# Computer algebra independent integration tests

## 7-Inverse-hyperbolic-functions/7.4-Inverse-hyperbolic-cotangent/7.4.1-Inverse-hyperbolic-cotangent-functions

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# Contents

# Chapter 1

# Introduction

This report gives the result of running the computer algebra independent integration problems. The listing of the problems are maintained by and can be downloaded from `https://rulebasedintegration.org`

The number of integrals in this report is [ 300 ]. This is test number [ 198 ].

## 1.1 Listing of CAS systems tested

The following systems were tested at this time.

1. Mathematica 12.3 (64 bit) on windows 10.
2. Rubi 4.16.1 in Mathematica 12.1 on windows 10.
3. Maple 2021.1 (64 bit) on windows 10.
4. Maxima 5.44 on Linux. (via sagemath 9.3)
5. Fricas 1.3.7 on Linux (via sagemath 9.3)
6. Giac/Xcas 1.7 on Linux. (via sagemath 9.3)
7. Sympy 1.8 under Python 3.8.8 using Anaconda distribution on Ubuntu.
8. Mupad using Matlab 2021a with Symbolic Math Toolbox Version 8.7 under windows 10 (64 bit)

Maxima, Fricas and Giac/Xcas were called from inside SageMath. This was done using SageMath integrate command by changing the name of the algorithm to use the different CAS systems.

Sympy was called directly using Python.

## 1.2 Results

Important note: A number of problems in this test suite have no antiderivative in closed form. This means the antiderivative of these integrals can not be expressed in terms of elementary, special functions or `Hypergeometric2F1` functions. `RootSum` and `RootOf` are not allowed.

If a CAS returns the above integral unevaluated within the time limit, then the result is counted as passed and assigned an A grade.

However, if CAS times out, then it is assigned an F grade even if the integral is not integrable, as this implies CAS could not determine that the integral is not integrable in the time limit.

If a CAS returns an antiderivative to such an integral, it is assigned an A grade automatically and this special result is listed in the introduction section of each individual test report to make it easy to identify as this can be important result to investigate.

The results given in in the table below reflects the above.

| System | solved | Failed |
|---|---|---|
| Rubi | % 100.00 ( 300 ) | % 0.00 ( 0 ) |
| Mathematica | % 98.00 ( 294 ) | % 2.00 ( 6 ) |
| Maple | % 91.00 ( 273 ) | % 9.00 ( 27 ) |
| Maxima | % 82.00 ( 246 ) | % 18.00 ( 54 ) |
| Fricas | % 74.33 ( 223 ) | % 25.67 ( 77 ) |
| Sympy | % 33.33 ( 100 ) | % 66.67 ( 200 ) |
| Giac | % 10.00 ( 30 ) | % 90.00 ( 270 ) |
| Mupad | % 51.00 ( 153 ) | % 49.00 ( 147 ) |

Table 1.1: Percentage solved for each CAS

The table below gives additional break down of the grading of quality of the antiderivatives generated by each CAS. The grading is given using the letters A,B,C and F with A being the best quality. The grading is accomplished by comparing the antiderivative generated with the optimal antiderivatives included in the test suite. The following table describes the meaning of these grades.

| grade | description |
|---|---|
| A | Integral was solved and antiderivative is optimal in quality and leaf size. |
| B | Integral was solved and antiderivative is optimal in quality but leaf size is larger than twice the optimal antiderivatives leaf size. |
| C | Integral was solved and antiderivative is non-optimal in quality. This can be due to one or more of the following reasons<br>1. antiderivative contains a hypergeometric function and the optimal antiderivative does not.<br>2. antiderivative contains a special function and the optimal antiderivative does not.<br>3. antiderivative contains the imaginary unit and the optimal antiderivative does not. |
| F | Integral was not solved. Either the integral was returned unevaluated within the time limit, or it timed out, or CAS hanged or crashed or an exception was raised. |

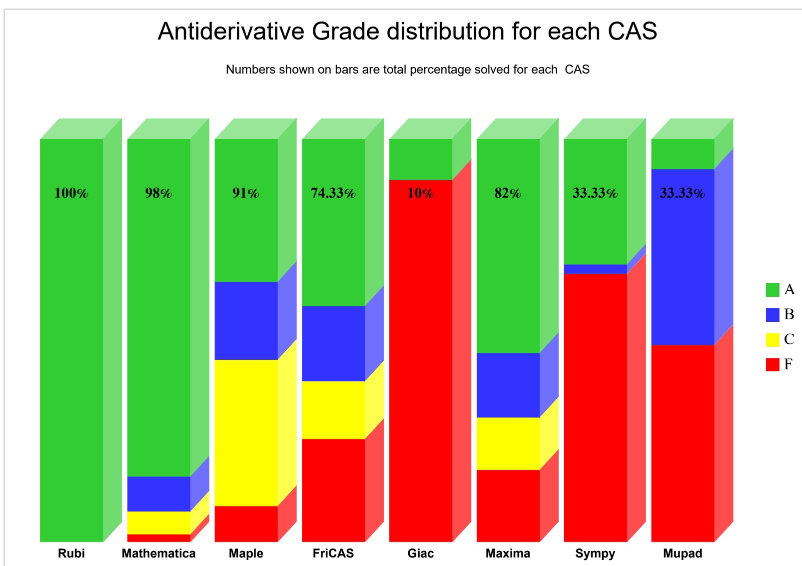
Table 1.2: Description of grading applied to integration result

Grading is implemented for all CAS systems. Based on the above, the following table summarizes the grading for this test suite.

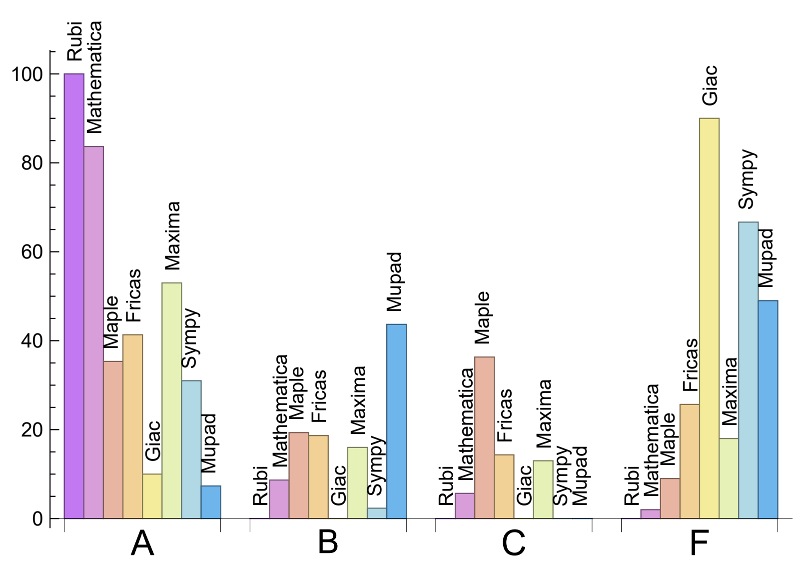
| System | % A grade | % B grade | % C grade | % F grade |
|---|---|---|---|---|
| Rubi | 100.00 | 0.00 | 0.00 | 0.00 |
| Mathematica | 83.67 | 8.67 | 5.67 | 2.00 |
| Maple | 35.33 | 19.33 | 36.33 | 9.00 |
| Maxima | 53.00 | 16.00 | 13.00 | 18.00 |
| Fricas | 41.33 | 18.67 | 14.33 | 25.67 |
| Sympy | 31.00 | 2.33 | 0.00 | 66.67 |
| Giac | 10.00 | 0.00 | 0.00 | 90.00 |
| Mupad | 7.33 | 43.67 | 0.00 | 49.00 |

Table 1.3: Antiderivative Grade distribution of each CAS

The following is a Bar chart illustration of the data in the above table.




The figure below compares the CAS systems for each grade level.




The following table shows the distribution of the different types of failure for each CAS. There are 3 types of reasons why it can fail. The first is when CAS returns back the input within the time limit, which means it could not solve it. This the typical normal failure **F** .

The second is due to time out. CAS could not solve the integral within the 3 minutes time limit which is assigned **F(-1)**.

The third is due to an exception generated. Assigned **F(-2)**. This most likely indicates an interface problem between sagemath and the CAS (applicable only to FriCAS, Maxima and Giac) or it could be an indication of an internal error in CAS. This type of error requires more investigations to determine the cause.

| System | Number failed | Percentage normal failure | Percentage timeout failure | Percentage exception failure |
|---|---|---|---|---|
| Rubi | 0 | 0.00 % | 0.00 % | 0.00 % |
| Mathematica | 6 | 100.00 % | 0.00 % | 0.00 % |
| Maple | 27 | 59.26 % | 29.63 % | 11.11 % |
| Maxima | 54 | 98.15 % | 0.00 % | 1.85 % |
| Fricas | 77 | 100.00 % | 0.00 % | 0.00 % |
| Sympy | 200 | 85.50 % | 11.00 % | 3.50 % |
| Giac | 270 | 99.26 % | 0.00 % | 0.74 % |
| Mupad | 147 | 100.00 % | 0.00 % | 0.00 % |

Table 1.4: Time and leaf size performance for each CAS

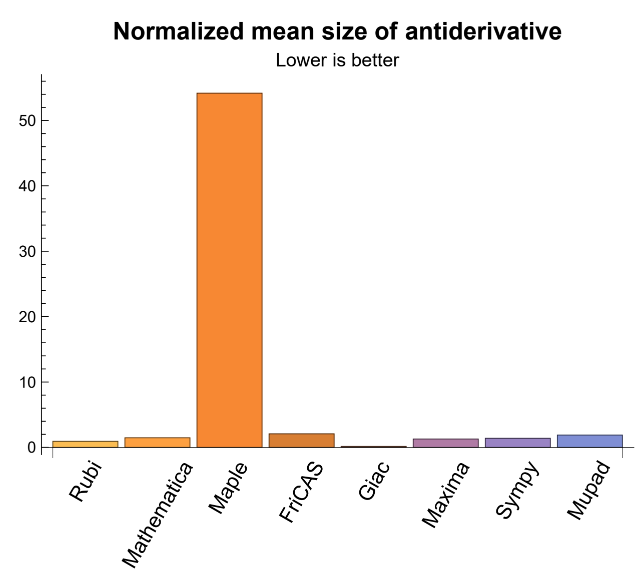
## 1.3 Performance

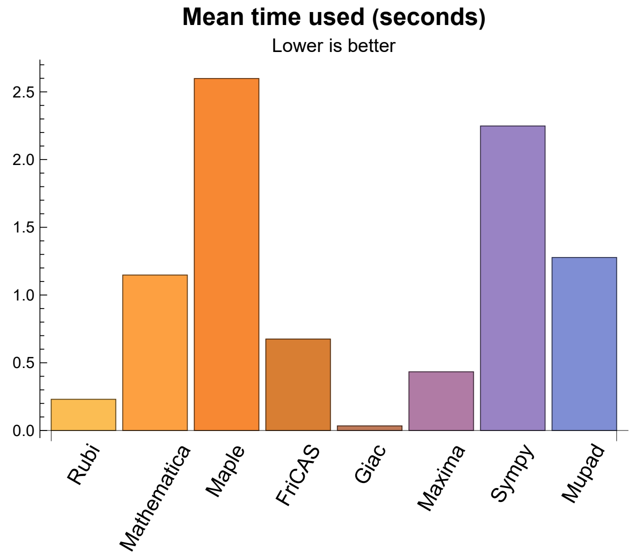
The table below summarizes the performance of each CAS system in terms of CPU time and leaf size of results.

| System | Mean time (sec) | Mean size | Normalized mean | Median size | Normalized median |
|---|---|---|---|---|---|
| Rubi | 0.23 | 125.80 | 0.93 | 79.00 | 1.00 |
| Mathematica | 1.15 | 234.41 | 1.46 | 78.00 | 0.94 |
| Maple | 2.60 | 5663.65 | 54.17 | 306.00 | 2.61 |
| Maxima | 0.43 | 128.09 | 1.28 | 78.50 | 1.09 |
| Fricas | 0.67 | 244.84 | 2.07 | 92.00 | 1.37 |
| Sympy | 2.25 | 95.50 | 1.39 | 41.00 | 1.14 |
| Giac | 0.03 | 3.47 | 0.14 | 0.00 | 0.00 |
| Mupad | 1.28 | 145.89 | 1.89 | 48.00 | 1.05 |

Table 1.5: Time and leaf size performance for each CAS

The following are bar charts for the normalized leafsize and time used columns from the above table.






## 1.4 list of integrals that has no closed form antiderivative

{42, 43, 120, 121, 122, 126, 127, 206, 211, 216, 220, 225, 230, 235, 239, 243, 247, 252, 256, 260, 264, 280}

## 1.5 list of integrals solved by CAS but has no known antiderivative

**Rubi** {}

**Mathematica** {}

**Maple** {}

**Maxima** {}

**Fricas** {}

**Sympy** {}

**Giac** {}

**Mupad** {}

## 1.6 list of integrals solved by CAS but failed verification

The following are integrals solved by CAS but the verification phase failed to verify the anti-derivative produced is correct. This does not mean necessarily that the anti-derivative is wrong, as additional methods of verification might be needed, or more time is needed (3 minutes time limit was used). These integrals are listed here to make it easier to do further investigation to determine why it was not possible to verify the result produced.

**Rubi** {76, 78}

**Mathematica** {13, 15, 17, 18, 19, 21, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 40, 41, 48, 49, 56, 66, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 82, 98, 100, 101, 106, 109, 110, 111, 112, 113, 114, 115, 116, 118, 125, 210, 215, 217, 218, 224, 229, 233, 238, 242, 246, 250, 255, 259, 263, 270, 271, 278, 281, 282, 295, 296, 297, 298, 299, 300}

**Maple** Verification phase not implemented yet.

**Maxima** Verification phase not implemented yet.

**Fricas** Verification phase not implemented yet.

**Sympy** Verification phase not implemented yet.

**Giac** Verification phase not implemented yet.

**Mupad** Verification phase not implemented yet.

## 1.7 Timing

The command `AboluteTiming[]` was used in Mathematica to obtain the elapsed time for each integrate call. In Maple, the command `Usage` was used as in the following example

```
cpu_time := Usage(assign ('result_of _int',int(expr,x)),output='realtime'
```

For all other CAS systems, the elapsed time to complete each integral was found by taking the difference between the time after the call has completed from the time before the call was made. This was done using Python's `time.time()` call.

All elapsed times shown are in seconds. A time limit of 3 minutes was used for each integral. If the integrate command did not complete within this time limit, the integral was aborted and considered to have failed and assigned an F grade. The time used by failed integrals due to time out is not counted in the final statistics.

## 1.8 Verification

A verification phase was applied on the result of integration for Rubi and Mathematica. Future version of this report will implement verification for the other CAS systems. For the integrals whose result was not run through a verification phase, it is assumed that the antiderivative produced was correct.

Verification phase has 3 minutes time out. An integral whose result was not verified could still be correct. Further investigation is needed on those integrals which failed verifications. Such integrals are marked in the summary table below and also in each integral separate section so they are easy to identify and locate.

## 1.9 Important notes about some of the results

### 1.9.1 Important note about Maxima results

Since these integrals are run in a batch mode, using an automated script, and by using sagemath (SageMath uses Maxima), then any integral where Maxima needs an interactive response from the user to answer a question during evaluation of the integral in order to complete the integration, will fail and is counted as failed.

The exception raised is `ValueError`. Therefore Maxima result below is lower than what could result if Maxima was run directly and each question Maxima asks was answered correctly.

The percentage of such failures were not counted for each test file, but for an example, for the Timofeev test file, there were about 14 such integrals out of total 705, or about 2 percent. This pecrentage can be higher or lower depending on the specific input test file.

Such integrals can be indentified by looking at the output of the integration in each section for Maxima. The exception message will indicate of the error is due to the interactive question being asked or not.

Maxima integrate was run using SageMath with the following settings set by default

```
'besselexpand : true'
'display2d : false'
'domain : complex'
'keepfloat : true'
'load(to_poly_solve)'
'load(simplify_sum)'
'load(abs_integrate)' 'load(diag)'
```

SageMath loading of Maxima `abs_integrate` was found to cause some problem. So the following code was added to disable this effect.

```
from sage.interfaces.maxima_lib import maxima_lib
maxima_lib.set('extra_definite_integration_methods', '[]')
maxima_lib.set('extra_integration_methods', '[]')
```

See https://ask.sagemath.org/question/43088/integrate-results-that-are-different-from-using-maxima/ for reference.

### 1.9.2 Important note about FriCAS and Giac/XCAS results

There are Few integrals which failed due to SageMath not able to translate the result back to SageMath syntax and not because these CAS system were not able to do the integrations.

These will fail With error `Exception raised: NotImplementedError`

The number of such cases seems to be very small. About 1 or 2 percent of all integrals.

Hopefully the next version of SageMath will have complete translation of FriCAS and XCAS syntax and I will re-run all the tests again when this happens.

### 1.9.3 Important note about finding leaf size of antiderivative

For Mathematica, Rubi and Maple, the buildin system function `LeafSize` is used to find the leaf size of each antiderivative.

The other CAS systems (SageMath and Sympy) do not have special buildin function for this purpose at this time. Therefore the leaf size for Fricas and Sympy and Giac antiderivatives is determined using the following function, thanks to user `slelievre` at https://ask.sagemath.org/question/57123/could-we-have-a-leaf_count-function-in-base-sagemath/

```
def tree_size(expr):
    r"""
    Return the tree size of this expression.
    """
    if expr not in SR:
        # deal with lists, tuples, vectors
        return 1 + sum(tree_size(a) for a in expr)
    expr = SR(expr)
    x, aa = expr.operator(), expr.operands()
    if x is None:
        return 1
    else:
        return 1 + sum(tree_size(a) for a in aa)
```

For Sympy, which is called directly from Python, the following code is used to obtain the leafsize of its result

```
try:
```

```
# 1.7 is a fudge factor since it is low side from actual leaf count
leafCount = round(1.7*count_ops(anti))

except Exception as ee:
       leafCount =1
```

### 1.9.4 Important note about Mupad results

Matlab's symbolic toolbox does not have a leaf count function to measure the size of the antiderivative, Maple was used to determine the leaf size of Mupad output by post processing.

Currently no grading of the antiderivative for Mupad is implemented. If it can integrate the problem, it was assigned a B grade automatically as a placeholder. In the future, when grading function is implemented for Mupad, the tests will be rerun again.

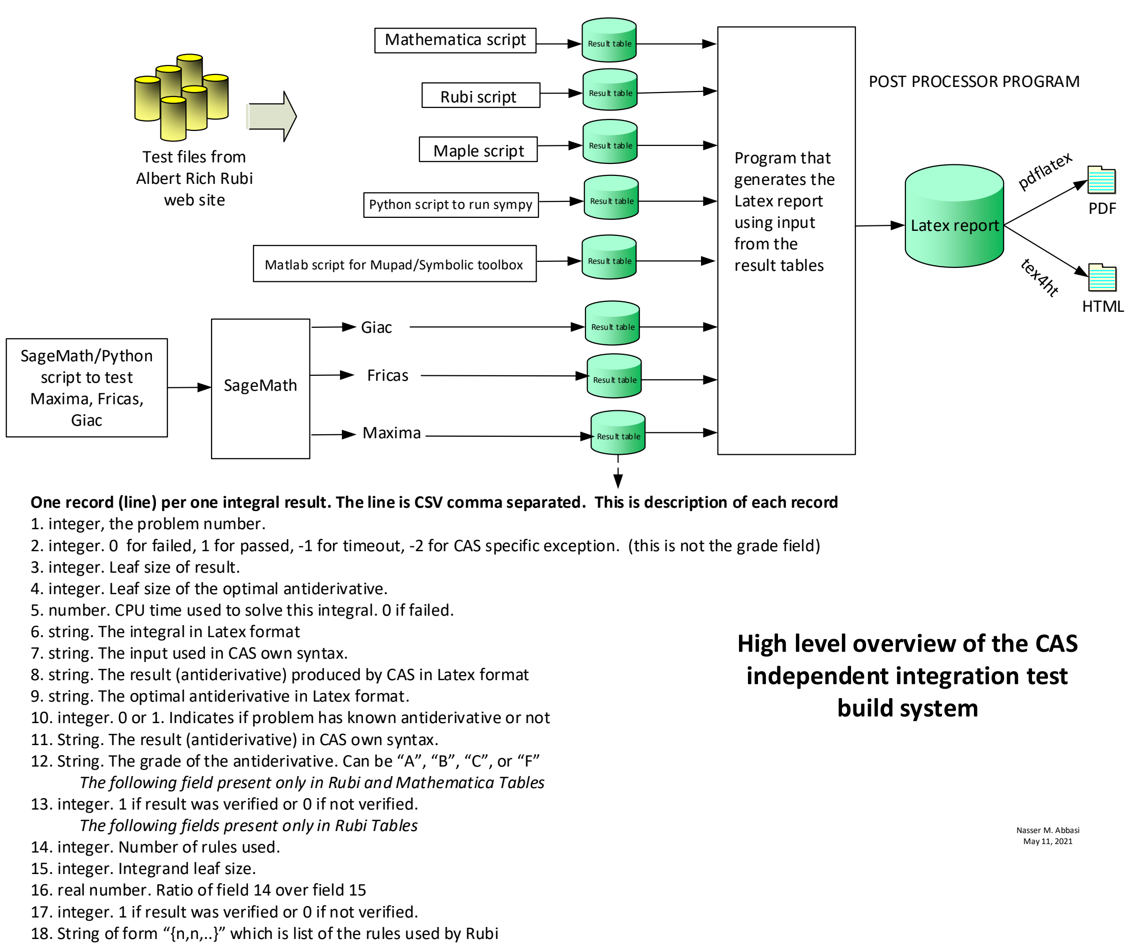
The following is an example of using Matlab's symbolic toolbox (Mupad) to solve an integral

```
integrand = evalin(symengine,'cos(x)*sin(x)')
the_variable = evalin(symengine,'x')
anti = int(integrand,the_variable)
```

Which gives `sin(x)^2/2`

## 1.10 Design of the test system

The following diagram gives a high level view of the current test build system.



# Chapter 2

# detailed summary tables of results

## 2.1 List of integrals sorted by grade for each CAS

### 2.1.1 Rubi

A grade: { 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300 }

B grade: { }

C grade: { }

F grade: { }

### 2.1.2 Mathematica

A grade: { 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 25, 27, 28, 29, 30, 31, 32, 33, 35, 36, 37, 38, 39, 40, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 67, 68, 69, 71, 72, 76, 77, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 96, 97, 99, 102, 103, 104, 105, 106, 107, 108, 110, 111, 120, 121, 122, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 211, 212, 213, 214, 216, 217, 218, 219, 220, 221, 222, 223, 225, 226, 227, 228, 230, 232, 233, 234, 235, 236, 237, 239, 240, 241, 243, 244, 245, 247, 249, 250, 251, 252, 253, 254, 256, 257, 258, 260, 261, 262, 264, 266, 267, 268, 270, 271, 272, 273, 274, 278, 280, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300 }

B grade: { 41, 70, 95, 98, 100, 101, 109, 139, 150, 210, 215, 224, 229, 231, 238, 242, 246, 248, 255, 259, 263, 275, 276, 279, 281, 283 }

C grade: { 24, 26, 34, 66, 73, 74, 75, 78, 79, 112, 113, 114, 115, 116, 118, 265, 282 }

F grade: { 117, 119, 123, 124, 269, 277 }

### 2.1.3 Maple

A grade: { 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 13, 15, 35, 36, 37, 38, 42, 43, 48, 49, 50, 51, 52, 53, 54, 57, 58, 60, 64, 65, 66, 67, 68, 72, 74, 75, 77, 78, 80, 81, 83, 84, 85, 87, 88, 89, 90, 91, 92, 94, 95, 97, 98, 99, 100, 101, 105, 106, 107, 108, 113, 120, 121, 122, 125, 126, 127, 133, 134, 135, 140, 151, 162, 171, 180, 189, 197, 198, 199, 200, 206, 211, 216, 220, 225, 230, 235, 239, 243, 247, 252, 256, 260, 264, 280, 282, 283, 284, 285, 286, 288, 289, 292, 293, 298 }

B grade: { 12, 14, 16, 17, 19, 20, 21, 22, 28, 39, 40, 41, 56, 59, 61, 62, 63, 69, 70, 71, 76, 82, 86, 96, 102, 103, 104, 109, 110, 111, 116, 123, 124, 129, 130, 131, 185, 194, 195, 196, 205, 210, 215, 219, 224, 229, 234, 238, 242, 246, 251, 255, 259, 263, 287, 290, 291, 294 }

C grade: { 18, 23, 24, 25, 26, 27, 29, 30, 31, 32, 33, 34, 55, 73, 79, 93, 112, 114, 115, 117, 118, 128, 132, 136, 137, 138, 139, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 152, 153, 154, 155, 156, 157, 159, 160, 161, 163, 167, 168, 169, 170, 176, 177, 178, 179, 186, 187, 188, 193, 201, 202, 203, 204, 207, 208, 209, 212, 213, 214, 217, 218, 221, 222, 223, 226, 227, 228, 231, 232, 233, 236, 237, 240, 241, 244, 245, 248, 249, 250, 253, 254, 257, 258, 261, 262, 265, 266, 267, 268, 269, 272, 273, 274, 278, 295, 296, 297, 299, 300 }

F grade: { 44, 45, 46, 47, 119, 158, 164, 165, 166, 172, 173, 174, 175, 181, 182, 183, 184, 190, 191, 192, 270, 271, 275, 276, 277, 279, 281 }

### 2.1.4 Maxima

A grade: { 1, 2, 3, 4, 5, 6, 8, 9, 10, 11, 12, 13, 14, 15, 20, 21, 23, 35, 36, 37, 38, 39, 40, 42, 43, 50, 51, 52, 53, 54, 57, 58, 60, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 74, 75, 77, 78, 83, 84, 85, 87, 88, 89, 90, 91, 92, 94, 96, 97, 99, 103, 104, 105, 107, 108, 110, 120, 121, 122, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 142, 143, 144, 145, 146, 147, 148, 149, 150, 154, 155, 156, 157, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 235, 239, 243, 247, 252, 256, 260, 264, 268, 280, 284, 285, 287, 288, 289, 290, 291, 292, 293, 294, 296, 297, 298, 299 }

B grade: { 7, 16, 17, 19, 22, 25, 27, 31, 33, 41, 44, 45, 46, 47, 55, 56, 59, 61, 86, 93, 95, 98, 100, 101, 102, 109, 140, 151, 234, 238, 240, 241, 242, 244, 245, 246, 251, 255, 257, 258, 259, 261, 262, 263, 283, 286, 295, 300 }

C grade: { 76, 79, 141, 152, 153, 159, 160, 161, 162, 163, 164, 165, 167, 168, 169, 170, 171, 172, 173, 174, 176, 177, 178, 179, 180, 181, 182, 183, 185, 186, 187, 188, 189, 266, 267, 269, 272, 273, 274 }

F grade: { 18, 24, 26, 28, 29, 30, 32, 34, 48, 49, 73, 80, 81, 82, 106, 111, 112, 113, 114, 115, 116, 117, 118, 119, 123, 124, 125, 158, 166, 175, 184, 190, 191, 192, 231, 232, 233, 236, 237, 248, 249, 250, 253, 254, 265, 270, 271, 275, 276, 277, 278, 279, 281, 282 }

### 2.1.5 FriCAS

A grade: { 1, 2, 3, 4, 5, 6, 8, 9, 10, 11, 12, 14, 16, 20, 22, 35, 36, 37, 38, 42, 43, 50, 51, 52, 55, 58, 59, 60, 61, 62, 63, 64, 65, 67, 68, 83, 84, 85, 87, 88, 89, 90, 91, 92, 94, 96, 97, 99, 104, 105, 120, 121, 122, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 152, 153, 154, 155, 156, 157, 159, 160, 163, 193, 194, 195, 196, 197, 198, 199, 206, 211, 216, 220, 225, 230, 235, 239, 243, 247, 252, 256, 259, 260, 263, 264, 266, 267, 268, 272, 273, 274, 280, 289, 292, 293, 296, 297, 298, 299 }

B grade: { 44, 45, 46, 47, 53, 54, 57, 95, 102, 103, 107, 108, 151, 161, 162, 164, 165, 167, 168, 169, 170, 171, 172, 173, 174, 176, 177, 178, 179, 180, 181, 182, 183, 185, 186, 187, 188, 189, 200, 205, 210, 215, 219, 224, 229, 234, 238, 242, 246, 251, 255, 283, 286, 294, 295, 300 }

C grade: { 201, 202, 203, 204, 207, 208, 209, 212, 213, 214, 217, 218, 221, 222, 223, 226, 227, 228, 231, 232, 233, 236, 237, 240, 241, 244, 245, 248, 249, 250, 253, 254, 257, 258, 261, 262, 265, 284, 285, 287, 288, 290, 291 }

F grade: { 7, 13, 15, 17, 18, 19, 21, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 39, 40, 41, 48, 49, 56, 66, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 86, 93, 98, 100, 101, 106, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 123, 124, 125, 158, 166, 175, 184, 190, 191, 192, 269, 270, 271, 275, 276, 277, 278, 279, 281, 282 }

### 2.1.6 Sympy

A grade: { 1, 2, 3, 4, 5, 6, 8, 9, 10, 11, 12, 14, 16, 20, 22, 35, 36, 37, 38, 42, 43, 53, 54, 57, 58, 62, 63, 64, 65, 67, 68, 90, 94, 96, 97, 99, 102, 103, 104, 105, 107, 122, 126, 127, 129, 130, 131, 133, 134, 135, 137, 138, 139, 140, 143, 144, 145, 147, 148, 149, 150, 151, 155, 157, 189, 194, 195, 196, 198, 199, 206, 211, 216, 220, 225, 230, 235, 239, 243, 247, 252, 256, 260, 264, 266, 267, 268, 272, 273, 274, 292, 293, 297 }

B grade: { 60, 87, 88, 89, 91, 92, 156 }

C grade: { }

F grade: { 7, 13, 15, 17, 18, 19, 21, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 39, 40, 41, 44, 45, 46, 47, 48, 49, 50, 51, 52, 55, 56, 59, 61, 66, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 93, 95, 98, 100, 101, 106, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 123, 124, 125, 128, 132, 136, 141, 142, 146, 152, 153, 154, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 190, 191, 192, 193, 197, 200, 201, 202, 203, 204, 205, 207, 208, 209, 210, 212, 213, 214, 215, 217, 218, 219, 221, 222, 223, 224, 226, 227, 228, 229, 231, 232, 233, 234, 236, 237, 238, 240, 241, 242, 244, 245, 246, 248, 249, 250, 251, 253, 254, 255, 257, 258, 259, 261, 262, 263, 265, 269, 270, 271, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 294, 295, 296, 298, 299, 300 }

### 2.1.7 Giac

A grade: { 42, 43, 54, 120, 121, 122, 126, 127, 194, 195, 196, 197, 198, 199, 206, 211, 216, 220, 225, 230, 235, 239, 243, 247, 252, 256, 260, 264, 280, 298 }

B grade: { }

C grade: { }

F grade: { 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 123, 124, 125, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 200, 201, 202, 203, 204, 205, 207, 208, 209, 210, 212, 213, 214, 215, 217, 218, 219, 221, 222, 223, 224, 226, 227, 228, 229, 231, 232, 233, 234, 236, 237, 238, 240, 241, 242, 244, 245, 246, 248, 249, 250, 251, 253, 254, 255, 257, 258, 259, 261, 262, 263, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 299, 300 }

### 2.1.8 Mupad

A grade: { 42, 43, 120, 121, 122, 126, 127, 206, 211, 216, 220, 225, 230, 235, 239, 243, 247, 252, 256, 260, 264, 280 }

B grade: { 1, 2, 3, 4, 5, 6, 8, 9, 10, 11, 12, 14, 16, 20, 22, 35, 36, 37, 38, 53, 54, 55, 57, 58, 59, 60, 61, 62, 63, 64, 65, 67, 68, 83, 84, 85, 87, 88, 89, 91, 92, 94, 96, 97, 99, 102, 103, 104, 105, 107, 108, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 159, 160, 161, 162, 163, 164, 165, 167, 168, 169, 170, 171, 172, 173, 174, 176, 177, 178, 179, 180, 181, 182, 183, 185, 186, 187, 188, 189, 193, 194, 195, 196, 197, 198, 199, 266, 267, 268, 272, 273, 274, 292, 293, 294, 295, 296, 297, 298, 299, 300 }

C grade: { }

F grade: { 7, 13, 15, 17, 18, 19, 21, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 39, 40, 41, 44, 45, 46, 47, 48, 49, 50, 51, 52, 56, 66, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 86, 90, 93, 95, 98, 100, 101, 106, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 123, 124, 125, 158, 166, 175, 184, 190, 191, 192, 200, 201, 202, 203, 204, 205, 207, 208, 209, 210, 212, 213, 214, 215, 217, 218, 219, 221, 222, 223, 224, 226, 227, 228, 229, 231, 232, 233, 234, 236, 237, 238, 240, 241, 242, 244, 245, 246, 248, 249, 250, 251, 253, 254, 255, 257, 258, 259, 261, 262, 263, 265, 269, 270, 271, 275, 276, 277, 278, 279, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291 }

## 2.2 Detailed conclusion table per each integral for all CAS systems

Detailed conclusion table per each integral is given by table below. The elapsed time is in seconds. For failed result it is given as F(-1) if the failure was due to timeout. It is given as F(-2) if the failure was due to an exception being raised, which could indicate a bug in the system. If the failure was due to integral not being evaluated within the time limit, then it is given just an F.

In this table,the column **normalized size** is defined as $\frac{\text{antiderivative leaf size}}{\text{optimal antiderivative leaf size}}$

| Problem 1 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | A | A | A | A | F | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 51 | 51 | 67 | 55 | 61 | 51 | 49 | 0 | 41 |
| normalized size | 1 | 1.00 | 1.31 | 1.08 | 1.20 | 1.00 | 0.96 | 0.00 | 0.80 |
| time (sec) | N/A | 0.028 | 0.009 | 0.030 | 0.302 | 0.703 | 1.525 | 0.000 | 1.313 |

| Problem 2 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | A | A | A | A | F | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 50 | 50 | 50 | 49 | 46 | 55 | 54 | 0 | 43 |
| normalized size | 1 | 1.00 | 1.00 | 0.98 | 0.92 | 1.10 | 1.08 | 0.00 | 0.86 |
| time (sec) | N/A | 0.037 | 0.009 | 0.034 | 0.300 | 0.584 | 1.180 | 0.000 | 1.267 |

| Problem 3 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | A | A | A | A | F | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 41 | 41 | 57 | 47 | 52 | 43 | 41 | 0 | 33 |
| normalized size | 1 | 1.00 | 1.39 | 1.15 | 1.27 | 1.05 | 1.00 | 0.00 | 0.80 |
| time (sec) | N/A | 0.024 | 0.009 | 0.033 | 0.297 | 0.422 | 0.868 | 0.000 | 1.219 |

| Problem 4 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | A | A | A | A | F | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 40 | 40 | 40 | 41 | 35 | 44 | 46 | 0 | 35 |
| normalized size | 1 | 1.00 | 1.00 | 1.02 | 0.88 | 1.10 | 1.15 | 0.00 | 0.88 |
| time (sec) | N/A | 0.030 | 0.008 | 0.030 | 0.305 | 0.519 | 0.665 | 0.000 | 1.225 |

| Problem 5 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | A | A | A | A | F | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 31 | 31 | 47 | 39 | 41 | 34 | 32 | 0 | 26 |
| normalized size | 1 | 1.00 | 1.52 | 1.26 | 1.32 | 1.10 | 1.03 | 0.00 | 0.84 |
| time (sec) | N/A | 0.013 | 0.007 | 0.032 | 0.302 | 0.581 | 0.454 | 0.000 | 1.180 |

| Problem 6 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | A | A | A | A | F | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 25 | 25 | 25 | 23 | 25 | 33 | 27 | 0 | 22 |
| normalized size | 1 | 1.00 | 1.00 | 0.92 | 1.00 | 1.32 | 1.08 | 0.00 | 0.88 |
| time (sec) | N/A | 0.007 | 0.003 | 0.044 | 0.301 | 0.611 | 0.332 | 0.000 | 1.149 |

| Problem 7 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | A | B | F | F | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 28 | 28 | 26 | 37 | 86 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.93 | 1.32 | 3.07 | 0.00 | 0.00 | 0.00 | -0.04 |
| time (sec) | N/A | 0.010 | 0.008 | 0.049 | 0.305 | 0.444 | 0.000 | 0.000 | 0.000 |

| Problem 8 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | A | A | A | A | F | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 30 | 30 | 30 | 35 | 30 | 39 | 26 | 0 | 27 |
| normalized size | 1 | 1.00 | 1.00 | 1.17 | 1.00 | 1.30 | 0.87 | 0.00 | 0.90 |
| time (sec) | N/A | 0.021 | 0.008 | 0.037 | 0.305 | 0.449 | 0.375 | 0.000 | 1.163 |

| Problem 9 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | A | A | A | A | F | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 31 | 31 | 47 | 39 | 36 | 35 | 24 | 0 | 40 |
| normalized size | 1 | 1.00 | 1.52 | 1.26 | 1.16 | 1.13 | 0.77 | 0.00 | 1.29 |
| time (sec) | N/A | 0.016 | 0.008 | 0.037 | 0.307 | 0.525 | 0.545 | 0.000 | 1.190 |

| Problem 10 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | A | A | A | A | F | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 47 | 47 | 47 | 48 | 40 | 50 | 46 | 0 | 39 |
| normalized size | 1 | 1.00 | 1.00 | 1.02 | 0.85 | 1.06 | 0.98 | 0.00 | 0.83 |
| time (sec) | N/A | 0.030 | 0.009 | 0.039 | 0.310 | 1.044 | 0.736 | 0.000 | 1.183 |

| Problem 11 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | A | A | A | A | F | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 41 | 41 | 57 | 47 | 51 | 43 | 32 | 0 | 60 |
| normalized size | 1 | 1.00 | 1.39 | 1.15 | 1.24 | 1.05 | 0.78 | 0.00 | 1.46 |
| time (sec) | N/A | 0.022 | 0.009 | 0.038 | 0.306 | 0.515 | 1.159 | 0.000 | 1.606 |

| Problem 12 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | B | A | A | A | F | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 105 | 105 | 80 | 196 | 135 | 98 | 114 | 0 | 85 |
| normalized size | 1 | 1.00 | 0.76 | 1.87 | 1.29 | 0.93 | 1.09 | 0.00 | 0.81 |
| time (sec) | N/A | 0.246 | 0.022 | 0.059 | 0.305 | 0.531 | 3.307 | 0.000 | 1.365 |

| Problem 13 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | A | A | F | F | F | F |
| verified | N/A | Yes | NO | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 127 | 127 | 87 | 196 | 155 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.69 | 1.54 | 1.22 | 0.00 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.226 | 0.451 | 0.059 | 0.319 | 0.741 | 0.000 | 0.000 | 0.000 |

| Problem 14 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | B | A | A | A | F | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 81 | 81 | 62 | 176 | 118 | 81 | 90 | 0 | 65 |
| normalized size | 1 | 1.00 | 0.77 | 2.17 | 1.46 | 1.00 | 1.11 | 0.00 | 0.80 |
| time (sec) | N/A | 0.163 | 0.019 | 0.058 | 0.320 | 0.532 | 1.443 | 0.000 | 1.265 |

| Problem 15 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | A | A | F | F | F | F |
| verified | N/A | Yes | NO | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 103 | 103 | 66 | 176 | 134 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.64 | 1.71 | 1.30 | 0.00 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.153 | 0.244 | 0.059 | 0.311 | 0.429 | 0.000 | 0.000 | 0.000 |

| Problem 16 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | B | B | A | A | F | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 54 | 54 | 43 | 155 | 97 | 62 | 60 | 0 | 44 |
| normalized size | 1 | 1.00 | 0.80 | 2.87 | 1.80 | 1.15 | 1.11 | 0.00 | 0.81 |
| time (sec) | N/A | 0.078 | 0.012 | 0.060 | 0.316 | 0.531 | 0.783 | 0.000 | 1.209 |

| Problem 17 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | B | B | F | F | F | F |
| verified | N/A | Yes | NO | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 58 | 58 | 46 | 122 | 135 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.79 | 2.10 | 2.33 | 0.00 | 0.00 | 0.00 | -0.02 |
| time (sec) | N/A | 0.078 | 0.084 | 0.303 | 0.323 | 0.426 | 0.000 | 0.000 | 0.000 |

| Problem 18 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | C | F | F | F | F | F |
| verified | N/A | Yes | NO | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 97 | 97 | 114 | 487 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 1.18 | 5.02 | 0.00 | 0.00 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.232 | 0.058 | 0.683 | 0.000 | 0.380 | 0.000 | 0.000 | 0.000 |

| Problem 19 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | B | B | F | F | F | F |
| verified | N/A | Yes | NO | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 55 | 55 | 49 | 159 | 146 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.89 | 2.89 | 2.65 | 0.00 | 0.00 | 0.00 | -0.02 |
| time (sec) | N/A | 0.108 | 0.101 | 0.062 | 0.319 | 0.518 | 0.000 | 0.000 | 0.000 |

| Problem 20 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | B | A | A | A | F | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 61 | 61 | 57 | 164 | 96 | 79 | 56 | 0 | 145 |
| normalized size | 1 | 1.00 | 0.93 | 2.69 | 1.57 | 1.30 | 0.92 | 0.00 | 2.38 |
| time (sec) | N/A | 0.099 | 0.016 | 0.063 | 0.311 | 0.548 | 1.577 | 0.000 | 1.447 |

| Problem 21 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | B | A | F | F | F | F |
| verified | N/A | Yes | NO | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 103 | 103 | 87 | 224 | 176 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.84 | 2.17 | 1.71 | 0.00 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.171 | 0.212 | 0.068 | 0.322 | 0.457 | 0.000 | 0.000 | 0.000 |

| Problem 22 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | B | B | A | A | F | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 90 | 90 | 82 | 185 | 154 | 97 | 90 | 0 | 196 |
| normalized size | 1 | 1.00 | 0.91 | 2.06 | 1.71 | 1.08 | 1.00 | 0.00 | 2.18 |
| time (sec) | N/A | 0.172 | 0.021 | 0.065 | 0.322 | 0.657 | 2.636 | 0.000 | 1.550 |

| Problem 23 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | C | A | F | F | F | F |
| verified | N/A | Yes | NO | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 186 | 186 | 117 | 1141 | 289 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.63 | 6.13 | 1.55 | 0.00 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.717 | 0.535 | 3.610 | 0.327 | 1.266 | 0.000 | 0.000 | 0.000 |

| Problem 24 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | C | C | F | F | F | F | F |
| verified | N/A | Yes | NO | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 196 | 196 | 175 | 806 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.89 | 4.11 | 0.00 | 0.00 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.580 | 0.588 | 2.917 | 0.000 | 1.954 | 0.000 | 0.000 | 0.000 |

| Problem 25 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | C | B | F | F | F | F |
| verified | N/A | Yes | NO | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 139 | 139 | 88 | 684 | 262 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.63 | 4.92 | 1.88 | 0.00 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.417 | 0.308 | 1.586 | 0.330 | 0.481 | 0.000 | 0.000 | 0.000 |

| Problem 26 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | C | C | F | F | F | F | F |
| verified | N/A | Yes | NO | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 149 | 149 | 140 | 765 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.94 | 5.13 | 0.00 | 0.00 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.333 | 0.382 | 1.490 | 0.000 | 0.677 | 0.000 | 0.000 | 0.000 |

| Problem 27 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | C | B | F | F | F | F |
| verified | N/A | Yes | NO | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 95 | 95 | 68 | 3070 | 215 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.72 | 32.32 | 2.26 | 0.00 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.183 | 0.139 | 0.757 | 0.326 | 0.548 | 0.000 | 0.000 | 0.000 |

| Problem 28 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | B | F | F | F | F | F |
| verified | N/A | Yes | NO | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 85 | 85 | 79 | 180 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.93 | 2.12 | 0.00 | 0.00 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.165 | 0.100 | 0.381 | 0.000 | 0.386 | 0.000 | 0.000 | 0.000 |

| Problem 29 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | C | F | F | F | F | F |
| verified | N/A | Yes | NO | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 150 | 150 | 156 | 564 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 1.04 | 3.76 | 0.00 | 0.00 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.350 | 0.076 | 0.549 | 0.000 | 0.474 | 0.000 | 0.000 | 0.000 |

| Problem 30 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | C | F | F | F | F | F |
| verified | N/A | Yes | NO | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 79 | 79 | 72 | 796 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.91 | 10.08 | 0.00 | 0.00 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.199 | 0.131 | 0.700 | 0.000 | 0.810 | 0.000 | 0.000 | 0.000 |

| Problem 31 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | C | B | F | F | F | F |
| verified | N/A | Yes | NO | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 95 | 95 | 79 | 3673 | 252 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.83 | 38.66 | 2.65 | 0.00 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.219 | 0.168 | 0.862 | 0.335 | 0.557 | 0.000 | 0.000 | 0.000 |

| Problem 32 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | C | F | F | F | F | F |
| verified | N/A | Yes | NO | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 154 | 154 | 142 | 895 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.92 | 5.81 | 0.00 | 0.00 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.369 | 0.217 | 2.412 | 0.000 | 0.636 | 0.000 | 0.000 | 0.000 |

| Problem 33 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | C | B | F | F | F | F |
| verified | N/A | Yes | NO | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 141 | 141 | 118 | 661 | 342 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.84 | 4.69 | 2.43 | 0.00 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.464 | 0.238 | 1.495 | 0.340 | 0.510 | 0.000 | 0.000 | 0.000 |

| Problem 34 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | C | C | F | F | F | F | F |
| verified | N/A | Yes | NO | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 164 | 164 | 565 | 926 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 3.45 | 5.65 | 0.00 | 0.00 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.034 | 7.804 | 1.286 | 0.000 | 0.546 | 0.000 | 0.000 | 0.000 |

| Problem 35 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | A | A | A | A | F | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 245 | 245 | 213 | 334 | 276 | 247 | 427 | 0 | 296 |
| normalized size | 1 | 1.00 | 0.87 | 1.36 | 1.13 | 1.01 | 1.74 | 0.00 | 1.21 |
| time (sec) | N/A | 0.181 | 0.116 | 0.041 | 0.307 | 0.563 | 6.987 | 0.000 | 1.509 |

| Problem 36 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | A | A | A | A | F | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 169 | 169 | 150 | 233 | 198 | 177 | 282 | 0 | 190 |
| normalized size | 1 | 1.00 | 0.89 | 1.38 | 1.17 | 1.05 | 1.67 | 0.00 | 1.12 |
| time (sec) | N/A | 0.127 | 0.083 | 0.034 | 0.306 | 0.599 | 4.748 | 0.000 | 1.519 |

| Problem 37 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | A | A | A | A | F | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 110 | 110 | 98 | 148 | 131 | 118 | 182 | 0 | 115 |
| normalized size | 1 | 1.00 | 0.89 | 1.35 | 1.19 | 1.07 | 1.65 | 0.00 | 1.05 |
| time (sec) | N/A | 0.133 | 0.052 | 0.036 | 0.304 | 0.455 | 2.127 | 0.000 | 1.370 |

| Problem 38 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | A | A | A | A | F | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 57 | 57 | 69 | 76 | 65 | 64 | 87 | 0 | 60 |
| normalized size | 1 | 1.00 | 1.21 | 1.33 | 1.14 | 1.12 | 1.53 | 0.00 | 1.05 |
| time (sec) | N/A | 0.066 | 0.011 | 0.037 | 0.303 | 0.494 | 1.064 | 0.000 | 1.274 |

| Problem 39 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | B | A | F | F | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 390 | 390 | 671 | 785 | 406 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 1.72 | 2.01 | 1.04 | 0.00 | 0.00 | 0.00 | -0.00 |
| time (sec) | N/A | 0.947 | 1.391 | 0.678 | 0.537 | 0.521 | 0.000 | 0.000 | 0.000 |

| Problem 40 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | B | A | F | F | F | F |
| verified | N/A | Yes | NO | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 590 | 590 | 755 | 2218 | 550 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 1.28 | 3.76 | 0.93 | 0.00 | 0.00 | 0.00 | -0.00 |
| time (sec) | N/A | 0.870 | 7.783 | 0.639 | 0.514 | 0.598 | 0.000 | 0.000 | 0.000 |

| Problem 41 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | B | B | B | F | F(-1) | F | F |
| verified | N/A | Yes | NO | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 657 | 657 | 1846 | 4128 | 1084 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 2.81 | 6.28 | 1.65 | 0.00 | 0.00 | 0.00 | -0.00 |
| time (sec) | N/A | 0.951 | 12.947 | 0.837 | 0.584 | 0.800 | 0.000 | 0.000 | 0.000 |

| Problem 42 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | N/A | A | A | A | A | A | A | A | A |
| verified | N/A | N/A | N/A | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 19 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -0.05 |
| time (sec) | N/A | 0.021 | 26.742 | 1.267 | 0.000 | 0.503 | 0.000 | 0.000 | 0.000 |

| Problem 43 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | N/A | A | A | A | A | A | A | A | A |
| verified | N/A | N/A | N/A | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 19 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -0.05 |
| time (sec) | N/A | 0.023 | 4.384 | 1.008 | 0.000 | 0.425 | 0.000 | 0.000 | 0.000 |

| Problem 44 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | F | B | B | F | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 62 | 62 | 119 | 0 | 153 | 354 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 1.92 | 0.00 | 2.47 | 5.71 | 0.00 | 0.00 | -0.02 |
| time (sec) | N/A | 0.113 | 0.112 | 0.937 | 0.340 | 0.504 | 0.000 | 0.000 | 0.000 |

| Problem 45 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | F | B | B | F | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 128 | 128 | 226 | 0 | 223 | 728 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 1.77 | 0.00 | 1.74 | 5.69 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.340 | 0.297 | 0.944 | 0.415 | 0.692 | 0.000 | 0.000 | 0.000 |

| Problem 46 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | F | B | B | F | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 200 | 200 | 329 | 0 | 401 | 1278 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 1.64 | 0.00 | 2.00 | 6.39 | 0.00 | 0.00 | -0.00 |
| time (sec) | N/A | 1.047 | 0.567 | 0.948 | 0.423 | 0.749 | 0.000 | 0.000 | 0.000 |

| Problem 47 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | F | B | B | F | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 283 | 283 | 431 | 0 | 639 | 2004 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 1.52 | 0.00 | 2.26 | 7.08 | 0.00 | 0.00 | -0.00 |
| time (sec) | N/A | 1.343 | 0.937 | 0.943 | 0.431 | 0.932 | 0.000 | 0.000 | 0.000 |

| Problem 48 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | A | F | F | F | F | F |
| verified | N/A | Yes | NO | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 186 | 186 | 125 | 199 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.67 | 1.07 | 0.00 | 0.00 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.083 | 0.970 | 0.658 | 0.000 | 0.807 | 0.000 | 0.000 | 0.000 |

| Problem 49 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | A | F | F | F | F | F |
| verified | N/A | Yes | NO | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 144 | 144 | 77 | 190 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.53 | 1.32 | 0.00 | 0.00 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.050 | 0.119 | 0.557 | 0.000 | 0.511 | 0.000 | 0.000 | 0.000 |

| Problem 50 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | A | A | A | F | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 37 | 37 | 30 | 52 | 63 | 41 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.81 | 1.41 | 1.70 | 1.11 | 0.00 | 0.00 | -0.03 |
| time (sec) | N/A | 0.025 | 0.047 | 0.485 | 0.408 | 0.469 | 0.000 | 0.000 | 0.000 |

| Problem 51 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | A | A | A | F | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 83 | 83 | 45 | 112 | 67 | 61 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.54 | 1.35 | 0.81 | 0.73 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.053 | 0.052 | 0.513 | 0.319 | 0.471 | 0.000 | 0.000 | 0.000 |

| Problem 52 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | A | A | A | F | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 124 | 124 | 55 | 176 | 99 | 81 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.44 | 1.42 | 0.80 | 0.65 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.082 | 0.063 | 0.522 | 0.323 | 0.554 | 0.000 | 0.000 | 0.000 |

| Problem 53 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | A | A | B | A | F | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 3 | 3 | 3 | 4 | 3 | 11 | 3 | 0 | 3 |
| normalized size | 1 | 1.00 | 1.00 | 1.33 | 1.00 | 3.67 | 1.00 | 0.00 | 1.00 |
| time (sec) | N/A | 0.023 | 0.025 | 0.057 | 0.304 | 0.466 | 0.284 | 0.000 | 0.304 |

| Problem 54 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | A | A | B | A | A | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 12 | 12 | 12 | 13 | 12 | 62 | 15 | 1 | 22 |
| normalized size | 1 | 1.00 | 1.00 | 1.08 | 1.00 | 5.17 | 1.25 | 0.08 | 1.83 |
| time (sec) | N/A | 0.026 | 0.009 | 0.059 | 0.303 | 0.600 | 1.722 | 0.123 | 1.363 |

| Problem 55 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | C | B | A | F | F | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 62 | 62 | 61 | 707 | 171 | 63 | 0 | 0 | 201 |
| normalized size | 1 | 1.00 | 0.98 | 11.40 | 2.76 | 1.02 | 0.00 | 0.00 | 3.24 |
| time (sec) | N/A | 0.051 | 0.066 | 2.003 | 0.309 | 0.530 | 0.000 | 0.000 | 2.680 |

| Problem 56 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | B | B | F | F | F | F |
| verified | N/A | Yes | NO | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 37 | 37 | 34 | 75 | 76 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.92 | 2.03 | 2.05 | 0.00 | 0.00 | 0.00 | -0.03 |
| time (sec) | N/A | 0.059 | 0.051 | 0.053 | 0.304 | 0.435 | 0.000 | 0.000 | 0.000 |

| Problem 57 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | A | A | B | A | F | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 8 | 8 | 8 | 13 | 6 | 14 | 5 | 0 | 21 |
| normalized size | 1 | 1.00 | 1.00 | 1.62 | 0.75 | 1.75 | 0.62 | 0.00 | 2.62 |
| time (sec) | N/A | 0.014 | 0.004 | 0.040 | 0.298 | 0.413 | 0.701 | 0.000 | 1.203 |

| Problem 58 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | A | A | A | A | F | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 36 | 36 | 44 | 39 | 34 | 29 | 31 | 0 | 21 |
| normalized size | 1 | 1.00 | 1.22 | 1.08 | 0.94 | 0.81 | 0.86 | 0.00 | 0.58 |
| time (sec) | N/A | 0.031 | 0.028 | 0.038 | 0.298 | 0.388 | 0.558 | 0.000 | 1.155 |

| Problem 59 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | B | B | A | F | F | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 38 | 38 | 28 | 99 | 76 | 42 | 0 | 0 | 81 |
| normalized size | 1 | 1.00 | 0.74 | 2.61 | 2.00 | 1.11 | 0.00 | 0.00 | 2.13 |
| time (sec) | N/A | 0.017 | 0.033 | 0.065 | 0.303 | 0.522 | 0.000 | 0.000 | 1.216 |

| Problem 60 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | A | A | A | B | F | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 50 | 50 | 50 | 53 | 47 | 47 | 88 | 0 | 34 |
| normalized size | 1 | 1.00 | 1.00 | 1.06 | 0.94 | 0.94 | 1.76 | 0.00 | 0.68 |
| time (sec) | N/A | 0.034 | 0.053 | 0.038 | 0.302 | 0.610 | 0.908 | 0.000 | 1.210 |

| Problem 61 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | B | B | A | F | F | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 67 | 67 | 43 | 131 | 118 | 66 | 0 | 0 | 112 |
| normalized size | 1 | 1.00 | 0.64 | 1.96 | 1.76 | 0.99 | 0.00 | 0.00 | 1.67 |
| time (sec) | N/A | 0.035 | 0.055 | 0.070 | 0.307 | 0.399 | 0.000 | 0.000 | 1.318 |

| Problem 62 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | B | A | A | A | F | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 101 | 101 | 81 | 199 | 106 | 112 | 153 | 0 | 134 |
| normalized size | 1 | 1.00 | 0.80 | 1.97 | 1.05 | 1.11 | 1.51 | 0.00 | 1.33 |
| time (sec) | N/A | 0.126 | 0.042 | 0.036 | 0.306 | 0.501 | 1.841 | 0.000 | 1.473 |

| Problem 63 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | B | A | A | A | F | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 78 | 78 | 92 | 146 | 79 | 84 | 117 | 0 | 98 |
| normalized size | 1 | 1.00 | 1.18 | 1.87 | 1.01 | 1.08 | 1.50 | 0.00 | 1.26 |
| time (sec) | N/A | 0.102 | 0.024 | 0.035 | 0.307 | 0.556 | 1.270 | 0.000 | 1.364 |

| Problem 64 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | A | A | A | A | F | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 65 | 65 | 56 | 89 | 61 | 66 | 76 | 0 | 62 |
| normalized size | 1 | 1.00 | 0.86 | 1.37 | 0.94 | 1.02 | 1.17 | 0.00 | 0.95 |
| time (sec) | N/A | 0.072 | 0.023 | 0.033 | 0.303 | 0.842 | 0.814 | 0.000 | 2.004 |

| Problem 65 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | A | A | A | A | F | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 35 | 35 | 43 | 36 | 31 | 48 | 41 | 0 | 42 |
| normalized size | 1 | 1.00 | 1.23 | 1.03 | 0.89 | 1.37 | 1.17 | 0.00 | 1.20 |
| time (sec) | N/A | 0.016 | 0.015 | 0.029 | 0.310 | 0.669 | 0.513 | 0.000 | 1.707 |

| Problem 66 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | C | A | A | F | F | F | F |
| verified | N/A | Yes | NO | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 92 | 92 | 259 | 81 | 128 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 2.82 | 0.88 | 1.39 | 0.00 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.097 | 0.169 | 0.055 | 0.309 | 0.699 | 0.000 | 0.000 | 0.000 |

| Problem 67 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | A | A | A | A | F | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 64 | 64 | 55 | 63 | 54 | 68 | 144 | 0 | 62 |
| normalized size | 1 | 1.00 | 0.86 | 0.98 | 0.84 | 1.06 | 2.25 | 0.00 | 0.97 |
| time (sec) | N/A | 0.051 | 0.056 | 0.038 | 0.314 | 0.679 | 1.482 | 0.000 | 1.732 |

| Problem 68 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | A | A | A | A | F | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 90 | 90 | 76 | 82 | 85 | 111 | 410 | 0 | 247 |
| normalized size | 1 | 1.00 | 0.84 | 0.91 | 0.94 | 1.23 | 4.56 | 0.00 | 2.74 |
| time (sec) | N/A | 0.100 | 0.117 | 0.041 | 0.305 | 0.722 | 2.430 | 0.000 | 1.951 |

| Problem 69 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | B | A | F | F | F | F |
| verified | N/A | Yes | NO | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 263 | 263 | 203 | 967 | 320 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.77 | 3.68 | 1.22 | 0.00 | 0.00 | 0.00 | -0.00 |
| time (sec) | N/A | 0.349 | 1.703 | 0.066 | 0.341 | 0.772 | 0.000 | 0.000 | 0.000 |

| Problem 70 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | B | B | A | F | F | F | F |
| verified | N/A | Yes | NO | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 204 | 204 | 607 | 729 | 259 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 2.98 | 3.57 | 1.27 | 0.00 | 0.00 | 0.00 | -0.00 |
| time (sec) | N/A | 0.278 | 4.539 | 0.063 | 0.333 | 0.481 | 0.000 | 0.000 | 0.000 |

| Problem 71 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | B | A | F | F | F | F |
| verified | N/A | Yes | NO | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 136 | 136 | 106 | 365 | 202 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.78 | 2.68 | 1.49 | 0.00 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.209 | 0.260 | 0.062 | 0.336 | 0.682 | 0.000 | 0.000 | 0.000 |

| Problem 72 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | A | A | F | F | F | F |
| verified | N/A | Yes | NO | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 81 | 81 | 55 | 151 | 139 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.68 | 1.86 | 1.72 | 0.00 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.090 | 0.075 | 0.305 | 0.330 | 0.436 | 0.000 | 0.000 | 0.000 |

| Problem 73 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | C | C | F | F | F | F | F |
| verified | N/A | Yes | NO | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 148 | 148 | 547 | 985 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 3.70 | 6.66 | 0.00 | 0.00 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.091 | 2.871 | 1.151 | 0.000 | 0.467 | 0.000 | 0.000 | 0.000 |

| Problem 74 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | C | A | A | F | F | F | F |
| verified | N/A | Yes | NO | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 251 | 251 | 206 | 342 | 244 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.82 | 1.36 | 0.97 | 0.00 | 0.00 | 0.00 | -0.00 |
| time (sec) | N/A | 0.719 | 1.124 | 0.073 | 0.322 | 0.472 | 0.000 | 0.000 | 0.000 |

| Problem 75 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | C | A | A | F | F | F | F |
| verified | N/A | Yes | NO | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 370 | 370 | 291 | 467 | 360 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.79 | 1.26 | 0.97 | 0.00 | 0.00 | 0.00 | -0.00 |
| time (sec) | N/A | 0.830 | 2.350 | 0.076 | 0.337 | 0.407 | 0.000 | 0.000 | 0.000 |

| Problem 76 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | B | C | F | F(-1) | F | F |
| verified | N/A | NO | NO | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 673 | 597 | 529 | 1230 | 589 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 0.89 | 0.79 | 1.83 | 0.88 | 0.00 | 0.00 | 0.00 | -0.00 |
| time (sec) | N/A | 1.099 | 0.620 | 0.753 | 0.595 | 0.412 | 0.000 | 0.000 | 0.000 |

| Problem 77 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | A | A | F | F | F | F |
| verified | N/A | Yes | NO | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 120 | 120 | 185 | 176 | 192 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 1.54 | 1.47 | 1.60 | 0.00 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.127 | 0.073 | 0.084 | 0.332 | 0.714 | 0.000 | 0.000 | 0.000 |

| Problem 78 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | C | A | A | F | F | F | F |
| verified | N/A | NO | NO | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 292 | 360 | 502 | 297 | 192 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.23 | 1.72 | 1.02 | 0.66 | 0.00 | 0.00 | 0.00 | -0.00 |
| time (sec) | N/A | 0.500 | 4.494 | 0.088 | 0.340 | 0.583 | 0.000 | 0.000 | 0.000 |

| Problem 79 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | C | C | C | F | F(-1) | F | F |
| verified | N/A | Yes | NO | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 738 | 738 | 5552 | 19686 | 647 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 7.52 | 26.67 | 0.88 | 0.00 | 0.00 | 0.00 | -0.00 |
| time (sec) | N/A | 1.530 | 36.346 | 1.877 | 0.550 | 0.495 | 0.000 | 0.000 | 0.000 |

| Problem 80 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | A | F | F | F(-1) | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 619 | 619 | 575 | 738 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.93 | 1.19 | 0.00 | 0.00 | 0.00 | 0.00 | -0.00 |
| time (sec) | N/A | 2.199 | 0.707 | 0.128 | 0.000 | 0.470 | 0.000 | 0.000 | 0.000 |

| Problem 81 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | A | F | F | F(-1) | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 738 | 738 | 719 | 970 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.97 | 1.31 | 0.00 | 0.00 | 0.00 | 0.00 | -0.00 |
| time (sec) | N/A | 2.371 | 0.745 | 0.118 | 0.000 | 0.653 | 0.000 | 0.000 | 0.000 |

| Problem 82 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | B | F(-2) | F | F(-1) | F | F |
| verified | N/A | Yes | NO | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 335 | 335 | 596 | 2098 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 1.78 | 6.26 | 0.00 | 0.00 | 0.00 | 0.00 | -0.00 |
| time (sec) | N/A | 0.749 | 0.962 | 1.113 | 0.000 | 0.650 | 0.000 | 0.000 | 0.000 |

| Problem 83 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | A | A | A | F | F | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 51 | 51 | 59 | 42 | 41 | 38 | 0 | 0 | 31 |
| normalized size | 1 | 1.00 | 1.16 | 0.82 | 0.80 | 0.75 | 0.00 | 0.00 | 0.61 |
| time (sec) | N/A | 0.015 | 0.019 | 0.045 | 0.301 | 0.466 | 0.000 | 0.000 | 1.305 |

| Problem 84 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | A | A | A | F | F | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 42 | 42 | 52 | 37 | 36 | 31 | 0 | 0 | 26 |
| normalized size | 1 | 1.00 | 1.24 | 0.88 | 0.86 | 0.74 | 0.00 | 0.00 | 0.62 |
| time (sec) | N/A | 0.011 | 0.014 | 0.046 | 0.308 | 0.569 | 0.000 | 0.000 | 1.263 |

| Problem 85 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | A | A | A | F | F | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 22 | 22 | 22 | 27 | 26 | 24 | 0 | 0 | 16 |
| normalized size | 1 | 1.00 | 1.00 | 1.23 | 1.18 | 1.09 | 0.00 | 0.00 | 0.73 |
| time (sec) | N/A | 0.006 | 0.007 | 0.046 | 0.301 | 0.622 | 0.000 | 0.000 | 1.237 |

| Problem 86 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | B | B | F | F | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 19 | 19 | 19 | 33 | 66 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 1.00 | 1.74 | 3.47 | 0.00 | 0.00 | 0.00 | -0.05 |
| time (sec) | N/A | 0.020 | 0.010 | 0.063 | 0.310 | 0.656 | 0.000 | 0.000 | 0.000 |

| Problem 87 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | A | A | A | B | F | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 25 | 25 | 45 | 32 | 31 | 30 | 92 | 0 | 18 |
| normalized size | 1 | 1.00 | 1.80 | 1.28 | 1.24 | 1.20 | 3.68 | 0.00 | 0.72 |
| time (sec) | N/A | 0.014 | 0.021 | 0.051 | 0.305 | 0.493 | 2.118 | 0.000 | 1.272 |

| Problem 88 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | A | A | A | B | F | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 42 | 42 | 58 | 37 | 36 | 38 | 160 | 0 | 45 |
| normalized size | 1 | 1.00 | 1.38 | 0.88 | 0.86 | 0.90 | 3.81 | 0.00 | 1.07 |
| time (sec) | N/A | 0.015 | 0.022 | 0.053 | 0.311 | 0.507 | 5.450 | 0.000 | 1.487 |

| Problem 89 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | A | A | A | B | F | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 38 | 38 | 31 | 35 | 24 | 35 | 121 | 0 | 24 |
| normalized size | 1 | 1.00 | 0.82 | 0.92 | 0.63 | 0.92 | 3.18 | 0.00 | 0.63 |
| time (sec) | N/A | 0.018 | 0.016 | 0.046 | 0.309 | 1.268 | 5.352 | 0.000 | 1.259 |

| Problem 90 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | A | A | A | A | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 31 | 31 | 25 | 30 | 19 | 30 | 39 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.81 | 0.97 | 0.61 | 0.97 | 1.26 | 0.00 | -0.03 |
| time (sec) | N/A | 0.014 | 0.013 | 0.045 | 0.307 | 0.645 | 1.069 | 0.000 | 0.000 |

| Problem 91 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | A | A | A | B | F | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 20 | 20 | 20 | 15 | 16 | 24 | 87 | 0 | 14 |
| normalized size | 1 | 1.00 | 1.00 | 0.75 | 0.80 | 1.20 | 4.35 | 0.00 | 0.70 |
| time (sec) | N/A | 0.009 | 0.010 | 0.047 | 0.304 | 0.649 | 0.535 | 0.000 | 1.289 |

| Problem 92 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | A | A | A | B | F | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 24 | 24 | 24 | 29 | 18 | 36 | 126 | 0 | 22 |
| normalized size | 1 | 1.00 | 1.00 | 1.21 | 0.75 | 1.50 | 5.25 | 0.00 | 0.92 |
| time (sec) | N/A | 0.010 | 0.022 | 0.050 | 0.313 | 0.489 | 1.376 | 0.000 | 1.252 |

| Problem 93 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | C | B | F | F(-1) | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 28 | 28 | 26 | 85 | 104 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.93 | 3.04 | 3.71 | 0.00 | 0.00 | 0.00 | -0.04 |
| time (sec) | N/A | 0.022 | 0.015 | 0.166 | 0.306 | 0.508 | 0.000 | 0.000 | 0.000 |

| Problem 94 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | A | A | A | A | F | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 19 | 19 | 19 | 30 | 15 | 23 | 15 | 0 | 26 |
| normalized size | 1 | 1.00 | 1.00 | 1.58 | 0.79 | 1.21 | 0.79 | 0.00 | 1.37 |
| time (sec) | N/A | 0.006 | 0.002 | 0.069 | 0.303 | 0.992 | 0.198 | 0.000 | 1.135 |

| Problem 95 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | B | A | B | B | F | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 38 | 38 | 97 | 61 | 147 | 128 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 2.55 | 1.61 | 3.87 | 3.37 | 0.00 | 0.00 | -0.03 |
| time (sec) | N/A | 0.023 | 0.054 | 0.092 | 0.417 | 0.581 | 0.000 | 0.000 | 0.000 |

| Problem 96 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | B | A | A | A | F | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 39 | 39 | 66 | 70 | 62 | 44 | 56 | 0 | 50 |
| normalized size | 1 | 1.00 | 1.69 | 1.79 | 1.59 | 1.13 | 1.44 | 0.00 | 1.28 |
| time (sec) | N/A | 0.022 | 0.033 | 0.032 | 0.306 | 0.568 | 0.785 | 0.000 | 2.024 |

| Problem 97 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | A | A | A | A | F | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 54 | 54 | 42 | 95 | 81 | 86 | 97 | 0 | 114 |
| normalized size | 1 | 1.00 | 0.78 | 1.76 | 1.50 | 1.59 | 1.80 | 0.00 | 2.11 |
| time (sec) | N/A | 0.048 | 0.041 | 0.033 | 0.306 | 0.575 | 1.224 | 0.000 | 1.542 |

| Problem 98 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | B | A | B | F | F | F | F |
| verified | N/A | Yes | NO | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 35 | 35 | 286 | 59 | 112 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 8.17 | 1.69 | 3.20 | 0.00 | 0.00 | 0.00 | -0.03 |
| time (sec) | N/A | 0.025 | 0.026 | 0.048 | 0.320 | 0.831 | 0.000 | 0.000 | 0.000 |

| Problem 99 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | A | A | A | A | F | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 48 | 48 | 43 | 54 | 53 | 67 | 136 | 0 | 93 |
| normalized size | 1 | 1.00 | 0.90 | 1.12 | 1.10 | 1.40 | 2.83 | 0.00 | 1.94 |
| time (sec) | N/A | 0.045 | 0.029 | 0.038 | 0.311 | 0.543 | 1.400 | 0.000 | 1.406 |

| Problem 100 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | B | A | B | F | F | F | F |
| verified | N/A | Yes | NO | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 25 | 25 | 117 | 34 | 58 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 4.68 | 1.36 | 2.32 | 0.00 | 0.00 | 0.00 | -0.04 |
| time (sec) | N/A | 0.023 | 0.015 | 0.046 | 0.306 | 0.551 | 0.000 | 0.000 | 0.000 |

| Problem 101 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | B | A | B | F | F | F | F |
| verified | N/A | Yes | NO | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 35 | 35 | 312 | 59 | 132 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 8.91 | 1.69 | 3.77 | 0.00 | 0.00 | 0.00 | -0.03 |
| time (sec) | N/A | 0.030 | 0.028 | 0.048 | 0.326 | 1.090 | 0.000 | 0.000 | 0.000 |

| Problem 102 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | B | B | B | A | F | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 168 | 168 | 270 | 786 | 333 | 385 | 644 | 0 | 742 |
| normalized size | 1 | 1.00 | 1.61 | 4.68 | 1.98 | 2.29 | 3.83 | 0.00 | 4.42 |
| time (sec) | N/A | 0.342 | 0.302 | 0.043 | 0.311 | 0.551 | 7.456 | 0.000 | 2.173 |

| Problem 103 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | B | A | B | A | F | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 120 | 120 | 174 | 477 | 207 | 241 | 369 | 0 | 386 |
| normalized size | 1 | 1.00 | 1.45 | 3.98 | 1.72 | 2.01 | 3.08 | 0.00 | 3.22 |
| time (sec) | N/A | 0.204 | 0.171 | 0.040 | 0.299 | 0.430 | 4.449 | 0.000 | 1.926 |

| Problem 104 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | B | A | A | A | F | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 97 | 97 | 138 | 184 | 109 | 133 | 173 | 0 | 136 |
| normalized size | 1 | 1.00 | 1.42 | 1.90 | 1.12 | 1.37 | 1.78 | 0.00 | 1.40 |
| time (sec) | N/A | 0.171 | 0.048 | 0.034 | 0.301 | 0.454 | 2.265 | 0.000 | 2.404 |

| Problem 105 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | A | A | A | A | F | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 40 | 40 | 48 | 42 | 36 | 60 | 46 | 0 | 48 |
| normalized size | 1 | 1.00 | 1.20 | 1.05 | 0.90 | 1.50 | 1.15 | 0.00 | 1.20 |
| time (sec) | N/A | 0.025 | 0.017 | 0.030 | 0.297 | 0.876 | 0.585 | 0.000 | 1.754 |

| Problem 106 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | A | F | F | F | F | F |
| verified | N/A | Yes | NO | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 130 | 130 | 206 | 202 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 1.58 | 1.55 | 0.00 | 0.00 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.142 | 0.117 | 0.085 | 0.000 | 0.644 | 0.000 | 0.000 | 0.000 |

| Problem 107 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | A | A | B | A | F | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 115 | 115 | 125 | 141 | 121 | 262 | 1658 | 0 | 175 |
| normalized size | 1 | 1.00 | 1.09 | 1.23 | 1.05 | 2.28 | 14.42 | 0.00 | 1.52 |
| time (sec) | N/A | 0.169 | 0.193 | 0.042 | 0.311 | 0.797 | 9.478 | 0.000 | 2.080 |

| Problem 108 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | A | A | B | F(-1) | F | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 167 | 167 | 174 | 236 | 291 | 833 | 0 | 0 | 422 |
| normalized size | 1 | 1.00 | 1.04 | 1.41 | 1.74 | 4.99 | 0.00 | 0.00 | 2.53 |
| time (sec) | N/A | 0.234 | 0.331 | 0.046 | 0.333 | 1.700 | 0.000 | 0.000 | 3.296 |

| Problem 109 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | B | B | B | F | F | F | F |
| verified | N/A | Yes | NO | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 374 | 374 | 1054 | 2694 | 791 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 2.82 | 7.20 | 2.11 | 0.00 | 0.00 | 0.00 | -0.00 |
| time (sec) | N/A | 0.637 | 7.362 | 0.078 | 0.618 | 0.583 | 0.000 | 0.000 | 0.000 |

| Problem 110 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | B | A | F | F | F | F |
| verified | N/A | Yes | NO | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 221 | 220 | 295 | 857 | 400 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 1.33 | 3.88 | 1.81 | 0.00 | 0.00 | 0.00 | -0.00 |
| time (sec) | N/A | 0.443 | 0.609 | 0.069 | 0.612 | 0.396 | 0.000 | 0.000 | 0.000 |

| Problem 111 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | B | F | F | F | F | F |
| verified | N/A | Yes | NO | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 97 | 97 | 111 | 226 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 1.14 | 2.33 | 0.00 | 0.00 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.116 | 0.166 | 0.237 | 0.000 | 0.453 | 0.000 | 0.000 | 0.000 |

| Problem 112 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | C | C | F | F | F | F | F |
| verified | N/A | Yes | NO | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 214 | 214 | 3759 | 1845 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 17.57 | 8.62 | 0.00 | 0.00 | 0.00 | 0.00 | -0.00 |
| time (sec) | N/A | 0.153 | 31.059 | 1.495 | 0.000 | 0.486 | 0.000 | 0.000 | 0.000 |

| Problem 113 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | C | A | F | F | F | F | F |
| verified | N/A | Yes | NO | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 480 | 485 | 470 | 783 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.01 | 0.98 | 1.63 | 0.00 | 0.00 | 0.00 | 0.00 | -0.00 |
| time (sec) | N/A | 1.743 | 8.899 | 0.077 | 0.000 | 0.527 | 0.000 | 0.000 | 0.000 |

| Problem 114 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | C | C | F | F | F | F | F |
| verified | N/A | Yes | NO | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 546 | 546 | 2594 | 10477 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 4.75 | 19.19 | 0.00 | 0.00 | 0.00 | 0.00 | -0.00 |
| time (sec) | N/A | 1.043 | 10.598 | 16.593 | 0.000 | 0.440 | 0.000 | 0.000 | 0.000 |

| Problem 115 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | C | C | F | F | F | F | F |
| verified | N/A | Yes | NO | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 326 | 325 | 600 | 12285 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 1.84 | 37.68 | 0.00 | 0.00 | 0.00 | 0.00 | -0.00 |
| time (sec) | N/A | 0.721 | 1.457 | 1.423 | 0.000 | 0.649 | 0.000 | 0.000 | 0.000 |

| Problem 116 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | C | B | F | F | F | F | F |
| verified | N/A | Yes | NO | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 132 | 132 | 208 | 485 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 1.58 | 3.67 | 0.00 | 0.00 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.227 | 0.330 | 0.303 | 0.000 | 0.595 | 0.000 | 0.000 | 0.000 |

| Problem 117 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | F | C | F | F | F | F | F |
| verified | N/A | Yes | N/A | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 308 | 308 | 0 | 3796 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.00 | 12.32 | 0.00 | 0.00 | 0.00 | 0.00 | -0.00 |
| time (sec) | N/A | 0.187 | 28.571 | 1.546 | 0.000 | 0.672 | 0.000 | 0.000 | 0.000 |

| Problem 118 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | C | C | F | F | F | F | F |
| verified | N/A | Yes | NO | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 1089 | 1094 | 3937 | 4619 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 3.62 | 4.24 | 0.00 | 0.00 | 0.00 | 0.00 | -0.00 |
| time (sec) | N/A | 2.782 | 31.312 | 1.316 | 0.000 | 0.556 | 0.000 | 0.000 | 0.000 |

| Problem 119 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | F | F | F | F | F | F | F |
| verified | N/A | Yes | N/A | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 162 | 162 | 0 | 0 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.246 | 2.528 | 1.926 | 0.000 | 0.394 | 0.000 | 0.000 | 0.000 |

| Problem 120 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | N/A | A | A | A | A | A | F(-1) | A | A |
| verified | N/A | N/A | N/A | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 23 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -0.04 |
| time (sec) | N/A | 0.067 | 2.652 | 1.793 | 0.000 | 0.481 | 0.000 | 0.000 | 0.000 |

| Problem 121 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | N/A | A | A | A | A | A | F(-1) | A | A |
| verified | N/A | N/A | N/A | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 23 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -0.04 |
| time (sec) | N/A | 0.065 | 0.351 | 2.065 | 0.000 | 0.621 | 0.000 | 0.000 | 0.000 |

| Problem 122 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | N/A | A | A | A | A | A | A | A | A |
| verified | N/A | N/A | N/A | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 43 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -0.02 |
| time (sec) | N/A | 0.048 | 0.097 | 1.025 | 0.000 | 0.842 | 0.000 | 0.000 | 0.000 |

| Problem 123 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | F | B | F | F | F | F | F |
| verified | N/A | Yes | N/A | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 460 | 460 | 0 | 1492 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.00 | 3.24 | 0.00 | 0.00 | 0.00 | 0.00 | -0.00 |
| time (sec) | N/A | 0.598 | 0.289 | 1.674 | 0.000 | 0.436 | 0.000 | 0.000 | 0.000 |

| Problem 124 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | F | B | F | F | F | F | F |
| verified | N/A | Yes | N/A | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 302 | 302 | 0 | 696 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.00 | 2.30 | 0.00 | 0.00 | 0.00 | 0.00 | -0.00 |
| time (sec) | N/A | 0.346 | 0.541 | 0.727 | 0.000 | 0.617 | 0.000 | 0.000 | 0.000 |

| Problem 125 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | A | F | F | F | F | F |
| verified | N/A | Yes | NO | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 89 | 89 | 98 | 119 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 1.10 | 1.34 | 0.00 | 0.00 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.059 | 0.401 | 0.721 | 0.000 | 0.712 | 0.000 | 0.000 | 0.000 |

| Problem 126 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | N/A | A | A | A | A | A | A | A | A |
| verified | N/A | N/A | N/A | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 43 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -0.02 |
| time (sec) | N/A | 0.045 | 0.095 | 0.988 | 0.000 | 0.558 | 0.000 | 0.000 | 0.000 |

| Problem 127 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | N/A | A | A | A | A | A | A | A | A |
| verified | N/A | N/A | N/A | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 43 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -0.02 |
| time (sec) | N/A | 0.043 | 0.792 | 1.073 | 0.000 | 0.481 | 0.000 | 0.000 | 0.000 |

| Problem 128 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | C | A | A | F | F | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 37 | 37 | 34 | 676 | 38 | 33 | 0 | 0 | 96 |
| normalized size | 1 | 1.00 | 0.92 | 18.27 | 1.03 | 0.89 | 0.00 | 0.00 | 2.59 |
| time (sec) | N/A | 0.027 | 0.065 | 0.165 | 0.339 | 0.538 | 0.000 | 0.000 | 1.610 |

| Problem 129 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | B | A | A | A | F | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 23 | 23 | 20 | 59 | 19 | 13 | 19 | 0 | 19 |
| normalized size | 1 | 1.00 | 0.87 | 2.57 | 0.83 | 0.57 | 0.83 | 0.00 | 0.83 |
| time (sec) | N/A | 0.009 | 0.017 | 0.383 | 0.378 | 0.637 | 0.400 | 0.000 | 0.090 |

| Problem 130 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | B | A | A | A | F | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 23 | 23 | 20 | 48 | 19 | 13 | 19 | 0 | 19 |
| normalized size | 1 | 1.00 | 0.87 | 2.09 | 0.83 | 0.57 | 0.83 | 0.00 | 0.83 |
| time (sec) | N/A | 0.007 | 0.015 | 0.382 | 0.378 | 0.446 | 0.228 | 0.000 | 1.127 |

| Problem 131 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | B | A | A | A | F | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 16 | 16 | 18 | 32 | 16 | 10 | 19 | 0 | 16 |
| normalized size | 1 | 1.00 | 1.12 | 2.00 | 1.00 | 0.62 | 1.19 | 0.00 | 1.00 |
| time (sec) | N/A | 0.003 | 0.008 | 0.057 | 0.381 | 0.428 | 0.164 | 0.000 | 1.121 |

| Problem 132 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | C | A | A | F | F | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 21 | 21 | 19 | 354 | 34 | 8 | 0 | 0 | 59 |
| normalized size | 1 | 1.00 | 0.90 | 16.86 | 1.62 | 0.38 | 0.00 | 0.00 | 2.81 |
| time (sec) | N/A | 0.044 | 0.014 | 0.425 | 0.326 | 0.475 | 0.000 | 0.000 | 0.180 |

| Problem 133 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | A | A | A | A | F | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 17 | 17 | 18 | 20 | 17 | 13 | 14 | 0 | 17 |
| normalized size | 1 | 1.00 | 1.06 | 1.18 | 1.00 | 0.76 | 0.82 | 0.00 | 1.00 |
| time (sec) | N/A | 0.009 | 0.016 | 0.378 | 0.386 | 0.939 | 0.253 | 0.000 | 0.086 |

| Problem 134 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | A | A | A | A | F | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 23 | 23 | 18 | 20 | 19 | 11 | 19 | 0 | 16 |
| normalized size | 1 | 1.00 | 0.78 | 0.87 | 0.83 | 0.48 | 0.83 | 0.00 | 0.70 |
| time (sec) | N/A | 0.010 | 0.014 | 0.387 | 0.378 | 1.207 | 0.510 | 0.000 | 1.135 |

| Problem 135 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | A | A | A | A | F | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 23 | 23 | 20 | 20 | 19 | 13 | 20 | 0 | 19 |
| normalized size | 1 | 1.00 | 0.87 | 0.87 | 0.83 | 0.57 | 0.87 | 0.00 | 0.83 |
| time (sec) | N/A | 0.009 | 0.016 | 0.397 | 0.377 | 0.571 | 0.793 | 0.000 | 1.123 |

| Problem 136 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | C | A | A | F | F | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 71 | 71 | 62 | 9175 | 73 | 101 | 0 | 0 | 203 |
| normalized size | 1 | 1.00 | 0.87 | 129.23 | 1.03 | 1.42 | 0.00 | 0.00 | 2.86 |
| time (sec) | N/A | 0.035 | 0.168 | 1.002 | 0.389 | 0.501 | 0.000 | 0.000 | 1.325 |

| Problem 137 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | C | A | A | A | F | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 42 | 42 | 37 | 3418 | 36 | 30 | 78 | 0 | 36 |
| normalized size | 1 | 1.00 | 0.88 | 81.38 | 0.86 | 0.71 | 1.86 | 0.00 | 0.86 |
| time (sec) | N/A | 0.026 | 0.034 | 0.389 | 0.445 | 0.575 | 2.620 | 0.000 | 1.175 |

| Problem 138 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | C | A | A | A | F | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 42 | 42 | 37 | 3418 | 36 | 30 | 60 | 0 | 36 |
| normalized size | 1 | 1.00 | 0.88 | 81.38 | 0.86 | 0.71 | 1.43 | 0.00 | 0.86 |
| time (sec) | N/A | 0.025 | 0.055 | 0.388 | 0.445 | 0.527 | 1.263 | 0.000 | 1.182 |

| Problem 139 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | B | C | A | A | A | F | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 34 | 34 | 74 | 3418 | 36 | 30 | 41 | 0 | 36 |
| normalized size | 1 | 1.00 | 2.18 | 100.53 | 1.06 | 0.88 | 1.21 | 0.00 | 1.06 |
| time (sec) | N/A | 0.025 | 0.076 | 0.395 | 0.448 | 0.667 | 0.671 | 0.000 | 1.154 |

| Problem 140 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | A | B | A | A | F | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 16 | 16 | 16 | 15 | 33 | 27 | 20 | 0 | 33 |
| normalized size | 1 | 1.00 | 1.00 | 0.94 | 2.06 | 1.69 | 1.25 | 0.00 | 2.06 |
| time (sec) | N/A | 0.005 | 0.006 | 0.092 | 0.443 | 0.631 | 0.300 | 0.000 | 1.121 |

| Problem 141 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | C | C | A | F | F | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 49 | 49 | 53 | 3774 | 38 | 27 | 0 | 0 | 183 |
| normalized size | 1 | 1.00 | 1.08 | 77.02 | 0.78 | 0.55 | 0.00 | 0.00 | 3.73 |
| time (sec) | N/A | 0.026 | 0.064 | 0.331 | 0.727 | 0.617 | 0.000 | 0.000 | 0.292 |

| Problem 142 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | C | A | A | F | F | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 39 | 39 | 37 | 1095 | 54 | 29 | 0 | 0 | 207 |
| normalized size | 1 | 1.00 | 0.95 | 28.08 | 1.38 | 0.74 | 0.00 | 0.00 | 5.31 |
| time (sec) | N/A | 0.026 | 0.049 | 0.269 | 0.385 | 0.581 | 0.000 | 0.000 | 1.247 |

| Problem 143 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | C | A | A | A | F | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 36 | 36 | 42 | 3213 | 34 | 29 | 32 | 0 | 34 |
| normalized size | 1 | 1.00 | 1.17 | 89.25 | 0.94 | 0.81 | 0.89 | 0.00 | 0.94 |
| time (sec) | N/A | 0.023 | 0.037 | 0.431 | 0.458 | 0.421 | 0.566 | 0.000 | 1.158 |

| Problem 144 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | C | A | A | A | F | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 31 | 31 | 34 | 3217 | 36 | 29 | 37 | 0 | 32 |
| normalized size | 1 | 1.00 | 1.10 | 103.77 | 1.16 | 0.94 | 1.19 | 0.00 | 1.03 |
| time (sec) | N/A | 0.014 | 0.046 | 0.388 | 0.451 | 1.439 | 0.869 | 0.000 | 1.119 |

| Problem 145 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | C | A | A | A | F | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 64 | 64 | 37 | 3217 | 36 | 29 | 39 | 0 | 36 |
| normalized size | 1 | 1.00 | 0.58 | 50.27 | 0.56 | 0.45 | 0.61 | 0.00 | 0.56 |
| time (sec) | N/A | 0.035 | 0.031 | 0.387 | 0.454 | 0.615 | 1.295 | 0.000 | 1.169 |

| Problem 146 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | C | A | A | F | F | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 110 | 110 | 97 | 63382 | 109 | 209 | 0 | 0 | 332 |
| normalized size | 1 | 1.00 | 0.88 | 576.20 | 0.99 | 1.90 | 0.00 | 0.00 | 3.02 |
| time (sec) | N/A | 0.059 | 0.276 | 9.364 | 0.463 | 0.616 | 0.000 | 0.000 | 1.452 |

| Problem 147 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | C | A | A | A | F | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 61 | 61 | 54 | 18111 | 54 | 52 | 97 | 0 | 53 |
| normalized size | 1 | 1.00 | 0.89 | 296.90 | 0.89 | 0.85 | 1.59 | 0.00 | 0.87 |
| time (sec) | N/A | 0.041 | 0.035 | 1.142 | 0.519 | 0.624 | 6.881 | 0.000 | 1.251 |

| Problem 148 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | C | A | A | A | F | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 61 | 61 | 54 | 18111 | 54 | 52 | 80 | 0 | 53 |
| normalized size | 1 | 1.00 | 0.89 | 296.90 | 0.89 | 0.85 | 1.31 | 0.00 | 0.87 |
| time (sec) | N/A | 0.041 | 0.026 | 1.281 | 0.516 | 0.461 | 4.087 | 0.000 | 1.232 |

| Problem 149 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | C | A | A | A | F | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 53 | 53 | 54 | 18111 | 54 | 52 | 60 | 0 | 53 |
| normalized size | 1 | 1.00 | 1.02 | 341.72 | 1.02 | 0.98 | 1.13 | 0.00 | 1.00 |
| time (sec) | N/A | 0.031 | 0.025 | 1.133 | 0.516 | 0.714 | 2.383 | 0.000 | 1.207 |

| Problem 150 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | B | C | A | A | A | F | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 34 | 34 | 99 | 18111 | 54 | 52 | 41 | 0 | 53 |
| normalized size | 1 | 1.00 | 2.91 | 532.68 | 1.59 | 1.53 | 1.21 | 0.00 | 1.56 |
| time (sec) | N/A | 0.015 | 0.074 | 1.128 | 0.524 | 0.550 | 1.214 | 0.000 | 0.117 |

| Problem 151 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | A | B | B | A | F | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 16 | 16 | 16 | 15 | 51 | 49 | 20 | 0 | 47 |
| normalized size | 1 | 1.00 | 1.00 | 0.94 | 3.19 | 3.06 | 1.25 | 0.00 | 2.94 |
| time (sec) | N/A | 0.005 | 0.008 | 0.092 | 0.524 | 0.928 | 0.606 | 0.000 | 1.181 |

| Problem 152 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | C | C | A | F | F | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 77 | 77 | 104 | 21848 | 75 | 49 | 0 | 0 | 306 |
| normalized size | 1 | 1.00 | 1.35 | 283.74 | 0.97 | 0.64 | 0.00 | 0.00 | 3.97 |
| time (sec) | N/A | 0.096 | 0.097 | 0.900 | 0.756 | 0.673 | 0.000 | 0.000 | 0.144 |

| Problem 153 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | C | C | A | F | F | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 68 | 68 | 62 | 7683 | 124 | 51 | 0 | 0 | 372 |
| normalized size | 1 | 1.00 | 0.91 | 112.99 | 1.82 | 0.75 | 0.00 | 0.00 | 5.47 |
| time (sec) | N/A | 0.044 | 0.042 | 0.462 | 0.613 | 0.461 | 0.000 | 0.000 | 1.203 |

| Problem 154 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | C | A | A | F | F | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 60 | 60 | 66 | 7366 | 72 | 51 | 0 | 0 | 383 |
| normalized size | 1 | 1.00 | 1.10 | 122.77 | 1.20 | 0.85 | 0.00 | 0.00 | 6.38 |
| time (sec) | N/A | 0.041 | 0.038 | 0.549 | 0.462 | 0.514 | 0.000 | 0.000 | 1.325 |

| Problem 155 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | C | A | A | A | F | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 55 | 55 | 60 | 17237 | 52 | 51 | 51 | 0 | 51 |
| normalized size | 1 | 1.00 | 1.09 | 313.40 | 0.95 | 0.93 | 0.93 | 0.00 | 0.93 |
| time (sec) | N/A | 0.038 | 0.026 | 1.587 | 0.587 | 0.925 | 0.848 | 0.000 | 1.180 |

| Problem 156 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | C | A | A | B | F | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 31 | 31 | 50 | 17235 | 53 | 49 | 56 | 0 | 48 |
| normalized size | 1 | 1.00 | 1.61 | 555.97 | 1.71 | 1.58 | 1.81 | 0.00 | 1.55 |
| time (sec) | N/A | 0.014 | 0.024 | 1.471 | 0.524 | 0.468 | 1.318 | 0.000 | 1.193 |

| Problem 157 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | C | A | A | A | F | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 64 | 64 | 54 | 17234 | 54 | 49 | 60 | 0 | 53 |
| normalized size | 1 | 1.00 | 0.84 | 269.28 | 0.84 | 0.77 | 0.94 | 0.00 | 0.83 |
| time (sec) | N/A | 0.034 | 0.037 | 1.417 | 0.537 | 0.507 | 2.121 | 0.000 | 0.118 |

| Problem 158 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | F | F | F | F | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 53 | 53 | 51 | 0 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.96 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -0.02 |
| time (sec) | N/A | 0.028 | 0.093 | 0.981 | 0.000 | 0.549 | 0.000 | 0.000 | 0.000 |

| Problem 159 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | C | C | A | F | F | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 81 | 81 | 79 | 130774 | 86 | 127 | 0 | 0 | 354 |
| normalized size | 1 | 1.00 | 0.98 | 1614.49 | 1.06 | 1.57 | 0.00 | 0.00 | 4.37 |
| time (sec) | N/A | 0.059 | 0.047 | 4.805 | 0.531 | 0.592 | 0.000 | 0.000 | 0.129 |

| Problem 160 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | C | C | A | F | F | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 56 | 56 | 55 | 28786 | 51 | 97 | 0 | 0 | 234 |
| normalized size | 1 | 1.00 | 0.98 | 514.04 | 0.91 | 1.73 | 0.00 | 0.00 | 4.18 |
| time (sec) | N/A | 0.035 | 0.039 | 1.184 | 0.529 | 0.476 | 0.000 | 0.000 | 1.328 |

| Problem 161 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | C | C | B | F | F | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 31 | 31 | 31 | 4303 | 30 | 79 | 0 | 0 | 108 |
| normalized size | 1 | 1.00 | 1.00 | 138.81 | 0.97 | 2.55 | 0.00 | 0.00 | 3.48 |
| time (sec) | N/A | 0.015 | 0.026 | 0.408 | 0.525 | 0.596 | 0.000 | 0.000 | 0.144 |

| Problem 162 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | A | C | B | F(-2) | F | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 12 | 12 | 12 | 13 | 16 | 28 | 0 | 0 | 12 |
| normalized size | 1 | 1.00 | 1.00 | 1.08 | 1.33 | 2.33 | 0.00 | 0.00 | 1.00 |
| time (sec) | N/A | 0.004 | 0.049 | 0.071 | 0.411 | 0.684 | 0.000 | 0.000 | 1.178 |

| Problem 163 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | C | C | A | F | F | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 44 | 44 | 29 | 972 | 37 | 87 | 0 | 0 | 113 |
| normalized size | 1 | 1.00 | 0.66 | 22.09 | 0.84 | 1.98 | 0.00 | 0.00 | 2.57 |
| time (sec) | N/A | 0.028 | 0.028 | 10.105 | 0.523 | 0.521 | 0.000 | 0.000 | 2.906 |

| Problem 164 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | F(-1) | C | B | F | F | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 65 | 65 | 45 | 0 | 65 | 137 | 0 | 0 | 220 |
| normalized size | 1 | 1.00 | 0.69 | 0.00 | 1.00 | 2.11 | 0.00 | 0.00 | 3.38 |
| time (sec) | N/A | 0.038 | 0.025 | 180.000 | 0.523 | 0.588 | 0.000 | 0.000 | 3.119 |

| Problem 165 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | F(-1) | C | B | F | F | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 92 | 92 | 66 | 0 | 108 | 199 | 0 | 0 | 300 |
| normalized size | 1 | 1.00 | 0.72 | 0.00 | 1.17 | 2.16 | 0.00 | 0.00 | 3.26 |
| time (sec) | N/A | 0.063 | 0.027 | 180.000 | 0.546 | 0.676 | 0.000 | 0.000 | 3.595 |

| Problem 166 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | F | F | F | F | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 65 | 65 | 51 | 0 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.78 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -0.02 |
| time (sec) | N/A | 0.039 | 0.538 | 2.949 | 0.000 | 0.846 | 0.000 | 0.000 | 0.000 |

| Problem 167 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | C | C | B | F | F | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 98 | 98 | 106 | 131085 | 178 | 326 | 0 | 0 | 669 |
| normalized size | 1 | 1.00 | 1.08 | 1337.60 | 1.82 | 3.33 | 0.00 | 0.00 | 6.83 |
| time (sec) | N/A | 0.081 | 0.091 | 5.951 | 0.769 | 0.518 | 0.000 | 0.000 | 1.286 |

| Problem 168 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | C | C | B | F | F | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 75 | 75 | 83 | 29109 | 124 | 244 | 0 | 0 | 490 |
| normalized size | 1 | 1.00 | 1.11 | 388.12 | 1.65 | 3.25 | 0.00 | 0.00 | 6.53 |
| time (sec) | N/A | 0.054 | 0.054 | 1.481 | 0.763 | 0.503 | 0.000 | 0.000 | 0.171 |

| Problem 169 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | C | C | B | F | F | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 50 | 50 | 56 | 4626 | 80 | 189 | 0 | 0 | 302 |
| normalized size | 1 | 1.00 | 1.12 | 92.52 | 1.60 | 3.78 | 0.00 | 0.00 | 6.04 |
| time (sec) | N/A | 0.031 | 0.070 | 0.480 | 0.748 | 0.456 | 0.000 | 0.000 | 1.293 |

| Problem 170 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | C | C | B | F(-2) | F | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 28 | 28 | 27 | 625 | 47 | 97 | 0 | 0 | 28 |
| normalized size | 1 | 1.00 | 0.96 | 22.32 | 1.68 | 3.46 | 0.00 | 0.00 | 1.00 |
| time (sec) | N/A | 0.013 | 0.055 | 0.273 | 0.755 | 0.746 | 0.000 | 0.000 | 0.088 |

| Problem 171 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | A | C | B | F(-2) | F | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 14 | 14 | 14 | 15 | 18 | 36 | 0 | 0 | 14 |
| normalized size | 1 | 1.00 | 1.00 | 1.07 | 1.29 | 2.57 | 0.00 | 0.00 | 1.00 |
| time (sec) | N/A | 0.005 | 0.006 | 0.076 | 0.412 | 0.646 | 0.000 | 0.000 | 1.136 |

| Problem 172 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | F(-1) | C | B | F | F | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 70 | 70 | 53 | 0 | 77 | 306 | 0 | 0 | 421 |
| normalized size | 1 | 1.00 | 0.76 | 0.00 | 1.10 | 4.37 | 0.00 | 0.00 | 6.01 |
| time (sec) | N/A | 0.048 | 0.074 | 180.000 | 0.768 | 0.458 | 0.000 | 0.000 | 4.025 |

| Problem 173 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | F(-1) | C | B | F | F | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 102 | 102 | 70 | 0 | 135 | 480 | 0 | 0 | 453 |
| normalized size | 1 | 1.00 | 0.69 | 0.00 | 1.32 | 4.71 | 0.00 | 0.00 | 4.44 |
| time (sec) | N/A | 0.063 | 0.061 | 180.000 | 0.776 | 0.685 | 0.000 | 0.000 | 3.799 |

| Problem 174 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | F(-1) | C | B | F | F | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 143 | 143 | 92 | 0 | 191 | 644 | 0 | 0 | 689 |
| normalized size | 1 | 1.00 | 0.64 | 0.00 | 1.34 | 4.50 | 0.00 | 0.00 | 4.82 |
| time (sec) | N/A | 0.090 | 0.045 | 180.000 | 0.757 | 0.548 | 0.000 | 0.000 | 4.905 |

| Problem 175 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | F | F | F | F | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 94 | 94 | 51 | 0 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.54 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.060 | 0.543 | 3.505 | 0.000 | 0.508 | 0.000 | 0.000 | 0.000 |

| Problem 176 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | C | C | B | F | F | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 92 | 92 | 114 | 29456 | 197 | 493 | 0 | 0 | 867 |
| normalized size | 1 | 1.00 | 1.24 | 320.17 | 2.14 | 5.36 | 0.00 | 0.00 | 9.42 |
| time (sec) | N/A | 0.071 | 0.043 | 1.510 | 1.150 | 1.144 | 0.000 | 0.000 | 1.378 |

| Problem 177 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | C | C | B | F | F | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 71 | 71 | 86 | 4977 | 144 | 418 | 0 | 0 | 620 |
| normalized size | 1 | 1.00 | 1.21 | 70.10 | 2.03 | 5.89 | 0.00 | 0.00 | 8.73 |
| time (sec) | N/A | 0.049 | 0.046 | 0.782 | 1.146 | 0.646 | 0.000 | 0.000 | 1.432 |

| Problem 178 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | C | C | B | F(-2) | F | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 47 | 47 | 49 | 952 | 94 | 250 | 0 | 0 | 46 |
| normalized size | 1 | 1.00 | 1.04 | 20.26 | 2.00 | 5.32 | 0.00 | 0.00 | 0.98 |
| time (sec) | N/A | 0.029 | 0.035 | 0.294 | 1.123 | 0.509 | 0.000 | 0.000 | 1.219 |

| Problem 179 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | C | C | B | F(-2) | F | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 34 | 34 | 27 | 634 | 62 | 124 | 0 | 0 | 25 |
| normalized size | 1 | 1.00 | 0.79 | 18.65 | 1.82 | 3.65 | 0.00 | 0.00 | 0.74 |
| time (sec) | N/A | 0.014 | 0.050 | 0.268 | 1.112 | 0.844 | 0.000 | 0.000 | 0.088 |

| Problem 180 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | A | C | B | F(-2) | F | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 16 | 16 | 16 | 15 | 30 | 107 | 0 | 0 | 14 |
| normalized size | 1 | 1.00 | 1.00 | 0.94 | 1.88 | 6.69 | 0.00 | 0.00 | 0.88 |
| time (sec) | N/A | 0.005 | 0.006 | 0.076 | 0.430 | 0.567 | 0.000 | 0.000 | 0.066 |

| Problem 181 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | F(-1) | C | B | F | F | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 97 | 97 | 74 | 0 | 173 | 811 | 0 | 0 | 902 |
| normalized size | 1 | 1.00 | 0.76 | 0.00 | 1.78 | 8.36 | 0.00 | 0.00 | 9.30 |
| time (sec) | N/A | 0.066 | 0.110 | 180.000 | 1.132 | 0.615 | 0.000 | 0.000 | 6.493 |

| Problem 182 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | F(-1) | C | B | F | F | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 131 | 131 | 93 | 0 | 243 | 1078 | 0 | 0 | 1074 |
| normalized size | 1 | 1.00 | 0.71 | 0.00 | 1.85 | 8.23 | 0.00 | 0.00 | 8.20 |
| time (sec) | N/A | 0.087 | 0.045 | 180.000 | 1.152 | 0.536 | 0.000 | 0.000 | 5.262 |

| Problem 183 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | F(-1) | C | B | F | F | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 170 | 170 | 107 | 0 | 332 | 1316 | 0 | 0 | 1251 |
| normalized size | 1 | 1.00 | 0.63 | 0.00 | 1.95 | 7.74 | 0.00 | 0.00 | 7.36 |
| time (sec) | N/A | 0.127 | 0.046 | 180.000 | 1.154 | 0.623 | 0.000 | 0.000 | 8.121 |

| Problem 184 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | F | F | F | F | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 79 | 79 | 71 | 0 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.90 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.049 | 0.140 | 14.578 | 0.000 | 0.423 | 0.000 | 0.000 | 0.000 |

| Problem 185 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | B | C | B | F | F | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 165 | 165 | 146 | 504228 | 380 | 583 | 0 | 0 | 546 |
| normalized size | 1 | 1.00 | 0.88 | 3055.93 | 2.30 | 3.53 | 0.00 | 0.00 | 3.31 |
| time (sec) | N/A | 0.133 | 0.108 | 33.060 | 0.536 | 0.721 | 0.000 | 0.000 | 2.187 |

| Problem 186 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | C | C | B | F | F | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 121 | 121 | 106 | 129477 | 255 | 411 | 0 | 0 | 418 |
| normalized size | 1 | 1.00 | 0.88 | 1070.06 | 2.11 | 3.40 | 0.00 | 0.00 | 3.45 |
| time (sec) | N/A | 0.080 | 0.078 | 18.412 | 0.534 | 1.476 | 0.000 | 0.000 | 1.500 |

| Problem 187 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | C | C | B | F | F | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 82 | 82 | 71 | 25561 | 166 | 287 | 0 | 0 | 304 |
| normalized size | 1 | 1.00 | 0.87 | 311.72 | 2.02 | 3.50 | 0.00 | 0.00 | 3.71 |
| time (sec) | N/A | 0.046 | 0.065 | 14.728 | 0.543 | 0.464 | 0.000 | 0.000 | 1.361 |

| Problem 188 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | C | C | B | F | F | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 48 | 48 | 41 | 480 | 101 | 210 | 0 | 0 | 205 |
| normalized size | 1 | 1.00 | 0.85 | 10.00 | 2.10 | 4.38 | 0.00 | 0.00 | 4.27 |
| time (sec) | N/A | 0.020 | 0.045 | 13.674 | 0.537 | 0.574 | 0.000 | 0.000 | 1.307 |

| Problem 189 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | A | C | B | A | F | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 20 | 20 | 20 | 21 | 65 | 164 | 51 | 0 | 121 |
| normalized size | 1 | 1.00 | 1.00 | 1.05 | 3.25 | 8.20 | 2.55 | 0.00 | 6.05 |
| time (sec) | N/A | 0.007 | 0.016 | 0.084 | 0.525 | 0.573 | 0.737 | 0.000 | 1.268 |

| Problem 190 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | F | F | F | F | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 64 | 64 | 60 | 0 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.94 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -0.02 |
| time (sec) | N/A | 0.021 | 0.089 | 0.681 | 0.000 | 0.918 | 0.000 | 0.000 | 0.000 |

| Problem 191 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | F | F | F | F | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 71 | 71 | 67 | 0 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.94 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.041 | 0.041 | 13.987 | 0.000 | 0.540 | 0.000 | 0.000 | 0.000 |

| Problem 192 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | F | F | F | F | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 101 | 101 | 67 | 0 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.66 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.069 | 0.044 | 13.911 | 0.000 | 0.590 | 0.000 | 0.000 | 0.000 |

| Problem 193 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | C | A | A | F | F | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 37 | 37 | 34 | 676 | 38 | 33 | 0 | 0 | 96 |
| normalized size | 1 | 1.00 | 0.92 | 18.27 | 1.03 | 0.89 | 0.00 | 0.00 | 2.59 |
| time (sec) | N/A | 0.010 | 0.035 | 0.164 | 0.322 | 0.474 | 0.000 | 0.000 | 0.003 |

| Problem 194 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | B | A | A | A | A | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 23 | 23 | 20 | 59 | 13 | 13 | 39 | 13 | 19 |
| normalized size | 1 | 1.00 | 0.87 | 2.57 | 0.57 | 0.57 | 1.70 | 0.57 | 0.83 |
| time (sec) | N/A | 0.014 | 0.038 | 0.442 | 0.309 | 0.392 | 11.343 | 0.118 | 0.079 |

| Problem 195 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | B | A | A | A | A | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 23 | 23 | 20 | 48 | 13 | 13 | 39 | 13 | 19 |
| normalized size | 1 | 1.00 | 0.87 | 2.09 | 0.57 | 0.57 | 1.70 | 0.57 | 0.83 |
| time (sec) | N/A | 0.008 | 0.017 | 0.391 | 0.314 | 0.358 | 5.601 | 0.131 | 0.056 |

| Problem 196 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | B | A | A | A | A | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 16 | 16 | 18 | 32 | 10 | 10 | 37 | 10 | 16 |
| normalized size | 1 | 1.00 | 1.12 | 2.00 | 0.62 | 0.62 | 2.31 | 0.62 | 1.00 |
| time (sec) | N/A | 0.003 | 0.007 | 0.064 | 0.306 | 0.507 | 2.928 | 0.118 | 1.207 |

| Problem 197 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | A | A | A | F | A | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 21 | 21 | 19 | 27 | 8 | 8 | 0 | 9 | 58 |
| normalized size | 1 | 1.00 | 0.90 | 1.29 | 0.38 | 0.38 | 0.00 | 0.43 | 2.76 |
| time (sec) | N/A | 0.031 | 0.018 | 0.309 | 0.307 | 0.499 | 0.000 | 0.132 | 0.545 |

| Problem 198 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | A | A | A | A | A | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 17 | 17 | 18 | 20 | 11 | 13 | 34 | 12 | 17 |
| normalized size | 1 | 1.00 | 1.06 | 1.18 | 0.65 | 0.76 | 2.00 | 0.71 | 1.00 |
| time (sec) | N/A | 0.009 | 0.017 | 0.393 | 0.311 | 0.506 | 5.736 | 0.140 | 0.074 |

| Problem 199 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | A | A | A | A | A | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 23 | 23 | 18 | 20 | 11 | 11 | 39 | 11 | 16 |
| normalized size | 1 | 1.00 | 0.78 | 0.87 | 0.48 | 0.48 | 1.70 | 0.48 | 0.70 |
| time (sec) | N/A | 0.009 | 0.015 | 0.380 | 0.309 | 0.536 | 10.803 | 0.119 | 1.143 |

| Problem 200 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | A | A | B | F | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 27 | 27 | 47 | 21 | 33 | 57 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 1.74 | 0.78 | 1.22 | 2.11 | 0.00 | 0.00 | -0.04 |
| time (sec) | N/A | 0.034 | 0.022 | 0.367 | 0.366 | 1.388 | 0.000 | 0.000 | 0.000 |

| Problem 201 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | C | A | C | F | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 51 | 51 | 81 | 449 | 56 | 87 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 1.59 | 8.80 | 1.10 | 1.71 | 0.00 | 0.00 | -0.02 |
| time (sec) | N/A | 0.066 | 0.015 | 0.519 | 0.375 | 2.014 | 0.000 | 0.000 | 0.000 |

| Problem 202 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | C | A | C | F | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 77 | 77 | 109 | 471 | 78 | 117 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 1.42 | 6.12 | 1.01 | 1.52 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.090 | 0.034 | 0.503 | 0.373 | 1.561 | 0.000 | 0.000 | 0.000 |

| Problem 203 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | C | A | C | F | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 307 | 307 | 345 | 5294 | 281 | 899 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 1.12 | 17.24 | 0.92 | 2.93 | 0.00 | 0.00 | -0.00 |
| time (sec) | N/A | 0.465 | 0.504 | 10.107 | 0.709 | 0.796 | 0.000 | 0.000 | 0.000 |

| Problem 204 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | C | A | C | F | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 231 | 231 | 259 | 4990 | 215 | 745 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 1.12 | 21.60 | 0.93 | 3.23 | 0.00 | 0.00 | -0.00 |
| time (sec) | N/A | 0.379 | 0.181 | 3.578 | 0.714 | 0.749 | 0.000 | 0.000 | 0.000 |

| Problem 205 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | B | A | B | F | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 150 | 150 | 131 | 306 | 142 | 551 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.87 | 2.04 | 0.95 | 3.67 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.232 | 1.423 | 0.351 | 0.688 | 0.854 | 0.000 | 0.000 | 0.000 |

| Problem 206 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | N/A | A | A | A | A | A | A | A | A |
| verified | N/A | N/A | N/A | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 18 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -0.06 |
| time (sec) | N/A | 0.066 | 9.537 | 0.559 | 0.000 | 0.774 | 0.000 | 0.000 | 0.000 |

| Problem 207 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | C | A | C | F | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 155 | 155 | 144 | 1726 | 149 | 450 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.93 | 11.14 | 0.96 | 2.90 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.307 | 0.205 | 5.739 | 1.124 | 1.751 | 0.000 | 0.000 | 0.000 |

| Problem 208 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | C | A | C | F | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 128 | 128 | 118 | 1667 | 125 | 381 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.92 | 13.02 | 0.98 | 2.98 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.269 | 0.119 | 5.319 | 1.094 | 3.990 | 0.000 | 0.000 | 0.000 |

| Problem 209 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | C | A | C | F | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 101 | 101 | 91 | 1584 | 101 | 322 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.90 | 15.68 | 1.00 | 3.19 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.231 | 0.102 | 5.091 | 1.099 | 0.753 | 0.000 | 0.000 | 0.000 |

| Problem 210 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | B | B | A | B | F | F | F |
| verified | N/A | Yes | NO | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 69 | 69 | 201 | 247 | 72 | 238 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 2.91 | 3.58 | 1.04 | 3.45 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.140 | 0.913 | 0.460 | 1.099 | 0.969 | 0.000 | 0.000 | 0.000 |

| Problem 211 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | N/A | A | A | A | A | A | A | A | A |
| verified | N/A | N/A | N/A | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 19 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -0.05 |
| time (sec) | N/A | 0.077 | 3.351 | 0.961 | 0.000 | 0.686 | 0.000 | 0.000 | 0.000 |

| Problem 212 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | C | A | C | F | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 168 | 168 | 144 | 1802 | 146 | 423 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.86 | 10.73 | 0.87 | 2.52 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.303 | 0.218 | 5.434 | 1.100 | 0.693 | 0.000 | 0.000 | 0.000 |

| Problem 213 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | C | A | C | F | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 139 | 139 | 119 | 1745 | 123 | 359 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.86 | 12.55 | 0.88 | 2.58 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.268 | 0.115 | 5.313 | 1.107 | 1.861 | 0.000 | 0.000 | 0.000 |

| Problem 214 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | C | A | C | F | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 110 | 110 | 93 | 1664 | 100 | 305 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.85 | 15.13 | 0.91 | 2.77 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.238 | 0.101 | 4.902 | 1.098 | 1.013 | 0.000 | 0.000 | 0.000 |

| Problem 215 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | B | B | A | B | F | F | F |
| verified | N/A | Yes | NO | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 76 | 76 | 200 | 271 | 73 | 227 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 2.63 | 3.57 | 0.96 | 2.99 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.150 | 0.985 | 0.396 | 1.102 | 0.800 | 0.000 | 0.000 | 0.000 |

| Problem 216 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | N/A | A | A | A | A | A | A | A | A |
| verified | N/A | N/A | N/A | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 22 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -0.05 |
| time (sec) | N/A | 0.065 | 3.391 | 0.950 | 0.000 | 0.524 | 0.000 | 0.000 | 0.000 |

| Problem 217 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | C | A | C | F | F | F |
| verified | N/A | Yes | NO | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 303 | 303 | 353 | 5222 | 277 | 879 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 1.17 | 17.23 | 0.91 | 2.90 | 0.00 | 0.00 | -0.00 |
| time (sec) | N/A | 0.465 | 0.449 | 10.362 | 0.701 | 0.565 | 0.000 | 0.000 | 0.000 |

| Problem 218 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | C | A | C | F | F | F |
| verified | N/A | Yes | NO | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 229 | 229 | 267 | 4918 | 213 | 729 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 1.17 | 21.48 | 0.93 | 3.18 | 0.00 | 0.00 | -0.00 |
| time (sec) | N/A | 0.382 | 0.165 | 3.775 | 0.738 | 0.622 | 0.000 | 0.000 | 0.000 |

| Problem 219 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | B | A | B | F | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 150 | 150 | 131 | 306 | 142 | 539 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.87 | 2.04 | 0.95 | 3.59 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.235 | 1.263 | 0.528 | 0.713 | 0.483 | 0.000 | 0.000 | 0.000 |

| Problem 220 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | N/A | A | A | A | A | A | A | A | A |
| verified | N/A | N/A | N/A | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 18 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -0.06 |
| time (sec) | N/A | 0.147 | 6.228 | 0.844 | 0.000 | 1.066 | 0.000 | 0.000 | 0.000 |

| Problem 221 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | C | A | C | F | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 152 | 152 | 141 | 1698 | 146 | 423 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.93 | 11.17 | 0.96 | 2.78 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.308 | 0.201 | 5.863 | 1.092 | 0.528 | 0.000 | 0.000 | 0.000 |

| Problem 222 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | C | A | C | F | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 126 | 126 | 116 | 1641 | 123 | 359 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.92 | 13.02 | 0.98 | 2.85 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.269 | 0.115 | 5.589 | 1.107 | 0.872 | 0.000 | 0.000 | 0.000 |

| Problem 223 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | C | A | C | F | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 100 | 100 | 90 | 1560 | 100 | 305 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.90 | 15.60 | 1.00 | 3.05 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.240 | 0.103 | 5.092 | 1.100 | 0.639 | 0.000 | 0.000 | 0.000 |

| Problem 224 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | B | B | A | B | F | F | F |
| verified | N/A | Yes | NO | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 69 | 69 | 197 | 247 | 72 | 226 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 2.86 | 3.58 | 1.04 | 3.28 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.145 | 0.869 | 0.560 | 1.098 | 0.485 | 0.000 | 0.000 | 0.000 |

| Problem 225 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | N/A | A | A | A | A | A | A | A | A |
| verified | N/A | N/A | N/A | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 19 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -0.05 |
| time (sec) | N/A | 0.061 | 3.505 | 1.270 | 0.000 | 0.696 | 0.000 | 0.000 | 0.000 |

| Problem 226 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | C | A | C | F | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 165 | 165 | 147 | 1830 | 149 | 450 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.89 | 11.09 | 0.90 | 2.73 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.310 | 0.215 | 6.464 | 1.099 | 0.570 | 0.000 | 0.000 | 0.000 |

| Problem 227 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | C | A | C | F | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 137 | 137 | 121 | 1771 | 125 | 381 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.88 | 12.93 | 0.91 | 2.78 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.270 | 0.122 | 5.458 | 1.104 | 0.532 | 0.000 | 0.000 | 0.000 |

| Problem 228 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | C | A | C | F | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 109 | 109 | 94 | 1688 | 101 | 322 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.86 | 15.49 | 0.93 | 2.95 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.238 | 0.119 | 4.881 | 1.115 | 0.527 | 0.000 | 0.000 | 0.000 |

| Problem 229 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | B | B | A | B | F | F | F |
| verified | N/A | Yes | NO | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 76 | 76 | 208 | 271 | 73 | 239 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 2.74 | 3.57 | 0.96 | 3.14 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.144 | 0.791 | 0.522 | 1.111 | 0.836 | 0.000 | 0.000 | 0.000 |

| Problem 230 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | N/A | A | A | A | A | A | A | A | A |
| verified | N/A | N/A | N/A | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 22 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -0.05 |
| time (sec) | N/A | 0.083 | 3.633 | 1.201 | 0.000 | 0.421 | 0.000 | 0.000 | 0.000 |

| Problem 231 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | B | C | F | C | F | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 302 | 302 | 654 | 7429 | 0 | 1808 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 2.17 | 24.60 | 0.00 | 5.99 | 0.00 | 0.00 | -0.00 |
| time (sec) | N/A | 0.242 | 0.351 | 50.403 | 0.000 | 0.772 | 0.000 | 0.000 | 0.000 |

| Problem 232 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | C | F | C | F | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 234 | 234 | 409 | 5543 | 0 | 1278 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 1.75 | 23.69 | 0.00 | 5.46 | 0.00 | 0.00 | -0.00 |
| time (sec) | N/A | 0.172 | 0.196 | 36.632 | 0.000 | 0.914 | 0.000 | 0.000 | 0.000 |

| Problem 233 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | C | F | C | F | F | F |
| verified | N/A | Yes | NO | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 162 | 162 | 263 | 2543 | 0 | 830 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 1.62 | 15.70 | 0.00 | 5.12 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.111 | 0.139 | 4.738 | 0.000 | 0.656 | 0.000 | 0.000 | 0.000 |

| Problem 234 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | B | B | B | F | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 79 | 79 | 78 | 180 | 182 | 498 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.99 | 2.28 | 2.30 | 6.30 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.048 | 0.022 | 0.547 | 0.463 | 1.010 | 0.000 | 0.000 | 0.000 |

| Problem 235 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | N/A | A | A | A | A | A | A | A | A |
| verified | N/A | N/A | N/A | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 18 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -0.06 |
| time (sec) | N/A | 0.041 | 0.990 | 4.151 | 0.000 | 0.559 | 0.000 | 0.000 | 0.000 |

| Problem 236 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | C | F | C | F | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 395 | 395 | 346 | 6892 | 0 | 2160 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.88 | 17.45 | 0.00 | 5.47 | 0.00 | 0.00 | -0.00 |
| time (sec) | N/A | 0.500 | 0.340 | 34.684 | 0.000 | 0.962 | 0.000 | 0.000 | 0.000 |

| Problem 237 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | C | F | C | F | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 295 | 295 | 257 | 6518 | 0 | 1688 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.87 | 22.09 | 0.00 | 5.72 | 0.00 | 0.00 | -0.00 |
| time (sec) | N/A | 0.397 | 0.156 | 4.678 | 0.000 | 0.828 | 0.000 | 0.000 | 0.000 |

| Problem 238 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | B | B | B | B | F | F | F |
| verified | N/A | Yes | NO | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 194 | 194 | 4654 | 612 | 372 | 1188 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 23.99 | 3.15 | 1.92 | 6.12 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.251 | 13.415 | 0.330 | 0.515 | 0.827 | 0.000 | 0.000 | 0.000 |

| Problem 239 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | N/A | A | A | A | A | A | A | A | A |
| verified | N/A | N/A | N/A | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 18 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -0.06 |
| time (sec) | N/A | 0.146 | 0.393 | 1.270 | 0.000 | 0.593 | 0.000 | 0.000 | 0.000 |

| Problem 240 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | C | B | C | F | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 170 | 170 | 155 | 2339 | 341 | 348 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.91 | 13.76 | 2.01 | 2.05 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.304 | 0.224 | 5.882 | 0.351 | 0.506 | 0.000 | 0.000 | 0.000 |

| Problem 241 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | C | B | C | F | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 133 | 133 | 119 | 2249 | 247 | 296 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.89 | 16.91 | 1.86 | 2.23 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.253 | 0.117 | 5.056 | 0.343 | 0.578 | 0.000 | 0.000 | 0.000 |

| Problem 242 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | B | B | B | B | F | F | F |
| verified | N/A | Yes | NO | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 93 | 93 | 766 | 292 | 265 | 221 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 8.24 | 3.14 | 2.85 | 2.38 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.155 | 3.851 | 0.521 | 0.430 | 0.633 | 0.000 | 0.000 | 0.000 |

| Problem 243 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | N/A | A | A | A | A | A | A | A | A |
| verified | N/A | N/A | N/A | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 23 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -0.04 |
| time (sec) | N/A | 0.089 | 0.811 | 1.823 | 0.000 | 0.712 | 0.000 | 0.000 | 0.000 |

| Problem 244 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | C | B | C | F | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 171 | 171 | 156 | 2449 | 340 | 348 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.91 | 14.32 | 1.99 | 2.04 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.298 | 0.214 | 5.932 | 0.350 | 0.673 | 0.000 | 0.000 | 0.000 |

| Problem 245 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | C | B | C | F | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 134 | 134 | 120 | 2351 | 246 | 296 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.90 | 17.54 | 1.84 | 2.21 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.245 | 0.119 | 4.913 | 0.342 | 0.741 | 0.000 | 0.000 | 0.000 |

| Problem 246 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | B | B | B | B | F | F | F |
| verified | N/A | Yes | NO | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 94 | 94 | 723 | 297 | 263 | 222 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 7.69 | 3.16 | 2.80 | 2.36 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.156 | 3.239 | 0.506 | 0.424 | 0.481 | 0.000 | 0.000 | 0.000 |

| Problem 247 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | N/A | A | A | A | A | A | A | A | A |
| verified | N/A | N/A | N/A | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 24 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -0.04 |
| time (sec) | N/A | 0.085 | 0.803 | 1.819 | 0.000 | 0.633 | 0.000 | 0.000 | 0.000 |

| Problem 248 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | B | C | F | C | F | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 302 | 302 | 654 | 7429 | 0 | 1566 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 2.17 | 24.60 | 0.00 | 5.19 | 0.00 | 0.00 | -0.00 |
| time (sec) | N/A | 0.235 | 0.311 | 49.151 | 0.000 | 0.800 | 0.000 | 0.000 | 0.000 |

| Problem 249 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | C | F | C | F | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 234 | 234 | 409 | 5543 | 0 | 1080 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 1.75 | 23.69 | 0.00 | 4.62 | 0.00 | 0.00 | -0.00 |
| time (sec) | N/A | 0.171 | 0.198 | 40.199 | 0.000 | 0.722 | 0.000 | 0.000 | 0.000 |

| Problem 250 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | C | F | C | F | F | F |
| verified | N/A | Yes | NO | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 162 | 162 | 263 | 2543 | 0 | 676 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 1.62 | 15.70 | 0.00 | 4.17 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.110 | 0.123 | 4.354 | 0.000 | 0.560 | 0.000 | 0.000 | 0.000 |

| Problem 251 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | B | B | B | F | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 79 | 79 | 78 | 267 | 184 | 388 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.99 | 3.38 | 2.33 | 4.91 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.048 | 0.033 | 0.552 | 0.469 | 0.694 | 0.000 | 0.000 | 0.000 |

| Problem 252 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | N/A | A | A | A | A | A | A | A | A |
| verified | N/A | N/A | N/A | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 18 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -0.06 |
| time (sec) | N/A | 0.042 | 0.116 | 4.189 | 0.000 | 0.593 | 0.000 | 0.000 | 0.000 |

| Problem 253 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | C | F | C | F | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 391 | 391 | 339 | 6698 | 0 | 1798 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.87 | 17.13 | 0.00 | 4.60 | 0.00 | 0.00 | -0.00 |
| time (sec) | N/A | 0.503 | 0.333 | 39.339 | 0.000 | 0.833 | 0.000 | 0.000 | 0.000 |

| Problem 254 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | C | F | C | F | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 293 | 293 | 253 | 6348 | 0 | 1462 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.86 | 21.67 | 0.00 | 4.99 | 0.00 | 0.00 | -0.00 |
| time (sec) | N/A | 0.403 | 0.128 | 4.915 | 0.000 | 0.893 | 0.000 | 0.000 | 0.000 |

| Problem 255 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | B | B | B | B | F | F | F |
| verified | N/A | Yes | NO | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 194 | 194 | 4463 | 629 | 392 | 1098 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 23.01 | 3.24 | 2.02 | 5.66 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.249 | 13.100 | 0.585 | 0.542 | 0.750 | 0.000 | 0.000 | 0.000 |

| Problem 256 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | N/A | A | A | A | A | A | A | A | A |
| verified | N/A | N/A | N/A | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 18 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -0.06 |
| time (sec) | N/A | 0.093 | 0.441 | 1.455 | 0.000 | 0.578 | 0.000 | 0.000 | 0.000 |

| Problem 257 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | C | B | C | F | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 168 | 168 | 155 | 2449 | 342 | 179 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.92 | 14.58 | 2.04 | 1.07 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.306 | 0.205 | 6.234 | 0.378 | 0.665 | 0.000 | 0.000 | 0.000 |

| Problem 258 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | C | B | C | F | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 132 | 132 | 119 | 2351 | 248 | 156 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.90 | 17.81 | 1.88 | 1.18 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.257 | 0.117 | 5.269 | 0.366 | 0.725 | 0.000 | 0.000 | 0.000 |

| Problem 259 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | B | B | B | A | F | F | F |
| verified | N/A | Yes | NO | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 93 | 93 | 709 | 299 | 286 | 121 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 7.62 | 3.22 | 3.08 | 1.30 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.159 | 3.785 | 0.757 | 0.451 | 0.521 | 0.000 | 0.000 | 0.000 |

| Problem 260 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | N/A | A | A | A | A | A | A | A | A |
| verified | N/A | N/A | N/A | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 23 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -0.04 |
| time (sec) | N/A | 0.088 | 0.783 | 2.065 | 0.000 | 0.640 | 0.000 | 0.000 | 0.000 |

| Problem 261 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | C | B | C | F | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 169 | 169 | 155 | 2339 | 343 | 179 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.92 | 13.84 | 2.03 | 1.06 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.295 | 0.213 | 5.973 | 0.406 | 0.681 | 0.000 | 0.000 | 0.000 |

| Problem 262 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | C | B | C | F | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 133 | 133 | 119 | 2249 | 249 | 156 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.89 | 16.91 | 1.87 | 1.17 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.248 | 0.110 | 5.512 | 0.377 | 0.627 | 0.000 | 0.000 | 0.000 |

| Problem 263 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | B | B | B | A | F | F | F |
| verified | N/A | Yes | NO | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 94 | 94 | 605 | 304 | 288 | 121 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 6.44 | 3.23 | 3.06 | 1.29 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.150 | 2.942 | 0.703 | 0.454 | 0.712 | 0.000 | 0.000 | 0.000 |

| Problem 264 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | N/A | A | A | A | A | A | A | A | A |
| verified | N/A | N/A | N/A | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 24 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -0.04 |
| time (sec) | N/A | 0.080 | 0.829 | 2.073 | 0.000 | 0.596 | 0.000 | 0.000 | 0.000 |

| Problem 265 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | C | C | F | C | F(-1) | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 160 | 160 | 131 | 920 | 0 | 326 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.82 | 5.75 | 0.00 | 2.04 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.574 | 0.302 | 0.536 | 0.000 | 0.598 | 0.000 | 0.000 | 0.000 |

| Problem 266 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | C | C | A | A | F(-2) | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 297 | 297 | 236 | 4034 | 328 | 246 | 362 | 0 | 510 |
| normalized size | 1 | 1.00 | 0.79 | 13.58 | 1.10 | 0.83 | 1.22 | 0.00 | 1.72 |
| time (sec) | N/A | 0.386 | 0.175 | 16.949 | 0.351 | 0.666 | 23.397 | 0.000 | 2.288 |

| Problem 267 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | C | C | A | A | F(-2) | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 225 | 225 | 192 | 3320 | 269 | 195 | 286 | 0 | 414 |
| normalized size | 1 | 1.00 | 0.85 | 14.76 | 1.20 | 0.87 | 1.27 | 0.00 | 1.84 |
| time (sec) | N/A | 0.256 | 0.151 | 12.627 | 0.349 | 0.522 | 9.881 | 0.000 | 2.280 |

| Problem 268 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | C | A | A | A | F | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 140 | 140 | 129 | 2616 | 171 | 138 | 209 | 0 | 329 |
| normalized size | 1 | 1.00 | 0.92 | 18.69 | 1.22 | 0.99 | 1.49 | 0.00 | 2.35 |
| time (sec) | N/A | 0.119 | 0.110 | 3.357 | 0.344 | 0.579 | 3.929 | 0.000 | 2.048 |

| Problem 269 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | F | C | C | F | F | F | F |
| verified | N/A | Yes | N/A | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 381 | 381 | 0 | 864 | 167 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.00 | 2.27 | 0.44 | 0.00 | 0.00 | 0.00 | -0.00 |
| time (sec) | N/A | 0.439 | 0.223 | 4.559 | 0.536 | 0.502 | 0.000 | 0.000 | 0.000 |

| Problem 270 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | F | F | F | F | F | F |
| verified | N/A | Yes | NO | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 247 | 247 | 161 | 0 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.65 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -0.00 |
| time (sec) | N/A | 0.488 | 0.159 | 11.444 | 0.000 | 0.865 | 0.000 | 0.000 | 0.000 |

| Problem 271 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | F(-2) | F | F | F | F | F |
| verified | N/A | Yes | NO | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 339 | 339 | 307 | 0 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.91 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -0.00 |
| time (sec) | N/A | 0.717 | 0.153 | 180.000 | 0.000 | 0.509 | 0.000 | 0.000 | 0.000 |

| Problem 272 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | C | C | A | A | F | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 315 | 315 | 236 | 4194 | 314 | 249 | 345 | 0 | 497 |
| normalized size | 1 | 1.00 | 0.75 | 13.31 | 1.00 | 0.79 | 1.10 | 0.00 | 1.58 |
| time (sec) | N/A | 0.749 | 0.159 | 4.748 | 0.339 | 0.608 | 15.301 | 0.000 | 2.339 |

| Problem 273 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | C | C | A | A | F | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 247 | 247 | 183 | 3514 | 252 | 198 | 265 | 0 | 414 |
| normalized size | 1 | 1.00 | 0.74 | 14.23 | 1.02 | 0.80 | 1.07 | 0.00 | 1.68 |
| time (sec) | N/A | 0.621 | 0.128 | 3.720 | 0.331 | 0.477 | 6.778 | 0.000 | 2.328 |

| Problem 274 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | C | C | A | A | F | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 104 | 104 | 144 | 2210 | 178 | 130 | 155 | 0 | 315 |
| normalized size | 1 | 1.00 | 1.38 | 21.25 | 1.71 | 1.25 | 1.49 | 0.00 | 3.03 |
| time (sec) | N/A | 0.198 | 0.019 | 1.798 | 0.332 | 0.572 | 2.303 | 0.000 | 2.089 |

| Problem 275 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | B | F | F | F | F | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 105 | 94 | 332 | 0 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 0.90 | 3.16 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.269 | 0.206 | 5.649 | 0.000 | 0.572 | 0.000 | 0.000 | 0.000 |

| Problem 276 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | B | F(-2) | F | F | F | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 197 | 191 | 457 | 0 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 0.97 | 2.32 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.463 | 0.367 | 180.000 | 0.000 | 0.618 | 0.000 | 0.000 | 0.000 |

| Problem 277 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | F | F(-2) | F | F | F | F | F |
| verified | N/A | Yes | N/A | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 256 | 250 | 0 | 0 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 0.98 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -0.00 |
| time (sec) | N/A | 0.670 | 0.297 | 180.000 | 0.000 | 0.442 | 0.000 | 0.000 | 0.000 |

| Problem 278 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | C | F | F | F(-1) | F | F |
| verified | N/A | Yes | NO | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 512 | 512 | 677 | 8491 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 1.32 | 16.58 | 0.00 | 0.00 | 0.00 | 0.00 | -0.00 |
| time (sec) | N/A | 0.767 | 4.434 | 3.145 | 0.000 | 0.597 | 0.000 | 0.000 | 0.000 |

| Problem 279 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | B | F | F | F | F(-1) | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 546 | 546 | 1287 | 0 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 2.36 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -0.00 |
| time (sec) | N/A | 1.387 | 3.223 | 2.963 | 0.000 | 0.645 | 0.000 | 0.000 | 0.000 |

| Problem 280 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | N/A | A | A | A | A | A | F(-1) | A | A |
| verified | N/A | N/A | N/A | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 101 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.252 | 0.240 | 1.488 | 0.000 | 0.498 | 0.000 | 0.000 | 0.000 |

| Problem 281 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | B | F | F | F | F(-1) | F | F |
| verified | N/A | Yes | NO | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 560 | 560 | 1236 | 0 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 2.21 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -0.00 |
| time (sec) | N/A | 1.261 | 3.586 | 2.197 | 0.000 | 0.635 | 0.000 | 0.000 | 0.000 |

| Problem 282 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | C | A | F | F | F(-1) | F | F |
| verified | N/A | Yes | NO | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 712 | 712 | 1318 | 936 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 1.85 | 1.31 | 0.00 | 0.00 | 0.00 | 0.00 | -0.00 |
| time (sec) | N/A | 1.113 | 5.904 | 4.682 | 0.000 | 0.612 | 0.000 | 0.000 | 0.000 |

| Problem 283 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | B | A | B | B | F | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 25 | 25 | 51 | 31 | 58 | 64 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 2.04 | 1.24 | 2.32 | 2.56 | 0.00 | 0.00 | -0.04 |
| time (sec) | N/A | 0.012 | 0.035 | 0.100 | 0.318 | 0.577 | 0.000 | 0.000 | 0.000 |

| Problem 284 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | A | A | C | F | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 51 | 51 | 71 | 62 | 59 | 94 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 1.39 | 1.22 | 1.16 | 1.84 | 0.00 | 0.00 | -0.02 |
| time (sec) | N/A | 0.047 | 0.025 | 0.065 | 0.322 | 0.582 | 0.000 | 0.000 | 0.000 |

| Problem 285 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | A | A | C | F | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 70 | 70 | 93 | 79 | 76 | 119 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 1.33 | 1.13 | 1.09 | 1.70 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.073 | 0.026 | 0.064 | 0.319 | 0.687 | 0.000 | 0.000 | 0.000 |

| Problem 286 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | A | B | B | F | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 41 | 41 | 68 | 67 | 107 | 137 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 1.66 | 1.63 | 2.61 | 3.34 | 0.00 | 0.00 | -0.02 |
| time (sec) | N/A | 0.016 | 0.083 | 0.069 | 0.330 | 0.630 | 0.000 | 0.000 | 0.000 |

| Problem 287 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | B | A | C | F | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 83 | 83 | 113 | 153 | 108 | 198 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 1.36 | 1.84 | 1.30 | 2.39 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.064 | 0.045 | 0.075 | 0.343 | 0.643 | 0.000 | 0.000 | 0.000 |

| Problem 288 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | A | A | C | F | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 119 | 119 | 149 | 185 | 142 | 247 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 1.25 | 1.55 | 1.19 | 2.08 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.099 | 0.042 | 0.073 | 0.346 | 0.573 | 0.000 | 0.000 | 0.000 |

| Problem 289 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | A | A | A | F(-1) | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 168 | 168 | 108 | 164 | 202 | 283 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.64 | 0.98 | 1.20 | 1.68 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.132 | 0.086 | 0.150 | 0.333 | 0.579 | 0.000 | 0.000 | 0.000 |

| Problem 290 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | B | A | C | F(-1) | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 216 | 216 | 177 | 590 | 194 | 395 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.82 | 2.73 | 0.90 | 1.83 | 0.00 | 0.00 | -0.00 |
| time (sec) | N/A | 2.714 | 0.112 | 0.185 | 0.376 | 0.659 | 0.000 | 0.000 | 0.000 |

| Problem 291 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | B | A | C | F(-1) | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 269 | 269 | 235 | 666 | 254 | 479 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.87 | 2.48 | 0.94 | 1.78 | 0.00 | 0.00 | -0.00 |
| time (sec) | N/A | 2.586 | 0.076 | 0.184 | 0.375 | 0.705 | 0.000 | 0.000 | 0.000 |

| Problem 292 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | A | A | A | A | F | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 17 | 17 | 17 | 19 | 21 | 21 | 14 | 0 | 15 |
| normalized size | 1 | 1.00 | 1.00 | 1.12 | 1.24 | 1.24 | 0.82 | 0.00 | 0.88 |
| time (sec) | N/A | 0.044 | 0.058 | 0.066 | 0.331 | 0.730 | 0.567 | 0.000 | 1.395 |

| Problem 293 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | A | A | A | A | F | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 44 | 44 | 39 | 46 | 37 | 58 | 60 | 0 | 107 |
| normalized size | 1 | 1.00 | 0.89 | 1.05 | 0.84 | 1.32 | 1.36 | 0.00 | 2.43 |
| time (sec) | N/A | 0.052 | 0.018 | 0.068 | 0.325 | 0.607 | 4.217 | 0.000 | 1.561 |

| Problem 294 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | B | A | B | F(-2) | F | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 47 | 47 | 42 | 118 | 40 | 108 | 0 | 0 | 58 |
| normalized size | 1 | 1.00 | 0.89 | 2.51 | 0.85 | 2.30 | 0.00 | 0.00 | 1.23 |
| time (sec) | N/A | 0.055 | 0.038 | 0.129 | 0.304 | 0.637 | 0.000 | 0.000 | 2.510 |

| Problem 295 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | C | B | B | F(-1) | F | B |
| verified | N/A | Yes | NO | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 107 | 107 | 153 | 794 | 184 | 233 | 0 | 0 | 187 |
| normalized size | 1 | 1.00 | 1.43 | 7.42 | 1.72 | 2.18 | 0.00 | 0.00 | 1.75 |
| time (sec) | N/A | 0.155 | 0.181 | 0.513 | 0.415 | 0.590 | 0.000 | 0.000 | 1.672 |

| Problem 296 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | C | A | A | F(-1) | F | B |
| verified | N/A | Yes | NO | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 49 | 49 | 60 | 824 | 64 | 92 | 0 | 0 | 119 |
| normalized size | 1 | 1.00 | 1.22 | 16.82 | 1.31 | 1.88 | 0.00 | 0.00 | 2.43 |
| time (sec) | N/A | 0.079 | 0.093 | 0.430 | 0.326 | 0.496 | 0.000 | 0.000 | 1.830 |

| Problem 297 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | C | A | A | A | F | B |
| verified | N/A | Yes | NO | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 45 | 45 | 46 | 349 | 43 | 25 | 66 | 0 | 28 |
| normalized size | 1 | 1.00 | 1.02 | 7.76 | 0.96 | 0.56 | 1.47 | 0.00 | 0.62 |
| time (sec) | N/A | 0.060 | 0.095 | 0.384 | 0.335 | 0.584 | 3.118 | 0.000 | 0.103 |

| Problem 298 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | A | A | A | F | A | B |
| verified | N/A | Yes | NO | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 45 | 45 | 46 | 68 | 42 | 25 | 0 | 35 | 28 |
| normalized size | 1 | 1.00 | 1.02 | 1.51 | 0.93 | 0.56 | 0.00 | 0.78 | 0.62 |
| time (sec) | N/A | 0.059 | 0.092 | 0.294 | 0.315 | 0.526 | 0.000 | 0.137 | 1.205 |

| Problem 299 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | C | A | A | F(-1) | F | B |
| verified | N/A | Yes | NO | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 49 | 49 | 59 | 939 | 64 | 93 | 0 | 0 | 111 |
| normalized size | 1 | 1.00 | 1.20 | 19.16 | 1.31 | 1.90 | 0.00 | 0.00 | 2.27 |
| time (sec) | N/A | 0.071 | 0.089 | 0.482 | 0.334 | 0.667 | 0.000 | 0.000 | 1.437 |

| Problem 300 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | C | B | B | F | F | B |
| verified | N/A | Yes | NO | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 107 | 107 | 150 | 920 | 184 | 234 | 0 | 0 | 179 |
| normalized size | 1 | 1.00 | 1.40 | 8.60 | 1.72 | 2.19 | 0.00 | 0.00 | 1.67 |
| time (sec) | N/A | 0.148 | 0.167 | 0.646 | 0.421 | 0.460 | 0.000 | 0.000 | 1.604 |

## 2.3 Detailed conclusion table specific for Rubi results

The following table is specific to Rubi. It gives additional statistics for each integral. the column **steps** is the number of steps used by Rubi to obtain the antiderivative. The **rules** column is the number of unique rules used. The **integrand size** column is the leaf size of the integrand. Finally the ratio $\frac{\text{number of rules}}{\text{integrand size}}$ is given. The larger this ratio is, the harder the integral was to solve. In this test, problem number [75] had the largest ratio of [1.333]

Table 2.1: Rubi specific breakdown of results for each integral

| # | grade | number of steps used | number of unique rules | normalized antiderivative leaf size | integrand leaf size | $\frac{\text{number of rules}}{\text{integrand leaf size}}$ |
|---|---|---|---|---|---|---|
| 1 | A | 4 | 3 | 1.00 | 8 | 0.375 |
| 2 | A | 4 | 3 | 1.00 | 8 | 0.375 |
| 3 | A | 4 | 3 | 1.00 | 8 | 0.375 |
| 4 | A | 4 | 3 | 1.00 | 8 | 0.375 |
| 5 | A | 3 | 3 | 1.00 | 6 | 0.500 |
| 6 | A | 2 | 2 | 1.00 | 4 | 0.500 |
| 7 | A | 1 | 1 | 1.00 | 8 | 0.125 |
| 8 | A | 5 | 5 | 1.00 | 8 | 0.625 |
| 9 | A | 3 | 3 | 1.00 | 8 | 0.375 |
| 10 | A | 4 | 3 | 1.00 | 8 | 0.375 |
| 11 | A | 4 | 3 | 1.00 | 8 | 0.375 |
| 12 | A | 15 | 7 | 1.00 | 10 | 0.700 |
| 13 | A | 14 | 9 | 1.00 | 10 | 0.900 |
| 14 | A | 10 | 7 | 1.00 | 10 | 0.700 |
| 15 | A | 9 | 8 | 1.00 | 10 | 0.800 |
| 16 | A | 5 | 5 | 1.00 | 8 | 0.625 |
| 17 | A | 5 | 5 | 1.00 | 6 | 0.833 |
| 18 | A | 6 | 5 | 1.00 | 10 | 0.500 |
| 19 | A | 4 | 4 | 1.00 | 10 | 0.400 |
| 20 | A | 8 | 7 | 1.00 | 10 | 0.700 |

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Table 2.1 – continued from previous page

| # | grade | number of steps used | number of unique rules | normalized antiderivative leaf size | integrand leaf size | $\frac{\text{number of rules}}{\text{integrand leaf size}}$ |
|---|---|---|---|---|---|---|
| 21 | A | 8 | 7 | 1.00 | 10 | 0.700 |
| 22 | A | 13 | 8 | 1.00 | 10 | 0.800 |
| 23 | A | 33 | 11 | 1.00 | 10 | 1.100 |
| 24 | A | 22 | 11 | 1.00 | 10 | 1.100 |
| 25 | A | 18 | 10 | 1.00 | 10 | 1.000 |
| 26 | A | 11 | 9 | 1.00 | 10 | 0.900 |
| 27 | A | 8 | 8 | 1.00 | 8 | 1.000 |
| 28 | A | 5 | 6 | 1.00 | 6 | 1.000 |
| 29 | A | 8 | 6 | 1.00 | 10 | 0.600 |
| 30 | A | 5 | 6 | 1.00 | 10 | 0.600 |
| 31 | A | 7 | 6 | 1.00 | 10 | 0.600 |
| 32 | A | 14 | 11 | 1.00 | 10 | 1.100 |
| 33 | A | 16 | 8 | 1.00 | 10 | 0.800 |
| 34 | A | 1 | 1 | 1.00 | 14 | 0.071 |
| 35 | A | 4 | 4 | 1.00 | 14 | 0.286 |
| 36 | A | 4 | 4 | 1.00 | 14 | 0.286 |
| 37 | A | 5 | 5 | 1.00 | 14 | 0.357 |
| 38 | A | 5 | 4 | 1.00 | 12 | 0.333 |
| 39 | A | 27 | 13 | 1.00 | 14 | 0.929 |
| 40 | A | 25 | 13 | 1.00 | 14 | 0.929 |
| 41 | A | 23 | 11 | 1.00 | 14 | 0.786 |
| 42 | A | 0 | 0 | 0.00 | 0 | 0.000 |
| 43 | A | 0 | 0 | 0.00 | 0 | 0.000 |
| 44 | A | 5 | 6 | 1.00 | 16 | 0.375 |
| 45 | A | 7 | 9 | 1.00 | 16 | 0.562 |
| 46 | A | 8 | 9 | 1.00 | 16 | 0.562 |
| 47 | A | 8 | 9 | 1.00 | 16 | 0.562 |
| 48 | A | 3 | 3 | 1.00 | 15 | 0.200 |
| 49 | A | 2 | 2 | 1.00 | 15 | 0.133 |
| 50 | A | 1 | 1 | 1.00 | 15 | 0.067 |
| 51 | A | 2 | 2 | 1.00 | 15 | 0.133 |
| 52 | A | 3 | 2 | 1.00 | 15 | 0.133 |
| 53 | A | 1 | 1 | 1.00 | 14 | 0.071 |
| 54 | A | 1 | 1 | 1.00 | 14 | 0.071 |
| 55 | A | 4 | 4 | 1.00 | 14 | 0.286 |
| 56 | A | 4 | 4 | 1.00 | 13 | 0.308 |

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Table 2.1 – continued from previous page

| # | grade | number of steps used | number of unique rules | normalized antiderivative leaf size | integrand leaf size | $\frac{\text{number of rules}}{\text{integrand leaf size}}$ |
|---|---|---|---|---|---|---|
| 57 | A | 1 | 1 | 1.00 | 12 | 0.083 |
| 58 | A | 3 | 3 | 1.00 | 13 | 0.231 |
| 59 | A | 2 | 2 | 1.00 | 12 | 0.167 |
| 60 | A | 4 | 3 | 1.00 | 13 | 0.231 |
| 61 | A | 3 | 3 | 1.00 | 12 | 0.250 |
| 62 | A | 7 | 5 | 1.00 | 10 | 0.500 |
| 63 | A | 7 | 5 | 1.00 | 10 | 0.500 |
| 64 | A | 7 | 5 | 1.00 | 8 | 0.625 |
| 65 | A | 3 | 3 | 1.00 | 6 | 0.500 |
| 66 | A | 5 | 5 | 1.00 | 10 | 0.500 |
| 67 | A | 7 | 5 | 1.00 | 10 | 0.500 |
| 68 | A | 5 | 4 | 1.00 | 10 | 0.400 |
| 69 | A | 19 | 15 | 1.00 | 12 | 1.250 |
| 70 | A | 15 | 13 | 1.00 | 12 | 1.083 |
| 71 | A | 12 | 10 | 1.00 | 10 | 1.000 |
| 72 | A | 6 | 6 | 1.00 | 8 | 0.750 |
| 73 | A | 2 | 2 | 1.00 | 12 | 0.167 |
| 74 | A | 17 | 15 | 1.00 | 12 | 1.250 |
| 75 | A | 21 | 16 | 1.00 | 12 | 1.333 |
| 76 | A | 37 | 7 | 0.89 | 16 | 0.438 |
| 77 | A | 5 | 5 | 1.00 | 14 | 0.357 |
| 78 | A | 37 | 10 | 1.23 | 16 | 0.625 |
| 79 | A | 57 | 11 | 1.00 | 16 | 0.688 |
| 80 | A | 55 | 16 | 1.00 | 18 | 0.889 |
| 81 | A | 65 | 19 | 1.00 | 18 | 1.056 |
| 82 | A | 12 | 8 | 1.00 | 19 | 0.421 |
| 83 | A | 6 | 4 | 1.00 | 10 | 0.400 |
| 84 | A | 5 | 4 | 1.00 | 8 | 0.500 |
| 85 | A | 4 | 4 | 1.00 | 6 | 0.667 |
| 86 | A | 2 | 2 | 1.00 | 10 | 0.200 |
| 87 | A | 4 | 4 | 1.00 | 10 | 0.400 |
| 88 | A | 5 | 4 | 1.00 | 10 | 0.400 |
| 89 | A | 3 | 2 | 1.00 | 12 | 0.167 |
| 90 | A | 3 | 2 | 1.00 | 12 | 0.167 |
| 91 | A | 2 | 2 | 1.00 | 12 | 0.167 |
| 92 | A | 4 | 4 | 1.00 | 12 | 0.333 |

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Table 2.1 – continued from previous page

| # | grade | number of steps used | number of unique rules | normalized antiderivative leaf size | integrand leaf size | $\frac{\text{number of rules}}{\text{integrand leaf size}}$ |
|---|---|---|---|---|---|---|
| 93 | A | 2 | 2 | 1.00 | 10 | 0.200 |
| 94 | A | 3 | 3 | 1.00 | 4 | 0.750 |
| 95 | A | 2 | 2 | 1.00 | 10 | 0.200 |
| 96 | A | 4 | 4 | 1.00 | 12 | 0.333 |
| 97 | A | 5 | 4 | 1.00 | 14 | 0.286 |
| 98 | A | 2 | 2 | 1.00 | 14 | 0.143 |
| 99 | A | 6 | 6 | 1.00 | 14 | 0.429 |
| 100 | A | 3 | 3 | 1.00 | 12 | 0.250 |
| 101 | A | 3 | 3 | 1.00 | 19 | 0.158 |
| 102 | A | 7 | 5 | 1.00 | 18 | 0.278 |
| 103 | A | 7 | 5 | 1.00 | 18 | 0.278 |
| 104 | A | 7 | 5 | 1.00 | 16 | 0.312 |
| 105 | A | 4 | 3 | 1.00 | 10 | 0.300 |
| 106 | A | 5 | 5 | 1.00 | 18 | 0.278 |
| 107 | A | 7 | 5 | 1.00 | 18 | 0.278 |
| 108 | A | 5 | 4 | 1.00 | 18 | 0.222 |
| 109 | A | 16 | 13 | 1.00 | 20 | 0.650 |
| 110 | A | 13 | 10 | 1.00 | 18 | 0.556 |
| 111 | A | 6 | 6 | 1.00 | 12 | 0.500 |
| 112 | A | 2 | 2 | 1.00 | 20 | 0.100 |
| 113 | A | 21 | 19 | 1.01 | 20 | 0.950 |
| 114 | A | 21 | 14 | 1.00 | 20 | 0.700 |
| 115 | A | 15 | 11 | 1.00 | 18 | 0.611 |
| 116 | A | 6 | 7 | 1.00 | 12 | 0.583 |
| 117 | A | 2 | 2 | 1.00 | 20 | 0.100 |
| 118 | A | 30 | 18 | 1.00 | 20 | 0.900 |
| 119 | A | 6 | 4 | 1.00 | 18 | 0.222 |
| 120 | A | 0 | 0 | 0.00 | 0 | 0.000 |
| 121 | A | 0 | 0 | 0.00 | 0 | 0.000 |
| 122 | A | 0 | 0 | 0.00 | 0 | 0.000 |
| 123 | A | 9 | 7 | 1.00 | 40 | 0.175 |
| 124 | A | 7 | 6 | 1.00 | 40 | 0.150 |
| 125 | A | 2 | 3 | 1.00 | 38 | 0.079 |
| 126 | A | 0 | 0 | 0.00 | 0 | 0.000 |
| 127 | A | 0 | 0 | 0.00 | 0 | 0.000 |
| 128 | A | 2 | 2 | 1.00 | 11 | 0.182 |

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Table 2.1 – continued from previous page

| # | grade | number of steps used | number of unique rules | normalized antiderivative leaf size | integrand leaf size | $\frac{\text{number of rules}}{\text{integrand leaf size}}$ |
|---|---|---|---|---|---|---|
| 129 | A | 2 | 2 | 1.00 | 11 | 0.182 |
| 130 | A | 2 | 2 | 1.00 | 9 | 0.222 |
| 131 | A | 2 | 2 | 1.00 | 7 | 0.286 |
| 132 | A | 2 | 2 | 1.00 | 11 | 0.182 |
| 133 | A | 2 | 2 | 1.00 | 11 | 0.182 |
| 134 | A | 2 | 2 | 1.00 | 11 | 0.182 |
| 135 | A | 2 | 2 | 1.00 | 11 | 0.182 |
| 136 | A | 3 | 2 | 1.00 | 13 | 0.154 |
| 137 | A | 3 | 2 | 1.00 | 13 | 0.154 |
| 138 | A | 3 | 2 | 1.00 | 13 | 0.154 |
| 139 | A | 3 | 3 | 1.00 | 11 | 0.273 |
| 140 | A | 2 | 2 | 1.00 | 9 | 0.222 |
| 141 | A | 3 | 3 | 1.00 | 13 | 0.231 |
| 142 | A | 3 | 3 | 1.00 | 13 | 0.231 |
| 143 | A | 3 | 2 | 1.00 | 13 | 0.154 |
| 144 | A | 1 | 1 | 1.00 | 13 | 0.077 |
| 145 | A | 2 | 2 | 1.00 | 13 | 0.154 |
| 146 | A | 4 | 2 | 1.00 | 13 | 0.154 |
| 147 | A | 4 | 2 | 1.00 | 13 | 0.154 |
| 148 | A | 4 | 2 | 1.00 | 13 | 0.154 |
| 149 | A | 4 | 3 | 1.00 | 13 | 0.231 |
| 150 | A | 3 | 3 | 1.00 | 11 | 0.273 |
| 151 | A | 2 | 2 | 1.00 | 9 | 0.222 |
| 152 | A | 4 | 3 | 1.00 | 13 | 0.231 |
| 153 | A | 4 | 4 | 1.00 | 13 | 0.308 |
| 154 | A | 4 | 3 | 1.00 | 13 | 0.231 |
| 155 | A | 4 | 2 | 1.00 | 13 | 0.154 |
| 156 | A | 1 | 1 | 1.00 | 13 | 0.077 |
| 157 | A | 2 | 2 | 1.00 | 13 | 0.154 |
| 158 | A | 1 | 1 | 1.00 | 13 | 0.077 |
| 159 | A | 5 | 4 | 1.00 | 13 | 0.308 |
| 160 | A | 4 | 4 | 1.00 | 13 | 0.308 |
| 161 | A | 3 | 3 | 1.00 | 11 | 0.273 |
| 162 | A | 2 | 2 | 1.00 | 9 | 0.222 |
| 163 | A | 4 | 3 | 1.00 | 13 | 0.231 |
| 164 | A | 5 | 4 | 1.00 | 13 | 0.308 |

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Table 2.1 – continued from previous page

| # | grade | number of steps used | number of unique rules | normalized antiderivative leaf size | integrand leaf size | number of rules / integrand leaf size |
|---|---|---|---|---|---|---|
| 165 | A | 6 | 4 | 1.00 | 13 | 0.308 |
| 166 | A | 2 | 2 | 1.00 | 13 | 0.154 |
| 167 | A | 6 | 5 | 1.00 | 13 | 0.385 |
| 168 | A | 5 | 5 | 1.00 | 13 | 0.385 |
| 169 | A | 4 | 4 | 1.00 | 13 | 0.308 |
| 170 | A | 3 | 3 | 1.00 | 11 | 0.273 |
| 171 | A | 2 | 2 | 1.00 | 9 | 0.222 |
| 172 | A | 5 | 4 | 1.00 | 13 | 0.308 |
| 173 | A | 6 | 5 | 1.00 | 13 | 0.385 |
| 174 | A | 7 | 5 | 1.00 | 13 | 0.385 |
| 175 | A | 3 | 2 | 1.00 | 13 | 0.154 |
| 176 | A | 6 | 5 | 1.00 | 13 | 0.385 |
| 177 | A | 5 | 4 | 1.00 | 13 | 0.308 |
| 178 | A | 4 | 3 | 1.00 | 13 | 0.231 |
| 179 | A | 3 | 3 | 1.00 | 11 | 0.273 |
| 180 | A | 2 | 2 | 1.00 | 9 | 0.222 |
| 181 | A | 6 | 4 | 1.00 | 13 | 0.308 |
| 182 | A | 7 | 5 | 1.00 | 13 | 0.385 |
| 183 | A | 8 | 5 | 1.00 | 13 | 0.385 |
| 184 | A | 1 | 1 | 1.00 | 13 | 0.077 |
| 185 | A | 6 | 3 | 1.00 | 13 | 0.231 |
| 186 | A | 5 | 3 | 1.00 | 13 | 0.231 |
| 187 | A | 4 | 3 | 1.00 | 13 | 0.231 |
| 188 | A | 3 | 3 | 1.00 | 11 | 0.273 |
| 189 | A | 2 | 2 | 1.00 | 9 | 0.222 |
| 190 | A | 1 | 1 | 1.00 | 13 | 0.077 |
| 191 | A | 2 | 2 | 1.00 | 13 | 0.154 |
| 192 | A | 3 | 2 | 1.00 | 13 | 0.154 |
| 193 | A | 2 | 2 | 1.00 | 11 | 0.182 |
| 194 | A | 2 | 2 | 1.00 | 11 | 0.182 |
| 195 | A | 2 | 2 | 1.00 | 9 | 0.222 |
| 196 | A | 2 | 2 | 1.00 | 7 | 0.286 |
| 197 | A | 2 | 2 | 1.00 | 11 | 0.182 |
| 198 | A | 2 | 2 | 1.00 | 11 | 0.182 |
| 199 | A | 2 | 2 | 1.00 | 11 | 0.182 |
| 200 | A | 6 | 4 | 1.00 | 3 | 1.333 |

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Table 2.1 – continued from previous page

| # | grade | number of steps used | number of unique rules | normalized antiderivative leaf size | integrand leaf size | $\frac{\text{number of rules}}{\text{integrand leaf size}}$ |
|---|---|---|---|---|---|---|
| 201 | A | 8 | 5 | 1.00 | 5 | 1.000 |
| 202 | A | 10 | 6 | 1.00 | 7 | 0.857 |
| 203 | A | 11 | 6 | 1.00 | 15 | 0.400 |
| 204 | A | 9 | 5 | 1.00 | 13 | 0.385 |
| 205 | A | 7 | 4 | 1.00 | 11 | 0.364 |
| 206 | A | 0 | 0 | 0.00 | 0 | 0.000 |
| 207 | A | 8 | 7 | 1.00 | 16 | 0.438 |
| 208 | A | 7 | 7 | 1.00 | 16 | 0.438 |
| 209 | A | 6 | 6 | 1.00 | 14 | 0.429 |
| 210 | A | 5 | 5 | 1.00 | 12 | 0.417 |
| 211 | A | 0 | 0 | 0.00 | 0 | 0.000 |
| 212 | A | 8 | 7 | 1.00 | 19 | 0.368 |
| 213 | A | 7 | 7 | 1.00 | 19 | 0.368 |
| 214 | A | 6 | 6 | 1.00 | 17 | 0.353 |
| 215 | A | 5 | 5 | 1.00 | 15 | 0.333 |
| 216 | A | 0 | 0 | 0.00 | 0 | 0.000 |
| 217 | A | 11 | 6 | 1.00 | 15 | 0.400 |
| 218 | A | 9 | 5 | 1.00 | 13 | 0.385 |
| 219 | A | 7 | 4 | 1.00 | 11 | 0.364 |
| 220 | A | 0 | 0 | 0.00 | 0 | 0.000 |
| 221 | A | 8 | 7 | 1.00 | 16 | 0.438 |
| 222 | A | 7 | 7 | 1.00 | 16 | 0.438 |
| 223 | A | 6 | 6 | 1.00 | 14 | 0.429 |
| 224 | A | 5 | 5 | 1.00 | 12 | 0.417 |
| 225 | A | 0 | 0 | 0.00 | 0 | 0.000 |
| 226 | A | 8 | 7 | 1.00 | 19 | 0.368 |
| 227 | A | 7 | 7 | 1.00 | 19 | 0.368 |
| 228 | A | 6 | 6 | 1.00 | 17 | 0.353 |
| 229 | A | 5 | 5 | 1.00 | 15 | 0.333 |
| 230 | A | 0 | 0 | 0.00 | 0 | 0.000 |
| 231 | A | 12 | 6 | 1.00 | 15 | 0.400 |
| 232 | A | 10 | 6 | 1.00 | 15 | 0.400 |
| 233 | A | 8 | 5 | 1.00 | 13 | 0.385 |
| 234 | A | 6 | 4 | 1.00 | 7 | 0.571 |
| 235 | A | 0 | 0 | 0.00 | 0 | 0.000 |
| 236 | A | 11 | 6 | 1.00 | 15 | 0.400 |

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Table 2.1 – continued from previous page

| # | grade | number of steps used | number of unique rules | normalized antiderivative leaf size | integrand leaf size | number of rules / integrand leaf size |
|---|---|---|---|---|---|---|
| 237 | A | 9 | 5 | 1.00 | 13 | 0.385 |
| 238 | A | 7 | 4 | 1.00 | 11 | 0.364 |
| 239 | A | 0 | 0 | 0.00 | 0 | 0.000 |
| 240 | A | 7 | 7 | 1.00 | 20 | 0.350 |
| 241 | A | 6 | 6 | 1.00 | 18 | 0.333 |
| 242 | A | 5 | 5 | 1.00 | 16 | 0.312 |
| 243 | A | 0 | 0 | 0.00 | 0 | 0.000 |
| 244 | A | 7 | 7 | 1.00 | 21 | 0.333 |
| 245 | A | 6 | 6 | 1.00 | 19 | 0.316 |
| 246 | A | 5 | 5 | 1.00 | 17 | 0.294 |
| 247 | A | 0 | 0 | 0.00 | 0 | 0.000 |
| 248 | A | 12 | 6 | 1.00 | 15 | 0.400 |
| 249 | A | 10 | 6 | 1.00 | 15 | 0.400 |
| 250 | A | 8 | 5 | 1.00 | 13 | 0.385 |
| 251 | A | 6 | 4 | 1.00 | 7 | 0.571 |
| 252 | A | 0 | 0 | 0.00 | 0 | 0.000 |
| 253 | A | 11 | 6 | 1.00 | 15 | 0.400 |
| 254 | A | 9 | 5 | 1.00 | 13 | 0.385 |
| 255 | A | 7 | 4 | 1.00 | 11 | 0.364 |
| 256 | A | 0 | 0 | 0.00 | 0 | 0.000 |
| 257 | A | 7 | 7 | 1.00 | 20 | 0.350 |
| 258 | A | 6 | 6 | 1.00 | 18 | 0.333 |
| 259 | A | 5 | 5 | 1.00 | 16 | 0.312 |
| 260 | A | 0 | 0 | 0.00 | 0 | 0.000 |
| 261 | A | 7 | 7 | 1.00 | 21 | 0.333 |
| 262 | A | 6 | 6 | 1.00 | 19 | 0.316 |
| 263 | A | 5 | 5 | 1.00 | 17 | 0.294 |
| 264 | A | 0 | 0 | 0.00 | 0 | 0.000 |
| 265 | A | 11 | 8 | 1.00 | 24 | 0.333 |
| 266 | A | 23 | 11 | 1.00 | 27 | 0.407 |
| 267 | A | 14 | 11 | 1.00 | 27 | 0.407 |
| 268 | A | 7 | 8 | 1.00 | 25 | 0.320 |
| 269 | A | 21 | 11 | 1.00 | 27 | 0.407 |
| 270 | A | 13 | 13 | 1.00 | 27 | 0.482 |
| 271 | A | 17 | 14 | 1.00 | 27 | 0.518 |
| 272 | A | 26 | 15 | 1.00 | 27 | 0.556 |

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Table 2.1 – continued from previous page

| # | grade | number of steps used | number of unique rules | normalized antiderivative leaf size | integrand leaf size | $\frac{\text{number of rules}}{\text{integrand leaf size}}$ |
|---|---|---|---|---|---|---|
| 273 | A | 21 | 15 | 1.00 | 27 | 0.556 |
| 274 | A | 9 | 8 | 1.00 | 24 | 0.333 |
| 275 | A | 8 | 8 | 0.90 | 27 | 0.296 |
| 276 | A | 17 | 16 | 0.97 | 27 | 0.593 |
| 277 | A | 26 | 18 | 0.98 | 27 | 0.667 |
| 278 | A | 22 | 17 | 1.00 | 22 | 0.773 |
| 279 | A | 38 | 20 | 1.00 | 21 | 0.952 |
| 280 | A | 0 | 0 | 0.00 | 0 | 0.000 |
| 281 | A | 38 | 22 | 1.00 | 24 | 0.917 |
| 282 | A | 32 | 17 | 1.00 | 24 | 0.708 |
| 283 | A | 2 | 2 | 1.00 | 4 | 0.500 |
| 284 | A | 7 | 4 | 1.00 | 6 | 0.667 |
| 285 | A | 9 | 5 | 1.00 | 8 | 0.625 |
| 286 | A | 2 | 2 | 1.00 | 8 | 0.250 |
| 287 | A | 7 | 4 | 1.00 | 10 | 0.400 |
| 288 | A | 9 | 5 | 1.00 | 12 | 0.417 |
| 289 | A | 6 | 6 | 1.00 | 12 | 0.500 |
| 290 | A | 25 | 8 | 1.00 | 14 | 0.571 |
| 291 | A | 29 | 9 | 1.00 | 16 | 0.562 |
| 292 | A | 1 | 1 | 1.00 | 20 | 0.050 |
| 293 | A | 4 | 4 | 1.00 | 12 | 0.333 |
| 294 | A | 4 | 4 | 1.00 | 14 | 0.286 |
| 295 | A | 8 | 7 | 1.00 | 20 | 0.350 |
| 296 | A | 5 | 5 | 1.00 | 20 | 0.250 |
| 297 | A | 3 | 2 | 1.00 | 20 | 0.100 |
| 298 | A | 3 | 2 | 1.00 | 20 | 0.100 |
| 299 | A | 5 | 5 | 1.00 | 20 | 0.250 |
| 300 | A | 8 | 7 | 1.00 | 20 | 0.350 |

# Chapter 3

# Listing of integrals

## 3.1 $\int x^5 \coth^{-1}(ax)\, dx$

**Optimal**. Leaf size=51

$$-\frac{\tanh^{-1}(ax)}{6a^6}+\frac{x}{6a^5}+\frac{x^3}{18a^3}+\frac{1}{6}x^6\coth^{-1}(ax)+\frac{x^5}{30a}$$

```
[Out] 1/6*x/a^5+1/18*x^3/a^3+1/30*x^5/a+1/6*x^6*arccoth(a*x)-1/6*arctanh(a*x)/a^6
```

**Rubi [A]** time = 0.03, antiderivative size = 51, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 3, integrand size = 8, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.375, Rules used = {5917, 302, 206}

$$\frac{x^3}{18a^3}+\frac{x}{6a^5}-\frac{\tanh^{-1}(ax)}{6a^6}+\frac{x^5}{30a}+\frac{1}{6}x^6\coth^{-1}(ax)$$

Antiderivative was successfully verified.

```
[In] Int[x^5*ArcCoth[a*x],x]
```

```
[Out] x/(6*a^5) + x^3/(18*a^3) + x^5/(30*a) + (x^6*ArcCoth[a*x])/6 - ArcTanh[a*x]
/(6*a^6)
```

Rule 206

```
Int[((a_) + (b_.)*(x_)^2)^(-1), x_Symbol] :> Simp[(1*ArcTanh[(Rt[-b, 2]*x)/
Rt[a, 2]])/(Rt[a, 2]*Rt[-b, 2]), x] /; FreeQ[{a, b}, x] && NegQ[a/b] && (Gt
Q[a, 0] || LtQ[b, 0])
```

Rule 302

```
Int[(x_)^(m_)/((a_) + (b_.)*(x_)^(n_)), x_Symbol] :> Int[PolynomialDivide[x
^m, a + b*x^n, x], x] /; FreeQ[{a, b}, x] && IGtQ[m, 0] && IGtQ[n, 0] && Gt
Q[m, 2*n - 1]
```

Rule 5917

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)*((d_.)*(x_))^(m_.), x_Symbol]
 :> Simp[((d*x)^(m + 1)*(a + b*ArcCoth[c*x])^p)/(d*(m + 1)), x] - Dist[(b*c
*p)/(d*(m + 1)), Int[((d*x)^(m + 1)*(a + b*ArcCoth[c*x])^(p - 1))/(1 - c^2*
x^2), x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[p, 0] && (EqQ[p, 1] || In
tegerQ[m]) && NeQ[m, -1]
```

Rubi steps

$$\begin{aligned}\int x^5 \coth^{-1}(ax)\,dx &= \frac{1}{6}x^6\coth^{-1}(ax) - \frac{1}{6}a\int \frac{x^6}{1-a^2x^2}\,dx \\ &= \frac{1}{6}x^6\coth^{-1}(ax) - \frac{1}{6}a\int\left(-\frac{1}{a^6}-\frac{x^2}{a^4}-\frac{x^4}{a^2}+\frac{1}{a^6\left(1-a^2x^2\right)}\right)dx \\ &= \frac{x}{6a^5}+\frac{x^3}{18a^3}+\frac{x^5}{30a}+\frac{1}{6}x^6\coth^{-1}(ax)-\frac{\int\frac{1}{1-a^2x^2}\,dx}{6a^5} \\ &= \frac{x}{6a^5}+\frac{x^3}{18a^3}+\frac{x^5}{30a}+\frac{1}{6}x^6\coth^{-1}(ax)-\frac{\tanh^{-1}(ax)}{6a^6}\end{aligned}$$

**Mathematica** [A] time = 0.01, size = 67, normalized size = 1.31

$$\frac{\log(1-ax)}{12a^6}-\frac{\log(ax+1)}{12a^6}+\frac{x}{6a^5}+\frac{x^3}{18a^3}+\frac{1}{6}x^6\coth^{-1}(ax)+\frac{x^5}{30a}$$

Antiderivative was successfully verified.

```
[In] Integrate[x^5*ArcCoth[a*x],x]
[Out] x/(6*a^5) + x^3/(18*a^3) + x^5/(30*a) + (x^6*ArcCoth[a*x])/6 + Log[1 - a*x]
/(12*a^6) - Log[1 + a*x]/(12*a^6)
```

**fricas** [A] time = 0.70, size = 51, normalized size = 1.00

$$\frac{6\,a^5x^5+10\,a^3x^3+30\,ax+15\left(a^6x^6-1\right)\log\left(\frac{ax+1}{ax-1}\right)}{180\,a^6}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^5*arccoth(a*x),x, algorithm="fricas")
[Out] 1/180*(6*a^5*x^5 + 10*a^3*x^3 + 30*a*x + 15*(a^6*x^6 - 1)*log((a*x + 1)/(a*
x - 1)))/a^6
```

**giac** [F] time = 0.00, size = 0, normalized size = 0.00

$$\int x^5\,\operatorname{arcoth}(ax)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^5*arccoth(a*x),x, algorithm="giac")
[Out] integrate(x^5*arccoth(a*x), x)
```

**maple** [A] time = 0.03, size = 55, normalized size = 1.08

$$\frac{x^6\operatorname{arccoth}(ax)}{6}+\frac{x^5}{30a}+\frac{x^3}{18a^3}+\frac{x}{6a^5}+\frac{\ln(ax-1)}{12a^6}-\frac{\ln(ax+1)}{12a^6}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^5*arccoth(a*x),x)
[Out] 1/6*x^6*arccoth(a*x)+1/30*x^5/a+1/18*x^3/a^3+1/6*x/a^5+1/12/a^6*ln(a*x-1)-1
/12*ln(a*x+1)/a^6
```

**maxima** [A] time = 0.30, size = 61, normalized size = 1.20

$$\frac{1}{6}x^6\operatorname{arcoth}(ax)+\frac{1}{180}a\left(\frac{2\left(3\,a^4x^5+5\,a^2x^3+15\,x\right)}{a^6}-\frac{15\log(ax+1)}{a^7}+\frac{15\log(ax-1)}{a^7}\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^5*arccoth(a*x),x, algorithm="maxima")
```

```
[Out] 1/6*x^6*arccoth(a*x) + 1/180*a*(2*(3*a^4*x^5 + 5*a^2*x^3 + 15*x)/a^6 - 15*l
og(a*x + 1)/a^7 + 15*log(a*x - 1)/a^7)
```

**mupad [B]** time = 1.31, size = 41, normalized size = 0.80

$$\frac{\frac{a\,x}{6}-\frac{\mathrm{acoth}(a\,x)}{6}+\frac{a^3\,x^3}{18}+\frac{a^5\,x^5}{30}}{a^6}+\frac{x^6\,\mathrm{acoth}\left(a\,x\right)}{6}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^5*acoth(a*x),x)
```

```
[Out] ((a*x)/6 - acoth(a*x)/6 + (a^3*x^3)/18 + (a^5*x^5)/30)/a^6 + (x^6*acoth(a*x
))/6
```

**sympy [A]** time = 1.53, size = 49, normalized size = 0.96

$$\begin{cases} \frac{x^6\,\mathrm{acoth}\,(ax)}{6}+\frac{x^5}{30a}+\frac{x^3}{18a^3}+\frac{x}{6a^5}-\frac{\mathrm{acoth}\,(ax)}{6a^6} & \text{for } a\neq 0 \\ \frac{i\pi x^6}{12} & \text{otherwise} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**5*acoth(a*x),x)
```

```
[Out] Piecewise((x**6*acoth(a*x)/6 + x**5/(30*a) + x**3/(18*a**3) + x/(6*a**5) -
acoth(a*x)/(6*a**6), Ne(a, 0)), (I*pi*x**6/12, True))
```

## 3.2 $\int x^4 \coth^{-1}(ax)\, dx$

**Optimal**. Leaf size=50

$$\frac{x^2}{10a^3} + \frac{\log\left(1-a^2x^2\right)}{10a^5} + \frac{1}{5}x^5\coth^{-1}(ax) + \frac{x^4}{20a}$$

```
[Out] 1/10*x^2/a^3+1/20*x^4/a+1/5*x^5*arccoth(a*x)+1/10*ln(-a^2*x^2+1)/a^5
```

**Rubi [A]** time = 0.04, antiderivative size = 50, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 3, integrand size = 8, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.375, Rules used = {5917, 266, 43}

$$\frac{x^2}{10a^3} + \frac{\log\left(1-a^2x^2\right)}{10a^5} + \frac{x^4}{20a} + \frac{1}{5}x^5\coth^{-1}(ax)$$

Antiderivative was successfully verified.

```
[In] Int[x^4*ArcCoth[a*x],x]
```

```
[Out] x^2/(10*a^3) + x^4/(20*a) + (x^5*ArcCoth[a*x])/5 + Log[1 - a^2*x^2]/(10*a^5
)
```

Rule 43

```
Int[((a_.) + (b_.)*(x_))^(m_.)*((c_.) + (d_.)*(x_))^(n_.), x_Symbol] :> Int
[ExpandIntegrand[(a + b*x)^m*(c + d*x)^n, x], x] /; FreeQ[{a, b, c, d, n},
x] && NeQ[b*c - a*d, 0] && IGtQ[m, 0] && ( !IntegerQ[n] || (EqQ[c, 0] && Le
Q[7*m + 4*n + 4, 0]) || LtQ[9*m + 5*(n + 1), 0] || GtQ[m + n + 2, 0])
```

Rule 266

```
Int[(x_)^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Dist[1/n, Subst[
Int[x^(Simplify[(m + 1)/n] - 1)*(a + b*x)^p, x], x, x^n], x] /; FreeQ[{a, b
, m, n, p}, x] && IntegerQ[Simplify[(m + 1)/n]]
```

Rule 5917

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)*((d_.)*(x_))^(m_.), x_Symbol]
 :> Simp[((d*x)^(m + 1)*(a + b*ArcCoth[c*x])^p)/(d*(m + 1)), x] - Dist[(b*c
*p)/(d*(m + 1)), Int[((d*x)^(m + 1)*(a + b*ArcCoth[c*x])^(p - 1))/(1 - c^2*
x^2), x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[p, 0] && (EqQ[p, 1] || In
tegerQ[m]) && NeQ[m, -1]
```

Rubi steps

$$\begin{aligned}
\int x^4\coth^{-1}(ax)\,dx &= \frac{1}{5}x^5\coth^{-1}(ax) - \frac{1}{5}a\int \frac{x^5}{1-a^2x^2}\,dx \\
&= \frac{1}{5}x^5\coth^{-1}(ax) - \frac{1}{10}a\,\text{Subst}\left(\int \frac{x^2}{1-a^2x}\,dx, x, x^2\right) \\
&= \frac{1}{5}x^5\coth^{-1}(ax) - \frac{1}{10}a\,\text{Subst}\left(\int \left(-\frac{1}{a^4} - \frac{x}{a^2} - \frac{1}{a^4\left(-1+a^2x\right)}\right)dx, x, x^2\right) \\
&= \frac{x^2}{10a^3} + \frac{x^4}{20a} + \frac{1}{5}x^5\coth^{-1}(ax) + \frac{\log\left(1-a^2x^2\right)}{10a^5}
\end{aligned}$$

**Mathematica** [A] time = 0.01, size = 50, normalized size = 1.00

$$\frac{x^2}{10a^3}+\frac{\log\left(1-a^2x^2\right)}{10a^5}+\frac{1}{5}x^5\coth^{-1}(ax)+\frac{x^4}{20a}$$

Antiderivative was successfully verified.

```
[In] Integrate[x^4*ArcCoth[a*x],x]
```

```
[Out] x^2/(10*a^3) + x^4/(20*a) + (x^5*ArcCoth[a*x])/5 + Log[1 - a^2*x^2]/(10*a^5
)
```

**fricas** [A] time = 0.58, size = 55, normalized size = 1.10

$$\frac{2\,a^5x^5\log\left(\frac{ax+1}{ax-1}\right)+a^4x^4+2\,a^2x^2+2\,\log\left(a^2x^2-1\right)}{20\,a^5}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^4*arccoth(a*x),x, algorithm="fricas")
```

```
[Out] 1/20*(2*a^5*x^5*log((a*x + 1)/(a*x - 1)) + a^4*x^4 + 2*a^2*x^2 + 2*log(a^2*
x^2 - 1))/a^5
```

**giac** [F] time = 0.00, size = 0, normalized size = 0.00

$$\int x^4\,\mathrm{arcoth}\,(ax)\;dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^4*arccoth(a*x),x, algorithm="giac")
```

```
[Out] integrate(x^4*arccoth(a*x), x)
```

**maple** [A] time = 0.03, size = 49, normalized size = 0.98

$$\frac{x^5\mathrm{arccoth}\,(ax)}{5}+\frac{x^4}{20a}+\frac{x^2}{10a^3}+\frac{\ln(ax-1)}{10a^5}+\frac{\ln(ax+1)}{10a^5}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^4*arccoth(a*x),x)
```

```
[Out] 1/5*x^5*arccoth(a*x)+1/20*x^4/a+1/10*x^2/a^3+1/10/a^5*ln(a*x-1)+1/10*ln(a*x
+1)/a^5
```

**maxima** [A] time = 0.30, size = 46, normalized size = 0.92

$$\frac{1}{5}\,x^5\,\mathrm{arcoth}\,(ax)+\frac{1}{20}\,a\left(\frac{a^2x^4+2\,x^2}{a^4}+\frac{2\,\log\left(a^2x^2-1\right)}{a^6}\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^4*arccoth(a*x),x, algorithm="maxima")
```

```
[Out] 1/5*x^5*arccoth(a*x) + 1/20*a*((a^2*x^4 + 2*x^2)/a^4 + 2*log(a^2*x^2 - 1)/a
^6)
```

**mupad** [B] time = 1.27, size = 43, normalized size = 0.86

$$\frac{\frac{\ln\left(a^2\,x^2-1\right)}{10}+\frac{a^2\,x^2}{10}+\frac{a^4\,x^4}{20}}{a^5}+\frac{x^5\,\mathrm{acoth}\,(a\,x)}{5}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^4*acoth(a*x),x)
```

```
[Out] (log(a^2*x^2 - 1)/10 + (a^2*x^2)/10 + (a^4*x^4)/20)/a^5 + (x^5*acoth(a*x))/
5
```

**sympy [A]** time = 1.18, size = 54, normalized size = 1.08

$$\begin{cases} \frac{x^5 \operatorname{acoth}(ax)}{5} + \frac{x^4}{20a} + \frac{x^2}{10a^3} + \frac{\log(ax+1)}{5a^5} - \frac{\operatorname{acoth}(ax)}{5a^5} & \text{for } a \neq 0 \\ \frac{i\pi x^5}{10} & \text{otherwise} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**4*acoth(a*x),x)
```

```
[Out] Piecewise((x**5*acoth(a*x)/5 + x**4/(20*a) + x**2/(10*a**3) + log(a*x + 1)/
(5*a**5) - acoth(a*x)/(5*a**5), Ne(a, 0)), (I*pi*x**5/10, True))
```

## 3.3 $\int x^3 \coth^{-1}(ax)\,dx$

**Optimal**. Leaf size=41

$$-\frac{\tanh^{-1}(ax)}{4a^4}+\frac{x}{4a^3}+\frac{1}{4}x^4\coth^{-1}(ax)+\frac{x^3}{12a}$$

```
[Out] 1/4*x/a^3+1/12*x^3/a+1/4*x^4*arccoth(a*x)-1/4*arctanh(a*x)/a^4
```

**Rubi [A]** time = 0.02, antiderivative size = 41, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 3, integrand size = 8, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.375, Rules used = {5917, 302, 206}

$$\frac{x}{4a^3}-\frac{\tanh^{-1}(ax)}{4a^4}+\frac{x^3}{12a}+\frac{1}{4}x^4\coth^{-1}(ax)$$

Antiderivative was successfully verified.

```
[In] Int[x^3*ArcCoth[a*x],x]
```

```
[Out] x/(4*a^3) + x^3/(12*a) + (x^4*ArcCoth[a*x])/4 - ArcTanh[a*x]/(4*a^4)
```

Rule 206

```
Int[((a_) + (b_.)*(x_)^2)^(-1), x_Symbol] :> Simp[(1*ArcTanh[(Rt[-b, 2]*x)/
Rt[a, 2]])/(Rt[a, 2]*Rt[-b, 2]), x] /; FreeQ[{a, b}, x] && NegQ[a/b] && (Gt
Q[a, 0] || LtQ[b, 0])
```

Rule 302

```
Int[(x_)^(m_)/((a_) + (b_.)*(x_)^(n_)), x_Symbol] :> Int[PolynomialDivide[x
^m, a + b*x^n, x], x] /; FreeQ[{a, b}, x] && IGtQ[m, 0] && IGtQ[n, 0] && Gt
Q[m, 2*n - 1]
```

Rule 5917

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)*((d_.)*(x_))^(m_.), x_Symbol]
 :> Simp[((d*x)^(m + 1)*(a + b*ArcCoth[c*x])^p)/(d*(m + 1)), x] - Dist[(b*c
*p)/(d*(m + 1)), Int[((d*x)^(m + 1)*(a + b*ArcCoth[c*x])^(p - 1))/(1 - c^2*
x^2), x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[p, 0] && (EqQ[p, 1] || In
tegerQ[m]) && NeQ[m, -1]
```

Rubi steps

$$\begin{aligned}
\int x^3\coth^{-1}(ax)\,dx &= \frac{1}{4}x^4\coth^{-1}(ax)-\frac{1}{4}a\int\frac{x^4}{1-a^2x^2}\,dx\\
&= \frac{1}{4}x^4\coth^{-1}(ax)-\frac{1}{4}a\int\left(-\frac{1}{a^4}-\frac{x^2}{a^2}+\frac{1}{a^4\left(1-a^2x^2\right)}\right)dx\\
&= \frac{x}{4a^3}+\frac{x^3}{12a}+\frac{1}{4}x^4\coth^{-1}(ax)-\frac{\int\frac{1}{1-a^2x^2}\,dx}{4a^3}\\
&= \frac{x}{4a^3}+\frac{x^3}{12a}+\frac{1}{4}x^4\coth^{-1}(ax)-\frac{\tanh^{-1}(ax)}{4a^4}
\end{aligned}$$

**Mathematica [A]** time = 0.01, size = 57, normalized size = 1.39

$$\frac{\log(1-ax)}{8a^4}-\frac{\log(ax+1)}{8a^4}+\frac{x}{4a^3}+\frac{1}{4}x^4\coth^{-1}(ax)+\frac{x^3}{12a}$$

Antiderivative was successfully verified.

```
[In] Integrate[x^3*ArcCoth[a*x],x]
```

```
[Out] x/(4*a^3) + x^3/(12*a) + (x^4*ArcCoth[a*x])/4 + Log[1 - a*x]/(8*a^4) - Log[
1 + a*x]/(8*a^4)
```

**fricas [A]** time = 0.42, size = 43, normalized size = 1.05

$$\frac{2\,a^3x^3 + 6\,ax + 3\left(a^4x^4 - 1\right)\log\left(\frac{ax+1}{ax-1}\right)}{24\,a^4}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^3*arccoth(a*x),x, algorithm="fricas")
```

```
[Out] 1/24*(2*a^3*x^3 + 6*a*x + 3*(a^4*x^4 - 1)*log((a*x + 1)/(a*x - 1)))/a^4
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int x^3\,\mathrm{arcoth}\,(ax)\;dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^3*arccoth(a*x),x, algorithm="giac")
```

```
[Out] integrate(x^3*arccoth(a*x), x)
```

**maple [A]** time = 0.03, size = 47, normalized size = 1.15

$$\frac{x^4\mathrm{arccoth}\,(ax)}{4} + \frac{x^3}{12a} + \frac{x}{4a^3} + \frac{\ln(ax-1)}{8a^4} - \frac{\ln(ax+1)}{8a^4}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^3*arccoth(a*x),x)
```

```
[Out] 1/4*x^4*arccoth(a*x)+1/12*x^3/a+1/4*x/a^3+1/8/a^4*ln(a*x-1)-1/8*ln(a*x+1)/a
^4
```

**maxima [A]** time = 0.30, size = 52, normalized size = 1.27

$$\frac{1}{4}\,x^4\,\mathrm{arcoth}\,(ax) + \frac{1}{24}\,a\left(\frac{2\left(a^2x^3 + 3\,x\right)}{a^4} - \frac{3\,\log(ax+1)}{a^5} + \frac{3\,\log(ax-1)}{a^5}\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^3*arccoth(a*x),x, algorithm="maxima")
```

```
[Out] 1/4*x^4*arccoth(a*x) + 1/24*a*(2*(a^2*x^3 + 3*x)/a^4 - 3*log(a*x + 1)/a^5 +
 3*log(a*x - 1)/a^5)
```

**mupad [B]** time = 1.22, size = 33, normalized size = 0.80

$$\frac{\frac{a\,x}{4} - \frac{\mathrm{acoth}(a\,x)}{4} + \frac{a^3\,x^3}{12}}{a^4} + \frac{x^4\,\mathrm{acoth}\,(a\,x)}{4}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^3*acoth(a*x),x)
```

```
[Out] ((a*x)/4 - acoth(a*x)/4 + (a^3*x^3)/12)/a^4 + (x^4*acoth(a*x))/4
```

**sympy [A]** time = 0.87, size = 41, normalized size = 1.00

$$\begin{cases} \frac{x^4 \operatorname{acoth}(ax)}{4} + \frac{x^3}{12a} + \frac{x}{4a^3} - \frac{\operatorname{acoth}(ax)}{4a^4} & \text{for } a \neq 0 \\ \frac{i\pi x^4}{8} & \text{otherwise} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**3*acoth(a*x),x)
```

```
[Out] Piecewise((x**4*acoth(a*x)/4 + x**3/(12*a) + x/(4*a**3) - acoth(a*x)/(4*a**
4), Ne(a, 0)), (I*pi*x**4/8, True))
```

## 3.4 $\int x^2 \coth^{-1}(ax)\,dx$

**Optimal**. Leaf size=40

$$\frac{\log\left(1-a^2x^2\right)}{6a^3}+\frac{1}{3}x^3\coth^{-1}(ax)+\frac{x^2}{6a}$$

```
[Out] 1/6*x^2/a+1/3*x^3*arccoth(a*x)+1/6*ln(-a^2*x^2+1)/a^3
```

**Rubi [A]** time = 0.03, antiderivative size = 40, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 3, integrand size = 8, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.375, Rules used = {5917, 266, 43}

$$\frac{\log\left(1-a^2x^2\right)}{6a^3}+\frac{x^2}{6a}+\frac{1}{3}x^3\coth^{-1}(ax)$$

Antiderivative was successfully verified.

```
[In] Int[x^2*ArcCoth[a*x],x]
```

```
[Out] x^2/(6*a) + (x^3*ArcCoth[a*x])/3 + Log[1 - a^2*x^2]/(6*a^3)
```

Rule 43

```
Int[((a_.) + (b_.)*(x_))^(m_.)*((c_.) + (d_.)*(x_))^(n_.), x_Symbol] :> Int
[ExpandIntegrand[(a + b*x)^m*(c + d*x)^n, x], x] /; FreeQ[{a, b, c, d, n},
x] && NeQ[b*c - a*d, 0] && IGtQ[m, 0] && ( !IntegerQ[n] || (EqQ[c, 0] && Le
Q[7*m + 4*n + 4, 0]) || LtQ[9*m + 5*(n + 1), 0] || GtQ[m + n + 2, 0])
```

Rule 266

```
Int[(x_)^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Dist[1/n, Subst[
Int[x^(Simplify[(m + 1)/n] - 1)*(a + b*x)^p, x], x, x^n], x] /; FreeQ[{a, b
, m, n, p}, x] && IntegerQ[Simplify[(m + 1)/n]]
```

Rule 5917

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)*((d_.)*(x_))^(m_.), x_Symbol]
 :> Simp[((d*x)^(m + 1)*(a + b*ArcCoth[c*x])^p)/(d*(m + 1)), x] - Dist[(b*c
*p)/(d*(m + 1)), Int[((d*x)^(m + 1)*(a + b*ArcCoth[c*x])^(p - 1))/(1 - c^2*
x^2), x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[p, 0] && (EqQ[p, 1] || In
tegerQ[m]) && NeQ[m, -1]
```

Rubi steps

$$\begin{aligned}
\int x^2\coth^{-1}(ax)\,dx &= \frac{1}{3}x^3\coth^{-1}(ax)-\frac{1}{3}a\int\frac{x^3}{1-a^2x^2}\,dx\\
&= \frac{1}{3}x^3\coth^{-1}(ax)-\frac{1}{6}a\,\text{Subst}\left(\int\frac{x}{1-a^2x}\,dx,x,x^2\right)\\
&= \frac{1}{3}x^3\coth^{-1}(ax)-\frac{1}{6}a\,\text{Subst}\left(\int\left(-\frac{1}{a^2}-\frac{1}{a^2\left(-1+a^2x\right)}\right)dx,x,x^2\right)\\
&= \frac{x^2}{6a}+\frac{1}{3}x^3\coth^{-1}(ax)+\frac{\log\left(1-a^2x^2\right)}{6a^3}
\end{aligned}$$

**Mathematica [A]** time = 0.01, size = 40, normalized size = 1.00

$$\frac{\log\left(1-a^2x^2\right)}{6a^3}+\frac{1}{3}x^3\coth^{-1}(ax)+\frac{x^2}{6a}$$

Antiderivative was successfully verified.

```
[In] Integrate[x^2*ArcCoth[a*x],x]
[Out] x^2/(6*a) + (x^3*ArcCoth[a*x])/3 + Log[1 - a^2*x^2]/(6*a^3)
```

**fricas** [A] time = 0.52, size = 44, normalized size = 1.10

$$\frac{a^3x^3\log\left(\frac{ax+1}{ax-1}\right)+a^2x^2+\log\left(a^2x^2-1\right)}{6\,a^3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*arccoth(a*x),x, algorithm="fricas")
[Out] 1/6*(a^3*x^3*log((a*x + 1)/(a*x - 1)) + a^2*x^2 + log(a^2*x^2 - 1))/a^3
```

**giac** [F] time = 0.00, size = 0, normalized size = 0.00

$$\int x^2\operatorname{arcoth}(ax)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*arccoth(a*x),x, algorithm="giac")
[Out] integrate(x^2*arccoth(a*x), x)
```

**maple** [A] time = 0.03, size = 41, normalized size = 1.02

$$\frac{x^3\operatorname{arccoth}(ax)}{3}+\frac{x^2}{6a}+\frac{\ln(ax-1)}{6a^3}+\frac{\ln(ax+1)}{6a^3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^2*arccoth(a*x),x)
[Out] 1/3*x^3*arccoth(a*x)+1/6*x^2/a+1/6/a^3*ln(a*x-1)+1/6/a^3*ln(a*x+1)
```

**maxima** [A] time = 0.31, size = 35, normalized size = 0.88

$$\frac{1}{3}x^3\operatorname{arcoth}(ax)+\frac{1}{6}a\left(\frac{x^2}{a^2}+\frac{\log\left(a^2x^2-1\right)}{a^4}\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*arccoth(a*x),x, algorithm="maxima")
[Out] 1/3*x^3*arccoth(a*x) + 1/6*a*(x^2/a^2 + log(a^2*x^2 - 1)/a^4)
```

**mupad** [B] time = 1.22, size = 35, normalized size = 0.88

$$\frac{\frac{\ln\left(a^2\,x^2-1\right)}{6}+\frac{a^2\,x^2}{6}}{a^3}+\frac{x^3\,\mathrm{acoth}\left(a\,x\right)}{3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^2*acoth(a*x),x)
[Out] (log(a^2*x^2 - 1)/6 + (a^2*x^2)/6)/a^3 + (x^3*acoth(a*x))/3
```

**sympy** [**A**] time = 0.67, size = 46, normalized size = 1.15

$$\begin{cases} \frac{x^3 \operatorname{acoth}(ax)}{3} + \frac{x^2}{6a} + \frac{\log(ax+1)}{3a^3} - \frac{\operatorname{acoth}(ax)}{3a^3} & \text{for } a \neq 0 \\ \frac{i\pi x^3}{6} & \text{otherwise} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**2*acoth(a*x),x)
```

```
[Out] Piecewise((x**3*acoth(a*x)/3 + x**2/(6*a) + log(a*x + 1)/(3*a**3) - acoth(a
*x)/(3*a**3), Ne(a, 0)), (I*pi*x**3/6, True))
```

## 3.5 $\int x \coth^{-1}(ax)\,dx$

**Optimal**. Leaf size=31

$$-\frac{\tanh^{-1}(ax)}{2a^2}+\frac{1}{2}x^2\coth^{-1}(ax)+\frac{x}{2a}$$

```
[Out] 1/2*x/a+1/2*x^2*arccoth(a*x)-1/2*arctanh(a*x)/a^2
```

**Rubi** [A] time = 0.01, antiderivative size = 31, normalized size of antiderivative = 1.00, number of steps used = 3, number of rules used = 3, integrand size = 6, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.500, Rules used = {5917, 321, 206}

$$-\frac{\tanh^{-1}(ax)}{2a^2}+\frac{1}{2}x^2\coth^{-1}(ax)+\frac{x}{2a}$$

Antiderivative was successfully verified.

```
[In] Int[x*ArcCoth[a*x],x]
```

```
[Out] x/(2*a) + (x^2*ArcCoth[a*x])/2 - ArcTanh[a*x]/(2*a^2)
```

Rule 206

```
Int[((a_) + (b_.)*(x_)^2)^(-1), x_Symbol] :> Simp[(1*ArcTanh[(Rt[-b, 2]*x)/
Rt[a, 2]])/(Rt[a, 2]*Rt[-b, 2]), x] /; FreeQ[{a, b}, x] && NegQ[a/b] && (Gt
Q[a, 0] || LtQ[b, 0])
```

Rule 321

```
Int[((c_.)*(x_))^(m_)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Simp[(c^(
n - 1)*(c*x)^(m - n + 1)*(a + b*x^n)^(p + 1))/(b*(m + n*p + 1)), x] - Dist[
(a*c^n*(m - n + 1))/(b*(m + n*p + 1)), Int[(c*x)^(m - n)*(a + b*x^n)^p, x],
 x] /; FreeQ[{a, b, c, p}, x] && IGtQ[n, 0] && GtQ[m, n - 1] && NeQ[m + n*p
 + 1, 0] && IntBinomialQ[a, b, c, n, m, p, x]
```

Rule 5917

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)*((d_.)*(x_))^(m_.), x_Symbol]
 :> Simp[((d*x)^(m + 1)*(a + b*ArcCoth[c*x])^p)/(d*(m + 1)), x] - Dist[(b*c
*p)/(d*(m + 1)), Int[((d*x)^(m + 1)*(a + b*ArcCoth[c*x])^(p - 1))/(1 - c^2*
x^2), x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[p, 0] && (EqQ[p, 1] || In
tegerQ[m]) && NeQ[m, -1]
```

Rubi steps

$$\begin{aligned}\int x\coth^{-1}(ax)\,dx&=\frac{1}{2}x^2\coth^{-1}(ax)-\frac{1}{2}a\int\frac{x^2}{1-a^2x^2}\,dx\\&=\frac{x}{2a}+\frac{1}{2}x^2\coth^{-1}(ax)-\frac{\int\frac{1}{1-a^2x^2}\,dx}{2a}\\&=\frac{x}{2a}+\frac{1}{2}x^2\coth^{-1}(ax)-\frac{\tanh^{-1}(ax)}{2a^2}\end{aligned}$$

**Mathematica** [A] time = 0.01, size = 47, normalized size = 1.52

$$\frac{\log(1-ax)}{4a^2}-\frac{\log(ax+1)}{4a^2}+\frac{1}{2}x^2\coth^{-1}(ax)+\frac{x}{2a}$$

Antiderivative was successfully verified.

```
[In] Integrate[x*ArcCoth[a*x],x]
```

```
[Out] x/(2*a) + (x^2*ArcCoth[a*x])/2 + Log[1 - a*x]/(4*a^2) - Log[1 + a*x]/(4*a^2
)
```

**fricas** [A] time = 0.58, size = 34, normalized size = 1.10

$$\frac{2\,ax+\left(a^2x^2-1\right)\log\left(\frac{ax+1}{ax-1}\right)}{4\,a^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*arccoth(a*x),x, algorithm="fricas")
```

```
[Out] 1/4*(2*a*x + (a^2*x^2 - 1)*log((a*x + 1)/(a*x - 1)))/a^2
```

**giac** [F] time = 0.00, size = 0, normalized size = 0.00

$$\int x\,\mathrm{arcoth}\left(ax\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*arccoth(a*x),x, algorithm="giac")
```

```
[Out] integrate(x*arccoth(a*x), x)
```

**maple** [A] time = 0.03, size = 39, normalized size = 1.26

$$\frac{x^2\mathrm{arccoth}\left(ax\right)}{2}+\frac{x}{2a}+\frac{\ln\left(ax-1\right)}{4a^2}-\frac{\ln\left(ax+1\right)}{4a^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x*arccoth(a*x),x)
```

```
[Out] 1/2*x^2*arccoth(a*x)+1/2*x/a+1/4/a^2*ln(a*x-1)-1/4/a^2*ln(a*x+1)
```

**maxima** [A] time = 0.30, size = 41, normalized size = 1.32

$$\frac{1}{2}\,x^2\,\mathrm{arcoth}\left(ax\right)+\frac{1}{4}\,a\left(\frac{2\,x}{a^2}-\frac{\log\left(ax+1\right)}{a^3}+\frac{\log\left(ax-1\right)}{a^3}\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*arccoth(a*x),x, algorithm="maxima")
```

```
[Out] 1/2*x^2*arccoth(a*x) + 1/4*a*(2*x/a^2 - log(a*x + 1)/a^3 + log(a*x - 1)/a^3
)
```

**mupad** [B] time = 1.18, size = 26, normalized size = 0.84

$$\frac{x^2\,\mathrm{acoth}\left(a\,x\right)}{2}-\frac{\frac{\mathrm{acoth}\left(a\,x\right)}{2}-\frac{a\,x}{2}}{a^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x*acoth(a*x),x)
```

```
[Out] (x^2*acoth(a*x))/2 - (acoth(a*x)/2 - (a*x)/2)/a^2
```

**sympy** [**A**] time = 0.45, size = 32, normalized size = 1.03

$$\begin{cases} \frac{x^2 \operatorname{acoth}(ax)}{2} + \frac{x}{2a} - \frac{\operatorname{acoth}(ax)}{2a^2} & \text{for } a \neq 0 \\ \frac{i\pi x^2}{4} & \text{otherwise} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*acoth(a*x),x)
```

```
[Out] Piecewise((x**2*acoth(a*x)/2 + x/(2*a) - acoth(a*x)/(2*a**2), Ne(a, 0)), (I
*pi*x**2/4, True))
```

## 3.6 $\int \coth^{-1}(ax)\,dx$

**Optimal**. Leaf size=25

$$\frac{\log\left(1-a^2x^2\right)}{2a}+x\coth^{-1}(ax)$$

```
[Out] x*arccoth(a*x)+1/2*ln(-a^2*x^2+1)/a
```

**Rubi [A]** time = 0.01, antiderivative size = 25, normalized size of antiderivative = 1.00, number of steps used = 2, number of rules used = 2, integrand size = 4, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.500, Rules used = {5911, 260}

$$\frac{\log\left(1-a^2x^2\right)}{2a}+x\coth^{-1}(ax)$$

Antiderivative was successfully verified.

```
[In] Int[ArcCoth[a*x],x]
```

```
[Out] x*ArcCoth[a*x] + Log[1 - a^2*x^2]/(2*a)
```

Rule 260

```
Int[(x_)^(m_.)/((a_) + (b_.)*(x_)^(n_)), x_Symbol] :> Simp[Log[RemoveConten
t[a + b*x^n, x]]/(b*n), x] /; FreeQ[{a, b, m, n}, x] && EqQ[m, n - 1]
```

Rule 5911

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.), x_Symbol] :> Simp[x*(a + b*A
rcCoth[c*x])^p, x] - Dist[b*c*p, Int[(x*(a + b*ArcCoth[c*x])^(p - 1))/(1 -
c^2*x^2), x], x] /; FreeQ[{a, b, c}, x] && IGtQ[p, 0]
```

Rubi steps

$$\begin{aligned}\int \coth^{-1}(ax)\,dx&=x\coth^{-1}(ax)-a\int \frac{x}{1-a^2x^2}\,dx\\&=x\coth^{-1}(ax)+\frac{\log\left(1-a^2x^2\right)}{2a}\end{aligned}$$

**Mathematica [A]** time = 0.00, size = 25, normalized size = 1.00

$$\frac{\log\left(1-a^2x^2\right)}{2a}+x\coth^{-1}(ax)$$

Antiderivative was successfully verified.

```
[In] Integrate[ArcCoth[a*x],x]
```

```
[Out] x*ArcCoth[a*x] + Log[1 - a^2*x^2]/(2*a)
```

**fricas [A]** time = 0.61, size = 33, normalized size = 1.32

$$\frac{ax\log\left(\frac{ax+1}{ax-1}\right)+\log\left(a^2x^2-1\right)}{2\,a}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(a*x),x, algorithm="fricas")
```

```
[Out] 1/2*(a*x*log((a*x + 1)/(a*x - 1)) + log(a^2*x^2 - 1))/a
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \operatorname{arcoth}(ax)\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(a*x),x, algorithm="giac")
[Out] integrate(arccoth(a*x), x)
```

**maple [A]** time = 0.04, size = 23, normalized size = 0.92

$$x \operatorname{arccoth}(ax) + \frac{\ln\left(a^2x^2 - 1\right)}{2a}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(arccoth(a*x),x)
[Out] x*arccoth(a*x)+1/2/a*ln(a^2*x^2-1)
```

**maxima [A]** time = 0.30, size = 25, normalized size = 1.00

$$\frac{2\,ax \operatorname{arcoth}(ax) + \log\left(-a^2x^2 + 1\right)}{2\,a}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(a*x),x, algorithm="maxima")
[Out] 1/2*(2*a*x*arccoth(a*x) + log(-a^2*x^2 + 1))/a
```

**mupad [B]** time = 1.15, size = 22, normalized size = 0.88

$$x \operatorname{acoth}(a\,x) + \frac{\ln\left(a^2\,x^2 - 1\right)}{2\,a}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(a*x),x)
[Out] x*acoth(a*x) + log(a^2*x^2 - 1)/(2*a)
```

**sympy [A]** time = 0.33, size = 27, normalized size = 1.08

$$\begin{cases} x \operatorname{acoth}(ax) + \frac{\log(ax+1)}{a} - \frac{\operatorname{acoth}(ax)}{a} & \text{for}\ a \neq 0 \\ \frac{i\pi x}{2} & \text{otherwise} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(a*x),x)
[Out] Piecewise((x*acoth(a*x) + log(a*x + 1)/a - acoth(a*x)/a, Ne(a, 0)), (I*pi*x
/2, True))
```

## 3.7 $\int \frac{\coth^{-1}(ax)}{x}\,dx$

**Optimal**. Leaf size=28

$$\frac{1}{2}\text{Li}_2\left(-\frac{1}{ax}\right)-\frac{1}{2}\text{Li}_2\left(\frac{1}{ax}\right)$$

```
[Out] 1/2*polylog(2,-1/a/x)-1/2*polylog(2,1/a/x)
```

**Rubi [A]** time = 0.01, antiderivative size = 28, normalized size of antiderivative = 1.00, number of steps used = 1, number of rules used = 1, integrand size = 8, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.125, Rules used = {5913}

$$\frac{1}{2}\text{PolyLog}\left(2,-\frac{1}{ax}\right)-\frac{1}{2}\text{PolyLog}\left(2,\frac{1}{ax}\right)$$

Antiderivative was successfully verified.

```
[In] Int[ArcCoth[a*x]/x,x]
```

```
[Out] PolyLog[2, -(1/(a*x))]/2 - PolyLog[2, 1/(a*x)]/2
```

Rule 5913

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))/(x_), x_Symbol] :> Simp[a*Log[x], x
] + (Simp[(b*PolyLog[2, -(c*x)^(-1)])/2, x] - Simp[(b*PolyLog[2, 1/(c*x)])/
2, x]) /; FreeQ[{a, b, c}, x]
```

Rubi steps

$$\int \frac{\coth^{-1}(ax)}{x}\,dx=\frac{1}{2}\text{Li}_2\left(-\frac{1}{ax}\right)-\frac{1}{2}\text{Li}_2\left(\frac{1}{ax}\right)$$

**Mathematica [A]** time = 0.01, size = 26, normalized size = 0.93

$$\frac{1}{2}\left(\text{Li}_2\left(-\frac{1}{ax}\right)-\text{Li}_2\left(\frac{1}{ax}\right)\right)$$

Antiderivative was successfully verified.

```
[In] Integrate[ArcCoth[a*x]/x,x]
```

```
[Out] (PolyLog[2, -(1/(a*x))] - PolyLog[2, 1/(a*x)])/2
```

**fricas [F]** time = 0.44, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{\text{arcoth}\,(ax)}{x},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(a*x)/x,x, algorithm="fricas")
```

```
[Out] integral(arccoth(a*x)/x, x)
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\text{arcoth}\,(ax)}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(a*x)/x,x, algorithm="giac")
```

```
[Out] integrate(arccoth(a*x)/x, x)
```

**maple [A]** time = 0.05, size = 37, normalized size = 1.32

$$\ln(ax)\operatorname{arccoth}(ax)-\frac{\operatorname{dilog}(ax)}{2}-\frac{\operatorname{dilog}(ax+1)}{2}-\frac{\ln(ax)\ln(ax+1)}{2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(arccoth(a*x)/x,x)
```

```
[Out] ln(a*x)*arccoth(a*x)-1/2*dilog(a*x)-1/2*dilog(a*x+1)-1/2*ln(a*x)*ln(a*x+1)
```

**maxima [B]** time = 0.30, size = 86, normalized size = 3.07

$$-\frac{1}{2}a\left(\frac{\log(ax+1)}{a}-\frac{\log(ax-1)}{a}\right)\log(x)-\frac{1}{2}a\left(\frac{\log(ax-1)\log(ax)+\mathrm{Li}_2(-ax+1)}{a}-\frac{\log(ax+1)\log(-ax)+}{a}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(a*x)/x,x, algorithm="maxima")
```

```
[Out] -1/2*a*(log(a*x + 1)/a - log(a*x - 1)/a)*log(x) - 1/2*a*((log(a*x - 1)*log(
a*x) + dilog(-a*x + 1))/a - (log(a*x + 1)*log(-a*x) + dilog(a*x + 1))/a) +
arccoth(a*x)*log(x)
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.04

$$\int \frac{\operatorname{acoth}(a\,x)}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(a*x)/x,x)
```

```
[Out] int(acoth(a*x)/x, x)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{acoth}(ax)}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(a*x)/x,x)
```

```
[Out] Integral(acoth(a*x)/x, x)
```

## 3.8 $\int \frac{\coth^{-1}(ax)}{x^2} dx$

**Optimal**. Leaf size=30

$$-\frac{1}{2}a\log\left(1-a^2x^2\right)+a\log(x)-\frac{\coth^{-1}(ax)}{x}$$

```
[Out] -arccoth(a*x)/x+a*ln(x)-1/2*a*ln(-a^2*x^2+1)
```

**Rubi [A]** time = 0.02, antiderivative size = 30, normalized size of antiderivative = 1.00, number of steps used = 5, number of rules used = 5, integrand size = 8, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.625, Rules used = {5917, 266, 36, 29, 31}

$$-\frac{1}{2}a\log\left(1-a^2x^2\right)+a\log(x)-\frac{\coth^{-1}(ax)}{x}$$

Antiderivative was successfully verified.

```
[In] Int[ArcCoth[a*x]/x^2,x]
```

```
[Out] -(ArcCoth[a*x]/x) + a*Log[x] - (a*Log[1 - a^2*x^2])/2
```

Rule 29

```
Int[(x_)^(-1), x_Symbol] :> Simp[Log[x], x]
```

Rule 31

```
Int[((a_) + (b_.)*(x_))^(-1), x_Symbol] :> Simp[Log[RemoveContent[a + b*x,
x]]/b, x] /; FreeQ[{a, b}, x]
```

Rule 36

```
Int[1/(((a_.) + (b_.)*(x_))*((c_.) + (d_.)*(x_))), x_Symbol] :> Dist[b/(b*c
 - a*d), Int[1/(a + b*x), x], x] - Dist[d/(b*c - a*d), Int[1/(c + d*x), x],
 x] /; FreeQ[{a, b, c, d}, x] && NeQ[b*c - a*d, 0]
```

Rule 266

```
Int[(x_)^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Dist[1/n, Subst[
Int[x^(Simplify[(m + 1)/n] - 1)*(a + b*x)^p, x], x, x^n], x] /; FreeQ[{a, b
, m, n, p}, x] && IntegerQ[Simplify[(m + 1)/n]]
```

Rule 5917

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)*((d_.)*(x_))^(m_.), x_Symbol]
 :> Simp[((d*x)^(m + 1)*(a + b*ArcCoth[c*x])^p)/(d*(m + 1)), x] - Dist[(b*c
*p)/(d*(m + 1)), Int[((d*x)^(m + 1)*(a + b*ArcCoth[c*x])^(p - 1))/(1 - c^2*
x^2), x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[p, 0] && (EqQ[p, 1] || In
tegerQ[m]) && NeQ[m, -1]
```

Rubi steps

$$\int \frac{\coth^{-1}(ax)}{x^2}\,dx = -\frac{\coth^{-1}(ax)}{x} + a\int \frac{1}{x\left(1-a^2x^2\right)}\,dx$$
$$= -\frac{\coth^{-1}(ax)}{x} + \frac{1}{2}a\,\text{Subst}\left(\int \frac{1}{x\left(1-a^2x\right)}\,dx, x, x^2\right)$$
$$= -\frac{\coth^{-1}(ax)}{x} + \frac{1}{2}a\,\text{Subst}\left(\int \frac{1}{x}\,dx, x, x^2\right) + \frac{1}{2}a^3\,\text{Subst}\left(\int \frac{1}{1-a^2x}\,dx, x, x^2\right)$$
$$= -\frac{\coth^{-1}(ax)}{x} + a\log(x) - \frac{1}{2}a\log\left(1-a^2x^2\right)$$

**Mathematica** [A] time = 0.01, size = 30, normalized size = 1.00

$$-\frac{1}{2}a\log\left(1-a^2x^2\right) + a\log(x) - \frac{\coth^{-1}(ax)}{x}$$

Antiderivative was successfully verified.

```
[In] Integrate[ArcCoth[a*x]/x^2,x]
[Out] -(ArcCoth[a*x]/x) + a*Log[x] - (a*Log[1 - a^2*x^2])/2
```

**fricas** [A] time = 0.45, size = 39, normalized size = 1.30

$$-\frac{ax\log\left(a^2x^2-1\right) - 2\,ax\log(x) + \log\left(\frac{ax+1}{ax-1}\right)}{2\,x}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(a*x)/x^2,x, algorithm="fricas")
[Out] -1/2*(a*x*log(a^2*x^2 - 1) - 2*a*x*log(x) + log((a*x + 1)/(a*x - 1)))/x
```

**giac** [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\text{arcoth}\,(ax)}{x^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(a*x)/x^2,x, algorithm="giac")
[Out] integrate(arccoth(a*x)/x^2, x)
```

**maple** [A] time = 0.04, size = 35, normalized size = 1.17

$$-\frac{\text{arccoth}\,(ax)}{x} + a\ln(ax) - \frac{a\ln(ax-1)}{2} - \frac{a\ln(ax+1)}{2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(arccoth(a*x)/x^2,x)
[Out] -arccoth(a*x)/x+a*ln(a*x)-1/2*a*ln(a*x-1)-1/2*a*ln(a*x+1)
```

**maxima** [A] time = 0.31, size = 30, normalized size = 1.00

$$-\frac{1}{2}a\left(\log\left(a^2x^2-1\right) - \log\left(x^2\right)\right) - \frac{\text{arcoth}\,(ax)}{x}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(a*x)/x^2,x, algorithm="maxima")
```

```
[Out] -1/2*a*(log(a^2*x^2 - 1) - log(x^2)) - arccoth(a*x)/x
```

**mupad [B]** time = 1.16, size = 27, normalized size = 0.90

$$a\ \ln(x) - \frac{a\ \ln\left(a^2\,x^2-1\right)}{2} - \frac{\operatorname{acoth}\left(a\,x\right)}{x}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(a*x)/x^2,x)
```

```
[Out] a*log(x) - (a*log(a^2*x^2 - 1))/2 - acoth(a*x)/x
```

**sympy [A]** time = 0.37, size = 26, normalized size = 0.87

$$a\log\left(x\right) - a\log\left(ax+1\right) + a\operatorname{acoth}\left(ax\right) - \frac{\operatorname{acoth}\left(ax\right)}{x}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(a*x)/x**2,x)
```

```
[Out] a*log(x) - a*log(a*x + 1) + a*acoth(a*x) - acoth(a*x)/x
```

## 3.9 $\int \frac{\coth^{-1}(ax)}{x^3} \, dx$

**Optimal**. Leaf size=31

$$\frac{1}{2}a^2 \tanh^{-1}(ax) - \frac{\coth^{-1}(ax)}{2x^2} - \frac{a}{2x}$$

```
[Out] -1/2*a/x-1/2*arccoth(a*x)/x^2+1/2*a^2*arctanh(a*x)
```

**Rubi [A]** time = 0.02, antiderivative size = 31, normalized size of antiderivative = 1.00, number of steps used = 3, number of rules used = 3, integrand size = 8, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.375, Rules used = {5917, 325, 206}

$$\frac{1}{2}a^2 \tanh^{-1}(ax) - \frac{\coth^{-1}(ax)}{2x^2} - \frac{a}{2x}$$

Antiderivative was successfully verified.

```
[In] Int[ArcCoth[a*x]/x^3,x]
```

```
[Out] -a/(2*x) - ArcCoth[a*x]/(2*x^2) + (a^2*ArcTanh[a*x])/2
```

Rule 206

```
Int[((a_) + (b_.)*(x_)^2)^(-1), x_Symbol] :> Simp[(1*ArcTanh[(Rt[-b, 2]*x)/
Rt[a, 2]])/(Rt[a, 2]*Rt[-b, 2]), x] /; FreeQ[{a, b}, x] && NegQ[a/b] && (Gt
Q[a, 0] || LtQ[b, 0])
```

Rule 325

```
Int[((c_.)*(x_))^(m_)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Simp[((c*
x)^(m + 1)*(a + b*x^n)^(p + 1))/(a*c*(m + 1)), x] - Dist[(b*(m + n*(p + 1)
+ 1))/(a*c^n*(m + 1)), Int[(c*x)^(m + n)*(a + b*x^n)^p, x], x] /; FreeQ[{a,
 b, c, p}, x] && IGtQ[n, 0] && LtQ[m, -1] && IntBinomialQ[a, b, c, n, m, p,
 x]
```

Rule 5917

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)*((d_.)*(x_))^(m_.), x_Symbol]
 :> Simp[((d*x)^(m + 1)*(a + b*ArcCoth[c*x])^p)/(d*(m + 1)), x] - Dist[(b*c
*p)/(d*(m + 1)), Int[((d*x)^(m + 1)*(a + b*ArcCoth[c*x])^(p - 1))/(1 - c^2*
x^2), x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[p, 0] && (EqQ[p, 1] || In
tegerQ[m]) && NeQ[m, -1]
```

Rubi steps

$$\begin{aligned}
\int \frac{\coth^{-1}(ax)}{x^3} \, dx &= -\frac{\coth^{-1}(ax)}{2x^2} + \frac{1}{2}a \int \frac{1}{x^2\left(1-a^2x^2\right)} \, dx \\
&= -\frac{a}{2x} - \frac{\coth^{-1}(ax)}{2x^2} + \frac{1}{2}a^3 \int \frac{1}{1-a^2x^2} \, dx \\
&= -\frac{a}{2x} - \frac{\coth^{-1}(ax)}{2x^2} + \frac{1}{2}a^2 \tanh^{-1}(ax)
\end{aligned}$$

**Mathematica [A]** time = 0.01, size = 47, normalized size = 1.52

$$-\frac{1}{4}a^2 \log(1-ax) + \frac{1}{4}a^2 \log(ax+1) - \frac{\coth^{-1}(ax)}{2x^2} - \frac{a}{2x}$$

Antiderivative was successfully verified.

```
[In] Integrate[ArcCoth[a*x]/x^3,x]
```

```
[Out] -1/2*a/x - ArcCoth[a*x]/(2*x^2) - (a^2*Log[1 - a*x])/4 + (a^2*Log[1 + a*x])
/4
```

**fricas [A]** time = 0.52, size = 35, normalized size = 1.13

$$-\frac{2\,ax-\left(a^2x^2-1\right)\log\left(\frac{ax+1}{ax-1}\right)}{4\,x^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(a*x)/x^3,x, algorithm="fricas")
```

```
[Out] -1/4*(2*a*x - (a^2*x^2 - 1)*log((a*x + 1)/(a*x - 1)))/x^2
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int\frac{\operatorname{arcoth}(ax)}{x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(a*x)/x^3,x, algorithm="giac")
```

```
[Out] integrate(arccoth(a*x)/x^3, x)
```

**maple [A]** time = 0.04, size = 39, normalized size = 1.26

$$-\frac{\operatorname{arccoth}(ax)}{2x^2}-\frac{a}{2x}-\frac{a^2\ln(ax-1)}{4}+\frac{a^2\ln(ax+1)}{4}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(arccoth(a*x)/x^3,x)
```

```
[Out] -1/2*arccoth(a*x)/x^2-1/2*a/x-1/4*a^2*ln(a*x-1)+1/4*a^2*ln(a*x+1)
```

**maxima [A]** time = 0.31, size = 36, normalized size = 1.16

$$\frac{1}{4}\left(a\log(ax+1)-a\log(ax-1)-\frac{2}{x}\right)a-\frac{\operatorname{arcoth}(ax)}{2\,x^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(a*x)/x^3,x, algorithm="maxima")
```

```
[Out] 1/4*(a*log(a*x + 1) - a*log(a*x - 1) - 2/x)*a - 1/2*arccoth(a*x)/x^2
```

**mupad [B]** time = 1.19, size = 40, normalized size = 1.29

$$\frac{a\,\mathrm{atan}\left(\frac{a^2\,x}{\sqrt{-a^2}}\right)\sqrt{-a^2}}{2}-\frac{\frac{\mathrm{acoth}(a\,x)}{2}+\frac{a\,x}{2}}{x^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(a*x)/x^3,x)
```

```
[Out] (a*atan((a^2*x)/(-a^2)^(1/2))*(-a^2)^(1/2))/2 - (acoth(a*x)/2 + (a*x)/2)/x^
2
```

**sympy [A]** time = 0.54, size = 24, normalized size = 0.77

$$\frac{a^2 \operatorname{acoth}(ax)}{2} - \frac{a}{2x} - \frac{\operatorname{acoth}(ax)}{2x^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(a*x)/x**3,x)
```

```
[Out] a**2*acoth(a*x)/2 - a/(2*x) - acoth(a*x)/(2*x**2)
```

## 3.10 $\int \frac{\coth^{-1}(ax)}{x^4} \, dx$

**Optimal**. Leaf size=47

$$\frac{1}{3}a^3\log(x) - \frac{1}{6}a^3\log\left(1 - a^2x^2\right) - \frac{\coth^{-1}(ax)}{3x^3} - \frac{a}{6x^2}$$

```
[Out] -1/6*a/x^2-1/3*arccoth(a*x)/x^3+1/3*a^3*ln(x)-1/6*a^3*ln(-a^2*x^2+1)
```

**Rubi [A]** time = 0.03, antiderivative size = 47, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 3, integrand size = 8, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.375, Rules used = {5917, 266, 44}

$$-\frac{1}{6}a^3\log\left(1 - a^2x^2\right) + \frac{1}{3}a^3\log(x) - \frac{a}{6x^2} - \frac{\coth^{-1}(ax)}{3x^3}$$

Antiderivative was successfully verified.

```
[In] Int[ArcCoth[a*x]/x^4,x]
```

```
[Out] -a/(6*x^2) - ArcCoth[a*x]/(3*x^3) + (a^3*Log[x])/3 - (a^3*Log[1 - a^2*x^2])
/6
```

Rule 44

```
Int[((a_) + (b_.)*(x_))^(m_.)*((c_.) + (d_.)*(x_))^(n_.), x_Symbol] :> Int[
ExpandIntegrand[(a + b*x)^m*(c + d*x)^n, x], x] /; FreeQ[{a, b, c, d}, x] &
& NeQ[b*c - a*d, 0] && ILtQ[m, 0] && IntegerQ[n] &&  !(IGtQ[n, 0] && LtQ[m
+ n + 2, 0])
```

Rule 266

```
Int[(x_)^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Dist[1/n, Subst[
Int[x^(Simplify[(m + 1)/n] - 1)*(a + b*x)^p, x], x, x^n], x] /; FreeQ[{a, b
, m, n, p}, x] && IntegerQ[Simplify[(m + 1)/n]]
```

Rule 5917

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)*((d_.)*(x_))^(m_.), x_Symbol]
 :> Simp[((d*x)^(m + 1)*(a + b*ArcCoth[c*x])^p)/(d*(m + 1)), x] - Dist[(b*c
*p)/(d*(m + 1)), Int[((d*x)^(m + 1)*(a + b*ArcCoth[c*x])^(p - 1))/(1 - c^2*
x^2), x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[p, 0] && (EqQ[p, 1] || In
tegerQ[m]) && NeQ[m, -1]
```

Rubi steps

$$\begin{aligned}
\int \frac{\coth^{-1}(ax)}{x^4} \, dx &= -\frac{\coth^{-1}(ax)}{3x^3} + \frac{1}{3}a\int \frac{1}{x^3\left(1 - a^2x^2\right)} \, dx \\
&= -\frac{\coth^{-1}(ax)}{3x^3} + \frac{1}{6}a\,\text{Subst}\left(\int \frac{1}{x^2\left(1 - a^2x\right)} \, dx, x, x^2\right) \\
&= -\frac{\coth^{-1}(ax)}{3x^3} + \frac{1}{6}a\,\text{Subst}\left(\int \left(\frac{1}{x^2} + \frac{a^2}{x} - \frac{a^4}{-1 + a^2x}\right) dx, x, x^2\right) \\
&= -\frac{a}{6x^2} - \frac{\coth^{-1}(ax)}{3x^3} + \frac{1}{3}a^3\log(x) - \frac{1}{6}a^3\log\left(1 - a^2x^2\right)
\end{aligned}$$

**Mathematica [A]** time = 0.01, size = 47, normalized size = 1.00

$$\frac{1}{3}a^3\log(x) - \frac{1}{6}a^3\log\left(1-a^2x^2\right) - \frac{\coth^{-1}(ax)}{3x^3} - \frac{a}{6x^2}$$

Antiderivative was successfully verified.

```
[In] Integrate[ArcCoth[a*x]/x^4,x]
```

```
[Out] -1/6*a/x^2 - ArcCoth[a*x]/(3*x^3) + (a^3*Log[x])/3 - (a^3*Log[1 - a^2*x^2])
/6
```

**fricas [A]** time = 1.04, size = 50, normalized size = 1.06

$$-\frac{a^3x^3\log\left(a^2x^2-1\right) - 2\,a^3x^3\log(x) + ax + \log\left(\frac{ax+1}{ax-1}\right)}{6\,x^3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(a*x)/x^4,x, algorithm="fricas")
```

```
[Out] -1/6*(a^3*x^3*log(a^2*x^2 - 1) - 2*a^3*x^3*log(x) + a*x + log((a*x + 1)/(a*
x - 1)))/x^3
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{arcoth}(ax)}{x^4}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(a*x)/x^4,x, algorithm="giac")
```

```
[Out] integrate(arccoth(a*x)/x^4, x)
```

**maple [A]** time = 0.04, size = 48, normalized size = 1.02

$$-\frac{\operatorname{arccoth}(ax)}{3x^3} - \frac{a}{6x^2} + \frac{a^3\ln(ax)}{3} - \frac{a^3\ln(ax-1)}{6} - \frac{a^3\ln(ax+1)}{6}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(arccoth(a*x)/x^4,x)
```

```
[Out] -1/3*arccoth(a*x)/x^3-1/6*a/x^2+1/3*a^3*ln(a*x)-1/6*a^3*ln(a*x-1)-1/6*a^3*l
n(a*x+1)
```

**maxima [A]** time = 0.31, size = 40, normalized size = 0.85

$$-\frac{1}{6}\left(a^2\log\left(a^2x^2-1\right) - a^2\log\left(x^2\right) + \frac{1}{x^2}\right)a - \frac{\operatorname{arcoth}(ax)}{3\,x^3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(a*x)/x^4,x, algorithm="maxima")
```

```
[Out] -1/6*(a^2*log(a^2*x^2 - 1) - a^2*log(x^2) + 1/x^2)*a - 1/3*arccoth(a*x)/x^3
```

**mupad [B]** time = 1.18, size = 39, normalized size = 0.83

$$\frac{a^3\,\ln(x)}{3} - \frac{\frac{\mathrm{acoth}(a\,x)}{3} + \frac{a\,x}{6}}{x^3} - \frac{a^3\,\ln\left(a^2\,x^2-1\right)}{6}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(a*x)/x^4,x)
```

```
[Out] (a^3*log(x))/3 - (acoth(a*x)/3 + (a*x)/6)/x^3 - (a^3*log(a^2*x^2 - 1))/6
```

**sympy** [A] time = 0.74, size = 46, normalized size = 0.98

$$\frac{a^3 \log(x)}{3} - \frac{a^3 \log(ax+1)}{3} + \frac{a^3 \operatorname{acoth}(ax)}{3} - \frac{a}{6x^2} - \frac{\operatorname{acoth}(ax)}{3x^3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(a*x)/x**4,x)
```

```
[Out] a**3*log(x)/3 - a**3*log(a*x + 1)/3 + a**3*acoth(a*x)/3 - a/(6*x**2) - acot
h(a*x)/(3*x**3)
```

## 3.11 $\int \frac{\coth^{-1}(ax)}{x^5} \, dx$

**Optimal**. Leaf size=41

$$\frac{1}{4}a^4\tanh^{-1}(ax)-\frac{a^3}{4x}-\frac{\coth^{-1}(ax)}{4x^4}-\frac{a}{12x^3}$$

```
[Out] -1/12*a/x^3-1/4*a^3/x-1/4*arccoth(a*x)/x^4+1/4*a^4*arctanh(a*x)
```

**Rubi [A]** time = 0.02, antiderivative size = 41, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 3, integrand size = 8, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.375, Rules used = {5917, 325, 206}

$$-\frac{a^3}{4x}+\frac{1}{4}a^4\tanh^{-1}(ax)-\frac{a}{12x^3}-\frac{\coth^{-1}(ax)}{4x^4}$$

Antiderivative was successfully verified.

```
[In] Int[ArcCoth[a*x]/x^5,x]
```

```
[Out] -a/(12*x^3) - a^3/(4*x) - ArcCoth[a*x]/(4*x^4) + (a^4*ArcTanh[a*x])/4
```

Rule 206

```
Int[((a_) + (b_.)*(x_)^2)^(-1), x_Symbol] :> Simp[(1*ArcTanh[(Rt[-b, 2]*x)/
Rt[a, 2]])/(Rt[a, 2]*Rt[-b, 2]), x] /; FreeQ[{a, b}, x] && NegQ[a/b] && (Gt
Q[a, 0] || LtQ[b, 0])
```

Rule 325

```
Int[((c_.)*(x_))^(m_)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Simp[((c*
x)^(m + 1)*(a + b*x^n)^(p + 1))/(a*c*(m + 1)), x] - Dist[(b*(m + n*(p + 1)
+ 1))/(a*c^n*(m + 1)), Int[(c*x)^(m + n)*(a + b*x^n)^p, x], x] /; FreeQ[{a,
 b, c, p}, x] && IGtQ[n, 0] && LtQ[m, -1] && IntBinomialQ[a, b, c, n, m, p,
 x]
```

Rule 5917

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)*((d_.)*(x_))^(m_.), x_Symbol]
 :> Simp[((d*x)^(m + 1)*(a + b*ArcCoth[c*x])^p)/(d*(m + 1)), x] - Dist[(b*c
*p)/(d*(m + 1)), Int[((d*x)^(m + 1)*(a + b*ArcCoth[c*x])^(p - 1))/(1 - c^2*
x^2), x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[p, 0] && (EqQ[p, 1] || In
tegerQ[m]) && NeQ[m, -1]
```

Rubi steps

$$\begin{aligned}
\int \frac{\coth^{-1}(ax)}{x^5} \, dx &= -\frac{\coth^{-1}(ax)}{4x^4}+\frac{1}{4}a\int \frac{1}{x^4\left(1-a^2x^2\right)} \, dx\\
&= -\frac{a}{12x^3}-\frac{\coth^{-1}(ax)}{4x^4}+\frac{1}{4}a^3\int \frac{1}{x^2\left(1-a^2x^2\right)} \, dx\\
&= -\frac{a}{12x^3}-\frac{a^3}{4x}-\frac{\coth^{-1}(ax)}{4x^4}+\frac{1}{4}a^5\int \frac{1}{1-a^2x^2} \, dx\\
&= -\frac{a}{12x^3}-\frac{a^3}{4x}-\frac{\coth^{-1}(ax)}{4x^4}+\frac{1}{4}a^4\tanh^{-1}(ax)
\end{aligned}$$

**Mathematica [A]** time = 0.01, size = 57, normalized size = 1.39

$$-\frac{1}{8}a^4\log(1-ax)+\frac{1}{8}a^4\log(ax+1)-\frac{a^3}{4x}-\frac{\coth^{-1}(ax)}{4x^4}-\frac{a}{12x^3}$$

Antiderivative was successfully verified.

```
[In] Integrate[ArcCoth[a*x]/x^5,x]
```

```
[Out] -1/12*a/x^3 - a^3/(4*x) - ArcCoth[a*x]/(4*x^4) - (a^4*Log[1 - a*x])/8 + (a^
4*Log[1 + a*x])/8
```

**fricas [A]** time = 0.52, size = 43, normalized size = 1.05

$$-\frac{6\,a^3x^3+2\,ax-3\left(a^4x^4-1\right)\log\left(\frac{ax+1}{ax-1}\right)}{24\,x^4}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(a*x)/x^5,x, algorithm="fricas")
```

```
[Out] -1/24*(6*a^3*x^3 + 2*a*x - 3*(a^4*x^4 - 1)*log((a*x + 1)/(a*x - 1)))/x^4
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{arcoth}(ax)}{x^5}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(a*x)/x^5,x, algorithm="giac")
```

```
[Out] integrate(arccoth(a*x)/x^5, x)
```

**maple [A]** time = 0.04, size = 47, normalized size = 1.15

$$-\frac{\operatorname{arccoth}(ax)}{4x^4}-\frac{a}{12x^3}-\frac{a^3}{4x}-\frac{a^4\ln(ax-1)}{8}+\frac{a^4\ln(ax+1)}{8}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(arccoth(a*x)/x^5,x)
```

```
[Out] -1/4*arccoth(a*x)/x^4-1/12*a/x^3-1/4*a^3/x-1/8*a^4*ln(a*x-1)+1/8*a^4*ln(a*x
+1)
```

**maxima [A]** time = 0.31, size = 51, normalized size = 1.24

$$\frac{1}{24}\left(3\,a^3\log(ax+1)-3\,a^3\log(ax-1)-\frac{2\left(3\,a^2x^2+1\right)}{x^3}\right)a-\frac{\operatorname{arcoth}(ax)}{4\,x^4}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(a*x)/x^5,x, algorithm="maxima")
```

```
[Out] 1/24*(3*a^3*log(a*x + 1) - 3*a^3*log(a*x - 1) - 2*(3*a^2*x^2 + 1)/x^3)*a -
1/4*arccoth(a*x)/x^4
```

**mupad [B]** time = 1.61, size = 60, normalized size = 1.46

$$\frac{\ln\left(1-\frac{1}{a\,x}\right)}{8\,x^4}-\frac{\ln\left(\frac{1}{a\,x}+1\right)}{8\,x^4}-\frac{a^3\,x^2+\frac{a}{3}}{4\,x^3}-\frac{a^4\,\mathrm{atan}\left(a\,x\,1\mathrm{i}\right)\,1\mathrm{i}}{4}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(a*x)/x^5,x)
```

```
[Out] log(1 - 1/(a*x))/(8*x^4) - (a^4*atan(a*x*1i)*1i)/4 - log(1/(a*x) + 1)/(8*x^
4) - (a/3 + a^3*x^2)/(4*x^3)
```

**sympy [A]** time = 1.16, size = 32, normalized size = 0.78

$$\frac{a^4\operatorname{acoth}(ax)}{4} - \frac{a^3}{4x} - \frac{a}{12x^3} - \frac{\operatorname{acoth}(ax)}{4x^4}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(a*x)/x**5,x)
```

```
[Out] a**4*acoth(a*x)/4 - a**3/(4*x) - a/(12*x**3) - acoth(a*x)/(4*x**4)
```

## 3.12 $\int x^5 \coth^{-1}(ax)^2 \, dx$

**Optimal**. Leaf size=105

$$-\frac{\coth^{-1}(ax)^2}{6a^6}+\frac{x\coth^{-1}(ax)}{3a^5}+\frac{4x^2}{45a^4}+\frac{x^3\coth^{-1}(ax)}{9a^3}+\frac{x^4}{60a^2}+\frac{23\log\left(1-a^2x^2\right)}{90a^6}+\frac{1}{6}x^6\coth^{-1}(ax)^2+\frac{x^5\coth^{-1}(ax)}{15a}$$

```
[Out] 4/45*x^2/a^4+1/60*x^4/a^2+1/3*x*arccoth(a*x)/a^5+1/9*x^3*arccoth(a*x)/a^3+1
/15*x^5*arccoth(a*x)/a-1/6*arccoth(a*x)^2/a^6+1/6*x^6*arccoth(a*x)^2+23/90*
ln(-a^2*x^2+1)/a^6
```

**Rubi [A]** time = 0.25, antiderivative size = 105, normalized size of antiderivative = 1.00, number of steps used = 15, number of rules used = 7, integrand size = 10, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.700, Rules used = {5917, 5981, 266, 43, 5911, 260, 5949}

$$\frac{x^4}{60a^2}+\frac{4x^2}{45a^4}+\frac{23\log\left(1-a^2x^2\right)}{90a^6}+\frac{x^3\coth^{-1}(ax)}{9a^3}+\frac{x\coth^{-1}(ax)}{3a^5}-\frac{\coth^{-1}(ax)^2}{6a^6}+\frac{1}{6}x^6\coth^{-1}(ax)^2+\frac{x^5\coth^{-1}(ax)}{15a}$$

Antiderivative was successfully verified.

```
[In] Int[x^5*ArcCoth[a*x]^2,x]
```

```
[Out] (4*x^2)/(45*a^4) + x^4/(60*a^2) + (x*ArcCoth[a*x])/(3*a^5) + (x^3*ArcCoth[a
*x])/(9*a^3) + (x^5*ArcCoth[a*x])/(15*a) - ArcCoth[a*x]^2/(6*a^6) + (x^6*Ar
cCoth[a*x]^2)/6 + (23*Log[1 - a^2*x^2])/(90*a^6)
```

Rule 43

```
Int[((a_.) + (b_.)*(x_))^(m_.)*((c_.) + (d_.)*(x_))^(n_.), x_Symbol] :> Int
[ExpandIntegrand[(a + b*x)^m*(c + d*x)^n, x], x] /; FreeQ[{a, b, c, d, n},
x] && NeQ[b*c - a*d, 0] && IGtQ[m, 0] && ( !IntegerQ[n] || (EqQ[c, 0] && Le
Q[7*m + 4*n + 4, 0]) || LtQ[9*m + 5*(n + 1), 0] || GtQ[m + n + 2, 0])
```

Rule 260

```
Int[(x_)^(m_.)/((a_) + (b_.)*(x_)^(n_)), x_Symbol] :> Simp[Log[RemoveConten
t[a + b*x^n, x]]/(b*n), x] /; FreeQ[{a, b, m, n}, x] && EqQ[m, n - 1]
```

Rule 266

```
Int[(x_)^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Dist[1/n, Subst[
Int[x^(Simplify[(m + 1)/n] - 1)*(a + b*x)^p, x], x, x^n], x] /; FreeQ[{a, b
, m, n, p}, x] && IntegerQ[Simplify[(m + 1)/n]]
```

Rule 5911

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.), x_Symbol] :> Simp[x*(a + b*A
rcCoth[c*x])^p, x] - Dist[b*c*p, Int[(x*(a + b*ArcCoth[c*x])^(p - 1))/(1 -
c^2*x^2), x], x] /; FreeQ[{a, b, c}, x] && IGtQ[p, 0]
```

Rule 5917

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)*((d_.)*(x_))^(m_.), x_Symbol]
 :> Simp[((d*x)^(m + 1)*(a + b*ArcCoth[c*x])^p)/(d*(m + 1)), x] - Dist[(b*c
*p)/(d*(m + 1)), Int[((d*x)^(m + 1)*(a + b*ArcCoth[c*x])^(p - 1))/(1 - c^2*
x^2), x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[p, 0] && (EqQ[p, 1] || In
tegerQ[m]) && NeQ[m, -1]
```

Rule 5949

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)/((d_) + (e_.)*(x_)^2), x_Symb
ol] :> Simp[(a + b*ArcCoth[c*x])^(p + 1)/(b*c*d*(p + 1)), x] /; FreeQ[{a, b
, c, d, e, p}, x] && EqQ[c^2*d + e, 0] && NeQ[p, -1]
```

Rule 5981

```
Int[(((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)*((f_.)*(x_))^(m_))/((d_) + (
e_.)*(x_)^2), x_Symbol] :> Dist[f^2/e, Int[(f*x)^(m - 2)*(a + b*ArcCoth[c*x
])^p, x], x] - Dist[(d*f^2)/e, Int[((f*x)^(m - 2)*(a + b*ArcCoth[c*x])^p)/(
d + e*x^2), x], x] /; FreeQ[{a, b, c, d, e, f}, x] && GtQ[p, 0] && GtQ[m, 1
]
```

Rubi steps

$$\begin{aligned}\int x^5\coth^{-1}(ax)^2\,dx &= \frac{1}{6}x^6\coth^{-1}(ax)^2-\frac{1}{3}a\int\frac{x^6\coth^{-1}(ax)}{1-a^2x^2}\,dx\\ &= \frac{1}{6}x^6\coth^{-1}(ax)^2+\frac{\int x^4\coth^{-1}(ax)\,dx}{3a}-\frac{\int\frac{x^4\coth^{-1}(ax)}{1-a^2x^2}\,dx}{3a}\\ &= \frac{x^5\coth^{-1}(ax)}{15a}+\frac{1}{6}x^6\coth^{-1}(ax)^2-\frac{1}{15}\int\frac{x^5}{1-a^2x^2}\,dx+\frac{\int x^2\coth^{-1}(ax)\,dx}{3a^3}-\frac{\int\frac{x^2\coth}{1-a}}{3a}\\ &= \frac{x^3\coth^{-1}(ax)}{9a^3}+\frac{x^5\coth^{-1}(ax)}{15a}+\frac{1}{6}x^6\coth^{-1}(ax)^2-\frac{1}{30}\operatorname{Subst}\left(\int\frac{x^2}{1-a^2x}\,dx,x,x^2\right)+\\ &= \frac{x\coth^{-1}(ax)}{3a^5}+\frac{x^3\coth^{-1}(ax)}{9a^3}+\frac{x^5\coth^{-1}(ax)}{15a}-\frac{\coth^{-1}(ax)^2}{6a^6}+\frac{1}{6}x^6\coth^{-1}(ax)^2-\frac{1}{30}\\ &= \frac{x^2}{30a^4}+\frac{x^4}{60a^2}+\frac{x\coth^{-1}(ax)}{3a^5}+\frac{x^3\coth^{-1}(ax)}{9a^3}+\frac{x^5\coth^{-1}(ax)}{15a}-\frac{\coth^{-1}(ax)^2}{6a^6}+\frac{1}{6}x^6\,c\\ &= \frac{4x^2}{45a^4}+\frac{x^4}{60a^2}+\frac{x\coth^{-1}(ax)}{3a^5}+\frac{x^3\coth^{-1}(ax)}{9a^3}+\frac{x^5\coth^{-1}(ax)}{15a}-\frac{\coth^{-1}(ax)^2}{6a^6}+\frac{1}{6}x^6\,c\end{aligned}$$

**Mathematica [A]** time = 0.02, size = 80, normalized size = 0.76

$$\frac{30\left(a^6x^6-1\right)\coth^{-1}(ax)^2+3a^4x^4+16a^2x^2+46\log\left(1-a^2x^2\right)+4ax\left(3a^4x^4+5a^2x^2+15\right)\coth^{-1}(ax)}{180a^6}$$

Antiderivative was successfully verified.

```
[In] Integrate[x^5*ArcCoth[a*x]^2,x]
```

```
[Out] (16*a^2*x^2 + 3*a^4*x^4 + 4*a*x*(15 + 5*a^2*x^2 + 3*a^4*x^4)*ArcCoth[a*x] +
 30*(-1 + a^6*x^6)*ArcCoth[a*x]^2 + 46*Log[1 - a^2*x^2])/(180*a^6)
```

**fricas [A]** time = 0.53, size = 98, normalized size = 0.93

$$\frac{6\,a^4x^4+32\,a^2x^2+15\left(a^6x^6-1\right)\log\left(\frac{ax+1}{ax-1}\right)^2+4\left(3\,a^5x^5+5\,a^3x^3+15\,ax\right)\log\left(\frac{ax+1}{ax-1}\right)+92\,\log\left(a^2x^2-1\right)}{360\,a^6}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^5*arccoth(a*x)^2,x, algorithm="fricas")
```

```
[Out] 1/360*(6*a^4*x^4 + 32*a^2*x^2 + 15*(a^6*x^6 - 1)*log((a*x + 1)/(a*x - 1))^2
 + 4*(3*a^5*x^5 + 5*a^3*x^3 + 15*a*x)*log((a*x + 1)/(a*x - 1)) + 92*log(a^2
*x^2 - 1))/a^6
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int x^5 \operatorname{arcoth}(ax)^2\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^5*arccoth(a*x)^2,x, algorithm="giac")
```

```
[Out] integrate(x^5*arccoth(a*x)^2, x)
```

**maple [B]** time = 0.06, size = 196, normalized size = 1.87

$$\frac{x^6 \operatorname{arccoth}(ax)^2}{6}+\frac{x^5 \operatorname{arccoth}(ax)}{15a}+\frac{x^3 \operatorname{arccoth}(ax)}{9a^3}+\frac{x \operatorname{arccoth}(ax)}{3a^5}+\frac{\operatorname{arccoth}(ax)\ln(ax-1)}{6a^6}-\frac{\operatorname{arccoth}(ax)\ln(ax}{6a^6}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^5*arccoth(a*x)^2,x)
```

```
[Out] 1/6*x^6*arccoth(a*x)^2+1/15*x^5*arccoth(a*x)/a+1/9*x^3*arccoth(a*x)/a^3+1/3
*x*arccoth(a*x)/a^5+1/6/a^6*arccoth(a*x)*ln(a*x-1)-1/6/a^6*arccoth(a*x)*ln(
a*x+1)+1/24/a^6*ln(a*x-1)^2-1/12/a^6*ln(a*x-1)*ln(1/2+1/2*a*x)+1/24/a^6*ln(
a*x+1)^2-1/12/a^6*ln(-1/2*a*x+1/2)*ln(a*x+1)+1/12/a^6*ln(-1/2*a*x+1/2)*ln(1
/2+1/2*a*x)+1/60*x^4/a^2+4/45*x^2/a^4+23/90/a^6*ln(a*x-1)+23/90*ln(a*x+1)/a
^6
```

**maxima [A]** time = 0.31, size = 135, normalized size = 1.29

$$\frac{1}{6}x^6 \operatorname{arcoth}(ax)^2+\frac{1}{90}a\left(\frac{2\left(3a^4x^5+5a^2x^3+15x\right)}{a^6}-\frac{15\log(ax+1)}{a^7}+\frac{15\log(ax-1)}{a^7}\right)\operatorname{arcoth}(ax)+\frac{6a^4x^4+32}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^5*arccoth(a*x)^2,x, algorithm="maxima")
```

```
[Out] 1/6*x^6*arccoth(a*x)^2 + 1/90*a*(2*(3*a^4*x^5 + 5*a^2*x^3 + 15*x)/a^6 - 15*
log(a*x + 1)/a^7 + 15*log(a*x - 1)/a^7)*arccoth(a*x) + 1/360*(6*a^4*x^4 + 3
2*a^2*x^2 - 2*(15*log(a*x - 1) - 46)*log(a*x + 1) + 15*log(a*x + 1)^2 + 15*
log(a*x - 1)^2 + 92*log(a*x - 1))/a^6
```

**mupad [B]** time = 1.36, size = 85, normalized size = 0.81

$$\frac{x^6 \operatorname{acoth}(a\,x)^2}{6}+\frac{\frac{23\ln\left(a^2\,x^2-1\right)}{90}+\frac{4\,a^2\,x^2}{45}+\frac{a^4\,x^4}{60}-\frac{\operatorname{acoth}(a\,x)^2}{6}+\frac{a^3\,x^3\operatorname{acoth}(a\,x)}{9}+\frac{a^5\,x^5\operatorname{acoth}(a\,x)}{15}+\frac{a\,x\operatorname{acoth}(a\,x)}{3}}{a^6}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^5*acoth(a*x)^2,x)
```

```
[Out] (x^6*acoth(a*x)^2)/6 + ((23*log(a^2*x^2 - 1))/90 + (4*a^2*x^2)/45 + (a^4*x^
4)/60 - acoth(a*x)^2/6 + (a^3*x^3*acoth(a*x))/9 + (a^5*x^5*acoth(a*x))/15 +
 (a*x*acoth(a*x))/3)/a^6
```

**sympy [A]** time = 3.31, size = 114, normalized size = 1.09

$$\begin{cases} \frac{x^6 \operatorname{acoth}^2(ax)}{6}+\frac{x^5 \operatorname{acoth}(ax)}{15a}+\frac{x^4}{60a^2}+\frac{x^3 \operatorname{acoth}(ax)}{9a^3}+\frac{4x^2}{45a^4}+\frac{x \operatorname{acoth}(ax)}{3a^5}+\frac{23\log(ax+1)}{45a^6}-\frac{\operatorname{acoth}^2(ax)}{6a^6}-\frac{23\operatorname{acoth}(ax)}{45a^6} & \text{for } a \neq ( \\ -\frac{\pi^2 x^6}{24} & \text{otherwi} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**5*acoth(a*x)**2,x)
```

```
[Out] Piecewise((x**6*acoth(a*x)**2/6 + x**5*acoth(a*x)/(15*a) + x**4/(60*a**2) +
 x**3*acoth(a*x)/(9*a**3) + 4*x**2/(45*a**4) + x*acoth(a*x)/(3*a**5) + 23*l
og(a*x + 1)/(45*a**6) - acoth(a*x)**2/(6*a**6) - 23*acoth(a*x)/(45*a**6), N
e(a, 0)), (-pi**2*x**6/24, True))
```

## 3.13 $\int x^4 \coth^{-1}(ax)^2 \, dx$

**Optimal**. Leaf size=127

$$-\frac{\text{Li}_2\left(1-\frac{2}{1-ax}\right)}{5a^5}-\frac{3\tanh^{-1}(ax)}{10a^5}+\frac{\coth^{-1}(ax)^2}{5a^5}-\frac{2\log\left(\frac{2}{1-ax}\right)\coth^{-1}(ax)}{5a^5}+\frac{3x}{10a^4}+\frac{x^2\coth^{-1}(ax)}{5a^3}+\frac{x^3}{30a^2}+\frac{1}{5}x^5\coth^{-1}($$

```
[Out] 3/10*x/a^4+1/30*x^3/a^2+1/5*x^2*arccoth(a*x)/a^3+1/10*x^4*arccoth(a*x)/a+1/
5*arccoth(a*x)^2/a^5+1/5*x^5*arccoth(a*x)^2-3/10*arctanh(a*x)/a^5-2/5*arcco
th(a*x)*ln(2/(-a*x+1))/a^5-1/5*polylog(2,1-2/(-a*x+1))/a^5
```

**Rubi [A]** time = 0.23, antiderivative size = 127, normalized size of antiderivative = 1.00, number of steps used = 14, number of rules used = 9, integrand size = 10, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.900, Rules used = {5917, 5981, 302, 206, 321, 5985, 5919, 2402, 2315}

$$-\frac{\text{PolyLog}\left(2,1-\frac{2}{1-ax}\right)}{5a^5}+\frac{x^3}{30a^2}+\frac{x^2\coth^{-1}(ax)}{5a^3}+\frac{3x}{10a^4}-\frac{3\tanh^{-1}(ax)}{10a^5}+\frac{\coth^{-1}(ax)^2}{5a^5}-\frac{2\log\left(\frac{2}{1-ax}\right)\coth^{-1}(ax)}{5a^5}+\frac{1}{5}x^5$$

Antiderivative was successfully verified.

```
[In] Int[x^4*ArcCoth[a*x]^2,x]
```

```
[Out] (3*x)/(10*a^4) + x^3/(30*a^2) + (x^2*ArcCoth[a*x])/(5*a^3) + (x^4*ArcCoth[a
*x])/(10*a) + ArcCoth[a*x]^2/(5*a^5) + (x^5*ArcCoth[a*x]^2)/5 - (3*ArcTanh[
a*x])/(10*a^5) - (2*ArcCoth[a*x]*Log[2/(1 - a*x)])/(5*a^5) - PolyLog[2, 1 -
 2/(1 - a*x)]/(5*a^5)
```

Rule 206

```
Int[((a_) + (b_.)*(x_)^2)^(-1), x_Symbol] :> Simp[(1*ArcTanh[(Rt[-b, 2]*x)/
Rt[a, 2]])/(Rt[a, 2]*Rt[-b, 2]), x] /; FreeQ[{a, b}, x] && NegQ[a/b] && (Gt
Q[a, 0] || LtQ[b, 0])
```

Rule 302

```
Int[(x_)^(m_)/((a_) + (b_.)*(x_)^(n_)), x_Symbol] :> Int[PolynomialDivide[x
^m, a + b*x^n, x], x] /; FreeQ[{a, b}, x] && IGtQ[m, 0] && IGtQ[n, 0] && Gt
Q[m, 2*n - 1]
```

Rule 321

```
Int[((c_.)*(x_))^(m_)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Simp[(c^(
n - 1)*(c*x)^(m - n + 1)*(a + b*x^n)^(p + 1))/(b*(m + n*p + 1)), x] - Dist[
(a*c^n*(m - n + 1))/(b*(m + n*p + 1)), Int[(c*x)^(m - n)*(a + b*x^n)^p, x],
 x] /; FreeQ[{a, b, c, p}, x] && IGtQ[n, 0] && GtQ[m, n - 1] && NeQ[m + n*p
 + 1, 0] && IntBinomialQ[a, b, c, n, m, p, x]
```

Rule 2315

```
Int[Log[(c_.)*(x_)]/((d_) + (e_.)*(x_)), x_Symbol] :> -Simp[PolyLog[2, 1 -
c*x]/e, x] /; FreeQ[{c, d, e}, x] && EqQ[e + c*d, 0]
```

Rule 2402

```
Int[Log[(c_.)/((d_) + (e_.)*(x_))]/((f_) + (g_.)*(x_)^2), x_Symbol] :> -Dis
t[e/g, Subst[Int[Log[2*d*x]/(1 - 2*d*x), x], x, 1/(d + e*x)], x] /; FreeQ[{
c, d, e, f, g}, x] && EqQ[c, 2*d] && EqQ[e^2*f + d^2*g, 0]
```

Rule 5917

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)*((d_.)*(x_))^(m_.), x_Symbol]
 :> Simp[((d*x)^(m + 1)*(a + b*ArcCoth[c*x])^p)/(d*(m + 1)), x] - Dist[(b*c
*p)/(d*(m + 1)), Int[((d*x)^(m + 1)*(a + b*ArcCoth[c*x])^(p - 1))/(1 - c^2*
x^2), x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[p, 0] && (EqQ[p, 1] || In
tegerQ[m]) && NeQ[m, -1]
```

Rule 5919

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)/((d_) + (e_.)*(x_)), x_Symbol
] :> -Simp[((a + b*ArcCoth[c*x])^p*Log[2/(1 + (e*x)/d)])/e, x] + Dist[(b*c*
p)/e, Int[((a + b*ArcCoth[c*x])^(p - 1)*Log[2/(1 + (e*x)/d)])/(1 - c^2*x^2)
, x], x] /; FreeQ[{a, b, c, d, e}, x] && IGtQ[p, 0] && EqQ[c^2*d^2 - e^2, 0
]
```

Rule 5981

```
Int[(((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)*((f_.)*(x_))^(m_))/((d_) + (
e_.)*(x_)^2), x_Symbol] :> Dist[f^2/e, Int[(f*x)^(m - 2)*(a + b*ArcCoth[c*x
])^p, x], x] - Dist[(d*f^2)/e, Int[((f*x)^(m - 2)*(a + b*ArcCoth[c*x])^p)/(
d + e*x^2), x], x] /; FreeQ[{a, b, c, d, e, f}, x] && GtQ[p, 0] && GtQ[m, 1
]
```

Rule 5985

```
Int[(((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)*(x_))/((d_) + (e_.)*(x_)^2),
 x_Symbol] :> Simp[(a + b*ArcCoth[c*x])^(p + 1)/(b*e*(p + 1)), x] + Dist[1/
(c*d), Int[(a + b*ArcCoth[c*x])^p/(1 - c*x), x], x] /; FreeQ[{a, b, c, d, e
}, x] && EqQ[c^2*d + e, 0] && IGtQ[p, 0]
```

Rubi steps

$$\int x^4\coth^{-1}(ax)^2\,dx = \frac{1}{5}x^5\coth^{-1}(ax)^2 - \frac{1}{5}(2a)\int\frac{x^5\coth^{-1}(ax)}{1-a^2x^2}\,dx$$

$$= \frac{1}{5}x^5\coth^{-1}(ax)^2 + \frac{2\int x^3\coth^{-1}(ax)\,dx}{5a} - \frac{2\int\frac{x^3\coth^{-1}(ax)}{1-a^2x^2}\,dx}{5a}$$

$$= \frac{x^4\coth^{-1}(ax)}{10a} + \frac{1}{5}x^5\coth^{-1}(ax)^2 - \frac{1}{10}\int\frac{x^4}{1-a^2x^2}\,dx + \frac{2\int x\coth^{-1}(ax)\,dx}{5a^3} - \frac{2\int\frac{x\,\mathrm{co}}{1\ldots}}{5\ldots}$$

$$= \frac{x^2\coth^{-1}(ax)}{5a^3} + \frac{x^4\coth^{-1}(ax)}{10a} + \frac{\coth^{-1}(ax)^2}{5a^5} + \frac{1}{5}x^5\coth^{-1}(ax)^2 - \frac{1}{10}\int\left(-\frac{1}{a^4} - \frac{x^2}{a^2} + \ldots\right.$$

$$= \frac{3x}{10a^4} + \frac{x^3}{30a^2} + \frac{x^2\coth^{-1}(ax)}{5a^3} + \frac{x^4\coth^{-1}(ax)}{10a} + \frac{\coth^{-1}(ax)^2}{5a^5} + \frac{1}{5}x^5\coth^{-1}(ax)^2 - \frac{2\,\mathrm{c}\ldots}{\ldots}$$

$$= \frac{3x}{10a^4} + \frac{x^3}{30a^2} + \frac{x^2\coth^{-1}(ax)}{5a^3} + \frac{x^4\coth^{-1}(ax)}{10a} + \frac{\coth^{-1}(ax)^2}{5a^5} + \frac{1}{5}x^5\coth^{-1}(ax)^2 - \frac{3\,\mathrm{t}\ldots}{\ldots}$$

$$= \frac{3x}{10a^4} + \frac{x^3}{30a^2} + \frac{x^2\coth^{-1}(ax)}{5a^3} + \frac{x^4\coth^{-1}(ax)}{10a} + \frac{\coth^{-1}(ax)^2}{5a^5} + \frac{1}{5}x^5\coth^{-1}(ax)^2 - \frac{3\,\mathrm{t}\ldots}{\ldots}$$

**Mathematica [A]** time = 0.45, size = 87, normalized size = 0.69

$$\frac{6\left(a^5x^5-1\right)\coth^{-1}(ax)^2 + ax\left(a^2x^2+9\right) + 3\coth^{-1}(ax)\left(a^4x^4+2a^2x^2-4\log\left(1-e^{-2\coth^{-1}(ax)}\right)-3\right) + 6\mathrm{Li}_2\left(\ldots\right.}{30a^5}$$

Warning: Unable to verify antiderivative.

```
[In] Integrate[x^4*ArcCoth[a*x]^2,x]
```

```
[Out] (a*x*(9 + a^2*x^2) + 6*(-1 + a^5*x^5)*ArcCoth[a*x]^2 + 3*ArcCoth[a*x]*(-3 +
 2*a^2*x^2 + a^4*x^4 - 4*Log[1 - E^(-2*ArcCoth[a*x])]) + 6*PolyLog[2, E^(-2
*ArcCoth[a*x])])/(30*a^5)
```

**fricas [F]** time = 0.74, size = 0, normalized size = 0.00

$$\text{integral}\left(x^4 \operatorname{arcoth}(ax)^2, x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^4*arccoth(a*x)^2,x, algorithm="fricas")
```

```
[Out] integral(x^4*arccoth(a*x)^2, x)
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int x^4 \operatorname{arcoth}(ax)^2 \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^4*arccoth(a*x)^2,x, algorithm="giac")
```

```
[Out] integrate(x^4*arccoth(a*x)^2, x)
```

**maple [A]** time = 0.06, size = 196, normalized size = 1.54

$$\frac{x^5 \operatorname{arccoth}(ax)^2}{5} + \frac{x^4 \operatorname{arccoth}(ax)}{10a} + \frac{x^2 \operatorname{arccoth}(ax)}{5a^3} + \frac{\operatorname{arccoth}(ax)\ln(ax-1)}{5a^5} + \frac{\operatorname{arccoth}(ax)\ln(ax+1)}{5a^5} + \frac{x^3}{30a^2} + \frac{3}{10}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^4*arccoth(a*x)^2,x)
```

```
[Out] 1/5*x^5*arccoth(a*x)^2+1/10*x^4*arccoth(a*x)/a+1/5*x^2*arccoth(a*x)/a^3+1/5
/a^5*arccoth(a*x)*ln(a*x-1)+1/5/a^5*arccoth(a*x)*ln(a*x+1)+1/30*x^3/a^2+3/1
0*x/a^4+3/20/a^5*ln(a*x-1)-3/20*ln(a*x+1)/a^5+1/20/a^5*ln(a*x-1)^2-1/5/a^5*
dilog(1/2+1/2*a*x)-1/10/a^5*ln(a*x-1)*ln(1/2+1/2*a*x)-1/20/a^5*ln(a*x+1)^2-
1/10/a^5*ln(-1/2*a*x+1/2)*ln(1/2+1/2*a*x)+1/10/a^5*ln(-1/2*a*x+1/2)*ln(a*x+
1)
```

**maxima [A]** time = 0.32, size = 155, normalized size = 1.22

$$\frac{1}{5} x^5 \operatorname{arcoth}(ax)^2 + \frac{1}{60} a^2 \left( \frac{2\,a^3 x^3 + 18\,ax - 3\,\log(ax+1)^2 + 6\,\log(ax+1)\log(ax-1) + 3\,\log(ax-1)^2 + 9\,\log}{a^7} \right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^4*arccoth(a*x)^2,x, algorithm="maxima")
```

```
[Out] 1/5*x^5*arccoth(a*x)^2 + 1/60*a^2*((2*a^3*x^3 + 18*a*x - 3*log(a*x + 1)^2 +
 6*log(a*x + 1)*log(a*x - 1) + 3*log(a*x - 1)^2 + 9*log(a*x - 1))/a^7 - 12*
(log(a*x - 1)*log(1/2*a*x + 1/2) + dilog(-1/2*a*x + 1/2))/a^7 - 9*log(a*x +
 1)/a^7) + 1/10*a*((a^2*x^4 + 2*x^2)/a^4 + 2*log(a^2*x^2 - 1)/a^6)*arccoth(
a*x)
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.01

$$\int x^4 \operatorname{acoth}(a\,x)^2 \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^4*acoth(a*x)^2,x)
```

```
[Out] int(x^4*acoth(a*x)^2, x)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int x^4 \operatorname{acoth}^2(ax)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**4*acoth(a*x)**2,x)
```

```
[Out] Integral(x**4*acoth(a*x)**2, x)
```

## 3.14 $\int x^3 \coth^{-1}(ax)^2 \, dx$

**Optimal**. Leaf size=81

$$-\frac{\coth^{-1}(ax)^2}{4a^4}+\frac{x\coth^{-1}(ax)}{2a^3}+\frac{x^2}{12a^2}+\frac{\log\left(1-a^2x^2\right)}{3a^4}+\frac{1}{4}x^4\coth^{-1}(ax)^2+\frac{x^3\coth^{-1}(ax)}{6a}$$

```
[Out] 1/12*x^2/a^2+1/2*x*arccoth(a*x)/a^3+1/6*x^3*arccoth(a*x)/a-1/4*arccoth(a*x)
^2/a^4+1/4*x^4*arccoth(a*x)^2+1/3*ln(-a^2*x^2+1)/a^4
```

**Rubi [A]** time = 0.16, antiderivative size = 81, normalized size of antiderivative = 1.00, number of steps used = 10, number of rules used = 7, integrand size = 10, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.700, Rules used = {5917, 5981, 266, 43, 5911, 260, 5949}

$$\frac{x^2}{12a^2}+\frac{\log\left(1-a^2x^2\right)}{3a^4}+\frac{x\coth^{-1}(ax)}{2a^3}-\frac{\coth^{-1}(ax)^2}{4a^4}+\frac{1}{4}x^4\coth^{-1}(ax)^2+\frac{x^3\coth^{-1}(ax)}{6a}$$

Antiderivative was successfully verified.

```
[In] Int[x^3*ArcCoth[a*x]^2,x]
```

```
[Out] x^2/(12*a^2) + (x*ArcCoth[a*x])/(2*a^3) + (x^3*ArcCoth[a*x])/(6*a) - ArcCot
h[a*x]^2/(4*a^4) + (x^4*ArcCoth[a*x]^2)/4 + Log[1 - a^2*x^2]/(3*a^4)
```

Rule 43

```
Int[((a_.) + (b_.)*(x_))^(m_.)*((c_.) + (d_.)*(x_))^(n_.), x_Symbol] :> Int
[ExpandIntegrand[(a + b*x)^m*(c + d*x)^n, x], x] /; FreeQ[{a, b, c, d, n},
x] && NeQ[b*c - a*d, 0] && IGtQ[m, 0] && ( !IntegerQ[n] || (EqQ[c, 0] && Le
Q[7*m + 4*n + 4, 0]) || LtQ[9*m + 5*(n + 1), 0] || GtQ[m + n + 2, 0])
```

Rule 260

```
Int[(x_)^(m_.)/((a_) + (b_.)*(x_)^(n_)), x_Symbol] :> Simp[Log[RemoveConten
t[a + b*x^n, x]]/(b*n), x] /; FreeQ[{a, b, m, n}, x] && EqQ[m, n - 1]
```

Rule 266

```
Int[(x_)^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Dist[1/n, Subst[
Int[x^(Simplify[(m + 1)/n] - 1)*(a + b*x)^p, x], x, x^n], x] /; FreeQ[{a, b
, m, n, p}, x] && IntegerQ[Simplify[(m + 1)/n]]
```

Rule 5911

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.), x_Symbol] :> Simp[x*(a + b*A
rcCoth[c*x])^p, x] - Dist[b*c*p, Int[(x*(a + b*ArcCoth[c*x])^(p - 1))/(1 -
c^2*x^2), x], x] /; FreeQ[{a, b, c}, x] && IGtQ[p, 0]
```

Rule 5917

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)*((d_.)*(x_))^(m_.), x_Symbol]
 :> Simp[((d*x)^(m + 1)*(a + b*ArcCoth[c*x])^p)/(d*(m + 1)), x] - Dist[(b*c
*p)/(d*(m + 1)), Int[((d*x)^(m + 1)*(a + b*ArcCoth[c*x])^(p - 1))/(1 - c^2*
x^2), x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[p, 0] && (EqQ[p, 1] || In
tegerQ[m]) && NeQ[m, -1]
```

Rule 5949

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)/((d_) + (e_.)*(x_)^2), x_Symb
ol] :> Simp[(a + b*ArcCoth[c*x])^(p + 1)/(b*c*d*(p + 1)), x] /; FreeQ[{a, b
```

```
, c, d, e, p}, x] && EqQ[c^2*d + e, 0] && NeQ[p, -1]
```

Rule 5981

```
Int[(((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)*((f_.)*(x_))^(m_))/((d_) + (
e_.)*(x_)^2), x_Symbol] :> Dist[f^2/e, Int[(f*x)^(m - 2)*(a + b*ArcCoth[c*x
])^p, x], x] - Dist[(d*f^2)/e, Int[((f*x)^(m - 2)*(a + b*ArcCoth[c*x])^p)/(
d + e*x^2), x], x] /; FreeQ[{a, b, c, d, e, f}, x] && GtQ[p, 0] && GtQ[m, 1
]
```

Rubi steps

$$\int x^3 \coth^{-1}(ax)^2\,dx = \frac{1}{4}x^4\coth^{-1}(ax)^2 - \frac{1}{2}a\int \frac{x^4\coth^{-1}(ax)}{1-a^2x^2}\,dx$$

$$= \frac{1}{4}x^4\coth^{-1}(ax)^2 + \frac{\int x^2\coth^{-1}(ax)\,dx}{2a} - \frac{\int \frac{x^2\coth^{-1}(ax)}{1-a^2x^2}\,dx}{2a}$$

$$= \frac{x^3\coth^{-1}(ax)}{6a} + \frac{1}{4}x^4\coth^{-1}(ax)^2 - \frac{1}{6}\int \frac{x^3}{1-a^2x^2}\,dx + \frac{\int \coth^{-1}(ax)\,dx}{2a^3} - \frac{\int \frac{\coth^{-1}(ax)}{1-a^2x^2}}{2a^3}$$

$$= \frac{x\coth^{-1}(ax)}{2a^3} + \frac{x^3\coth^{-1}(ax)}{6a} - \frac{\coth^{-1}(ax)^2}{4a^4} + \frac{1}{4}x^4\coth^{-1}(ax)^2 - \frac{1}{12}\mathrm{Subst}\left(\int \frac{x}{1-a^2}\right.$$

$$= \frac{x\coth^{-1}(ax)}{2a^3} + \frac{x^3\coth^{-1}(ax)}{6a} - \frac{\coth^{-1}(ax)^2}{4a^4} + \frac{1}{4}x^4\coth^{-1}(ax)^2 + \frac{\log\left(1-a^2x^2\right)}{4a^4} - \frac{1}{12}$$

$$= \frac{x^2}{12a^2} + \frac{x\coth^{-1}(ax)}{2a^3} + \frac{x^3\coth^{-1}(ax)}{6a} - \frac{\coth^{-1}(ax)^2}{4a^4} + \frac{1}{4}x^4\coth^{-1}(ax)^2 + \frac{\log\left(1-a^2\right.}{3a^4}$$

**Mathematica [A]** time = 0.02, size = 62, normalized size = 0.77

$$\frac{3\left(a^4x^4-1\right)\coth^{-1}(ax)^2 + a^2x^2 + 4\log\left(1-a^2x^2\right) + 2ax\left(a^2x^2+3\right)\coth^{-1}(ax)}{12a^4}$$

Antiderivative was successfully verified.

```
[In] Integrate[x^3*ArcCoth[a*x]^2,x]
```

```
[Out] (a^2*x^2 + 2*a*x*(3 + a^2*x^2)*ArcCoth[a*x] + 3*(-1 + a^4*x^4)*ArcCoth[a*x]
^2 + 4*Log[1 - a^2*x^2])/(12*a^4)
```

**fricas [A]** time = 0.53, size = 81, normalized size = 1.00

$$\frac{4\,a^2x^2 + 3\left(a^4x^4-1\right)\log\left(\frac{ax+1}{ax-1}\right)^2 + 4\left(a^3x^3+3\,ax\right)\log\left(\frac{ax+1}{ax-1}\right) + 16\,\log\left(a^2x^2-1\right)}{48\,a^4}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^3*arccoth(a*x)^2,x, algorithm="fricas")
```

```
[Out] 1/48*(4*a^2*x^2 + 3*(a^4*x^4 - 1)*log((a*x + 1)/(a*x - 1))^2 + 4*(a^3*x^3 +
 3*a*x)*log((a*x + 1)/(a*x - 1)) + 16*log(a^2*x^2 - 1))/a^4
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int x^3\,\mathrm{arcoth}\,(ax)^2\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^3*arccoth(a*x)^2,x, algorithm="giac")
```

```
[Out] integrate(x^3*arccoth(a*x)^2, x)
```

**maple** [B] time = 0.06, size = 176, normalized size = 2.17

$$\frac{x^4\mathrm{arccoth}\,(ax)^2}{4}+\frac{x^3\mathrm{arccoth}\,(ax)}{6a}+\frac{x\,\mathrm{arccoth}\,(ax)}{2a^3}+\frac{\mathrm{arccoth}\,(ax)\ln(ax-1)}{4a^4}-\frac{\mathrm{arccoth}\,(ax)\ln(ax+1)}{4a^4}+\frac{\ln(ax-1)}{16a^4}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^3*arccoth(a*x)^2,x)
```

```
[Out] 1/4*x^4*arccoth(a*x)^2+1/6*x^3*arccoth(a*x)/a+1/2*x*arccoth(a*x)/a^3+1/4/a^
4*arccoth(a*x)*ln(a*x-1)-1/4/a^4*arccoth(a*x)*ln(a*x+1)+1/16/a^4*ln(a*x-1)^
2-1/8/a^4*ln(a*x-1)*ln(1/2+1/2*a*x)+1/16/a^4*ln(a*x+1)^2+1/8/a^4*ln(-1/2*a*
x+1/2)*ln(1/2+1/2*a*x)-1/8/a^4*ln(-1/2*a*x+1/2)*ln(a*x+1)+1/12*x^2/a^2+1/3/
a^4*ln(a*x-1)+1/3*ln(a*x+1)/a^4
```

**maxima** [A] time = 0.32, size = 118, normalized size = 1.46

$$\frac{1}{4}\,x^4\,\mathrm{arcoth}\,(ax)^2+\frac{1}{12}\,a\left(\frac{2\left(a^2x^3+3\,x\right)}{a^4}-\frac{3\,\log(ax+1)}{a^5}+\frac{3\,\log(ax-1)}{a^5}\right)\mathrm{arcoth}\,(ax)+\frac{4\,a^2x^2-2\left(3\,\log(ax-1)\right.}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^3*arccoth(a*x)^2,x, algorithm="maxima")
```

```
[Out] 1/4*x^4*arccoth(a*x)^2 + 1/12*a*(2*(a^2*x^3 + 3*x)/a^4 - 3*log(a*x + 1)/a^5
 + 3*log(a*x - 1)/a^5)*arccoth(a*x) + 1/48*(4*a^2*x^2 - 2*(3*log(a*x - 1) -
 8)*log(a*x + 1) + 3*log(a*x + 1)^2 + 3*log(a*x - 1)^2 + 16*log(a*x - 1))/a
^4
```

**mupad** [B] time = 1.26, size = 65, normalized size = 0.80

$$\frac{x^4\,\mathrm{acoth}\left(a\,x\right)^2}{4}+\frac{\frac{\ln\left(a^2\,x^2-1\right)}{3}+\frac{a^2\,x^2}{12}-\frac{\mathrm{acoth}(a\,x)^2}{4}+\frac{a^3\,x^3\,\mathrm{acoth}(a\,x)}{6}+\frac{a\,x\,\mathrm{acoth}(a\,x)}{2}}{a^4}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^3*acoth(a*x)^2,x)
```

```
[Out] (x^4*acoth(a*x)^2)/4 + (log(a^2*x^2 - 1)/3 + (a^2*x^2)/12 - acoth(a*x)^2/4
+ (a^3*x^3*acoth(a*x))/6 + (a*x*acoth(a*x))/2)/a^4
```

**sympy** [A] time = 1.44, size = 90, normalized size = 1.11

$$\begin{cases} \frac{x^4\,\mathrm{acoth}^2\,(ax)}{4}+\frac{x^3\,\mathrm{acoth}\,(ax)}{6a}+\frac{x^2}{12a^2}+\frac{x\,\mathrm{acoth}\,(ax)}{2a^3}+\frac{2\log(ax+1)}{3a^4}-\frac{\mathrm{acoth}^2\,(ax)}{4a^4}-\frac{2\,\mathrm{acoth}\,(ax)}{3a^4} & \text{for } a\neq 0 \\ -\frac{\pi^2x^4}{16} & \text{otherwise} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**3*acoth(a*x)**2,x)
```

```
[Out] Piecewise((x**4*acoth(a*x)**2/4 + x**3*acoth(a*x)/(6*a) + x**2/(12*a**2) +
x*acoth(a*x)/(2*a**3) + 2*log(a*x + 1)/(3*a**4) - acoth(a*x)**2/(4*a**4) -
2*acoth(a*x)/(3*a**4), Ne(a, 0)), (-pi**2*x**4/16, True))
```

## 3.15 $\int x^2 \coth^{-1}(ax)^2\,dx$

**Optimal**. Leaf size=103

$$-\frac{\text{Li}_2\left(1-\frac{2}{1-ax}\right)}{3a^3}-\frac{\tanh^{-1}(ax)}{3a^3}+\frac{\coth^{-1}(ax)^2}{3a^3}-\frac{2\log\left(\frac{2}{1-ax}\right)\coth^{-1}(ax)}{3a^3}+\frac{x}{3a^2}+\frac{1}{3}x^3\coth^{-1}(ax)^2+\frac{x^2\coth^{-1}(ax)}{3a}$$

```
[Out] 1/3*x/a^2+1/3*x^2*arccoth(a*x)/a+1/3*arccoth(a*x)^2/a^3+1/3*x^3*arccoth(a*x
)^2-1/3*arctanh(a*x)/a^3-2/3*arccoth(a*x)*ln(2/(-a*x+1))/a^3-1/3*polylog(2,
1-2/(-a*x+1))/a^3
```

**Rubi** [A] time = 0.15, antiderivative size = 103, normalized size of antiderivative = 1.00, number of steps used = 9, number of rules used = 8, integrand size = 10, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.800, Rules used = {5917, 5981, 321, 206, 5985, 5919, 2402, 2315}

$$-\frac{\text{PolyLog}\left(2,1-\frac{2}{1-ax}\right)}{3a^3}+\frac{x}{3a^2}-\frac{\tanh^{-1}(ax)}{3a^3}+\frac{\coth^{-1}(ax)^2}{3a^3}-\frac{2\log\left(\frac{2}{1-ax}\right)\coth^{-1}(ax)}{3a^3}+\frac{1}{3}x^3\coth^{-1}(ax)^2+\frac{x^2\text{coth}}{3a}$$

Antiderivative was successfully verified.

```
[In] Int[x^2*ArcCoth[a*x]^2,x]
```

```
[Out] x/(3*a^2) + (x^2*ArcCoth[a*x])/(3*a) + ArcCoth[a*x]^2/(3*a^3) + (x^3*ArcCot
h[a*x]^2)/3 - ArcTanh[a*x]/(3*a^3) - (2*ArcCoth[a*x]*Log[2/(1 - a*x)])/(3*a
^3) - PolyLog[2, 1 - 2/(1 - a*x)]/(3*a^3)
```

Rule 206

```
Int[((a_) + (b_.)*(x_)^2)^(-1), x_Symbol] :> Simp[(1*ArcTanh[(Rt[-b, 2]*x)/
Rt[a, 2]])/(Rt[a, 2]*Rt[-b, 2]), x] /; FreeQ[{a, b}, x] && NegQ[a/b] && (Gt
Q[a, 0] || LtQ[b, 0])
```

Rule 321

```
Int[((c_.)*(x_))^(m_)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Simp[(c^(
n - 1)*(c*x)^(m - n + 1)*(a + b*x^n)^(p + 1))/(b*(m + n*p + 1)), x] - Dist[
(a*c^n*(m - n + 1))/(b*(m + n*p + 1)), Int[(c*x)^(m - n)*(a + b*x^n)^p, x],
 x] /; FreeQ[{a, b, c, p}, x] && IGtQ[n, 0] && GtQ[m, n - 1] && NeQ[m + n*p
 + 1, 0] && IntBinomialQ[a, b, c, n, m, p, x]
```

Rule 2315

```
Int[Log[(c_.)*(x_)]/((d_) + (e_.)*(x_)), x_Symbol] :> -Simp[PolyLog[2, 1 -
c*x]/e, x] /; FreeQ[{c, d, e}, x] && EqQ[e + c*d, 0]
```

Rule 2402

```
Int[Log[(c_.)/((d_) + (e_.)*(x_))]/((f_) + (g_.)*(x_)^2), x_Symbol] :> -Dis
t[e/g, Subst[Int[Log[2*d*x]/(1 - 2*d*x), x], x, 1/(d + e*x)], x] /; FreeQ[{
c, d, e, f, g}, x] && EqQ[c, 2*d] && EqQ[e^2*f + d^2*g, 0]
```

Rule 5917

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)*((d_.)*(x_))^(m_.), x_Symbol]
 :> Simp[((d*x)^(m + 1)*(a + b*ArcCoth[c*x])^p)/(d*(m + 1)), x] - Dist[(b*c
*p)/(d*(m + 1)), Int[((d*x)^(m + 1)*(a + b*ArcCoth[c*x])^(p - 1))/(1 - c^2*
x^2), x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[p, 0] && (EqQ[p, 1] || In
tegerQ[m]) && NeQ[m, -1]
```

Rule 5919

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)/((d_) + (e_.)*(x_)), x_Symbol
] :> -Simp[((a + b*ArcCoth[c*x])^p*Log[2/(1 + (e*x)/d)])/e, x] + Dist[(b*c*
p)/e, Int[((a + b*ArcCoth[c*x])^(p - 1)*Log[2/(1 + (e*x)/d)])/(1 - c^2*x^2)
, x], x] /; FreeQ[{a, b, c, d, e}, x] && IGtQ[p, 0] && EqQ[c^2*d^2 - e^2, 0
]
```

Rule 5981

```
Int[(((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)*((f_.)*(x_))^(m_))/((d_) + (
e_.)*(x_)^2), x_Symbol] :> Dist[f^2/e, Int[(f*x)^(m - 2)*(a + b*ArcCoth[c*x
])^p, x], x] - Dist[(d*f^2)/e, Int[((f*x)^(m - 2)*(a + b*ArcCoth[c*x])^p)/(
d + e*x^2), x], x] /; FreeQ[{a, b, c, d, e, f}, x] && GtQ[p, 0] && GtQ[m, 1
]
```

Rule 5985

```
Int[(((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)*(x_))/((d_) + (e_.)*(x_)^2),
 x_Symbol] :> Simp[(a + b*ArcCoth[c*x])^(p + 1)/(b*e*(p + 1)), x] + Dist[1/
(c*d), Int[(a + b*ArcCoth[c*x])^p/(1 - c*x), x], x] /; FreeQ[{a, b, c, d, e
}, x] && EqQ[c^2*d + e, 0] && IGtQ[p, 0]
```

Rubi steps

$$\begin{aligned}\int x^2 \coth^{-1}(ax)^2 \, dx &= \frac{1}{3}x^3 \coth^{-1}(ax)^2 - \frac{1}{3}(2a)\int \frac{x^3 \coth^{-1}(ax)}{1-a^2x^2} \, dx \\ &= \frac{1}{3}x^3 \coth^{-1}(ax)^2 + \frac{2\int x\coth^{-1}(ax)\,dx}{3a} - \frac{2\int \frac{x\coth^{-1}(ax)}{1-a^2x^2}\,dx}{3a} \\ &= \frac{x^2\coth^{-1}(ax)}{3a} + \frac{\coth^{-1}(ax)^2}{3a^3} + \frac{1}{3}x^3\coth^{-1}(ax)^2 - \frac{1}{3}\int \frac{x^2}{1-a^2x^2}\,dx - \frac{2\int \frac{\coth^{-1}(ax)}{1-ax}\,dx}{3a^2} \\ &= \frac{x}{3a^2} + \frac{x^2\coth^{-1}(ax)}{3a} + \frac{\coth^{-1}(ax)^2}{3a^3} + \frac{1}{3}x^3\coth^{-1}(ax)^2 - \frac{2\coth^{-1}(ax)\log\left(\frac{2}{1-ax}\right)}{3a^3} - \frac{\int \frac{}{1-}}{3} \\ &= \frac{x}{3a^2} + \frac{x^2\coth^{-1}(ax)}{3a} + \frac{\coth^{-1}(ax)^2}{3a^3} + \frac{1}{3}x^3\coth^{-1}(ax)^2 - \frac{\tanh^{-1}(ax)}{3a^3} - \frac{2\coth^{-1}(ax)\log}{3a^3} \\ &= \frac{x}{3a^2} + \frac{x^2\coth^{-1}(ax)}{3a} + \frac{\coth^{-1}(ax)^2}{3a^3} + \frac{1}{3}x^3\coth^{-1}(ax)^2 - \frac{\tanh^{-1}(ax)}{3a^3} - \frac{2\coth^{-1}(ax)\log}{3a^3}\end{aligned}$$

**Mathematica [A]** time = 0.24, size = 66, normalized size = 0.64

$$\frac{(a^3x^3-1)\coth^{-1}(ax)^2 + \coth^{-1}(ax)\left(a^2x^2 - 2\log\left(1-e^{-2\coth^{-1}(ax)}\right) - 1\right) + \text{Li}_2\left(e^{-2\coth^{-1}(ax)}\right) + ax}{3a^3}$$

Warning: Unable to verify antiderivative.

```
[In] Integrate[x^2*ArcCoth[a*x]^2,x]
```

```
[Out] (a*x + (-1 + a^3*x^3)*ArcCoth[a*x]^2 + ArcCoth[a*x]*(-1 + a^2*x^2 - 2*Log[1
 - E^(-2*ArcCoth[a*x])]) + PolyLog[2, E^(-2*ArcCoth[a*x])])/(3*a^3)
```

**fricas [F]** time = 0.43, size = 0, normalized size = 0.00

$$\text{integral}\left(x^2 \operatorname{arcoth}(ax)^2, x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*arccoth(a*x)^2,x, algorithm="fricas")
```

```
[Out] integral(x^2*arccoth(a*x)^2, x)
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int x^2 \operatorname{arcoth}(ax)^2 \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*arccoth(a*x)^2,x, algorithm="giac")
```

```
[Out] integrate(x^2*arccoth(a*x)^2, x)
```

**maple [A]** time = 0.06, size = 176, normalized size = 1.71

$$\frac{x^3 \operatorname{arccoth}(ax)^2}{3} + \frac{x^2 \operatorname{arccoth}(ax)}{3a} + \frac{\operatorname{arccoth}(ax)\ln(ax-1)}{3a^3} + \frac{\operatorname{arccoth}(ax)\ln(ax+1)}{3a^3} + \frac{x}{3a^2} + \frac{\ln(ax-1)}{6a^3} - \frac{\ln(a}{6}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^2*arccoth(a*x)^2,x)
```

```
[Out] 1/3*x^3*arccoth(a*x)^2+1/3*x^2*arccoth(a*x)/a+1/3/a^3*arccoth(a*x)*ln(a*x-1
)+1/3/a^3*arccoth(a*x)*ln(a*x+1)+1/3*x/a^2+1/6/a^3*ln(a*x-1)-1/6/a^3*ln(a*x
+1)+1/12/a^3*ln(a*x-1)^2-1/3/a^3*dilog(1/2+1/2*a*x)-1/6/a^3*ln(a*x-1)*ln(1/
2+1/2*a*x)-1/12/a^3*ln(a*x+1)^2-1/6/a^3*ln(-1/2*a*x+1/2)*ln(1/2+1/2*a*x)+1/
6/a^3*ln(-1/2*a*x+1/2)*ln(a*x+1)
```

**maxima [A]** time = 0.31, size = 134, normalized size = 1.30

$$\frac{1}{3}x^3 \operatorname{arcoth}(ax)^2 + \frac{1}{12}a^2 \left( \frac{4\,ax - \log(ax+1)^2 + 2\,\log(ax+1)\log(ax-1) + \log(ax-1)^2 + 2\,\log(ax-1)}{a^5} - \right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*arccoth(a*x)^2,x, algorithm="maxima")
```

```
[Out] 1/3*x^3*arccoth(a*x)^2 + 1/12*a^2*((4*a*x - log(a*x + 1)^2 + 2*log(a*x + 1)
*log(a*x - 1) + log(a*x - 1)^2 + 2*log(a*x - 1))/a^5 - 4*(log(a*x - 1)*log(
1/2*a*x + 1/2) + dilog(-1/2*a*x + 1/2))/a^5 - 2*log(a*x + 1)/a^5) + 1/3*a*(
x^2/a^2 + log(a^2*x^2 - 1)/a^4)*arccoth(a*x)
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.01

$$\int x^2 \operatorname{acoth}(a\,x)^2 \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^2*acoth(a*x)^2,x)
```

```
[Out] int(x^2*acoth(a*x)^2, x)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int x^2 \operatorname{acoth}^2(ax)\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**2*acoth(a*x)**2,x)
```

```
[Out] Integral(x**2*acoth(a*x)**2, x)
```

## 3.16 $\int x \coth^{-1}(ax)^2 \, dx$

**Optimal**. Leaf size=54

$$\frac{\log(1-a^2x^2)}{2a^2} - \frac{\coth^{-1}(ax)^2}{2a^2} + \frac{1}{2}x^2\coth^{-1}(ax)^2 + \frac{x\coth^{-1}(ax)}{a}$$

```
[Out] x*arccoth(a*x)/a-1/2*arccoth(a*x)^2/a^2+1/2*x^2*arccoth(a*x)^2+1/2*ln(-a^2*
x^2+1)/a^2
```

**Rubi [A]** time = 0.08, antiderivative size = 54, normalized size of antiderivative = 1.00, number of steps used = 5, number of rules used = 5, integrand size = 8, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.625, Rules used = {5917, 5981, 5911, 260, 5949}

$$\frac{\log(1-a^2x^2)}{2a^2} - \frac{\coth^{-1}(ax)^2}{2a^2} + \frac{1}{2}x^2\coth^{-1}(ax)^2 + \frac{x\coth^{-1}(ax)}{a}$$

Antiderivative was successfully verified.

```
[In] Int[x*ArcCoth[a*x]^2,x]
```

```
[Out] (x*ArcCoth[a*x])/a - ArcCoth[a*x]^2/(2*a^2) + (x^2*ArcCoth[a*x]^2)/2 + Log[
1 - a^2*x^2]/(2*a^2)
```

Rule 260

```
Int[(x_)^(m_.)/((a_) + (b_.)*(x_)^(n_)), x_Symbol] :> Simp[Log[RemoveConten
t[a + b*x^n, x]]/(b*n), x] /; FreeQ[{a, b, m, n}, x] && EqQ[m, n - 1]
```

Rule 5911

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.), x_Symbol] :> Simp[x*(a + b*A
rcCoth[c*x])^p, x] - Dist[b*c*p, Int[(x*(a + b*ArcCoth[c*x])^(p - 1))/(1 -
c^2*x^2), x], x] /; FreeQ[{a, b, c}, x] && IGtQ[p, 0]
```

Rule 5917

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)*((d_.)*(x_))^(m_.), x_Symbol]
 :> Simp[((d*x)^(m + 1)*(a + b*ArcCoth[c*x])^p)/(d*(m + 1)), x] - Dist[(b*c
*p)/(d*(m + 1)), Int[((d*x)^(m + 1)*(a + b*ArcCoth[c*x])^(p - 1))/(1 - c^2*
x^2), x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[p, 0] && (EqQ[p, 1] || In
tegerQ[m]) && NeQ[m, -1]
```

Rule 5949

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)/((d_) + (e_.)*(x_)^2), x_Symb
ol] :> Simp[(a + b*ArcCoth[c*x])^(p + 1)/(b*c*d*(p + 1)), x] /; FreeQ[{a, b
, c, d, e, p}, x] && EqQ[c^2*d + e, 0] && NeQ[p, -1]
```

Rule 5981

```
Int[(((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)*((f_.)*(x_))^(m_))/((d_) + (
e_.)*(x_)^2), x_Symbol] :> Dist[f^2/e, Int[(f*x)^(m - 2)*(a + b*ArcCoth[c*x
])^p, x], x] - Dist[(d*f^2)/e, Int[((f*x)^(m - 2)*(a + b*ArcCoth[c*x])^p)/(
d + e*x^2), x], x] /; FreeQ[{a, b, c, d, e, f}, x] && GtQ[p, 0] && GtQ[m, 1
]
```

Rubi steps

$$\begin{aligned}\int x\coth^{-1}(ax)^2\,dx &= \frac{1}{2}x^2\coth^{-1}(ax)^2 - a\int \frac{x^2\coth^{-1}(ax)}{1-a^2x^2}\,dx\\ &= \frac{1}{2}x^2\coth^{-1}(ax)^2 + \frac{\int \coth^{-1}(ax)\,dx}{a} - \frac{\int \frac{\coth^{-1}(ax)}{1-a^2x^2}\,dx}{a}\\ &= \frac{x\coth^{-1}(ax)}{a} - \frac{\coth^{-1}(ax)^2}{2a^2} + \frac{1}{2}x^2\coth^{-1}(ax)^2 - \int \frac{x}{1-a^2x^2}\,dx\\ &= \frac{x\coth^{-1}(ax)}{a} - \frac{\coth^{-1}(ax)^2}{2a^2} + \frac{1}{2}x^2\coth^{-1}(ax)^2 + \frac{\log\left(1-a^2x^2\right)}{2a^2}\end{aligned}$$

**Mathematica** [A] time = 0.01, size = 43, normalized size = 0.80

$$\frac{\log\left(1-a^2x^2\right)+\left(a^2x^2-1\right)\coth^{-1}(ax)^2+2ax\coth^{-1}(ax)}{2a^2}$$

Antiderivative was successfully verified.

```
[In] Integrate[x*ArcCoth[a*x]^2,x]
```

```
[Out] (2*a*x*ArcCoth[a*x] + (-1 + a^2*x^2)*ArcCoth[a*x]^2 + Log[1 - a^2*x^2])/(2*
a^2)
```

**fricas** [A] time = 0.53, size = 62, normalized size = 1.15

$$\frac{4\,ax\log\left(\frac{ax+1}{ax-1}\right)+\left(a^2x^2-1\right)\log\left(\frac{ax+1}{ax-1}\right)^2+4\,\log\left(a^2x^2-1\right)}{8\,a^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*arccoth(a*x)^2,x, algorithm="fricas")
```

```
[Out] 1/8*(4*a*x*log((a*x + 1)/(a*x - 1)) + (a^2*x^2 - 1)*log((a*x + 1)/(a*x - 1)
)^2 + 4*log(a^2*x^2 - 1))/a^2
```

**giac** [F] time = 0.00, size = 0, normalized size = 0.00

$$\int x\,\mathrm{arcoth}\left(ax\right)^2\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*arccoth(a*x)^2,x, algorithm="giac")
```

```
[Out] integrate(x*arccoth(a*x)^2, x)
```

**maple** [B] time = 0.06, size = 155, normalized size = 2.87

$$\frac{x^2\mathrm{arccoth}\left(ax\right)^2}{2}+\frac{x\,\mathrm{arccoth}\left(ax\right)}{a}+\frac{\mathrm{arccoth}\left(ax\right)\ln\left(ax-1\right)}{2a^2}-\frac{\mathrm{arccoth}\left(ax\right)\ln\left(ax+1\right)}{2a^2}+\frac{\ln\left(ax-1\right)^2}{8a^2}-\frac{\ln\left(ax-1\right)}{4}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x*arccoth(a*x)^2,x)
```

```
[Out] 1/2*x^2*arccoth(a*x)^2+x*arccoth(a*x)/a+1/2/a^2*arccoth(a*x)*ln(a*x-1)-1/2/
a^2*arccoth(a*x)*ln(a*x+1)+1/8/a^2*ln(a*x-1)^2-1/4/a^2*ln(a*x-1)*ln(1/2+1/2
*a*x)+1/2/a^2*ln(a*x-1)+1/2/a^2*ln(a*x+1)+1/8/a^2*ln(a*x+1)^2+1/4/a^2*ln(-1
/2*a*x+1/2)*ln(1/2+1/2*a*x)-1/4/a^2*ln(-1/2*a*x+1/2)*ln(a*x+1)
```

**maxima** [B] time = 0.32, size = 97, normalized size = 1.80

$$\frac{1}{2}\,x^2\operatorname{arcoth}\left(ax\right)^2+\frac{1}{2}\,a\left(\frac{2\,x}{a^2}-\frac{\log\left(ax+1\right)}{a^3}+\frac{\log\left(ax-1\right)}{a^3}\right)\operatorname{arcoth}\left(ax\right)-\frac{2\left(\log\left(ax-1\right)-2\right)\log\left(ax+1\right)-\log\left(ax\right.}{8\,a^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*arccoth(a*x)^2,x, algorithm="maxima")
```

```
[Out] 1/2*x^2*arccoth(a*x)^2 + 1/2*a*(2*x/a^2 - log(a*x + 1)/a^3 + log(a*x - 1)/a
^3)*arccoth(a*x) - 1/8*(2*(log(a*x - 1) - 2)*log(a*x + 1) - log(a*x + 1)^2
- log(a*x - 1)^2 - 4*log(a*x - 1))/a^2
```

**mupad** [B] time = 1.21, size = 44, normalized size = 0.81

$$\frac{x^2\operatorname{acoth}\left(a\,x\right)^2}{2}+\frac{-\frac{\operatorname{acoth}(a\,x)^2}{2}+a\,x\operatorname{acoth}\left(a\,x\right)+\frac{\ln\left(a^2\,x^2-1\right)}{2}}{a^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x*acoth(a*x)^2,x)
```

```
[Out] (x^2*acoth(a*x)^2)/2 + (log(a^2*x^2 - 1)/2 - acoth(a*x)^2/2 + a*x*acoth(a*x
))/a^2
```

**sympy** [A] time = 0.78, size = 60, normalized size = 1.11

$$\begin{cases} \frac{x^2\operatorname{acoth}^2\left(ax\right)}{2}+\frac{x\operatorname{acoth}\left(ax\right)}{a}+\frac{\log\left(ax+1\right)}{a^2}-\frac{\operatorname{acoth}^2\left(ax\right)}{2a^2}-\frac{\operatorname{acoth}\left(ax\right)}{a^2} & \text{for}\ a\neq 0 \\ -\frac{\pi^2x^2}{8} & \text{otherwise} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*acoth(a*x)**2,x)
```

```
[Out] Piecewise((x**2*acoth(a*x)**2/2 + x*acoth(a*x)/a + log(a*x + 1)/a**2 - acot
h(a*x)**2/(2*a**2) - acoth(a*x)/a**2, Ne(a, 0)), (-pi**2*x**2/8, True))
```

# 3.17 $\int \coth^{-1}(ax)^2\, dx$

**Optimal**. Leaf size=58

$$-\frac{\text{Li}_2\left(1-\frac{2}{1-ax}\right)}{a}+x\coth^{-1}(ax)^2+\frac{\coth^{-1}(ax)^2}{a}-\frac{2\log\left(\frac{2}{1-ax}\right)\coth^{-1}(ax)}{a}$$

```
[Out] arccoth(a*x)^2/a+x*arccoth(a*x)^2-2*arccoth(a*x)*ln(2/(-a*x+1))/a-polylog(2
,1-2/(-a*x+1))/a
```

**Rubi** [A] time = 0.08, antiderivative size = 58, normalized size of antiderivative = 1.00, number of steps used = 5, number of rules used = 5, integrand size = 6, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.833, Rules used = {5911, 5985, 5919, 2402, 2315}

$$-\frac{\text{PolyLog}\left(2,1-\frac{2}{1-ax}\right)}{a}+x\coth^{-1}(ax)^2+\frac{\coth^{-1}(ax)^2}{a}-\frac{2\log\left(\frac{2}{1-ax}\right)\coth^{-1}(ax)}{a}$$

Antiderivative was successfully verified.

```
[In] Int[ArcCoth[a*x]^2,x]
```

```
[Out] ArcCoth[a*x]^2/a + x*ArcCoth[a*x]^2 - (2*ArcCoth[a*x]*Log[2/(1 - a*x)])/a -
 PolyLog[2, 1 - 2/(1 - a*x)]/a
```

Rule 2315

```
Int[Log[(c_.)*(x_)]/((d_) + (e_.)*(x_)), x_Symbol] :> -Simp[PolyLog[2, 1 -
c*x]/e, x] /; FreeQ[{c, d, e}, x] && EqQ[e + c*d, 0]
```

Rule 2402

```
Int[Log[(c_.)/((d_) + (e_.)*(x_))]/((f_) + (g_.)*(x_)^2), x_Symbol] :> -Dis
t[e/g, Subst[Int[Log[2*d*x]/(1 - 2*d*x), x], x, 1/(d + e*x)], x] /; FreeQ[{
c, d, e, f, g}, x] && EqQ[c, 2*d] && EqQ[e^2*f + d^2*g, 0]
```

Rule 5911

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.), x_Symbol] :> Simp[x*(a + b*A
rcCoth[c*x])^p, x] - Dist[b*c*p, Int[(x*(a + b*ArcCoth[c*x])^(p - 1))/(1 -
c^2*x^2), x], x] /; FreeQ[{a, b, c}, x] && IGtQ[p, 0]
```

Rule 5919

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)/((d_) + (e_.)*(x_)), x_Symbol
] :> -Simp[((a + b*ArcCoth[c*x])^p*Log[2/(1 + (e*x)/d)])/e, x] + Dist[(b*c*
p)/e, Int[((a + b*ArcCoth[c*x])^(p - 1)*Log[2/(1 + (e*x)/d)])/(1 - c^2*x^2)
, x], x] /; FreeQ[{a, b, c, d, e}, x] && IGtQ[p, 0] && EqQ[c^2*d^2 - e^2, 0
]
```

Rule 5985

```
Int[(((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)*(x_))/((d_) + (e_.)*(x_)^2),
 x_Symbol] :> Simp[(a + b*ArcCoth[c*x])^(p + 1)/(b*e*(p + 1)), x] + Dist[1/
(c*d), Int[(a + b*ArcCoth[c*x])^p/(1 - c*x), x], x] /; FreeQ[{a, b, c, d, e
}, x] && EqQ[c^2*d + e, 0] && IGtQ[p, 0]
```

Rubi steps

$$\int \coth^{-1}(ax)^2\,dx = x\coth^{-1}(ax)^2-(2a)\int \frac{x\coth^{-1}(ax)}{1-a^2x^2}\,dx$$
$$=\frac{\coth^{-1}(ax)^2}{a}+x\coth^{-1}(ax)^2-2\int \frac{\coth^{-1}(ax)}{1-ax}\,dx$$
$$=\frac{\coth^{-1}(ax)^2}{a}+x\coth^{-1}(ax)^2-\frac{2\coth^{-1}(ax)\log\left(\frac{2}{1-ax}\right)}{a}+2\int \frac{\log\left(\frac{2}{1-ax}\right)}{1-a^2x^2}\,dx$$
$$=\frac{\coth^{-1}(ax)^2}{a}+x\coth^{-1}(ax)^2-\frac{2\coth^{-1}(ax)\log\left(\frac{2}{1-ax}\right)}{a}-\frac{2\,\text{Subst}\left(\int \frac{\log(2x)}{1-2x}\,dx,x,\frac{1}{1-ax}\right)}{a}$$
$$=\frac{\coth^{-1}(ax)^2}{a}+x\coth^{-1}(ax)^2-\frac{2\coth^{-1}(ax)\log\left(\frac{2}{1-ax}\right)}{a}-\frac{\text{Li}_2\left(1-\frac{2}{1-ax}\right)}{a}$$

**Mathematica [A]** time = 0.08, size = 46, normalized size = 0.79

$$\frac{\text{Li}_2\left(e^{-2\coth^{-1}(ax)}\right)+\coth^{-1}(ax)\left((ax-1)\coth^{-1}(ax)-2\log\left(1-e^{-2\coth^{-1}(ax)}\right)\right)}{a}$$

Warning: Unable to verify antiderivative.

```
[In] Integrate[ArcCoth[a*x]^2,x]
[Out] (ArcCoth[a*x]*((-1 + a*x)*ArcCoth[a*x] - 2*Log[1 - E^(-2*ArcCoth[a*x])]) +
PolyLog[2, E^(-2*ArcCoth[a*x])])/a
```

**fricas [F]** time = 0.43, size = 0, normalized size = 0.00

$$\text{integral}\left(\text{arcoth}\left(ax\right)^2,x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(a*x)^2,x, algorithm="fricas")
[Out] integral(arccoth(a*x)^2, x)
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \text{arcoth}\left(ax\right)^2\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(a*x)^2,x, algorithm="giac")
[Out] integrate(arccoth(a*x)^2, x)
```

**maple [B]** time = 0.30, size = 122, normalized size = 2.10

$$x\,\text{arccoth}\left(ax\right)^2+\frac{\text{arccoth}\left(ax\right)^2}{a}-\frac{2\,\text{arccoth}\left(ax\right)\ln\left(1-\frac{1}{\sqrt{\frac{ax-1}{ax+1}}}\right)}{a}-\frac{2\,\text{arccoth}\left(ax\right)\ln\left(1+\frac{1}{\sqrt{\frac{ax-1}{ax+1}}}\right)}{a}-\frac{2\,\text{polylog}\left(2,\frac{1}{\sqrt{\frac{ax-1}{ax+1}}}\right)}{a}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(arccoth(a*x)^2,x)
[Out] x*arccoth(a*x)^2+arccoth(a*x)^2/a-2/a*arccoth(a*x)*ln(1-1/((a*x-1)/(a*x+1))
^(1/2))-2/a*arccoth(a*x)*ln(1+1/((a*x-1)/(a*x+1))^(1/2))-2/a*polylog(2,1/((
a*x-1)/(a*x+1))^(1/2))-2/a*polylog(2,-1/((a*x-1)/(a*x+1))^(1/2))
```

**maxima [B]** time = 0.32, size = 135, normalized size = 2.33

$$x \operatorname{arcoth}(ax)^2 + \frac{1}{4}\left(a\left(\frac{\log(ax+1)^2 + 2\log(ax+1)\log(ax-1) - \log(ax-1)^2}{a^3} - \frac{4\left(\log(ax-1)\log\left(\frac{1}{2}ax + \frac{1}{2}\right.\right.}{a^3}\right.\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(a*x)^2,x, algorithm="maxima")
```

```
[Out] x*arccoth(a*x)^2 + 1/4*(a*((log(a*x + 1)^2 + 2*log(a*x + 1)*log(a*x - 1) -
log(a*x - 1)^2)/a^3 - 4*(log(a*x - 1)*log(1/2*a*x + 1/2) + dilog(-1/2*a*x +
 1/2))/a^3) - 2*(log(a*x + 1)/a - log(a*x - 1)/a)*log(a^2*x^2 - 1)/a)*a + a
rccoth(a*x)*log(a^2*x^2 - 1)/a
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.02

$$\int \operatorname{acoth}(a\,x)^2\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(a*x)^2,x)
```

```
[Out] int(acoth(a*x)^2, x)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \operatorname{acoth}^2(ax)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(a*x)**2,x)
```

```
[Out] Integral(acoth(a*x)**2, x)
```

## 3.18 $\int \frac{\coth^{-1}(ax)^2}{x}\,dx$

**Optimal**. Leaf size=97

$$\frac{1}{2}\mathrm{Li}_3\left(1-\frac{2}{ax+1}\right)-\frac{1}{2}\mathrm{Li}_3\left(1-\frac{2ax}{ax+1}\right)+\mathrm{Li}_2\left(1-\frac{2}{ax+1}\right)\coth^{-1}(ax)-\mathrm{Li}_2\left(1-\frac{2ax}{ax+1}\right)\coth^{-1}(ax)+2\coth^{-1}\left(1-\right.$$

```
[Out] 2*arccoth(a*x)^2*arccoth(1-2/(-a*x+1))+arccoth(a*x)*polylog(2,1-2/(a*x+1))-
arccoth(a*x)*polylog(2,1-2*a*x/(a*x+1))+1/2*polylog(3,1-2/(a*x+1))-1/2*poly
log(3,1-2*a*x/(a*x+1))
```

**Rubi [A]** time = 0.23, antiderivative size = 97, normalized size of antiderivative = 1.00, number of steps used = 6, number of rules used = 5, integrand size = 10, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.500, Rules used = {5915, 6053, 5949, 6057, 6610}

$$\frac{1}{2}\mathrm{PolyLog}\left(3,1-\frac{2}{ax+1}\right)-\frac{1}{2}\mathrm{PolyLog}\left(3,1-\frac{2ax}{ax+1}\right)+\coth^{-1}(ax)\mathrm{PolyLog}\left(2,1-\frac{2}{ax+1}\right)-\coth^{-1}(ax)\mathrm{PolyLog}$$

Antiderivative was successfully verified.

```
[In] Int[ArcCoth[a*x]^2/x,x]
```

```
[Out] 2*ArcCoth[a*x]^2*ArcCoth[1 - 2/(1 - a*x)] + ArcCoth[a*x]*PolyLog[2, 1 - 2/(
1 + a*x)] - ArcCoth[a*x]*PolyLog[2, 1 - (2*a*x)/(1 + a*x)] + PolyLog[3, 1 -
 2/(1 + a*x)]/2 - PolyLog[3, 1 - (2*a*x)/(1 + a*x)]/2
```

Rule 5915

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_)/(x_), x_Symbol] :> Simp[2*(a +
 b*ArcCoth[c*x])^p*ArcCoth[1 - 2/(1 - c*x)], x] - Dist[2*b*c*p, Int[((a + b
*ArcCoth[c*x])^(p - 1)*ArcCoth[1 - 2/(1 - c*x)])/(1 - c^2*x^2), x], x] /; F
reeQ[{a, b, c}, x] && IGtQ[p, 1]
```

Rule 5949

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)/((d_) + (e_.)*(x_)^2), x_Symb
ol] :> Simp[(a + b*ArcCoth[c*x])^(p + 1)/(b*c*d*(p + 1)), x] /; FreeQ[{a, b
, c, d, e, p}, x] && EqQ[c^2*d + e, 0] && NeQ[p, -1]
```

Rule 6053

```
Int[(ArcCoth[u_]*((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.))/((d_) + (e_.)*(
x_)^2), x_Symbol] :> Dist[1/2, Int[(Log[SimplifyIntegrand[1 + 1/u, x]]*(a +
 b*ArcCoth[c*x])^p)/(d + e*x^2), x], x] - Dist[1/2, Int[(Log[SimplifyIntegr
and[1 - 1/u, x]]*(a + b*ArcCoth[c*x])^p)/(d + e*x^2), x], x] /; FreeQ[{a, b
, c, d, e}, x] && IGtQ[p, 0] && EqQ[c^2*d + e, 0] && EqQ[u^2 - (1 - 2/(1 -
c*x))^2, 0]
```

Rule 6057

```
Int[(Log[u_]*((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.))/((d_) + (e_.)*(x_)^
2), x_Symbol] :> Simp[((a + b*ArcCoth[c*x])^p*PolyLog[2, 1 - u])/(2*c*d), x
] - Dist[(b*p)/2, Int[((a + b*ArcCoth[c*x])^(p - 1)*PolyLog[2, 1 - u])/(d +
 e*x^2), x], x] /; FreeQ[{a, b, c, d, e}, x] && IGtQ[p, 0] && EqQ[c^2*d + e
, 0] && EqQ[(1 - u)^2 - (1 - 2/(1 + c*x))^2, 0]
```

Rule 6610

```
Int[(u_)*PolyLog[n_, v_], x_Symbol] :> With[{w = DerivativeDivides[v, u*v,
x]}, Simp[w*PolyLog[n + 1, v], x] /;  !FalseQ[w]] /; FreeQ[n, x]
```

Rubi steps

$$\int \frac{\coth^{-1}(ax)^2}{x}\,dx = 2\coth^{-1}(ax)^2\coth^{-1}\left(1-\frac{2}{1-ax}\right)-(4a)\int \frac{\coth^{-1}(ax)\coth^{-1}\left(1-\frac{2}{1-ax}\right)}{1-a^2x^2}\,dx$$

$$= 2\coth^{-1}(ax)^2\coth^{-1}\left(1-\frac{2}{1-ax}\right)+(2a)\int \frac{\coth^{-1}(ax)\log\left(\frac{2}{1+ax}\right)}{1-a^2x^2}\,dx-(2a)\int \frac{\coth^{-1}(a}{1}$$

$$= 2\coth^{-1}(ax)^2\coth^{-1}\left(1-\frac{2}{1-ax}\right)+\coth^{-1}(ax)\mathrm{Li}_2\left(1-\frac{2}{1+ax}\right)-\coth^{-1}(ax)\mathrm{Li}_2\left(1-\frac{2}{1}\right.$$

$$= 2\coth^{-1}(ax)^2\coth^{-1}\left(1-\frac{2}{1-ax}\right)+\coth^{-1}(ax)\mathrm{Li}_2\left(1-\frac{2}{1+ax}\right)-\coth^{-1}(ax)\mathrm{Li}_2\left(1-\frac{2}{1}\right.$$

**Mathematica [A]** time = 0.06, size = 114, normalized size = 1.18

$$-\coth^{-1}(ax)\mathrm{Li}_2\left(-e^{-2\coth^{-1}(ax)}\right)-\coth^{-1}(ax)\mathrm{Li}_2\left(e^{2\coth^{-1}(ax)}\right)-\frac{1}{2}\mathrm{Li}_3\left(-e^{-2\coth^{-1}(ax)}\right)+\frac{1}{2}\mathrm{Li}_3\left(e^{2\coth^{-1}(ax)}\right)+\frac{2}{3}\mathrm{cotl}$$

Warning: Unable to verify antiderivative.

```
[In] Integrate[ArcCoth[a*x]^2/x,x]
```

```
[Out] (2*ArcCoth[a*x]^3)/3 + ArcCoth[a*x]^2*Log[1 + E^(-2*ArcCoth[a*x])] - ArcCot
h[a*x]^2*Log[1 - E^(2*ArcCoth[a*x])] - ArcCoth[a*x]*PolyLog[2, -E^(-2*ArcCo
th[a*x])] - ArcCoth[a*x]*PolyLog[2, E^(2*ArcCoth[a*x])] - PolyLog[3, -E^(-2
*ArcCoth[a*x])]/2 + PolyLog[3, E^(2*ArcCoth[a*x])]/2
```

**fricas [F]** time = 0.38, size = 0, normalized size = 0.00

$$\mathrm{integral}\left(\frac{\mathrm{arcoth}\left(ax\right)^2}{x},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(a*x)^2/x,x, algorithm="fricas")
```

```
[Out] integral(arccoth(a*x)^2/x, x)
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\mathrm{arcoth}\left(ax\right)^2}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(a*x)^2/x,x, algorithm="giac")
```

```
[Out] integrate(arccoth(a*x)^2/x, x)
```

**maple [C]** time = 0.68, size = 487, normalized size = 5.02

$$\ln\left(ax\right)\mathrm{arccoth}\left(ax\right)^2+\frac{i\pi\,\mathrm{csgn}\left(i\left(1+\frac{ax+1}{ax-1}\right)\right)\mathrm{csgn}\left(\frac{i}{\frac{ax+1}{ax-1}-1}\right)\mathrm{csgn}\left(\frac{i\left(1+\frac{ax+1}{ax-1}\right)}{\frac{ax+1}{ax-1}-1}\right)\mathrm{arccoth}\left(ax\right)^2}{2}-\frac{i\pi\,\mathrm{csgn}\left(i\left(1+\frac{ax+}{ax-}\right.\right.}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(arccoth(a*x)^2/x,x)
```

```
[Out] ln(a*x)*arccoth(a*x)^2+1/2*I*Pi*csgn(I*(1+(a*x+1)/(a*x-1)))*csgn(I/((a*x+1)
/(a*x-1)-1))*csgn(I/((a*x+1)/(a*x-1)-1)*(1+(a*x+1)/(a*x-1)))*arccoth(a*x)^2
-1/2*I*Pi*csgn(I*(1+(a*x+1)/(a*x-1)))*csgn(I/((a*x+1)/(a*x-1)-1)*(1+(a*x+1)
/(a*x-1)))^2*arccoth(a*x)^2-1/2*I*Pi*csgn(I/((a*x+1)/(a*x-1)-1))*csgn(I/((a
*x+1)/(a*x-1)-1)*(1+(a*x+1)/(a*x-1)))^2*arccoth(a*x)^2+1/2*I*Pi*csgn(I/((a*
x+1)/(a*x-1)-1)*(1+(a*x+1)/(a*x-1)))^3*arccoth(a*x)^2+arccoth(a*x)^2*ln((a*
x+1)/(a*x-1)-1)-arccoth(a*x)^2*ln(1-1/((a*x-1)/(a*x+1))^(1/2))-2*arccoth(a*
x)*polylog(2,1/((a*x-1)/(a*x+1))^(1/2))+2*polylog(3,1/((a*x-1)/(a*x+1))^(1/
2))-arccoth(a*x)^2*ln(1+1/((a*x-1)/(a*x+1))^(1/2))-2*arccoth(a*x)*polylog(2
,-1/((a*x-1)/(a*x+1))^(1/2))+2*polylog(3,-1/((a*x-1)/(a*x+1))^(1/2))+arccot
h(a*x)*polylog(2,-(a*x+1)/(a*x-1))-1/2*polylog(3,-(a*x+1)/(a*x-1))
```

**maxima [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{arcoth}(ax)^2}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(a*x)^2/x,x, algorithm="maxima")
```

```
[Out] integrate(arccoth(a*x)^2/x, x)
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.01

$$\int \frac{\operatorname{acoth}(a\,x)^2}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(a*x)^2/x,x)
```

```
[Out] int(acoth(a*x)^2/x, x)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{acoth}^2(ax)}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(a*x)**2/x,x)
```

```
[Out] Integral(acoth(a*x)**2/x, x)
```

# 3.19 $\int \frac{\coth^{-1}(ax)^2}{x^2} dx$

**Optimal**. Leaf size=55

$$-a\text{Li}_2\left(\frac{2}{ax+1}-1\right)+a\coth^{-1}(ax)^2-\frac{\coth^{-1}(ax)^2}{x}+2a\log\left(2-\frac{2}{ax+1}\right)\coth^{-1}(ax)$$

```
[Out] a*arccoth(a*x)^2-arccoth(a*x)^2/x+2*a*arccoth(a*x)*ln(2-2/(a*x+1))-a*polylo
g(2,-1+2/(a*x+1))
```

**Rubi [A]** time = 0.11, antiderivative size = 55, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 4, integrand size = 10, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.400, Rules used = {5917, 5989, 5933, 2447}

$$-a\text{PolyLog}\left(2,\frac{2}{ax+1}-1\right)+a\coth^{-1}(ax)^2-\frac{\coth^{-1}(ax)^2}{x}+2a\log\left(2-\frac{2}{ax+1}\right)\coth^{-1}(ax)$$

Antiderivative was successfully verified.

```
[In] Int[ArcCoth[a*x]^2/x^2,x]
```

```
[Out] a*ArcCoth[a*x]^2 - ArcCoth[a*x]^2/x + 2*a*ArcCoth[a*x]*Log[2 - 2/(1 + a*x)]
 - a*PolyLog[2, -1 + 2/(1 + a*x)]
```

Rule 2447

```
Int[Log[u_]*(Pq_)^(m_.), x_Symbol] :> With[{C = FullSimplify[(Pq^m*(1 - u))
/D[u, x]]}, Simp[C*PolyLog[2, 1 - u], x] /; FreeQ[C, x]] /; IntegerQ[m] &&
PolyQ[Pq, x] && RationalFunctionQ[u, x] && LeQ[RationalFunctionExponents[u,
 x][[2]], Expon[Pq, x]]
```

Rule 5917

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)*((d_.)*(x_))^(m_.), x_Symbol]
 :> Simp[((d*x)^(m + 1)*(a + b*ArcCoth[c*x])^p)/(d*(m + 1)), x] - Dist[(b*c
*p)/(d*(m + 1)), Int[((d*x)^(m + 1)*(a + b*ArcCoth[c*x])^(p - 1))/(1 - c^2*
x^2), x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[p, 0] && (EqQ[p, 1] || In
tegerQ[m]) && NeQ[m, -1]
```

Rule 5933

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)/((x_)*((d_) + (e_.)*(x_))), x
_Symbol] :> Simp[((a + b*ArcCoth[c*x])^p*Log[2 - 2/(1 + (e*x)/d)])/d, x] -
Dist[(b*c*p)/d, Int[((a + b*ArcCoth[c*x])^(p - 1)*Log[2 - 2/(1 + (e*x)/d)])
/(1 - c^2*x^2), x], x] /; FreeQ[{a, b, c, d, e}, x] && IGtQ[p, 0] && EqQ[c^
2*d^2 - e^2, 0]
```

Rule 5989

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)/((x_)*((d_) + (e_.)*(x_)^2)),
 x_Symbol] :> Simp[(a + b*ArcCoth[c*x])^(p + 1)/(b*d*(p + 1)), x] + Dist[1/
d, Int[(a + b*ArcCoth[c*x])^p/(x*(1 + c*x)), x], x] /; FreeQ[{a, b, c, d, e
}, x] && EqQ[c^2*d + e, 0] && GtQ[p, 0]
```

Rubi steps

$$\int \frac{\coth^{-1}(ax)^2}{x^2}\,dx = -\frac{\coth^{-1}(ax)^2}{x} + (2a)\int \frac{\coth^{-1}(ax)}{x\left(1-a^2x^2\right)}\,dx$$
$$= a\coth^{-1}(ax)^2 - \frac{\coth^{-1}(ax)^2}{x} + (2a)\int \frac{\coth^{-1}(ax)}{x(1+ax)}\,dx$$
$$= a\coth^{-1}(ax)^2 - \frac{\coth^{-1}(ax)^2}{x} + 2a\coth^{-1}(ax)\log\left(2-\frac{2}{1+ax}\right) - \left(2a^2\right)\int \frac{\log\left(2-\frac{2}{1+ax}\right)}{1-a^2x^2}\,dx$$
$$= a\coth^{-1}(ax)^2 - \frac{\coth^{-1}(ax)^2}{x} + 2a\coth^{-1}(ax)\log\left(2-\frac{2}{1+ax}\right) - a\text{Li}_2\left(-1+\frac{2}{1+ax}\right)$$

**Mathematica [A]** time = 0.10, size = 49, normalized size = 0.89

$$-a\text{Li}_2\left(-e^{-2\coth^{-1}(ax)}\right) + \frac{(ax-1)\coth^{-1}(ax)^2}{x} + 2a\coth^{-1}(ax)\log\left(e^{-2\coth^{-1}(ax)}+1\right)$$

Warning: Unable to verify antiderivative.

```
[In] Integrate[ArcCoth[a*x]^2/x^2,x]
```

```
[Out] ((-1 + a*x)*ArcCoth[a*x]^2)/x + 2*a*ArcCoth[a*x]*Log[1 + E^(-2*ArcCoth[a*x]
)] - a*PolyLog[2, -E^(-2*ArcCoth[a*x])]
```

**fricas [F]** time = 0.52, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{\operatorname{arcoth}(ax)^2}{x^2}, x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(a*x)^2/x^2,x, algorithm="fricas")
```

```
[Out] integral(arccoth(a*x)^2/x^2, x)
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{arcoth}(ax)^2}{x^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(a*x)^2/x^2,x, algorithm="giac")
```

```
[Out] integrate(arccoth(a*x)^2/x^2, x)
```

**maple [B]** time = 0.06, size = 159, normalized size = 2.89

$$-\frac{\operatorname{arccoth}(ax)^2}{x} + 2a\operatorname{arccoth}(ax)\ln(ax) - a\operatorname{arccoth}(ax)\ln(ax-1) - a\operatorname{arccoth}(ax)\ln(ax+1) - \frac{a\ln(ax-1)^2}{4} + a\,\mathrm{d}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(arccoth(a*x)^2/x^2,x)
```

```
[Out] -arccoth(a*x)^2/x+2*a*arccoth(a*x)*ln(a*x)-a*arccoth(a*x)*ln(a*x-1)-a*arcco
th(a*x)*ln(a*x+1)-1/4*a*ln(a*x-1)^2+a*dilog(1/2+1/2*a*x)+1/2*a*ln(a*x-1)*ln
(1/2+1/2*a*x)+1/4*a*ln(a*x+1)^2+1/2*a*ln(-1/2*a*x+1/2)*ln(1/2+1/2*a*x)-1/2*
```

```
a*ln(-1/2*a*x+1/2)*ln(a*x+1)-a*dilog(a*x)-a*dilog(a*x+1)-a*ln(a*x)*ln(a*x+1
)
```

**maxima [B]** time = 0.32, size = 146, normalized size = 2.65

$$\frac{1}{4}a^2\left(\frac{\log(ax+1)^2 - 2\log(ax+1)\log(ax-1) - \log(ax-1)^2}{a} + \frac{4\left(\log(ax-1)\log\left(\frac{1}{2}ax+\frac{1}{2}\right) + \mathrm{Li}_2\left(-\frac{1}{2}ax\right.\right.}{a}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(a*x)^2/x^2,x, algorithm="maxima")
```

```
[Out] 1/4*a^2*((log(a*x + 1)^2 - 2*log(a*x + 1)*log(a*x - 1) - log(a*x - 1)^2)/a
+ 4*(log(a*x - 1)*log(1/2*a*x + 1/2) + dilog(-1/2*a*x + 1/2))/a - 4*(log(a*
x + 1)*log(x) + dilog(-a*x))/a + 4*(log(-a*x + 1)*log(x) + dilog(a*x))/a) -
 a*(log(a^2*x^2 - 1) - log(x^2))*arccoth(a*x) - arccoth(a*x)^2/x
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.02

$$\int \frac{\mathrm{acoth}(a\,x)^2}{x^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(a*x)^2/x^2,x)
```

```
[Out] int(acoth(a*x)^2/x^2, x)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\mathrm{acoth}^2(ax)}{x^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(a*x)**2/x**2,x)
```

```
[Out] Integral(acoth(a*x)**2/x**2, x)
```

## 3.20 $\int \frac{\coth^{-1}(ax)^2}{x^3} \, dx$

**Optimal**. Leaf size=61

$$-\frac{1}{2}a^2\log\left(1-a^2x^2\right)+a^2\log(x)+\frac{1}{2}a^2\coth^{-1}(ax)^2-\frac{\coth^{-1}(ax)^2}{2x^2}-\frac{a\coth^{-1}(ax)}{x}$$

```
[Out] -a*arccoth(a*x)/x+1/2*a^2*arccoth(a*x)^2-1/2*arccoth(a*x)^2/x^2+a^2*ln(x)-1
/2*a^2*ln(-a^2*x^2+1)
```

**Rubi [A]** time = 0.10, antiderivative size = 61, normalized size of antiderivative = 1.00, number of steps used = 8, number of rules used = 7, integrand size = 10, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.700, Rules used = {5917, 5983, 266, 36, 29, 31, 5949}

$$-\frac{1}{2}a^2\log\left(1-a^2x^2\right)+a^2\log(x)+\frac{1}{2}a^2\coth^{-1}(ax)^2-\frac{\coth^{-1}(ax)^2}{2x^2}-\frac{a\coth^{-1}(ax)}{x}$$

Antiderivative was successfully verified.

```
[In] Int[ArcCoth[a*x]^2/x^3,x]
```

```
[Out] -((a*ArcCoth[a*x])/x) + (a^2*ArcCoth[a*x]^2)/2 - ArcCoth[a*x]^2/(2*x^2) + a
^2*Log[x] - (a^2*Log[1 - a^2*x^2])/2
```

Rule 29

```
Int[(x_)^(-1), x_Symbol] :> Simp[Log[x], x]
```

Rule 31

```
Int[((a_) + (b_.)*(x_))^(-1), x_Symbol] :> Simp[Log[RemoveContent[a + b*x,
x]]/b, x] /; FreeQ[{a, b}, x]
```

Rule 36

```
Int[1/(((a_.) + (b_.)*(x_))*((c_.) + (d_.)*(x_))), x_Symbol] :> Dist[b/(b*c
 - a*d), Int[1/(a + b*x), x], x] - Dist[d/(b*c - a*d), Int[1/(c + d*x), x],
 x] /; FreeQ[{a, b, c, d}, x] && NeQ[b*c - a*d, 0]
```

Rule 266

```
Int[(x_)^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Dist[1/n, Subst[
Int[x^(Simplify[(m + 1)/n] - 1)*(a + b*x)^p, x], x, x^n], x] /; FreeQ[{a, b
, m, n, p}, x] && IntegerQ[Simplify[(m + 1)/n]]
```

Rule 5917

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)*((d_.)*(x_))^(m_.), x_Symbol]
 :> Simp[((d*x)^(m + 1)*(a + b*ArcCoth[c*x])^p)/(d*(m + 1)), x] - Dist[(b*c
*p)/(d*(m + 1)), Int[((d*x)^(m + 1)*(a + b*ArcCoth[c*x])^(p - 1))/(1 - c^2*
x^2), x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[p, 0] && (EqQ[p, 1] || In
tegerQ[m]) && NeQ[m, -1]
```

Rule 5949

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)/((d_) + (e_.)*(x_)^2), x_Symb
ol] :> Simp[(a + b*ArcCoth[c*x])^(p + 1)/(b*c*d*(p + 1)), x] /; FreeQ[{a, b
, c, d, e, p}, x] && EqQ[c^2*d + e, 0] && NeQ[p, -1]
```

Rule 5983

```
Int[(((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)*((f_.)*(x_))^(m_))/((d_) + (
e_.)*(x_)^2), x_Symbol] :> Dist[1/d, Int[(f*x)^m*(a + b*ArcCoth[c*x])^p, x]
, x] - Dist[e/(d*f^2), Int[((f*x)^(m + 2)*(a + b*ArcCoth[c*x])^p)/(d + e*x^
2), x], x] /; FreeQ[{a, b, c, d, e, f}, x] && GtQ[p, 0] && LtQ[m, -1]
```

Rubi steps

$$\begin{aligned}
\int \frac{\coth^{-1}(ax)^2}{x^3}\,dx &= -\frac{\coth^{-1}(ax)^2}{2x^2} + a\int \frac{\coth^{-1}(ax)}{x^2\left(1-a^2x^2\right)}\,dx \\
&= -\frac{\coth^{-1}(ax)^2}{2x^2} + a\int \frac{\coth^{-1}(ax)}{x^2}\,dx + a^3\int \frac{\coth^{-1}(ax)}{1-a^2x^2}\,dx \\
&= -\frac{a\coth^{-1}(ax)}{x} + \frac{1}{2}a^2\coth^{-1}(ax)^2 - \frac{\coth^{-1}(ax)^2}{2x^2} + a^2\int \frac{1}{x\left(1-a^2x^2\right)}\,dx \\
&= -\frac{a\coth^{-1}(ax)}{x} + \frac{1}{2}a^2\coth^{-1}(ax)^2 - \frac{\coth^{-1}(ax)^2}{2x^2} + \frac{1}{2}a^2\,\text{Subst}\left(\int \frac{1}{x\left(1-a^2x\right)}\,dx, x, x^2\right) \\
&= -\frac{a\coth^{-1}(ax)}{x} + \frac{1}{2}a^2\coth^{-1}(ax)^2 - \frac{\coth^{-1}(ax)^2}{2x^2} + \frac{1}{2}a^2\,\text{Subst}\left(\int \frac{1}{x}\,dx, x, x^2\right) + \frac{1}{2}a^4\,\text{Sub} \\
&= -\frac{a\coth^{-1}(ax)}{x} + \frac{1}{2}a^2\coth^{-1}(ax)^2 - \frac{\coth^{-1}(ax)^2}{2x^2} + a^2\log(x) - \frac{1}{2}a^2\log\left(1-a^2x^2\right)
\end{aligned}$$

**Mathematica [A]** time = 0.02, size = 57, normalized size = 0.93

$$-\frac{1}{2}a^2\log\left(1-a^2x^2\right) + \frac{\left(a^2x^2-1\right)\coth^{-1}(ax)^2}{2x^2} + a^2\log(x) - \frac{a\coth^{-1}(ax)}{x}$$

Antiderivative was successfully verified.

```
[In] Integrate[ArcCoth[a*x]^2/x^3,x]
[Out] -((a*ArcCoth[a*x])/x) + ((-1 + a^2*x^2)*ArcCoth[a*x]^2)/(2*x^2) + a^2*Log[x
] - (a^2*Log[1 - a^2*x^2])/2
```

**fricas [A]** time = 0.55, size = 79, normalized size = 1.30

$$-\frac{4\,a^2x^2\log\left(a^2x^2-1\right) - 8\,a^2x^2\log(x) + 4\,ax\log\left(\frac{ax+1}{ax-1}\right) - \left(a^2x^2-1\right)\log\left(\frac{ax+1}{ax-1}\right)^2}{8\,x^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(a*x)^2/x^3,x, algorithm="fricas")
[Out] -1/8*(4*a^2*x^2*log(a^2*x^2 - 1) - 8*a^2*x^2*log(x) + 4*a*x*log((a*x + 1)/(
a*x - 1)) - (a^2*x^2 - 1)*log((a*x + 1)/(a*x - 1))^2)/x^2
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{arcoth}(ax)^2}{x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(a*x)^2/x^3,x, algorithm="giac")
[Out] integrate(arccoth(a*x)^2/x^3, x)
```

**maple [B]** time = 0.06, size = 164, normalized size = 2.69

$$-\frac{\operatorname{arccoth}(ax)^2}{2x^2}-\frac{a\operatorname{arccoth}(ax)}{x}-\frac{a^2\operatorname{arccoth}(ax)\ln(ax-1)}{2}+\frac{a^2\operatorname{arccoth}(ax)\ln(ax+1)}{2}-\frac{a^2\ln(ax-1)^2}{8}+\frac{a^2\ln(a$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(arccoth(a*x)^2/x^3,x)
```

```
[Out] -1/2*arccoth(a*x)^2/x^2-a*arccoth(a*x)/x-1/2*a^2*arccoth(a*x)*ln(a*x-1)+1/2
*a^2*arccoth(a*x)*ln(a*x+1)-1/8*a^2*ln(a*x-1)^2+1/4*a^2*ln(a*x-1)*ln(1/2+1/
2*a*x)+a^2*ln(a*x)-1/2*a^2*ln(a*x-1)-1/2*a^2*ln(a*x+1)-1/8*a^2*ln(a*x+1)^2+
1/4*a^2*ln(-1/2*a*x+1/2)*ln(a*x+1)-1/4*a^2*ln(-1/2*a*x+1/2)*ln(1/2+1/2*a*x)
```

**maxima [A]** time = 0.31, size = 96, normalized size = 1.57

$$\frac{1}{8}\left(2\left(\log(ax-1)-2\right)\log(ax+1)-\log(ax+1)^2-\log(ax-1)^2-4\log(ax-1)+8\log(x)\right)a^2+\frac{1}{2}\left(a\log(ax+$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(a*x)^2/x^3,x, algorithm="maxima")
```

```
[Out] 1/8*(2*(log(a*x - 1) - 2)*log(a*x + 1) - log(a*x + 1)^2 - log(a*x - 1)^2 -
4*log(a*x - 1) + 8*log(x))*a^2 + 1/2*(a*log(a*x + 1) - a*log(a*x - 1) - 2/x
)*a*arccoth(a*x) - 1/2*arccoth(a*x)^2/x^2
```

**mupad [B]** time = 1.45, size = 145, normalized size = 2.38

$$a^2\ln(x)+\ln\left(\frac{1}{a\,x}+1\right)^2\left(\frac{a^2}{8}-\frac{1}{8\,x^2}\right)+\ln\left(1-\frac{1}{a\,x}\right)^2\left(\frac{a^2}{8}-\frac{1}{8\,x^2}\right)-\frac{a^2\ln\left(a^2\,x^2-1\right)}{2}+\ln\left(1-\frac{1}{a\,x}\right)\left(\frac{4\,a\,x-2}{16\,x^2}+\frac{4\,a\,x}{16$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(a*x)^2/x^3,x)
```

```
[Out] a^2*log(x) + log(1/(a*x) + 1)^2*(a^2/8 - 1/(8*x^2)) + log(1 - 1/(a*x))^2*(a
^2/8 - 1/(8*x^2)) - (a^2*log(a^2*x^2 - 1))/2 + log(1 - 1/(a*x))*((4*a*x - 2
)/(16*x^2) + (4*a*x + 2)/(16*x^2) - log(1/(a*x) + 1)*(a^2/4 - 1/(4*x^2))) -
 (a*log(1/(a*x) + 1))/(2*x)
```

**sympy [A]** time = 1.58, size = 56, normalized size = 0.92

$$a^2\log(x)-a^2\log(ax+1)+\frac{a^2\operatorname{acoth}^2(ax)}{2}+a^2\operatorname{acoth}(ax)-\frac{a\operatorname{acoth}(ax)}{x}-\frac{\operatorname{acoth}^2(ax)}{2x^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(a*x)**2/x**3,x)
```

```
[Out] a**2*log(x) - a**2*log(a*x + 1) + a**2*acoth(a*x)**2/2 + a**2*acoth(a*x) -
a*acoth(a*x)/x - acoth(a*x)**2/(2*x**2)
```

## 3.21 $\int \frac{\coth^{-1}(ax)^2}{x^4} dx$

**Optimal**. Leaf size=103

$$-\frac{1}{3}a^3\text{Li}_2\left(\frac{2}{ax+1}-1\right)+\frac{1}{3}a^3\tanh^{-1}(ax)+\frac{1}{3}a^3\coth^{-1}(ax)^2+\frac{2}{3}a^3\log\left(2-\frac{2}{ax+1}\right)\coth^{-1}(ax)-\frac{a^2}{3x}-\frac{\coth^{-1}(ax)^2}{3x^3}$$

```
[Out] -1/3*a^2/x-1/3*a*arccoth(a*x)/x^2+1/3*a^3*arccoth(a*x)^2-1/3*arccoth(a*x)^2
/x^3+1/3*a^3*arctanh(a*x)+2/3*a^3*arccoth(a*x)*ln(2-2/(a*x+1))-1/3*a^3*poly
log(2,-1+2/(a*x+1))
```

**Rubi** [A] time = 0.17, antiderivative size = 103, normalized size of antiderivative = 1.00, number of steps used = 8, number of rules used = 7, integrand size = 10, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.700, Rules used = {5917, 5983, 325, 206, 5989, 5933, 2447}

$$-\frac{1}{3}a^3\text{PolyLog}\left(2,\frac{2}{ax+1}-1\right)-\frac{a^2}{3x}+\frac{1}{3}a^3\tanh^{-1}(ax)+\frac{1}{3}a^3\coth^{-1}(ax)^2+\frac{2}{3}a^3\log\left(2-\frac{2}{ax+1}\right)\coth^{-1}(ax)-\frac{a\,\text{co}}{}$$

Antiderivative was successfully verified.

```
[In] Int[ArcCoth[a*x]^2/x^4,x]
```

```
[Out] -a^2/(3*x) - (a*ArcCoth[a*x])/(3*x^2) + (a^3*ArcCoth[a*x]^2)/3 - ArcCoth[a*
x]^2/(3*x^3) + (a^3*ArcTanh[a*x])/3 + (2*a^3*ArcCoth[a*x]*Log[2 - 2/(1 + a*
x)])/3 - (a^3*PolyLog[2, -1 + 2/(1 + a*x)])/3
```

Rule 206

```
Int[((a_) + (b_.)*(x_)^2)^(-1), x_Symbol] :> Simp[(1*ArcTanh[(Rt[-b, 2]*x)/
Rt[a, 2]])/(Rt[a, 2]*Rt[-b, 2]), x] /; FreeQ[{a, b}, x] && NegQ[a/b] && (Gt
Q[a, 0] || LtQ[b, 0])
```

Rule 325

```
Int[((c_.)*(x_))^(m_)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Simp[((c*
x)^(m + 1)*(a + b*x^n)^(p + 1))/(a*c*(m + 1)), x] - Dist[(b*(m + n*(p + 1)
+ 1))/(a*c^n*(m + 1)), Int[(c*x)^(m + n)*(a + b*x^n)^p, x], x] /; FreeQ[{a,
 b, c, p}, x] && IGtQ[n, 0] && LtQ[m, -1] && IntBinomialQ[a, b, c, n, m, p,
 x]
```

Rule 2447

```
Int[Log[u_]*(Pq_)^(m_.), x_Symbol] :> With[{C = FullSimplify[(Pq^m*(1 - u))
/D[u, x]]}, Simp[C*PolyLog[2, 1 - u], x] /; FreeQ[C, x]] /; IntegerQ[m] &&
PolyQ[Pq, x] && RationalFunctionQ[u, x] && LeQ[RationalFunctionExponents[u,
 x][[2]], Expon[Pq, x]]
```

Rule 5917

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)*((d_.)*(x_))^(m_.), x_Symbol]
 :> Simp[((d*x)^(m + 1)*(a + b*ArcCoth[c*x])^p)/(d*(m + 1)), x] - Dist[(b*c
*p)/(d*(m + 1)), Int[((d*x)^(m + 1)*(a + b*ArcCoth[c*x])^(p - 1))/(1 - c^2*
x^2), x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[p, 0] && (EqQ[p, 1] || In
tegerQ[m]) && NeQ[m, -1]
```

Rule 5933

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)/((x_)*((d_) + (e_.)*(x_))), x
_Symbol] :> Simp[((a + b*ArcCoth[c*x])^p*Log[2 - 2/(1 + (e*x)/d)])/d, x] -
Dist[(b*c*p)/d, Int[((a + b*ArcCoth[c*x])^(p - 1)*Log[2 - 2/(1 + (e*x)/d)])
```

```
/(1 - c^2*x^2), x], x] /; FreeQ[{a, b, c, d, e}, x] && IGtQ[p, 0] && EqQ[c^
2*d^2 - e^2, 0]
```

Rule 5983

```
Int[(((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)*((f_.)*(x_))^(m_))/((d_) + (
e_.)*(x_)^2), x_Symbol] :> Dist[1/d, Int[(f*x)^m*(a + b*ArcCoth[c*x])^p, x]
, x] - Dist[e/(d*f^2), Int[((f*x)^(m + 2)*(a + b*ArcCoth[c*x])^p)/(d + e*x^
2), x], x] /; FreeQ[{a, b, c, d, e, f}, x] && GtQ[p, 0] && LtQ[m, -1]
```

Rule 5989

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)/((x_)*((d_) + (e_.)*(x_)^2)),
 x_Symbol] :> Simp[(a + b*ArcCoth[c*x])^(p + 1)/(b*d*(p + 1)), x] + Dist[1/
d, Int[(a + b*ArcCoth[c*x])^p/(x*(1 + c*x)), x], x] /; FreeQ[{a, b, c, d, e
}, x] && EqQ[c^2*d + e, 0] && GtQ[p, 0]
```

Rubi steps

$$\begin{aligned}\int \frac{\coth^{-1}(ax)^2}{x^4}\,dx &= -\frac{\coth^{-1}(ax)^2}{3x^3}+\frac{1}{3}(2a)\int \frac{\coth^{-1}(ax)}{x^3\left(1-a^2x^2\right)}\,dx\\ &= -\frac{\coth^{-1}(ax)^2}{3x^3}+\frac{1}{3}(2a)\int \frac{\coth^{-1}(ax)}{x^3}\,dx+\frac{1}{3}\left(2a^3\right)\int \frac{\coth^{-1}(ax)}{x\left(1-a^2x^2\right)}\,dx\\ &= -\frac{a\coth^{-1}(ax)}{3x^2}+\frac{1}{3}a^3\coth^{-1}(ax)^2-\frac{\coth^{-1}(ax)^2}{3x^3}+\frac{1}{3}a^2\int \frac{1}{x^2\left(1-a^2x^2\right)}\,dx+\frac{1}{3}\left(2a^3\right)\int \frac{\mathrm{co}}{x(}\\ &= -\frac{a^2}{3x}-\frac{a\coth^{-1}(ax)}{3x^2}+\frac{1}{3}a^3\coth^{-1}(ax)^2-\frac{\coth^{-1}(ax)^2}{3x^3}+\frac{2}{3}a^3\coth^{-1}(ax)\log\left(2-\frac{2}{1+ax}\right)+\\ &= -\frac{a^2}{3x}-\frac{a\coth^{-1}(ax)}{3x^2}+\frac{1}{3}a^3\coth^{-1}(ax)^2-\frac{\coth^{-1}(ax)^2}{3x^3}+\frac{1}{3}a^3\tanh^{-1}(ax)+\frac{2}{3}a^3\coth^{-1}(ax)\end{aligned}$$

**Mathematica [A]** time = 0.21, size = 87, normalized size = 0.84

$$\frac{-a^3x^3\text{Li}_2\left(-e^{-2\coth^{-1}(ax)}\right)+\left(a^3x^3-1\right)\coth^{-1}(ax)^2-a^2x^2+ax\coth^{-1}(ax)\left(a^2x^2+2a^2x^2\log\left(e^{-2\coth^{-1}(ax)}+1\right)-\right.}{3x^3}$$

Warning: Unable to verify antiderivative.

```
[In] Integrate[ArcCoth[a*x]^2/x^4,x]
```

```
[Out] (-(a^2*x^2) + (-1 + a^3*x^3)*ArcCoth[a*x]^2 + a*x*ArcCoth[a*x]*(-1 + a^2*x^
2 + 2*a^2*x^2*Log[1 + E^(-2*ArcCoth[a*x])]) - a^3*x^3*PolyLog[2, -E^(-2*Arc
Coth[a*x])])/(3*x^3)
```

**fricas [F]** time = 0.46, size = 0, normalized size = 0.00

$$\mathrm{integral}\left(\frac{\mathrm{arcoth}\left(ax\right)^2}{x^4},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(a*x)^2/x^4,x, algorithm="fricas")
```

```
[Out] integral(arccoth(a*x)^2/x^4, x)
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{arcoth}(ax)^2}{x^4}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(a*x)^2/x^4,x, algorithm="giac")
```

```
[Out] integrate(arccoth(a*x)^2/x^4, x)
```

**maple [B]** time = 0.07, size = 224, normalized size = 2.17

$$-\frac{\operatorname{arccoth}(ax)^2}{3x^3}-\frac{a\operatorname{arccoth}(ax)}{3x^2}+\frac{2a^3\operatorname{arccoth}(ax)\ln(ax)}{3}-\frac{a^3\operatorname{arccoth}(ax)\ln(ax-1)}{3}-\frac{a^3\operatorname{arccoth}(ax)\ln(ax+}{3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(arccoth(a*x)^2/x^4,x)
```

```
[Out] -1/3*arccoth(a*x)^2/x^3-1/3*a*arccoth(a*x)/x^2+2/3*a^3*arccoth(a*x)*ln(a*x)
-1/3*a^3*arccoth(a*x)*ln(a*x-1)-1/3*a^3*arccoth(a*x)*ln(a*x+1)-1/3*a^2/x-1/
6*a^3*ln(a*x-1)+1/6*a^3*ln(a*x+1)-1/12*a^3*ln(a*x-1)^2+1/3*a^3*dilog(1/2+1/
2*a*x)+1/6*a^3*ln(a*x-1)*ln(1/2+1/2*a*x)+1/12*a^3*ln(a*x+1)^2+1/6*a^3*ln(-1
/2*a*x+1/2)*ln(1/2+1/2*a*x)-1/6*a^3*ln(-1/2*a*x+1/2)*ln(a*x+1)-1/3*a^3*dilo
g(a*x)-1/3*a^3*dilog(a*x+1)-1/3*a^3*ln(a*x)*ln(a*x+1)
```

**maxima [A]** time = 0.32, size = 176, normalized size = 1.71

$$\frac{1}{12}\left(4\left(\log(ax-1)\log\left(\frac{1}{2}ax+\frac{1}{2}\right)+\mathrm{Li}_2\left(-\frac{1}{2}ax+\frac{1}{2}\right)\right)a-4\left(\log(ax+1)\log(x)+\mathrm{Li}_2(-ax)\right)a+4\left(\log(-ax+\right.\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(a*x)^2/x^4,x, algorithm="maxima")
```

```
[Out] 1/12*(4*(log(a*x - 1)*log(1/2*a*x + 1/2) + dilog(-1/2*a*x + 1/2))*a - 4*(lo
g(a*x + 1)*log(x) + dilog(-a*x))*a + 4*(log(-a*x + 1)*log(x) + dilog(a*x))*
a + 2*a*log(a*x + 1) - 2*a*log(a*x - 1) + (a*x*log(a*x + 1)^2 - 2*a*x*log(a
*x + 1)*log(a*x - 1) - a*x*log(a*x - 1)^2 - 4)/x)*a^2 - 1/3*(a^2*log(a^2*x^
2 - 1) - a^2*log(x^2) + 1/x^2)*a*arccoth(a*x) - 1/3*arccoth(a*x)^2/x^3
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.01

$$\int \frac{\operatorname{acoth}(a\,x)^2}{x^4}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(a*x)^2/x^4,x)
```

```
[Out] int(acoth(a*x)^2/x^4, x)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{acoth}^2(ax)}{x^4}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(a*x)**2/x**4,x)
```

```
[Out] Integral(acoth(a*x)**2/x**4, x)
```

## 3.22 $\int \frac{\coth^{-1}(ax)^2}{x^5} dx$

**Optimal**. Leaf size=90

$$\frac{2}{3}a^4\log(x)+\frac{1}{4}a^4\coth^{-1}(ax)^2-\frac{a^3\coth^{-1}(ax)}{2x}-\frac{a^2}{12x^2}-\frac{1}{3}a^4\log\left(1-a^2x^2\right)-\frac{\coth^{-1}(ax)^2}{4x^4}-\frac{a\coth^{-1}(ax)}{6x^3}$$

```
[Out] -1/12*a^2/x^2-1/6*a*arccoth(a*x)/x^3-1/2*a^3*arccoth(a*x)/x+1/4*a^4*arccoth
(a*x)^2-1/4*arccoth(a*x)^2/x^4+2/3*a^4*ln(x)-1/3*a^4*ln(-a^2*x^2+1)
```

**Rubi [A]** time = 0.17, antiderivative size = 90, normalized size of antiderivative = 1.00, number of steps used = 13, number of rules used = 8, integrand size = 10, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.800, Rules used = {5917, 5983, 266, 44, 36, 29, 31, 5949}

$$-\frac{a^2}{12x^2}-\frac{1}{3}a^4\log\left(1-a^2x^2\right)+\frac{2}{3}a^4\log(x)+\frac{1}{4}a^4\coth^{-1}(ax)^2-\frac{a^3\coth^{-1}(ax)}{2x}-\frac{a\coth^{-1}(ax)}{6x^3}-\frac{\coth^{-1}(ax)^2}{4x^4}$$

Antiderivative was successfully verified.

```
[In] Int[ArcCoth[a*x]^2/x^5,x]
```

```
[Out] -a^2/(12*x^2) - (a*ArcCoth[a*x])/(6*x^3) - (a^3*ArcCoth[a*x])/(2*x) + (a^4*
ArcCoth[a*x]^2)/4 - ArcCoth[a*x]^2/(4*x^4) + (2*a^4*Log[x])/3 - (a^4*Log[1
- a^2*x^2])/3
```

Rule 29

```
Int[(x_)^(-1), x_Symbol] :> Simp[Log[x], x]
```

Rule 31

```
Int[((a_) + (b_.)*(x_))^(-1), x_Symbol] :> Simp[Log[RemoveContent[a + b*x,
x]]/b, x] /; FreeQ[{a, b}, x]
```

Rule 36

```
Int[1/(((a_.) + (b_.)*(x_))*((c_.) + (d_.)*(x_))), x_Symbol] :> Dist[b/(b*c
 - a*d), Int[1/(a + b*x), x], x] - Dist[d/(b*c - a*d), Int[1/(c + d*x), x],
 x] /; FreeQ[{a, b, c, d}, x] && NeQ[b*c - a*d, 0]
```

Rule 44

```
Int[((a_) + (b_.)*(x_))^(m_.)*((c_.) + (d_.)*(x_))^(n_.), x_Symbol] :> Int[
ExpandIntegrand[(a + b*x)^m*(c + d*x)^n, x], x] /; FreeQ[{a, b, c, d}, x] &
& NeQ[b*c - a*d, 0] && ILtQ[m, 0] && IntegerQ[n] &&  !(IGtQ[n, 0] && LtQ[m
+ n + 2, 0])
```

Rule 266

```
Int[(x_)^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Dist[1/n, Subst[
Int[x^(Simplify[(m + 1)/n] - 1)*(a + b*x)^p, x], x, x^n], x] /; FreeQ[{a, b
, m, n, p}, x] && IntegerQ[Simplify[(m + 1)/n]]
```

Rule 5917

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)*((d_.)*(x_))^(m_.), x_Symbol]
 :> Simp[((d*x)^(m + 1)*(a + b*ArcCoth[c*x])^p)/(d*(m + 1)), x] - Dist[(b*c
*p)/(d*(m + 1)), Int[((d*x)^(m + 1)*(a + b*ArcCoth[c*x])^(p - 1))/(1 - c^2*
x^2), x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[p, 0] && (EqQ[p, 1] || In
```

```
tegerQ[m]) && NeQ[m, -1]
```

Rule 5949

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)/((d_) + (e_.)*(x_)^2), x_Symb
ol] :> Simp[(a + b*ArcCoth[c*x])^(p + 1)/(b*c*d*(p + 1)), x] /; FreeQ[{a, b
, c, d, e, p}, x] && EqQ[c^2*d + e, 0] && NeQ[p, -1]
```

Rule 5983

```
Int[(((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)*((f_.)*(x_))^(m_))/((d_) + (
e_.)*(x_)^2), x_Symbol] :> Dist[1/d, Int[(f*x)^m*(a + b*ArcCoth[c*x])^p, x]
, x] - Dist[e/(d*f^2), Int[((f*x)^(m + 2)*(a + b*ArcCoth[c*x])^p)/(d + e*x^
2), x], x] /; FreeQ[{a, b, c, d, e, f}, x] && GtQ[p, 0] && LtQ[m, -1]
```

Rubi steps

$$\int \frac{\coth^{-1}(ax)^2}{x^5}\,dx = -\frac{\coth^{-1}(ax)^2}{4x^4}+\frac{1}{2}a\int \frac{\coth^{-1}(ax)}{x^4\left(1-a^2x^2\right)}\,dx$$
$$= -\frac{\coth^{-1}(ax)^2}{4x^4}+\frac{1}{2}a\int \frac{\coth^{-1}(ax)}{x^4}\,dx+\frac{1}{2}a^3\int \frac{\coth^{-1}(ax)}{x^2\left(1-a^2x^2\right)}\,dx$$
$$= -\frac{a\coth^{-1}(ax)}{6x^3}-\frac{\coth^{-1}(ax)^2}{4x^4}+\frac{1}{6}a^2\int \frac{1}{x^3\left(1-a^2x^2\right)}\,dx+\frac{1}{2}a^3\int \frac{\coth^{-1}(ax)}{x^2}\,dx+\frac{1}{2}a^5$$
$$= -\frac{a\coth^{-1}(ax)}{6x^3}-\frac{a^3\coth^{-1}(ax)}{2x}+\frac{1}{4}a^4\coth^{-1}(ax)^2-\frac{\coth^{-1}(ax)^2}{4x^4}+\frac{1}{12}a^2\,\text{Subst}\left(\int \frac{}{x^2(}\right.$$
$$= -\frac{a\coth^{-1}(ax)}{6x^3}-\frac{a^3\coth^{-1}(ax)}{2x}+\frac{1}{4}a^4\coth^{-1}(ax)^2-\frac{\coth^{-1}(ax)^2}{4x^4}+\frac{1}{12}a^2\,\text{Subst}\left(\int \left(\frac{1}{x^2}\right.\right.$$
$$= -\frac{a^2}{12x^2}-\frac{a\coth^{-1}(ax)}{6x^3}-\frac{a^3\coth^{-1}(ax)}{2x}+\frac{1}{4}a^4\coth^{-1}(ax)^2-\frac{\coth^{-1}(ax)^2}{4x^4}+\frac{1}{6}a^4\log(x)-$$
$$= -\frac{a^2}{12x^2}-\frac{a\coth^{-1}(ax)}{6x^3}-\frac{a^3\coth^{-1}(ax)}{2x}+\frac{1}{4}a^4\coth^{-1}(ax)^2-\frac{\coth^{-1}(ax)^2}{4x^4}+\frac{2}{3}a^4\log(x)-$$

**Mathematica [A]** time = 0.02, size = 82, normalized size = 0.91

$$\frac{\left(a^4x^4-1\right)\coth^{-1}(ax)^2}{4x^4}+\frac{2}{3}a^4\log(x)-\frac{a^2}{12x^2}-\frac{a\left(3a^2x^2+1\right)\coth^{-1}(ax)}{6x^3}-\frac{1}{3}a^4\log\left(1-a^2x^2\right)$$

Antiderivative was successfully verified.

```
[In] Integrate[ArcCoth[a*x]^2/x^5,x]
```

```
[Out] -1/12*a^2/x^2 - (a*(1 + 3*a^2*x^2)*ArcCoth[a*x])/(6*x^3) + ((-1 + a^4*x^4)*
ArcCoth[a*x]^2)/(4*x^4) + (2*a^4*Log[x])/3 - (a^4*Log[1 - a^2*x^2])/3
```

**fricas [A]** time = 0.66, size = 97, normalized size = 1.08

$$-\frac{16\,a^4x^4\log\left(a^2x^2-1\right)-32\,a^4x^4\log(x)+4\,a^2x^2-3\left(a^4x^4-1\right)\log\left(\frac{ax+1}{ax-1}\right)^2+4\left(3\,a^3x^3+ax\right)\log\left(\frac{ax+1}{ax-1}\right)}{48\,x^4}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(a*x)^2/x^5,x, algorithm="fricas")
```

```
[Out] -1/48*(16*a^4*x^4*log(a^2*x^2 - 1) - 32*a^4*x^4*log(x) + 4*a^2*x^2 - 3*(a^4
*x^4 - 1)*log((a*x + 1)/(a*x - 1))^2 + 4*(3*a^3*x^3 + a*x)*log((a*x + 1)/(a
*x - 1)))/x^4
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{arcoth}(ax)^2}{x^5}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(a*x)^2/x^5,x, algorithm="giac")
```

```
[Out] integrate(arccoth(a*x)^2/x^5, x)
```

**maple [B]** time = 0.06, size = 185, normalized size = 2.06

$$-\frac{\operatorname{arccoth}(ax)^2}{4x^4}-\frac{a\operatorname{arccoth}(ax)}{6x^3}-\frac{a^3\operatorname{arccoth}(ax)}{2x}-\frac{a^4\operatorname{arccoth}(ax)\ln(ax-1)}{4}+\frac{a^4\operatorname{arccoth}(ax)\ln(ax+1)}{4}-\frac{a^4\ln(a}{1}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(arccoth(a*x)^2/x^5,x)
```

```
[Out] -1/4*arccoth(a*x)^2/x^4-1/6*a*arccoth(a*x)/x^3-1/2*a^3*arccoth(a*x)/x-1/4*a
^4*arccoth(a*x)*ln(a*x-1)+1/4*a^4*arccoth(a*x)*ln(a*x+1)-1/16*a^4*ln(a*x-1)
^2+1/8*a^4*ln(a*x-1)*ln(1/2+1/2*a*x)-1/16*a^4*ln(a*x+1)^2-1/8*a^4*ln(-1/2*a
*x+1/2)*ln(1/2+1/2*a*x)+1/8*a^4*ln(-1/2*a*x+1/2)*ln(a*x+1)-1/12*a^2/x^2+2/3
*a^4*ln(a*x)-1/3*a^4*ln(a*x-1)-1/3*a^4*ln(a*x+1)
```

**maxima [B]** time = 0.32, size = 154, normalized size = 1.71

$$\frac{1}{48}\left(32\,a^2\log(x)-\frac{3\,a^2x^2\log(ax+1)^2+3\,a^2x^2\log(ax-1)^2+16\,a^2x^2\log(ax-1)-2\left(3\,a^2x^2\log(ax-1)-8\,a^2\right.}{x^2}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(a*x)^2/x^5,x, algorithm="maxima")
```

```
[Out] 1/48*(32*a^2*log(x) - (3*a^2*x^2*log(a*x + 1)^2 + 3*a^2*x^2*log(a*x - 1)^2
+ 16*a^2*x^2*log(a*x - 1) - 2*(3*a^2*x^2*log(a*x - 1) - 8*a^2*x^2)*log(a*x
+ 1) + 4)/x^2)*a^2 + 1/12*(3*a^3*log(a*x + 1) - 3*a^3*log(a*x - 1) - 2*(3*a
^2*x^2 + 1)/x^3)*a*arccoth(a*x) - 1/4*arccoth(a*x)^2/x^4
```

**mupad [B]** time = 1.55, size = 196, normalized size = 2.18

$$\frac{2\,a^4\,\ln(x)}{3}+\ln\left(\frac{1}{a\,x}+1\right)^2\left(\frac{a^4}{16}-\frac{1}{16\,x^4}\right)+\ln\left(1-\frac{1}{a\,x}\right)^2\left(\frac{a^4}{16}-\frac{1}{16\,x^4}\right)+\ln\left(1-\frac{1}{a\,x}\right)\left(\frac{24\,a^3\,x^3-12\,a^2\,x^2+8\,a\,x-6}{192\,x^4}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(a*x)^2/x^5,x)
```

```
[Out] (2*a^4*log(x))/3 + log(1/(a*x) + 1)^2*(a^4/16 - 1/(16*x^4)) + log(1 - 1/(a*
x))^2*(a^4/16 - 1/(16*x^4)) + log(1 - 1/(a*x))*((8*a*x - 12*a^2*x^2 + 24*a^
3*x^3 - 6)/(192*x^4) + (8*a*x + 12*a^2*x^2 + 24*a^3*x^3 + 6)/(192*x^4) - lo
g(1/(a*x) + 1)*(a^4/8 - 1/(8*x^4))) - (a^4*log(a^2*x^2 - 1))/3 - a^2/(12*x^
2) - (a*log(1/(a*x) + 1)*((a^2*x^2)/4 + 1/12))/x^3
```

**sympy [A]** time = 2.64, size = 90, normalized size = 1.00

$$\frac{2a^4\log(x)}{3}-\frac{2a^4\log(ax+1)}{3}+\frac{a^4\operatorname{acoth}^2(ax)}{4}+\frac{2a^4\operatorname{acoth}(ax)}{3}-\frac{a^3\operatorname{acoth}(ax)}{2x}-\frac{a^2}{12x^2}-\frac{a\operatorname{acoth}(ax)}{6x^3}-\frac{\operatorname{acoth}^2(ax)}{4x^4}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(a*x)**2/x**5,x)
```

```
[Out] 2*a**4*log(x)/3 - 2*a**4*log(a*x + 1)/3 + a**4*acoth(a*x)**2/4 + 2*a**4*aco
th(a*x)/3 - a**3*acoth(a*x)/(2*x) - a**2/(12*x**2) - a*acoth(a*x)/(6*x**3)
- acoth(a*x)**2/(4*x**4)
```

# 3.23 $\int x^5 \coth^{-1}(ax)^3 \, dx$

**Optimal**. Leaf size=186

$$-\frac{23\text{Li}_2\left(1-\frac{2}{1-ax}\right)}{30a^6}-\frac{19\tanh^{-1}(ax)}{60a^6}-\frac{\coth^{-1}(ax)^3}{6a^6}+\frac{23\coth^{-1}(ax)^2}{30a^6}-\frac{23\log\left(\frac{2}{1-ax}\right)\coth^{-1}(ax)}{15a^6}+\frac{19x}{60a^5}+\frac{x\coth^{-1}(ax}{2a^5}$$

```
[Out] 19/60*x/a^5+1/60*x^3/a^3+4/15*x^2*arccoth(a*x)/a^4+1/20*x^4*arccoth(a*x)/a^
2+23/30*arccoth(a*x)^2/a^6+1/2*x*arccoth(a*x)^2/a^5+1/6*x^3*arccoth(a*x)^2/
a^3+1/10*x^5*arccoth(a*x)^2/a-1/6*arccoth(a*x)^3/a^6+1/6*x^6*arccoth(a*x)^3
-19/60*arctanh(a*x)/a^6-23/15*arccoth(a*x)*ln(2/(-a*x+1))/a^6-23/30*polylog
(2,1-2/(-a*x+1))/a^6
```

**Rubi [A]** time = 0.72, antiderivative size = 186, normalized size of antiderivative = 1.00, number of steps used = 33, number of rules used = 11, integrand size = 10, $\frac{\text{number of rules}}{\text{integrand size}}$ = 1.100, Rules used = {5917, 5981, 302, 206, 321, 5985, 5919, 2402, 2315, 5911, 5949}

$$-\frac{23\text{PolyLog}\left(2,1-\frac{2}{1-ax}\right)}{30a^6}+\frac{x^3}{60a^3}+\frac{x^4\coth^{-1}(ax)}{20a^2}+\frac{x^3\coth^{-1}(ax)^2}{6a^3}+\frac{4x^2\coth^{-1}(ax)}{15a^4}+\frac{19x}{60a^5}-\frac{19\tanh^{-1}(ax)}{60a^6}+x\cot$$

Antiderivative was successfully verified.

```
[In] Int[x^5*ArcCoth[a*x]^3,x]
```

```
[Out] (19*x)/(60*a^5) + x^3/(60*a^3) + (4*x^2*ArcCoth[a*x])/(15*a^4) + (x^4*ArcCo
th[a*x])/(20*a^2) + (23*ArcCoth[a*x]^2)/(30*a^6) + (x*ArcCoth[a*x]^2)/(2*a^
5) + (x^3*ArcCoth[a*x]^2)/(6*a^3) + (x^5*ArcCoth[a*x]^2)/(10*a) - ArcCoth[a
*x]^3/(6*a^6) + (x^6*ArcCoth[a*x]^3)/6 - (19*ArcTanh[a*x])/(60*a^6) - (23*A
rcCoth[a*x]*Log[2/(1 - a*x)])/(15*a^6) - (23*PolyLog[2, 1 - 2/(1 - a*x)])/(
30*a^6)
```

Rule 206

```
Int[((a_) + (b_.)*(x_)^2)^(-1), x_Symbol] :> Simp[(1*ArcTanh[(Rt[-b, 2]*x)/
Rt[a, 2]])/(Rt[a, 2]*Rt[-b, 2]), x] /; FreeQ[{a, b}, x] && NegQ[a/b] && (Gt
Q[a, 0] || LtQ[b, 0])
```

Rule 302

```
Int[(x_)^(m_)/((a_) + (b_.)*(x_)^(n_)), x_Symbol] :> Int[PolynomialDivide[x
^m, a + b*x^n, x], x] /; FreeQ[{a, b}, x] && IGtQ[m, 0] && IGtQ[n, 0] && Gt
Q[m, 2*n - 1]
```

Rule 321

```
Int[((c_.)*(x_))^(m_)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Simp[(c^(
n - 1)*(c*x)^(m - n + 1)*(a + b*x^n)^(p + 1))/(b*(m + n*p + 1)), x] - Dist[
(a*c^n*(m - n + 1))/(b*(m + n*p + 1)), Int[(c*x)^(m - n)*(a + b*x^n)^p, x],
 x] /; FreeQ[{a, b, c, p}, x] && IGtQ[n, 0] && GtQ[m, n - 1] && NeQ[m + n*p
 + 1, 0] && IntBinomialQ[a, b, c, n, m, p, x]
```

Rule 2315

```
Int[Log[(c_.)*(x_)]/((d_) + (e_.)*(x_)), x_Symbol] :> -Simp[PolyLog[2, 1 -
c*x]/e, x] /; FreeQ[{c, d, e}, x] && EqQ[e + c*d, 0]
```

Rule 2402

```
Int[Log[(c_.)/((d_) + (e_.)*(x_))]/((f_) + (g_.)*(x_)^2), x_Symbol] :> -Dis
t[e/g, Subst[Int[Log[2*d*x]/(1 - 2*d*x), x], x, 1/(d + e*x)], x] /; FreeQ[{
c, d, e, f, g}, x] && EqQ[c, 2*d] && EqQ[e^2*f + d^2*g, 0]
```

Rule 5911

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.), x_Symbol] :> Simp[x*(a + b*A
rcCoth[c*x])^p, x] - Dist[b*c*p, Int[(x*(a + b*ArcCoth[c*x])^(p - 1))/(1 -
c^2*x^2), x], x] /; FreeQ[{a, b, c}, x] && IGtQ[p, 0]
```

Rule 5917

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)*((d_.)*(x_))^(m_.), x_Symbol]
 :> Simp[((d*x)^(m + 1)*(a + b*ArcCoth[c*x])^p)/(d*(m + 1)), x] - Dist[(b*c
*p)/(d*(m + 1)), Int[((d*x)^(m + 1)*(a + b*ArcCoth[c*x])^(p - 1))/(1 - c^2*
x^2), x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[p, 0] && (EqQ[p, 1] || In
tegerQ[m]) && NeQ[m, -1]
```

Rule 5919

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)/((d_) + (e_.)*(x_)), x_Symbol
] :> -Simp[((a + b*ArcCoth[c*x])^p*Log[2/(1 + (e*x)/d)])/e, x] + Dist[(b*c*
p)/e, Int[((a + b*ArcCoth[c*x])^(p - 1)*Log[2/(1 + (e*x)/d)])/(1 - c^2*x^2)
, x], x] /; FreeQ[{a, b, c, d, e}, x] && IGtQ[p, 0] && EqQ[c^2*d^2 - e^2, 0
]
```

Rule 5949

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)/((d_) + (e_.)*(x_)^2), x_Symb
ol] :> Simp[(a + b*ArcCoth[c*x])^(p + 1)/(b*c*d*(p + 1)), x] /; FreeQ[{a, b
, c, d, e, p}, x] && EqQ[c^2*d + e, 0] && NeQ[p, -1]
```

Rule 5981

```
Int[(((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)*((f_.)*(x_))^(m_))/((d_) + (
e_.)*(x_)^2), x_Symbol] :> Dist[f^2/e, Int[(f*x)^(m - 2)*(a + b*ArcCoth[c*x
])^p, x], x] - Dist[(d*f^2)/e, Int[((f*x)^(m - 2)*(a + b*ArcCoth[c*x])^p)/(
d + e*x^2), x], x] /; FreeQ[{a, b, c, d, e, f}, x] && GtQ[p, 0] && GtQ[m, 1
]
```

Rule 5985

```
Int[(((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)*(x_))/((d_) + (e_.)*(x_)^2),
 x_Symbol] :> Simp[(a + b*ArcCoth[c*x])^(p + 1)/(b*e*(p + 1)), x] + Dist[1/
(c*d), Int[(a + b*ArcCoth[c*x])^p/(1 - c*x), x], x] /; FreeQ[{a, b, c, d, e
}, x] && EqQ[c^2*d + e, 0] && IGtQ[p, 0]
```

Rubi steps

$$\int x^5 \coth^{-1}(ax)^3\,dx = \frac{1}{6}x^6 \coth^{-1}(ax)^3 - \frac{1}{2}a\int \frac{x^6 \coth^{-1}(ax)^2}{1-a^2x^2}\,dx$$
$$= \frac{1}{6}x^6 \coth^{-1}(ax)^3 + \frac{\int x^4 \coth^{-1}(ax)^2\,dx}{2a} - \frac{\int \frac{x^4 \coth^{-1}(ax)^2}{1-a^2x^2}\,dx}{2a}$$
$$= \frac{x^5 \coth^{-1}(ax)^2}{10a} + \frac{1}{6}x^6 \coth^{-1}(ax)^3 - \frac{1}{5}\int \frac{x^5 \coth^{-1}(ax)}{1-a^2x^2}\,dx + \frac{\int x^2 \coth^{-1}(ax)^2\,dx}{2a^3} - \frac{\int \frac{x^2}{\cdots}}{\cdots}$$
$$= \frac{x^3 \coth^{-1}(ax)^2}{6a^3} + \frac{x^5 \coth^{-1}(ax)^2}{10a} + \frac{1}{6}x^6 \coth^{-1}(ax)^3 + \frac{\int \coth^{-1}(ax)^2\,dx}{2a^5} - \frac{\int \frac{\coth^{-1}(ax)^2}{1-a^2x^2}\,dx}{2a^5}$$
$$= \frac{x^4 \coth^{-1}(ax)}{20a^2} + \frac{x \coth^{-1}(ax)^2}{2a^5} + \frac{x^3 \coth^{-1}(ax)^2}{6a^3} + \frac{x^5 \coth^{-1}(ax)^2}{10a} - \frac{\coth^{-1}(ax)^3}{6a^6} + \frac{1}{6}x^6 \cdots$$
$$= \frac{4x^2 \coth^{-1}(ax)}{15a^4} + \frac{x^4 \coth^{-1}(ax)}{20a^2} + \frac{23 \coth^{-1}(ax)^2}{30a^6} + \frac{x \coth^{-1}(ax)^2}{2a^5} + \frac{x^3 \coth^{-1}(ax)^2}{6a^3} + \cdots$$
$$= \frac{19x}{60a^5} + \frac{x^3}{60a^3} + \frac{4x^2 \coth^{-1}(ax)}{15a^4} + \frac{x^4 \coth^{-1}(ax)}{20a^2} + \frac{23 \coth^{-1}(ax)^2}{30a^6} + \frac{x \coth^{-1}(ax)^2}{2a^5} + \frac{x^3 \cdots}{\cdots}$$
$$= \frac{19x}{60a^5} + \frac{x^3}{60a^3} + \frac{4x^2 \coth^{-1}(ax)}{15a^4} + \frac{x^4 \coth^{-1}(ax)}{20a^2} + \frac{23 \coth^{-1}(ax)^2}{30a^6} + \frac{x \coth^{-1}(ax)^2}{2a^5} + \frac{x^3 \cdots}{\cdots}$$
$$= \frac{19x}{60a^5} + \frac{x^3}{60a^3} + \frac{4x^2 \coth^{-1}(ax)}{15a^4} + \frac{x^4 \coth^{-1}(ax)}{20a^2} + \frac{23 \coth^{-1}(ax)^2}{30a^6} + \frac{x \coth^{-1}(ax)^2}{2a^5} + \frac{x^3 \cdots}{\cdots}$$

**Mathematica [A]** time = 0.54, size = 117, normalized size = 0.63

$$\frac{10\left(a^6x^6-1\right)\coth^{-1}(ax)^3 + ax\left(a^2x^2+19\right) + 2\left(3a^5x^5+5a^3x^3+15ax-23\right)\coth^{-1}(ax)^2 + \coth^{-1}(ax)\left(3a^4x^4+1\cdots\right.}{60a^6}$$

Warning: Unable to verify antiderivative.

```
[In] Integrate[x^5*ArcCoth[a*x]^3,x]
```

```
[Out] (a*x*(19 + a^2*x^2) + 2*(-23 + 15*a*x + 5*a^3*x^3 + 3*a^5*x^5)*ArcCoth[a*x]
^2 + 10*(-1 + a^6*x^6)*ArcCoth[a*x]^3 + ArcCoth[a*x]*(-19 + 16*a^2*x^2 + 3*
a^4*x^4 - 92*Log[1 - E^(-2*ArcCoth[a*x])]) + 46*PolyLog[2, E^(-2*ArcCoth[a*
x])])/(60*a^6)
```

**fricas [F]** time = 1.27, size = 0, normalized size = 0.00

$$\text{integral}\left(x^5\,\text{arcoth}\left(ax\right)^3, x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^5*arccoth(a*x)^3,x, algorithm="fricas")
```

```
[Out] integral(x^5*arccoth(a*x)^3, x)
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int x^5\,\text{arcoth}\left(ax\right)^3\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^5*arccoth(a*x)^3,x, algorithm="giac")
```

```
[Out] integrate(x^5*arccoth(a*x)^3, x)
```

**maple [C]** time = 3.61, size = 1141, normalized size = 6.13

result too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^5*arccoth(a*x)^3,x)
```

```
[Out] 23/30*arccoth(a*x)^2/a^6-1/6*arccoth(a*x)^3/a^6+1/6*x^6*arccoth(a*x)^3+1/10
*x^5*arccoth(a*x)^2/a+1/6*x^3*arccoth(a*x)^2/a^3+1/20*x^4*arccoth(a*x)/a^2+
4/15*x^2*arccoth(a*x)/a^4+1/2*x*arccoth(a*x)^2/a^5-19/60/a^6*arccoth(a*x)+2
3/15/a^6*dilog(1/((a*x-1)/(a*x+1))^(1/2))+1/80/a^6/(((a*x-1)/(a*x+1))^(1/2)
*a*x+((a*x-1)/(a*x+1))^(1/2)-a*x)-1/80/a^6/(((a*x-1)/(a*x+1))^(1/2)*a*x+((a
*x-1)/(a*x+1))^(1/2)+a*x)-23/15/a^6*dilog(1+1/((a*x-1)/(a*x+1))^(1/2))-1/8*
I/a^6*Pi*csgn(I*(a*x+1)/(a*x-1))^3*arccoth(a*x)^2+1/120/a^6*((a*x-1)/(a*x+1
))^(1/2)/(2*((a*x-1)/(a*x+1))^(1/2)*a*x+((a*x-1)/(a*x+1))^(1/2)+2*a*x-1)-1/
80/a^5/(((a*x-1)/(a*x+1))^(1/2)*a*x+((a*x-1)/(a*x+1))^(1/2)-a*x)*x+1/80/a^5
/(((a*x-1)/(a*x+1))^(1/2)*a*x+((a*x-1)/(a*x+1))^(1/2)+a*x)*x-1/8*I/a^6*Pi*c
sgn(I*(a*x+1)/(a*x-1))*csgn(I/((a*x+1)/(a*x-1)-1))*csgn(I*(a*x+1)/(a*x-1)/(
(a*x+1)/(a*x-1)-1))*arccoth(a*x)^2-1/120/a^5*((a*x-1)/(a*x+1))^(1/2)/(2*((a
*x-1)/(a*x+1))^(1/2)*a*x+((a*x-1)/(a*x+1))^(1/2)-2*a*x+1)*x-1/120/a^5*((a*x
-1)/(a*x+1))^(1/2)/(2*((a*x-1)/(a*x+1))^(1/2)*a*x+((a*x-1)/(a*x+1))^(1/2)+2
*a*x-1)*x+1/8*I/a^6*Pi*csgn(I/((a*x+1)/(a*x-1)-1))*csgn(I*(a*x+1)/(a*x-1)/(
(a*x+1)/(a*x-1)-1))^2*arccoth(a*x)^2+1/8*I/a^6*Pi*csgn(I*(a*x+1)/(a*x-1))*c
sgn(I*(a*x+1)/(a*x-1)/((a*x+1)/(a*x-1)-1))^2*arccoth(a*x)^2-1/8*I/a^6*Pi*cs
gn(I/((a*x-1)/(a*x+1))^(1/2))^2*csgn(I*(a*x+1)/(a*x-1))*arccoth(a*x)^2+1/4*
I/a^6*Pi*csgn(I/((a*x-1)/(a*x+1))^(1/2))*csgn(I*(a*x+1)/(a*x-1))^2*arccoth(
a*x)^2+1/120/a^6*((a*x-1)/(a*x+1))^(1/2)/(2*((a*x-1)/(a*x+1))^(1/2)*a*x+((a
*x-1)/(a*x+1))^(1/2)-2*a*x+1)+1/4/a^6*arccoth(a*x)^2*ln(a*x-1)-1/4/a^6*arcc
oth(a*x)^2*ln(a*x+1)-23/15/a^6*arccoth(a*x)*ln(1+1/((a*x-1)/(a*x+1))^(1/2))
-41/120/a^6/(((a*x-1)/(a*x+1))^(1/2)+1)*((a*x-1)/(a*x+1))^(1/2)-1/4/a^6*arc
coth(a*x)^2*ln((a*x-1)/(a*x+1))-41/120/a^6/(-1+((a*x-1)/(a*x+1))^(1/2))*((a
*x-1)/(a*x+1))^(1/2)-1/8*I/a^6*Pi*csgn(I*(a*x+1)/(a*x-1)/((a*x+1)/(a*x-1)-1
))^3*arccoth(a*x)^2
```

**maxima [A]** time = 0.33, size = 289, normalized size = 1.55

$$\frac{1}{6}x^6\,\mathrm{arcoth}\,(ax)^3+\frac{1}{60}a\left(\frac{2\left(3a^4x^5+5a^2x^3+15x\right)}{a^6}-\frac{15\log\left(ax+1\right)}{a^7}+\frac{15\log\left(ax-1\right)}{a^7}\right)\mathrm{arcoth}\,(ax)^2+\frac{1}{240}a\Bigg($$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^5*arccoth(a*x)^3,x, algorithm="maxima")
```

```
[Out] 1/6*x^6*arccoth(a*x)^3 + 1/60*a*(2*(3*a^4*x^5 + 5*a^2*x^3 + 15*x)/a^6 - 15*
log(a*x + 1)/a^7 + 15*log(a*x - 1)/a^7)*arccoth(a*x)^2 + 1/240*a*(((4*a^3*x
^3 + (15*log(a*x - 1) - 46)*log(a*x + 1)^2 - 5*log(a*x + 1)^3 + 5*log(a*x -
 1)^3 + 76*a*x - (15*log(a*x - 1)^2 - 92*log(a*x - 1))*log(a*x + 1) + 46*lo
g(a*x - 1)^2 + 38*log(a*x - 1))/a - 184*(log(a*x - 1)*log(1/2*a*x + 1/2) +
dilog(-1/2*a*x + 1/2))/a - 38*log(a*x + 1)/a)/a^6 + 2*(6*a^4*x^4 + 32*a^2*x
^2 - 2*(15*log(a*x - 1) - 46)*log(a*x + 1) + 15*log(a*x + 1)^2 + 15*log(a*x
 - 1)^2 + 92*log(a*x - 1))*arccoth(a*x)/a^7)
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.01

$$\int x^5\,\mathrm{acoth}\,(a\,x)^3\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^5*acoth(a*x)^3,x)
```

```
[Out] int(x^5*acoth(a*x)^3, x)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int x^5 \operatorname{acoth}^3(ax)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**5*acoth(a*x)**3,x)
```

```
[Out] Integral(x**5*acoth(a*x)**3, x)
```

# 3.24 $\int x^4 \coth^{-1}(ax)^3 \, dx$

**Optimal**. Leaf size=196

$$\frac{3\text{Li}_3\left(1-\frac{2}{1-ax}\right)}{10a^5}-\frac{3\text{Li}_2\left(1-\frac{2}{1-ax}\right)\coth^{-1}(ax)}{5a^5}+\frac{\coth^{-1}(ax)^3}{5a^5}-\frac{9\coth^{-1}(ax)^2}{20a^5}-\frac{3\log\left(\frac{2}{1-ax}\right)\coth^{-1}(ax)^2}{5a^5}+\frac{9x\coth}{10a}$$

```
[Out] 1/20*x^2/a^3+9/10*x*arccoth(a*x)/a^4+1/10*x^3*arccoth(a*x)/a^2-9/20*arccoth
(a*x)^2/a^5+3/10*x^2*arccoth(a*x)^2/a^3+3/20*x^4*arccoth(a*x)^2/a+1/5*arcco
th(a*x)^3/a^5+1/5*x^5*arccoth(a*x)^3-3/5*arccoth(a*x)^2*ln(2/(-a*x+1))/a^5+
1/2*ln(-a^2*x^2+1)/a^5-3/5*arccoth(a*x)*polylog(2,1-2/(-a*x+1))/a^5+3/10*po
lylog(3,1-2/(-a*x+1))/a^5
```

**Rubi [A]** time = 0.58, antiderivative size = 196, normalized size of antiderivative = 1.00, number of steps used = 22, number of rules used = 11, integrand size = 10, $\frac{\text{number of rules}}{\text{integrand size}}$ = 1.100, Rules used = {5917, 5981, 266, 43, 5911, 260, 5949, 5985, 5919, 6059, 6610}

$$\frac{3\text{PolyLog}\left(3,1-\frac{2}{1-ax}\right)}{10a^5}-\frac{3\coth^{-1}(ax)\text{PolyLog}\left(2,1-\frac{2}{1-ax}\right)}{5a^5}+\frac{x^2}{20a^3}+\frac{\log\left(1-a^2x^2\right)}{2a^5}+\frac{x^3\coth^{-1}(ax)}{10a^2}+\frac{3x^2\coth}{10a}$$

Antiderivative was successfully verified.

```
[In] Int[x^4*ArcCoth[a*x]^3,x]
```

```
[Out] x^2/(20*a^3) + (9*x*ArcCoth[a*x])/(10*a^4) + (x^3*ArcCoth[a*x])/(10*a^2) -
(9*ArcCoth[a*x]^2)/(20*a^5) + (3*x^2*ArcCoth[a*x]^2)/(10*a^3) + (3*x^4*ArcC
oth[a*x]^2)/(20*a) + ArcCoth[a*x]^3/(5*a^5) + (x^5*ArcCoth[a*x]^3)/5 - (3*A
rcCoth[a*x]^2*Log[2/(1 - a*x)])/(5*a^5) + Log[1 - a^2*x^2]/(2*a^5) - (3*Arc
Coth[a*x]*PolyLog[2, 1 - 2/(1 - a*x)])/(5*a^5) + (3*PolyLog[3, 1 - 2/(1 - a
*x)])/(10*a^5)
```

Rule 43

```
Int[((a_.) + (b_.)*(x_))^(m_.)*((c_.) + (d_.)*(x_))^(n_.), x_Symbol] :> Int
[ExpandIntegrand[(a + b*x)^m*(c + d*x)^n, x], x] /; FreeQ[{a, b, c, d, n},
x] && NeQ[b*c - a*d, 0] && IGtQ[m, 0] && ( !IntegerQ[n] || (EqQ[c, 0] && Le
Q[7*m + 4*n + 4, 0]) || LtQ[9*m + 5*(n + 1), 0] || GtQ[m + n + 2, 0])
```

Rule 260

```
Int[(x_)^(m_.)/((a_) + (b_.)*(x_)^(n_)), x_Symbol] :> Simp[Log[RemoveConten
t[a + b*x^n, x]]/(b*n), x] /; FreeQ[{a, b, m, n}, x] && EqQ[m, n - 1]
```

Rule 266

```
Int[(x_)^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Dist[1/n, Subst[
Int[x^(Simplify[(m + 1)/n] - 1)*(a + b*x)^p, x], x, x^n], x] /; FreeQ[{a, b
, m, n, p}, x] && IntegerQ[Simplify[(m + 1)/n]]
```

Rule 5911

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.), x_Symbol] :> Simp[x*(a + b*A
rcCoth[c*x])^p, x] - Dist[b*c*p, Int[(x*(a + b*ArcCoth[c*x])^(p - 1))/(1 -
c^2*x^2), x], x] /; FreeQ[{a, b, c}, x] && IGtQ[p, 0]
```

Rule 5917

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)*((d_.)*(x_))^(m_.), x_Symbol]
 :> Simp[((d*x)^(m + 1)*(a + b*ArcCoth[c*x])^p)/(d*(m + 1)), x] - Dist[(b*c
```

```
*p)/(d*(m + 1)), Int[((d*x)^(m + 1)*(a + b*ArcCoth[c*x])^(p - 1))/(1 - c^2*
x^2), x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[p, 0] && (EqQ[p, 1] || In
tegerQ[m]) && NeQ[m, -1]
```

Rule 5919

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)/((d_) + (e_.)*(x_)), x_Symbol
] :> -Simp[((a + b*ArcCoth[c*x])^p*Log[2/(1 + (e*x)/d)])/e, x] + Dist[(b*c*
p)/e, Int[((a + b*ArcCoth[c*x])^(p - 1)*Log[2/(1 + (e*x)/d)])/(1 - c^2*x^2)
, x], x] /; FreeQ[{a, b, c, d, e}, x] && IGtQ[p, 0] && EqQ[c^2*d^2 - e^2, 0
]
```

Rule 5949

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)/((d_) + (e_.)*(x_)^2), x_Symb
ol] :> Simp[(a + b*ArcCoth[c*x])^(p + 1)/(b*c*d*(p + 1)), x] /; FreeQ[{a, b
, c, d, e, p}, x] && EqQ[c^2*d + e, 0] && NeQ[p, -1]
```

Rule 5981

```
Int[(((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)*((f_.)*(x_))^(m_))/((d_) + (
e_.)*(x_)^2), x_Symbol] :> Dist[f^2/e, Int[(f*x)^(m - 2)*(a + b*ArcCoth[c*x
])^p, x], x] - Dist[(d*f^2)/e, Int[((f*x)^(m - 2)*(a + b*ArcCoth[c*x])^p)/(
d + e*x^2), x], x] /; FreeQ[{a, b, c, d, e, f}, x] && GtQ[p, 0] && GtQ[m, 1
]
```

Rule 5985

```
Int[(((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)*(x_))/((d_) + (e_.)*(x_)^2),
 x_Symbol] :> Simp[(a + b*ArcCoth[c*x])^(p + 1)/(b*e*(p + 1)), x] + Dist[1/
(c*d), Int[(a + b*ArcCoth[c*x])^p/(1 - c*x), x], x] /; FreeQ[{a, b, c, d, e
}, x] && EqQ[c^2*d + e, 0] && IGtQ[p, 0]
```

Rule 6059

```
Int[(Log[u_]*((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.))/((d_) + (e_.)*(x_)^
2), x_Symbol] :> -Simp[((a + b*ArcCoth[c*x])^p*PolyLog[2, 1 - u])/(2*c*d),
x] + Dist[(b*p)/2, Int[((a + b*ArcCoth[c*x])^(p - 1)*PolyLog[2, 1 - u])/(d
+ e*x^2), x], x] /; FreeQ[{a, b, c, d, e}, x] && IGtQ[p, 0] && EqQ[c^2*d +
e, 0] && EqQ[(1 - u)^2 - (1 - 2/(1 - c*x))^2, 0]
```

Rule 6610

```
Int[(u_)*PolyLog[n_, v_], x_Symbol] :> With[{w = DerivativeDivides[v, u*v,
x]}, Simp[w*PolyLog[n + 1, v], x] /;  !FalseQ[w]] /; FreeQ[n, x]
```

Rubi steps

$$\int x^4 \coth^{-1}(ax)^3\,dx = \frac{1}{5}x^5\coth^{-1}(ax)^3 - \frac{1}{5}(3a)\int \frac{x^5\coth^{-1}(ax)^2}{1-a^2x^2}\,dx$$
$$= \frac{1}{5}x^5\coth^{-1}(ax)^3 + \frac{3\int x^3\coth^{-1}(ax)^2\,dx}{5a} - \frac{3\int \frac{x^3\coth^{-1}(ax)^2}{1-a^2x^2}\,dx}{5a}$$
$$= \frac{3x^4\coth^{-1}(ax)^2}{20a} + \frac{1}{5}x^5\coth^{-1}(ax)^3 - \frac{3}{10}\int \frac{x^4\coth^{-1}(ax)}{1-a^2x^2}\,dx + \frac{3\int x\coth^{-1}(ax)^2\,dx}{5a^3}$$
$$= \frac{3x^2\coth^{-1}(ax)^2}{10a^3} + \frac{3x^4\coth^{-1}(ax)^2}{20a} + \frac{\coth^{-1}(ax)^3}{5a^5} + \frac{1}{5}x^5\coth^{-1}(ax)^3 - \frac{3\int \frac{\coth^{-1}(ax)^2}{1-ax}}{5a^4}$$
$$= \frac{x^3\coth^{-1}(ax)}{10a^2} + \frac{3x^2\coth^{-1}(ax)^2}{10a^3} + \frac{3x^4\coth^{-1}(ax)^2}{20a} + \frac{\coth^{-1}(ax)^3}{5a^5} + \frac{1}{5}x^5\coth^{-1}(ax)^3$$
$$= \frac{9x\coth^{-1}(ax)}{10a^4} + \frac{x^3\coth^{-1}(ax)}{10a^2} - \frac{9\coth^{-1}(ax)^2}{20a^5} + \frac{3x^2\coth^{-1}(ax)^2}{10a^3} + \frac{3x^4\coth^{-1}(ax)^2}{20a}$$
$$= \frac{9x\coth^{-1}(ax)}{10a^4} + \frac{x^3\coth^{-1}(ax)}{10a^2} - \frac{9\coth^{-1}(ax)^2}{20a^5} + \frac{3x^2\coth^{-1}(ax)^2}{10a^3} + \frac{3x^4\coth^{-1}(ax)^2}{20a}$$
$$= \frac{x^2}{20a^3} + \frac{9x\coth^{-1}(ax)}{10a^4} + \frac{x^3\coth^{-1}(ax)}{10a^2} - \frac{9\coth^{-1}(ax)^2}{20a^5} + \frac{3x^2\coth^{-1}(ax)^2}{10a^3} + \frac{3x^4\coth}{20}$$

**Mathematica [C]** time = 0.59, size = 175, normalized size = 0.89

$$8a^5x^5\coth^{-1}(ax)^3 + 6a^4x^4\coth^{-1}(ax)^2 + 4a^3x^3\coth^{-1}(ax) + 2a^2x^2 - 40\log\left(\frac{1}{ax\sqrt{1-\frac{1}{a^2x^2}}}\right) + 12a^2x^2\coth^{-1}(ax)$$

Warning: Unable to verify antiderivative.

```
[In] Integrate[x^4*ArcCoth[a*x]^3,x]
```

```
[Out] (-2 - I*Pi^3 + 2*a^2*x^2 + 36*a*x*ArcCoth[a*x] + 4*a^3*x^3*ArcCoth[a*x] - 1
8*ArcCoth[a*x]^2 + 12*a^2*x^2*ArcCoth[a*x]^2 + 6*a^4*x^4*ArcCoth[a*x]^2 + 8
*ArcCoth[a*x]^3 + 8*a^5*x^5*ArcCoth[a*x]^3 - 24*ArcCoth[a*x]^2*Log[1 - E^(2
*ArcCoth[a*x])] - 40*Log[1/(a*Sqrt[1 - 1/(a^2*x^2)]*x)] - 24*ArcCoth[a*x]*P
olyLog[2, E^(2*ArcCoth[a*x])] + 12*PolyLog[3, E^(2*ArcCoth[a*x])])/(40*a^5)
```

**fricas [F]** time = 1.95, size = 0, normalized size = 0.00

$$\text{integral}\left(x^4\,\text{arcoth}\,(ax)^3\,,x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^4*arccoth(a*x)^3,x, algorithm="fricas")
```

```
[Out] integral(x^4*arccoth(a*x)^3, x)
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int x^4\,\text{arcoth}\,(ax)^3\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^4*arccoth(a*x)^3,x, algorithm="giac")
```

```
[Out] integrate(x^4*arccoth(a*x)^3, x)
```

**maple** [C] time = 2.92, size = 806, normalized size = 4.11

result too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^4*arccoth(a*x)^3,x)
```

```
[Out] -9/20*arccoth(a*x)^2/a^5+1/5*arccoth(a*x)^3/a^5+1/10*x^3*arccoth(a*x)/a^2+3
/10*x^2*arccoth(a*x)^2/a^3+3/20*x^4*arccoth(a*x)^2/a+9/10*x*arccoth(a*x)/a^
4-1/20/a^5+1/5*x^5*arccoth(a*x)^3+1/20*x^2/a^3+3/10/a^5*arccoth(a*x)^2*ln(a
*x+1)-3/5/a^5*arccoth(a*x)^2*ln(1-1/((a*x-1)/(a*x+1))^(1/2))-6/5/a^5*arccot
h(a*x)*polylog(2,1/((a*x-1)/(a*x+1))^(1/2))-3/5/a^5*arccoth(a*x)^2*ln(1+1/(
(a*x-1)/(a*x+1))^(1/2))-6/5/a^5*arccoth(a*x)*polylog(2,-1/((a*x-1)/(a*x+1))
^(1/2))+3/5/a^5*arccoth(a*x)^2*ln((a*x+1)/(a*x-1)-1)+3/10/a^5*arccoth(a*x)^
2*ln((a*x-1)/(a*x+1))+3/20*I/a^5*Pi*csgn(I*(a*x+1)/(a*x-1))*csgn(I/((a*x+1)
/(a*x-1)-1))*csgn(I*(a*x+1)/(a*x-1)/((a*x+1)/(a*x-1)-1))*arccoth(a*x)^2+1/a
^5*arccoth(a*x)-1/a^5*ln(1+1/((a*x-1)/(a*x+1))^(1/2))-1/a^5*ln(1/((a*x-1)/(
a*x+1))^(1/2)-1)+6/5/a^5*polylog(3,-1/((a*x-1)/(a*x+1))^(1/2))+6/5/a^5*poly
log(3,1/((a*x-1)/(a*x+1))^(1/2))+3/20*I/a^5*Pi*csgn(I*(a*x+1)/(a*x-1)/((a*x
+1)/(a*x-1)-1))^3*arccoth(a*x)^2+3/20*I/a^5*Pi*csgn(I*(a*x+1)/(a*x-1))^3*ar
ccoth(a*x)^2-3/20*I/a^5*Pi*csgn(I/((a*x+1)/(a*x-1)-1))*csgn(I*(a*x+1)/(a*x-
1)/((a*x+1)/(a*x-1)-1))^2*arccoth(a*x)^2-3/20*I/a^5*Pi*csgn(I*(a*x+1)/(a*x-
1))*csgn(I*(a*x+1)/(a*x-1)/((a*x+1)/(a*x-1)-1))^2*arccoth(a*x)^2+3/20*I/a^5
*Pi*csgn(I/((a*x-1)/(a*x+1))^(1/2))^2*csgn(I*(a*x+1)/(a*x-1))*arccoth(a*x)^
2-3/10*I/a^5*Pi*csgn(I/((a*x-1)/(a*x+1))^(1/2))*csgn(I*(a*x+1)/(a*x-1))^2*a
rccoth(a*x)^2-3/5/a^5*arccoth(a*x)^2*ln(2)+3/10/a^5*arccoth(a*x)^2*ln(a*x-1
)
```

**maxima** [F] time = 0.00, size = 0, normalized size = 0.00

$$\frac{2\left(a^5x^5+1\right)\log\left(ax+1\right)^3+3\left(a^4x^4+2\,a^2x^2-2\left(a^5x^5-1\right)\log\left(ax-1\right)\right)\log\left(ax+1\right)^2}{80\,a^5}+\frac{1}{8}\int-\frac{5\left(a^5x^5+a^4x^4\right)\log}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^4*arccoth(a*x)^3,x, algorithm="maxima")
```

```
[Out] 1/80*(2*(a^5*x^5 + 1)*log(a*x + 1)^3 + 3*(a^4*x^4 + 2*a^2*x^2 - 2*(a^5*x^5
- 1)*log(a*x - 1))*log(a*x + 1)^2)/a^5 + 1/8*integrate(-1/5*(5*(a^5*x^5 + a
^4*x^4)*log(a*x - 1)^3 + 3*(a^4*x^4 + 2*a^2*x^2 - 5*(a^5*x^5 + a^4*x^4)*log
(a*x - 1)^2 - 2*(a^5*x^5 - 1)*log(a*x - 1))*log(a*x + 1))/(a^5*x + a^4), x)
```

**mupad** [F] time = 0.00, size = -1, normalized size = -0.01

$$\int x^4\,\mathrm{acoth}\left(a\,x\right)^3\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^4*acoth(a*x)^3,x)
```

```
[Out] int(x^4*acoth(a*x)^3, x)
```

**sympy** [F] time = 0.00, size = 0, normalized size = 0.00

$$\int x^4\,\mathrm{acoth}^3\left(ax\right)dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**4*acoth(a*x)**3,x)
[Out] Integral(x**4*acoth(a*x)**3, x)
```

## 3.25 $\int x^3 \coth^{-1}(ax)^3 \, dx$

**Optimal**. Leaf size=139

$$-\frac{\text{Li}_2\left(1-\frac{2}{1-ax}\right)}{a^4}-\frac{\tanh^{-1}(ax)}{4a^4}-\frac{\coth^{-1}(ax)^3}{4a^4}+\frac{\coth^{-1}(ax)^2}{a^4}-\frac{2\log\left(\frac{2}{1-ax}\right)\coth^{-1}(ax)}{a^4}+\frac{x}{4a^3}+\frac{3x\coth^{-1}(ax)^2}{4a^3}+\frac{x^2\,\text{cot}\cdots}{4\cdots}$$

```
[Out] 1/4*x/a^3+1/4*x^2*arccoth(a*x)/a^2+arccoth(a*x)^2/a^4+3/4*x*arccoth(a*x)^2/
a^3+1/4*x^3*arccoth(a*x)^2/a-1/4*arccoth(a*x)^3/a^4+1/4*x^4*arccoth(a*x)^3-
1/4*arctanh(a*x)/a^4-2*arccoth(a*x)*ln(2/(-a*x+1))/a^4-polylog(2,1-2/(-a*x+
1))/a^4
```

**Rubi [A]** time = 0.42, antiderivative size = 139, normalized size of antiderivative = 1.00, number of steps used = 18, number of rules used = 10, integrand size = 10, $\frac{\text{number of rules}}{\text{integrand size}}$ = 1.000, Rules used = {5917, 5981, 321, 206, 5985, 5919, 2402, 2315, 5911, 5949}

$$-\frac{\text{PolyLog}\left(2,1-\frac{2}{1-ax}\right)}{a^4}+\frac{x^2\coth^{-1}(ax)}{4a^2}+\frac{x}{4a^3}-\frac{\tanh^{-1}(ax)}{4a^4}+\frac{3x\coth^{-1}(ax)^2}{4a^3}-\frac{\coth^{-1}(ax)^3}{4a^4}+\frac{\coth^{-1}(ax)^2}{a^4}-\frac{2\log\left(\cdots\right.}{\cdots}$$

Antiderivative was successfully verified.

```
[In] Int[x^3*ArcCoth[a*x]^3,x]
```

```
[Out] x/(4*a^3) + (x^2*ArcCoth[a*x])/(4*a^2) + ArcCoth[a*x]^2/a^4 + (3*x*ArcCoth[
a*x]^2)/(4*a^3) + (x^3*ArcCoth[a*x]^2)/(4*a) - ArcCoth[a*x]^3/(4*a^4) + (x^
4*ArcCoth[a*x]^3)/4 - ArcTanh[a*x]/(4*a^4) - (2*ArcCoth[a*x]*Log[2/(1 - a*x
)])/a^4 - PolyLog[2, 1 - 2/(1 - a*x)]/a^4
```

Rule 206

```
Int[((a_) + (b_.)*(x_)^2)^(-1), x_Symbol] :> Simp[(1*ArcTanh[(Rt[-b, 2]*x)/
Rt[a, 2]])/(Rt[a, 2]*Rt[-b, 2]), x] /; FreeQ[{a, b}, x] && NegQ[a/b] && (Gt
Q[a, 0] || LtQ[b, 0])
```

Rule 321

```
Int[((c_.)*(x_))^(m_)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Simp[(c^(
n - 1)*(c*x)^(m - n + 1)*(a + b*x^n)^(p + 1))/(b*(m + n*p + 1)), x] - Dist[
(a*c^n*(m - n + 1))/(b*(m + n*p + 1)), Int[(c*x)^(m - n)*(a + b*x^n)^p, x],
 x] /; FreeQ[{a, b, c, p}, x] && IGtQ[n, 0] && GtQ[m, n - 1] && NeQ[m + n*p
 + 1, 0] && IntBinomialQ[a, b, c, n, m, p, x]
```

Rule 2315

```
Int[Log[(c_.)*(x_)]/((d_) + (e_.)*(x_)), x_Symbol] :> -Simp[PolyLog[2, 1 -
c*x]/e, x] /; FreeQ[{c, d, e}, x] && EqQ[e + c*d, 0]
```

Rule 2402

```
Int[Log[(c_.)/((d_) + (e_.)*(x_))]/((f_) + (g_.)*(x_)^2), x_Symbol] :> -Dis
t[e/g, Subst[Int[Log[2*d*x]/(1 - 2*d*x), x], x, 1/(d + e*x)], x] /; FreeQ[{
c, d, e, f, g}, x] && EqQ[c, 2*d] && EqQ[e^2*f + d^2*g, 0]
```

Rule 5911

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.), x_Symbol] :> Simp[x*(a + b*A
rcCoth[c*x])^p, x] - Dist[b*c*p, Int[(x*(a + b*ArcCoth[c*x])^(p - 1))/(1 -
c^2*x^2), x], x] /; FreeQ[{a, b, c}, x] && IGtQ[p, 0]
```

Rule 5917

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)*((d_.)*(x_))^(m_.), x_Symbol]
 :> Simp[((d*x)^(m + 1)*(a + b*ArcCoth[c*x])^p)/(d*(m + 1)), x] - Dist[(b*c
*p)/(d*(m + 1)), Int[((d*x)^(m + 1)*(a + b*ArcCoth[c*x])^(p - 1))/(1 - c^2*
x^2), x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[p, 0] && (EqQ[p, 1] || In
tegerQ[m]) && NeQ[m, -1]
```

Rule 5919

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)/((d_) + (e_.)*(x_)), x_Symbol
] :> -Simp[((a + b*ArcCoth[c*x])^p*Log[2/(1 + (e*x)/d)])/e, x] + Dist[(b*c*
p)/e, Int[((a + b*ArcCoth[c*x])^(p - 1)*Log[2/(1 + (e*x)/d)])/(1 - c^2*x^2)
, x], x] /; FreeQ[{a, b, c, d, e}, x] && IGtQ[p, 0] && EqQ[c^2*d^2 - e^2, 0
]
```

Rule 5949

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)/((d_) + (e_.)*(x_)^2), x_Symb
ol] :> Simp[(a + b*ArcCoth[c*x])^(p + 1)/(b*c*d*(p + 1)), x] /; FreeQ[{a, b
, c, d, e, p}, x] && EqQ[c^2*d + e, 0] && NeQ[p, -1]
```

Rule 5981

```
Int[(((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)*((f_.)*(x_))^(m_))/((d_) + (
e_.)*(x_)^2), x_Symbol] :> Dist[f^2/e, Int[(f*x)^(m - 2)*(a + b*ArcCoth[c*x
])^p, x], x] - Dist[(d*f^2)/e, Int[((f*x)^(m - 2)*(a + b*ArcCoth[c*x])^p)/(
d + e*x^2), x], x] /; FreeQ[{a, b, c, d, e, f}, x] && GtQ[p, 0] && GtQ[m, 1
]
```

Rule 5985

```
Int[(((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)*(x_))/((d_) + (e_.)*(x_)^2),
 x_Symbol] :> Simp[(a + b*ArcCoth[c*x])^(p + 1)/(b*e*(p + 1)), x] + Dist[1/
(c*d), Int[(a + b*ArcCoth[c*x])^p/(1 - c*x), x], x] /; FreeQ[{a, b, c, d, e
}, x] && EqQ[c^2*d + e, 0] && IGtQ[p, 0]
```

Rubi steps

$$\int x^3 \coth^{-1}(ax)^3\,dx = \frac{1}{4}x^4\coth^{-1}(ax)^3 - \frac{1}{4}(3a)\int \frac{x^4\coth^{-1}(ax)^2}{1-a^2x^2}\,dx$$
$$= \frac{1}{4}x^4\coth^{-1}(ax)^3 + \frac{3\int x^2\coth^{-1}(ax)^2\,dx}{4a} - \frac{3\int \frac{x^2\coth^{-1}(ax)^2}{1-a^2x^2}\,dx}{4a}$$
$$= \frac{x^3\coth^{-1}(ax)^2}{4a} + \frac{1}{4}x^4\coth^{-1}(ax)^3 - \frac{1}{2}\int \frac{x^3\coth^{-1}(ax)}{1-a^2x^2}\,dx + \frac{3\int \coth^{-1}(ax)^2\,dx}{4a^3} - \frac{3\int \text{co}}{}$$
$$= \frac{3x\coth^{-1}(ax)^2}{4a^3} + \frac{x^3\coth^{-1}(ax)^2}{4a} - \frac{\coth^{-1}(ax)^3}{4a^4} + \frac{1}{4}x^4\coth^{-1}(ax)^3 + \frac{\int x\coth^{-1}(ax)\,dx}{2a^2}$$
$$= \frac{x^2\coth^{-1}(ax)}{4a^2} + \frac{\coth^{-1}(ax)^2}{a^4} + \frac{3x\coth^{-1}(ax)^2}{4a^3} + \frac{x^3\coth^{-1}(ax)^2}{4a} - \frac{\coth^{-1}(ax)^3}{4a^4} + \frac{1}{4}x^4\,\text{co}$$
$$= \frac{x}{4a^3} + \frac{x^2\coth^{-1}(ax)}{4a^2} + \frac{\coth^{-1}(ax)^2}{a^4} + \frac{3x\coth^{-1}(ax)^2}{4a^3} + \frac{x^3\coth^{-1}(ax)^2}{4a} - \frac{\coth^{-1}(ax)^3}{4a^4} +$$
$$= \frac{x}{4a^3} + \frac{x^2\coth^{-1}(ax)}{4a^2} + \frac{\coth^{-1}(ax)^2}{a^4} + \frac{3x\coth^{-1}(ax)^2}{4a^3} + \frac{x^3\coth^{-1}(ax)^2}{4a} - \frac{\coth^{-1}(ax)^3}{4a^4} +$$
$$= \frac{x}{4a^3} + \frac{x^2\coth^{-1}(ax)}{4a^2} + \frac{\coth^{-1}(ax)^2}{a^4} + \frac{3x\coth^{-1}(ax)^2}{4a^3} + \frac{x^3\coth^{-1}(ax)^2}{4a} - \frac{\coth^{-1}(ax)^3}{4a^4} +$$

**Mathematica [A]** time = 0.31, size = 88, normalized size = 0.63

$$\frac{\left(a^4x^4-1\right)\coth^{-1}(ax)^3 + \left(a^3x^3+3ax-4\right)\coth^{-1}(ax)^2 + \coth^{-1}(ax)\left(a^2x^2-8\log\left(1-e^{-2\coth^{-1}(ax)}\right)-1\right) + 4\text{Li}_2}{4a^4}$$

Warning: Unable to verify antiderivative.

```
[In] Integrate[x^3*ArcCoth[a*x]^3,x]
```

```
[Out] (a*x + (-4 + 3*a*x + a^3*x^3)*ArcCoth[a*x]^2 + (-1 + a^4*x^4)*ArcCoth[a*x]^
3 + ArcCoth[a*x]*(-1 + a^2*x^2 - 8*Log[1 - E^(-2*ArcCoth[a*x])]) + 4*PolyLo
g[2, E^(-2*ArcCoth[a*x])])/(4*a^4)
```

**fricas [F]** time = 0.48, size = 0, normalized size = 0.00

$$\text{integral}\left(x^3\,\text{arcoth}\left(ax\right)^3, x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^3*arccoth(a*x)^3,x, algorithm="fricas")
```

```
[Out] integral(x^3*arccoth(a*x)^3, x)
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int x^3\,\text{arcoth}\left(ax\right)^3\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^3*arccoth(a*x)^3,x, algorithm="giac")
```

```
[Out] integrate(x^3*arccoth(a*x)^3, x)
```

**maple [C]** time = 1.59, size = 684, normalized size = 4.92

$$-\frac{\operatorname{arccoth}(ax)}{4a^4}+\frac{\operatorname{arccoth}(ax)^2}{a^4}+\frac{3\operatorname{arccoth}(ax)^2\ln(ax-1)}{8a^4}-\frac{3\operatorname{arccoth}(ax)^2\ln(ax+1)}{8a^4}-\frac{2\operatorname{arccoth}(ax)\ln\left(1+\right.}{a^4}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^3*arccoth(a*x)^3,x)
```

```
[Out] -1/4/a^4*arccoth(a*x)+arccoth(a*x)^2/a^4+3/8/a^4*arccoth(a*x)^2*ln(a*x-1)-3
/8/a^4*arccoth(a*x)^2*ln(a*x+1)-2/a^4*arccoth(a*x)*ln(1+1/((a*x-1)/(a*x+1))
^(1/2))-1/4/a^4/(((a*x-1)/(a*x+1))^(1/2)+1)*((a*x-1)/(a*x+1))^(1/2)-3/8/a^4
*arccoth(a*x)^2*ln((a*x-1)/(a*x+1))-1/4/a^4/(-1+((a*x-1)/(a*x+1))^(1/2))*((
a*x-1)/(a*x+1))^(1/2)+2/a^4*dilog(1/((a*x-1)/(a*x+1))^(1/2))-1/4*arccoth(a*
x)^3/a^4+1/4*x^4*arccoth(a*x)^3+3/4*x*arccoth(a*x)^2/a^3+1/4*x^3*arccoth(a*
x)^2/a+1/4*x^2*arccoth(a*x)/a^2+3/16*I/a^4*Pi*csgn(I/((a*x+1)/(a*x-1)-1))*c
sgn(I*(a*x+1)/(a*x-1)/((a*x+1)/(a*x-1)-1))^2*arccoth(a*x)^2-3/16*I/a^4*Pi*c
sgn(I*(a*x+1)/(a*x-1)/((a*x+1)/(a*x-1)-1))^3*arccoth(a*x)^2+3/8*I/a^4*Pi*cs
gn(I/((a*x-1)/(a*x+1))^(1/2))*csgn(I*(a*x+1)/(a*x-1))^2*arccoth(a*x)^2-2/a^
4*dilog(1+1/((a*x-1)/(a*x+1))^(1/2))+3/16*I/a^4*Pi*csgn(I*(a*x+1)/(a*x-1))*
csgn(I*(a*x+1)/(a*x-1)/((a*x+1)/(a*x-1)-1))^2*arccoth(a*x)^2-3/16*I/a^4*Pi*
csgn(I/((a*x-1)/(a*x+1))^(1/2))^2*csgn(I*(a*x+1)/(a*x-1))*arccoth(a*x)^2-3/
16*I/a^4*Pi*csgn(I*(a*x+1)/(a*x-1))^3*arccoth(a*x)^2-3/16*I/a^4*Pi*csgn(I*(
a*x+1)/(a*x-1))*csgn(I/((a*x+1)/(a*x-1)-1))*csgn(I*(a*x+1)/(a*x-1)/((a*x+1)
/(a*x-1)-1))*arccoth(a*x)^2
```

**maxima [B]** time = 0.33, size = 262, normalized size = 1.88

$$\frac{1}{4}x^4\operatorname{arcoth}(ax)^3+\frac{1}{8}a\left(\frac{2\left(a^2x^3+3x\right)}{a^4}-\frac{3\log(ax+1)}{a^5}+\frac{3\log(ax-1)}{a^5}\right)\operatorname{arcoth}(ax)^2+\frac{1}{32}a\left(\frac{(3\log(ax-1)-8)\log(}{}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^3*arccoth(a*x)^3,x, algorithm="maxima")
```

```
[Out] 1/4*x^4*arccoth(a*x)^3 + 1/8*a*(2*(a^2*x^3 + 3*x)/a^4 - 3*log(a*x + 1)/a^5
+ 3*log(a*x - 1)/a^5)*arccoth(a*x)^2 + 1/32*a*((((3*log(a*x - 1) - 8)*log(a
*x + 1)^2 - log(a*x + 1)^3 + log(a*x - 1)^3 + 8*a*x - (3*log(a*x - 1)^2 - 1
6*log(a*x - 1))*log(a*x + 1) + 8*log(a*x - 1)^2 + 4*log(a*x - 1))/a - 32*(l
og(a*x - 1)*log(1/2*a*x + 1/2) + dilog(-1/2*a*x + 1/2))/a - 4*log(a*x + 1)/
a)/a^4 + 2*(4*a^2*x^2 - 2*(3*log(a*x - 1) - 8)*log(a*x + 1) + 3*log(a*x + 1
)^2 + 3*log(a*x - 1)^2 + 16*log(a*x - 1))*arccoth(a*x)/a^5)
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.01

$$\int x^3\operatorname{acoth}(a\,x)^3\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^3*acoth(a*x)^3,x)
```

```
[Out] int(x^3*acoth(a*x)^3, x)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int x^3\operatorname{acoth}^3(ax)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**3*acoth(a*x)**3,x)
```

```
[Out] Integral(x**3*acoth(a*x)**3, x)
```

# 3.26 $\int x^2 \coth^{-1}(ax)^3 \, dx$

**Optimal**. Leaf size=149

$$\frac{\text{Li}_3\left(1-\frac{2}{1-ax}\right)}{2a^3}-\frac{\text{Li}_2\left(1-\frac{2}{1-ax}\right)\coth^{-1}(ax)}{a^3}+\frac{\coth^{-1}(ax)^3}{3a^3}-\frac{\coth^{-1}(ax)^2}{2a^3}-\frac{\log\left(\frac{2}{1-ax}\right)\coth^{-1}(ax)^2}{a^3}+\frac{x\coth^{-1}(ax)}{a^2}-$$

```
[Out] x*arccoth(a*x)/a^2-1/2*arccoth(a*x)^2/a^3+1/2*x^2*arccoth(a*x)^2/a+1/3*arcc
oth(a*x)^3/a^3+1/3*x^3*arccoth(a*x)^3-arccoth(a*x)^2*ln(2/(-a*x+1))/a^3+1/2
*ln(-a^2*x^2+1)/a^3-arccoth(a*x)*polylog(2,1-2/(-a*x+1))/a^3+1/2*polylog(3,
1-2/(-a*x+1))/a^3
```

**Rubi [A]** time = 0.33, antiderivative size = 149, normalized size of antiderivative = 1.00, number of steps used = 11, number of rules used = 9, integrand size = 10, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.900, Rules used = {5917, 5981, 5911, 260, 5949, 5985, 5919, 6059, 6610}

$$\frac{\text{PolyLog}\left(3,1-\frac{2}{1-ax}\right)}{2a^3}-\frac{\coth^{-1}(ax)\text{PolyLog}\left(2,1-\frac{2}{1-ax}\right)}{a^3}+\frac{\log\left(1-a^2x^2\right)}{2a^3}+\frac{\coth^{-1}(ax)^3}{3a^3}-\frac{\coth^{-1}(ax)^2}{2a^3}+\frac{x\coth}{a}$$

Antiderivative was successfully verified.

```
[In] Int[x^2*ArcCoth[a*x]^3,x]
```

```
[Out] (x*ArcCoth[a*x])/a^2 - ArcCoth[a*x]^2/(2*a^3) + (x^2*ArcCoth[a*x]^2)/(2*a)
+ ArcCoth[a*x]^3/(3*a^3) + (x^3*ArcCoth[a*x]^3)/3 - (ArcCoth[a*x]^2*Log[2/(
1 - a*x)])/a^3 + Log[1 - a^2*x^2]/(2*a^3) - (ArcCoth[a*x]*PolyLog[2, 1 - 2/
(1 - a*x)])/a^3 + PolyLog[3, 1 - 2/(1 - a*x)]/(2*a^3)
```

Rule 260

```
Int[(x_)^(m_.)/((a_) + (b_.)*(x_)^(n_)), x_Symbol] :> Simp[Log[RemoveConten
t[a + b*x^n, x]]/(b*n), x] /; FreeQ[{a, b, m, n}, x] && EqQ[m, n - 1]
```

Rule 5911

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.), x_Symbol] :> Simp[x*(a + b*A
rcCoth[c*x])^p, x] - Dist[b*c*p, Int[(x*(a + b*ArcCoth[c*x])^(p - 1))/(1 -
c^2*x^2), x], x] /; FreeQ[{a, b, c}, x] && IGtQ[p, 0]
```

Rule 5917

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)*((d_.)*(x_))^(m_.), x_Symbol]
 :> Simp[((d*x)^(m + 1)*(a + b*ArcCoth[c*x])^p)/(d*(m + 1)), x] - Dist[(b*c
*p)/(d*(m + 1)), Int[((d*x)^(m + 1)*(a + b*ArcCoth[c*x])^(p - 1))/(1 - c^2*
x^2), x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[p, 0] && (EqQ[p, 1] || In
tegerQ[m]) && NeQ[m, -1]
```

Rule 5919

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)/((d_) + (e_.)*(x_)), x_Symbol
] :> -Simp[((a + b*ArcCoth[c*x])^p*Log[2/(1 + (e*x)/d)])/e, x] + Dist[(b*c*
p)/e, Int[((a + b*ArcCoth[c*x])^(p - 1)*Log[2/(1 + (e*x)/d)])/(1 - c^2*x^2)
, x], x] /; FreeQ[{a, b, c, d, e}, x] && IGtQ[p, 0] && EqQ[c^2*d^2 - e^2, 0
]
```

Rule 5949

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)/((d_) + (e_.)*(x_)^2), x_Symb
ol] :> Simp[(a + b*ArcCoth[c*x])^(p + 1)/(b*c*d*(p + 1)), x] /; FreeQ[{a, b
```

```
, c, d, e, p}, x] && EqQ[c^2*d + e, 0] && NeQ[p, -1]
```

Rule 5981

```
Int[(((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)*((f_.)*(x_))^(m_))/((d_) + (
e_.)*(x_)^2), x_Symbol] :> Dist[f^2/e, Int[(f*x)^(m - 2)*(a + b*ArcCoth[c*x
])^p, x], x] - Dist[(d*f^2)/e, Int[((f*x)^(m - 2)*(a + b*ArcCoth[c*x])^p)/(
d + e*x^2), x], x] /; FreeQ[{a, b, c, d, e, f}, x] && GtQ[p, 0] && GtQ[m, 1
]
```

Rule 5985

```
Int[(((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)*(x_))/((d_) + (e_.)*(x_)^2),
 x_Symbol] :> Simp[(a + b*ArcCoth[c*x])^(p + 1)/(b*e*(p + 1)), x] + Dist[1/
(c*d), Int[(a + b*ArcCoth[c*x])^p/(1 - c*x), x], x] /; FreeQ[{a, b, c, d, e
}, x] && EqQ[c^2*d + e, 0] && IGtQ[p, 0]
```

Rule 6059

```
Int[(Log[u_]*((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.))/((d_) + (e_.)*(x_)^
2), x_Symbol] :> -Simp[((a + b*ArcCoth[c*x])^p*PolyLog[2, 1 - u])/(2*c*d),
x] + Dist[(b*p)/2, Int[((a + b*ArcCoth[c*x])^(p - 1)*PolyLog[2, 1 - u])/(d
+ e*x^2), x], x] /; FreeQ[{a, b, c, d, e}, x] && IGtQ[p, 0] && EqQ[c^2*d +
e, 0] && EqQ[(1 - u)^2 - (1 - 2/(1 - c*x))^2, 0]
```

Rule 6610

```
Int[(u_)*PolyLog[n_, v_], x_Symbol] :> With[{w = DerivativeDivides[v, u*v,
x]}, Simp[w*PolyLog[n + 1, v], x] /;  !FalseQ[w]] /; FreeQ[n, x]
```

Rubi steps

$$\begin{aligned}\int x^2\coth^{-1}(ax)^3\,dx &= \frac{1}{3}x^3\coth^{-1}(ax)^3 - a\int\frac{x^3\coth^{-1}(ax)^2}{1-a^2x^2}\,dx\\
&= \frac{1}{3}x^3\coth^{-1}(ax)^3 + \frac{\int x\coth^{-1}(ax)^2\,dx}{a} - \frac{\int\frac{x\coth^{-1}(ax)^2}{1-a^2x^2}\,dx}{a}\\
&= \frac{x^2\coth^{-1}(ax)^2}{2a} + \frac{\coth^{-1}(ax)^3}{3a^3} + \frac{1}{3}x^3\coth^{-1}(ax)^3 - \frac{\int\frac{\coth^{-1}(ax)^2}{1-ax}\,dx}{a^2} - \int\frac{x^2\coth^{-1}(ax)}{1-a^2x^2}\,dx\\
&= \frac{x^2\coth^{-1}(ax)^2}{2a} + \frac{\coth^{-1}(ax)^3}{3a^3} + \frac{1}{3}x^3\coth^{-1}(ax)^3 - \frac{\coth^{-1}(ax)^2\log\left(\frac{2}{1-ax}\right)}{a^3} + \frac{\int\coth^{-1}(a}{a^2}\\
&= \frac{x\coth^{-1}(ax)}{a^2} - \frac{\coth^{-1}(ax)^2}{2a^3} + \frac{x^2\coth^{-1}(ax)^2}{2a} + \frac{\coth^{-1}(ax)^3}{3a^3} + \frac{1}{3}x^3\coth^{-1}(ax)^3 - \coth^{-}\\
&= \frac{x\coth^{-1}(ax)}{a^2} - \frac{\coth^{-1}(ax)^2}{2a^3} + \frac{x^2\coth^{-1}(ax)^2}{2a} + \frac{\coth^{-1}(ax)^3}{3a^3} + \frac{1}{3}x^3\coth^{-1}(ax)^3 - \coth^{-}\end{aligned}$$

**Mathematica [C]** time = 0.38, size = 140, normalized size = 0.94

$$\frac{8a^3x^3\coth^{-1}(ax)^3 - 24\log\left(\frac{1}{ax\sqrt{1-\frac{1}{a^2x^2}}}\right) + 12a^2x^2\coth^{-1}(ax)^2 - 24\coth^{-1}(ax)\text{Li}_2\left(e^{2\coth^{-1}(ax)}\right) + 12\text{Li}_3\left(e^{2\coth^{-1}(\right.}}{24a^3}$$

Warning: Unable to verify antiderivative.

```
[In] Integrate[x^2*ArcCoth[a*x]^3,x]
```

```
[Out] ((-I)*Pi^3 + 24*a*x*ArcCoth[a*x] - 12*ArcCoth[a*x]^2 + 12*a^2*x^2*ArcCoth[a
*x]^2 + 8*ArcCoth[a*x]^3 + 8*a^3*x^3*ArcCoth[a*x]^3 - 24*ArcCoth[a*x]^2*Log
[1 - E^(2*ArcCoth[a*x])] - 24*Log[1/(a*Sqrt[1 - 1/(a^2*x^2)]*x)] - 24*ArcCo
th[a*x]*PolyLog[2, E^(2*ArcCoth[a*x])] + 12*PolyLog[3, E^(2*ArcCoth[a*x])])
/(24*a^3)
```

**fricas [F]** time = 0.68, size = 0, normalized size = 0.00

$$\mathrm{integral}\left(x^2\,\mathrm{arcoth}\left(ax\right)^3,x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*arccoth(a*x)^3,x, algorithm="fricas")
```

```
[Out] integral(x^2*arccoth(a*x)^3, x)
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int x^2\,\mathrm{arcoth}\left(ax\right)^3\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*arccoth(a*x)^3,x, algorithm="giac")
```

```
[Out] integrate(x^2*arccoth(a*x)^3, x)
```

**maple [C]** time = 1.49, size = 765, normalized size = 5.13

$$\frac{\mathrm{arccoth}\left(ax\right)}{a^3}-\frac{\ln\left(\frac{1}{\sqrt{\frac{ax-1}{ax+1}}}-1\right)}{a^3}-\frac{\ln\left(1+\frac{1}{\sqrt{\frac{ax-1}{ax+1}}}\right)}{a^3}-\frac{\mathrm{arccoth}\left(ax\right)^2}{2a^3}+\frac{\mathrm{arccoth}\left(ax\right)^3}{3a^3}+\frac{x^2\mathrm{arccoth}\left(ax\right)^2}{2a}+\frac{\mathrm{arccoth}\left(ax\right)}{2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^2*arccoth(a*x)^3,x)
```

```
[Out] 1/a^3*arccoth(a*x)-1/a^3*ln(1/((a*x-1)/(a*x+1))^(1/2)-1)-1/a^3*ln(1+1/((a*x
-1)/(a*x+1))^(1/2))+2/a^3*polylog(3,1/((a*x-1)/(a*x+1))^(1/2))+2/a^3*polylo
g(3,-1/((a*x-1)/(a*x+1))^(1/2))-1/2*arccoth(a*x)^2/a^3+1/3*arccoth(a*x)^3/a
^3+1/2*x^2*arccoth(a*x)^2/a+1/2/a^3*arccoth(a*x)^2*ln(a*x-1)+1/2/a^3*arccot
h(a*x)^2*ln(a*x+1)+1/2/a^3*arccoth(a*x)^2*ln((a*x-1)/(a*x+1))+1/a^3*arccoth
(a*x)^2*ln((a*x+1)/(a*x-1)-1)-1/a^3*arccoth(a*x)^2*ln(1-1/((a*x-1)/(a*x+1))
^(1/2))-2/a^3*arccoth(a*x)*polylog(2,1/((a*x-1)/(a*x+1))^(1/2))-1/a^3*arcco
th(a*x)^2*ln(1+1/((a*x-1)/(a*x+1))^(1/2))-2/a^3*arccoth(a*x)*polylog(2,-1/(
(a*x-1)/(a*x+1))^(1/2))-1/a^3*arccoth(a*x)^2*ln(2)+x*arccoth(a*x)/a^2+1/3*x
^3*arccoth(a*x)^3+1/4*I/a^3*arccoth(a*x)^2*Pi*csgn(I*(a*x+1)/(a*x-1)/((a*x+
1)/(a*x-1)-1))^3+1/4*I/a^3*arccoth(a*x)^2*Pi*csgn(I*(a*x+1)/(a*x-1)/((a*x+1
)/(a*x-1)-1))*csgn(I*(a*x+1)/(a*x-1))*csgn(I/((a*x+1)/(a*x-1)-1))+1/4*I/a^3
*arccoth(a*x)^2*Pi*csgn(I*(a*x+1)/(a*x-1))^3-1/4*I/a^3*arccoth(a*x)^2*Pi*cs
gn(I*(a*x+1)/(a*x-1)/((a*x+1)/(a*x-1)-1))^2*csgn(I*(a*x+1)/(a*x-1))-1/4*I/a
^3*arccoth(a*x)^2*Pi*csgn(I*(a*x+1)/(a*x-1)/((a*x+1)/(a*x-1)-1))^2*csgn(I/(
(a*x+1)/(a*x-1)-1))-1/2*I/a^3*arccoth(a*x)^2*Pi*csgn(I*(a*x+1)/(a*x-1))^2*c
sgn(I/((a*x-1)/(a*x+1))^(1/2))+1/4*I/a^3*arccoth(a*x)^2*Pi*csgn(I*(a*x+1)/(
a*x-1))*csgn(I/((a*x-1)/(a*x+1))^(1/2))^2
```

**maxima [F]** time = 0.00, size = 0, normalized size = 0.00

$$\frac{\left(a^3x^3+1\right)\log\left(ax+1\right)^3+3\left(a^2x^2-\left(a^3x^3-1\right)\log\left(ax-1\right)\right)\log\left(ax+1\right)^2}{24\,a^3}+\frac{1}{8}\int-\frac{\left(a^3x^3+a^2x^2\right)\log\left(ax-1\right)^3}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*arccoth(a*x)^3,x, algorithm="maxima")
```

```
[Out] 1/24*((a^3*x^3 + 1)*log(a*x + 1)^3 + 3*(a^2*x^2 - (a^3*x^3 - 1)*log(a*x - 1
))*log(a*x + 1)^2)/a^3 + 1/8*integrate(-((a^3*x^3 + a^2*x^2)*log(a*x - 1)^3
 + (2*a^2*x^2 - 3*(a^3*x^3 + a^2*x^2)*log(a*x - 1)^2 - 2*(a^3*x^3 - 1)*log(
a*x - 1))*log(a*x + 1))/(a^3*x + a^2), x)
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.01

$$\int x^2 \operatorname{acoth}(a\,x)^3\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^2*acoth(a*x)^3,x)
```

```
[Out] int(x^2*acoth(a*x)^3, x)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int x^2 \operatorname{acoth}^3(ax)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**2*acoth(a*x)**3,x)
```

```
[Out] Integral(x**2*acoth(a*x)**3, x)
```

## 3.27 $\int x \coth^{-1}(ax)^3 \, dx$

**Optimal**. Leaf size=95

$$-\frac{3\text{Li}_2\left(1-\frac{2}{1-ax}\right)}{2a^2}-\frac{\coth^{-1}(ax)^3}{2a^2}+\frac{3\coth^{-1}(ax)^2}{2a^2}-\frac{3\log\left(\frac{2}{1-ax}\right)\coth^{-1}(ax)}{a^2}+\frac{1}{2}x^2\coth^{-1}(ax)^3+\frac{3x\coth^{-1}(ax)^2}{2a}$$

```
[Out] 3/2*arccoth(a*x)^2/a^2+3/2*x*arccoth(a*x)^2/a-1/2*arccoth(a*x)^3/a^2+1/2*x^
2*arccoth(a*x)^3-3*arccoth(a*x)*ln(2/(-a*x+1))/a^2-3/2*polylog(2,1-2/(-a*x+
1))/a^2
```

**Rubi [A]** time = 0.18, antiderivative size = 95, normalized size of antiderivative = 1.00, number of steps used = 8, number of rules used = 8, integrand size = 8, $\frac{\text{number of rules}}{\text{integrand size}}$ = 1.000, Rules used = {5917, 5981, 5911, 5985, 5919, 2402, 2315, 5949}

$$-\frac{3\text{PolyLog}\left(2,1-\frac{2}{1-ax}\right)}{2a^2}-\frac{\coth^{-1}(ax)^3}{2a^2}+\frac{3\coth^{-1}(ax)^2}{2a^2}-\frac{3\log\left(\frac{2}{1-ax}\right)\coth^{-1}(ax)}{a^2}+\frac{1}{2}x^2\coth^{-1}(ax)^3+\frac{3x\coth^{-1}}{2a}$$

Antiderivative was successfully verified.

```
[In] Int[x*ArcCoth[a*x]^3,x]
```

```
[Out] (3*ArcCoth[a*x]^2)/(2*a^2) + (3*x*ArcCoth[a*x]^2)/(2*a) - ArcCoth[a*x]^3/(2
*a^2) + (x^2*ArcCoth[a*x]^3)/2 - (3*ArcCoth[a*x]*Log[2/(1 - a*x)])/a^2 - (3
*PolyLog[2, 1 - 2/(1 - a*x)])/(2*a^2)
```

Rule 2315

```
Int[Log[(c_.)*(x_)]/((d_) + (e_.)*(x_)), x_Symbol] :> -Simp[PolyLog[2, 1 -
c*x]/e, x] /; FreeQ[{c, d, e}, x] && EqQ[e + c*d, 0]
```

Rule 2402

```
Int[Log[(c_.)/((d_) + (e_.)*(x_))]/((f_) + (g_.)*(x_)^2), x_Symbol] :> -Dis
t[e/g, Subst[Int[Log[2*d*x]/(1 - 2*d*x), x], x, 1/(d + e*x)], x] /; FreeQ[{
c, d, e, f, g}, x] && EqQ[c, 2*d] && EqQ[e^2*f + d^2*g, 0]
```

Rule 5911

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.), x_Symbol] :> Simp[x*(a + b*A
rcCoth[c*x])^p, x] - Dist[b*c*p, Int[(x*(a + b*ArcCoth[c*x])^(p - 1))/(1 -
c^2*x^2), x], x] /; FreeQ[{a, b, c}, x] && IGtQ[p, 0]
```

Rule 5917

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)*((d_.)*(x_))^(m_.), x_Symbol]
 :> Simp[((d*x)^(m + 1)*(a + b*ArcCoth[c*x])^p)/(d*(m + 1)), x] - Dist[(b*c
*p)/(d*(m + 1)), Int[((d*x)^(m + 1)*(a + b*ArcCoth[c*x])^(p - 1))/(1 - c^2*
x^2), x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[p, 0] && (EqQ[p, 1] || In
tegerQ[m]) && NeQ[m, -1]
```

Rule 5919

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)/((d_) + (e_.)*(x_)), x_Symbol
] :> -Simp[((a + b*ArcCoth[c*x])^p*Log[2/(1 + (e*x)/d)])/e, x] + Dist[(b*c*
p)/e, Int[((a + b*ArcCoth[c*x])^(p - 1)*Log[2/(1 + (e*x)/d)])/(1 - c^2*x^2)
, x], x] /; FreeQ[{a, b, c, d, e}, x] && IGtQ[p, 0] && EqQ[c^2*d^2 - e^2, 0
]
```

Rule 5949

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)/((d_) + (e_.)*(x_)^2), x_Symb
ol] :> Simp[(a + b*ArcCoth[c*x])^(p + 1)/(b*c*d*(p + 1)), x] /; FreeQ[{a, b
, c, d, e, p}, x] && EqQ[c^2*d + e, 0] && NeQ[p, -1]
```

Rule 5981

```
Int[(((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)*((f_.)*(x_))^(m_))/((d_) + (
e_.)*(x_)^2), x_Symbol] :> Dist[f^2/e, Int[(f*x)^(m - 2)*(a + b*ArcCoth[c*x
])^p, x], x] - Dist[(d*f^2)/e, Int[((f*x)^(m - 2)*(a + b*ArcCoth[c*x])^p)/(
d + e*x^2), x], x] /; FreeQ[{a, b, c, d, e, f}, x] && GtQ[p, 0] && GtQ[m, 1
]
```

Rule 5985

```
Int[(((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)*(x_))/((d_) + (e_.)*(x_)^2),
 x_Symbol] :> Simp[(a + b*ArcCoth[c*x])^(p + 1)/(b*e*(p + 1)), x] + Dist[1/
(c*d), Int[(a + b*ArcCoth[c*x])^p/(1 - c*x), x], x] /; FreeQ[{a, b, c, d, e
}, x] && EqQ[c^2*d + e, 0] && IGtQ[p, 0]
```

Rubi steps

$$\begin{aligned}
\int x\coth^{-1}(ax)^3\,dx &= \frac{1}{2}x^2\coth^{-1}(ax)^3-\frac{1}{2}(3a)\int\frac{x^2\coth^{-1}(ax)^2}{1-a^2x^2}\,dx\\
&= \frac{1}{2}x^2\coth^{-1}(ax)^3+\frac{3\int\coth^{-1}(ax)^2\,dx}{2a}-\frac{3\int\frac{\coth^{-1}(ax)^2}{1-a^2x^2}\,dx}{2a}\\
&= \frac{3x\coth^{-1}(ax)^2}{2a}-\frac{\coth^{-1}(ax)^3}{2a^2}+\frac{1}{2}x^2\coth^{-1}(ax)^3-3\int\frac{x\coth^{-1}(ax)}{1-a^2x^2}\,dx\\
&= \frac{3\coth^{-1}(ax)^2}{2a^2}+\frac{3x\coth^{-1}(ax)^2}{2a}-\frac{\coth^{-1}(ax)^3}{2a^2}+\frac{1}{2}x^2\coth^{-1}(ax)^3-\frac{3\int\frac{\coth^{-1}(ax)}{1-ax}\,dx}{a}\\
&= \frac{3\coth^{-1}(ax)^2}{2a^2}+\frac{3x\coth^{-1}(ax)^2}{2a}-\frac{\coth^{-1}(ax)^3}{2a^2}+\frac{1}{2}x^2\coth^{-1}(ax)^3-\frac{3\coth^{-1}(ax)\log\left(\frac{2}{1-a\right.}}{a^2}\\
&= \frac{3\coth^{-1}(ax)^2}{2a^2}+\frac{3x\coth^{-1}(ax)^2}{2a}-\frac{\coth^{-1}(ax)^3}{2a^2}+\frac{1}{2}x^2\coth^{-1}(ax)^3-\frac{3\coth^{-1}(ax)\log\left(\frac{2}{1-a\right.}}{a^2}\\
&= \frac{3\coth^{-1}(ax)^2}{2a^2}+\frac{3x\coth^{-1}(ax)^2}{2a}-\frac{\coth^{-1}(ax)^3}{2a^2}+\frac{1}{2}x^2\coth^{-1}(ax)^3-\frac{3\coth^{-1}(ax)\log\left(\frac{2}{1-a\right.}}{a^2}
\end{aligned}$$

**Mathematica [A]** time = 0.14, size = 68, normalized size = 0.72

$$\frac{\coth^{-1}(ax)\left(\left(a^2x^2-1\right)\coth^{-1}(ax)^2+3(ax-1)\coth^{-1}(ax)-6\log\left(1-e^{-2\coth^{-1}(ax)}\right)\right)+3\text{Li}_2\left(e^{-2\coth^{-1}(ax)}\right)}{2a^2}$$

Warning: Unable to verify antiderivative.

```
[In] Integrate[x*ArcCoth[a*x]^3,x]
```

```
[Out] (ArcCoth[a*x]*(3*(-1 + a*x)*ArcCoth[a*x] + (-1 + a^2*x^2)*ArcCoth[a*x]^2 -
6*Log[1 - E^(-2*ArcCoth[a*x])]) + 3*PolyLog[2, E^(-2*ArcCoth[a*x])])/(2*a^2
)
```

**fricas [F]** time = 0.55, size = 0, normalized size = 0.00

$$\text{integral}\left(x\,\text{arcoth}\,(ax)^3\,,x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*arccoth(a*x)^3,x, algorithm="fricas")
```

```
[Out] integral(x*arccoth(a*x)^3, x)
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int x \operatorname{arcoth}(ax)^3 \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*arccoth(a*x)^3,x, algorithm="giac")
```

```
[Out] integrate(x*arccoth(a*x)^3, x)
```

**maple [C]** time = 0.76, size = 3070, normalized size = 32.32

output too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x*arccoth(a*x)^3,x)
```

```
[Out] 3/8*I/a^2*Pi*csgn(I*(a*x+1)/(a*x-1)/((a*x+1)/(a*x-1)-1))^3*arccoth(a*x)*ln(
1-1/((a*x-1)/(a*x+1))^(1/2))+3/8*I/a^2*Pi*csgn(I/((a*x+1)/(a*x-1)-1))*csgn(
I*(a*x+1)/(a*x-1)/((a*x+1)/(a*x-1)-1))^2*dilog(1+1/((a*x-1)/(a*x+1))^(1/2))
+3/8*I/a^2*Pi*csgn(I/((a*x-1)/(a*x+1))^(1/2))^2*csgn(I*(a*x+1)/(a*x-1))*pol
ylog(2,-1/((a*x-1)/(a*x+1))^(1/2))+3/8*I/a^2*Pi*csgn(I/((a*x-1)/(a*x+1))^(1
/2))^2*csgn(I*(a*x+1)/(a*x-1))*polylog(2,1/((a*x-1)/(a*x+1))^(1/2))-3/8*I/a
^2*Pi*csgn(I*(a*x+1)/(a*x-1))*csgn(I*(a*x+1)/(a*x-1)/((a*x+1)/(a*x-1)-1))^2
*polylog(2,-1/((a*x-1)/(a*x+1))^(1/2))-3/4*I/a^2*Pi*csgn(I/((a*x-1)/(a*x+1)
)^(1/2))*csgn(I*(a*x+1)/(a*x-1))^2*dilog(1/((a*x-1)/(a*x+1))^(1/2))-3/8*I/a
^2*Pi*csgn(I/((a*x-1)/(a*x+1))^(1/2))^2*csgn(I*(a*x+1)/(a*x-1))*arccoth(a*x
)^2+3/4*I/a^2*Pi*csgn(I/((a*x-1)/(a*x+1))^(1/2))*csgn(I*(a*x+1)/(a*x-1))^2*
arccoth(a*x)^2-1/2*arccoth(a*x)^3/a^2+3/8*I/a^2*Pi*csgn(I*(a*x+1)/(a*x-1)/(
(a*x+1)/(a*x-1)-1))^3*polylog(2,-1/((a*x-1)/(a*x+1))^(1/2))+3/8*I/a^2*Pi*cs
gn(I*(a*x+1)/(a*x-1)/((a*x+1)/(a*x-1)-1))^3*dilog(1/((a*x-1)/(a*x+1))^(1/2)
)-3/8*I/a^2*Pi*csgn(I*(a*x+1)/(a*x-1)/((a*x+1)/(a*x-1)-1))^3*dilog(1+1/((a*
x-1)/(a*x+1))^(1/2))+3/8*I/a^2*Pi*csgn(I*(a*x+1)/(a*x-1)/((a*x+1)/(a*x-1)-1
))^3*polylog(2,1/((a*x-1)/(a*x+1))^(1/2))-3/2/a^2*arccoth(a*x)*ln(1-1/((a*x
-1)/(a*x+1))^(1/2))+3/4/a^2*arccoth(a*x)^2*ln(a*x-1)-3/4/a^2*arccoth(a*x)^2
*ln(a*x+1)-3/a^2*arccoth(a*x)*ln(1+1/((a*x-1)/(a*x+1))^(1/2))-3/4/a^2*arcco
th(a*x)^2*ln((a*x-1)/(a*x+1))+3/2*arccoth(a*x)^2/a^2+3/2*x*arccoth(a*x)^2/a
+3/8*I/a^2*Pi*csgn(I*(a*x+1)/(a*x-1))*csgn(I/((a*x+1)/(a*x-1)-1))*csgn(I*(a
*x+1)/(a*x-1)/((a*x+1)/(a*x-1)-1))*arccoth(a*x)*ln(1-1/((a*x-1)/(a*x+1))^(1
/2))-3/8*I/a^2*Pi*csgn(I*(a*x+1)/(a*x-1))^3*arccoth(a*x)^2+1/2*x^2*arccoth(
a*x)^3-3/2/a^2*polylog(2,1/((a*x-1)/(a*x+1))^(1/2))-3/2/a^2*dilog(1+1/((a*x
-1)/(a*x+1))^(1/2))+3/2/a^2*dilog(1/((a*x-1)/(a*x+1))^(1/2))-3/2/a^2*polylo
g(2,-1/((a*x-1)/(a*x+1))^(1/2))-3/8*I/a^2*Pi*csgn(I*(a*x+1)/(a*x-1))*csgn(I
*(a*x+1)/(a*x-1)/((a*x+1)/(a*x-1)-1))^2*dilog(1/((a*x-1)/(a*x+1))^(1/2))+3/
4*I/a^2*Pi*csgn(I/((a*x-1)/(a*x+1))^(1/2))*csgn(I*(a*x+1)/(a*x-1))^2*dilog(
1+1/((a*x-1)/(a*x+1))^(1/2))+3/8*I/a^2*Pi*csgn(I*(a*x+1)/(a*x-1))*csgn(I*(a
*x+1)/(a*x-1)/((a*x+1)/(a*x-1)-1))^2*dilog(1+1/((a*x-1)/(a*x+1))^(1/2))-3/8
*I/a^2*Pi*csgn(I/((a*x+1)/(a*x-1)-1))*csgn(I*(a*x+1)/(a*x-1)/((a*x+1)/(a*x-
1)-1))^2*dilog(1/((a*x-1)/(a*x+1))^(1/2))-3/8*I/a^2*Pi*csgn(I/((a*x+1)/(a*x
-1)-1))*csgn(I*(a*x+1)/(a*x-1)/((a*x+1)/(a*x-1)-1))^2*polylog(2,1/((a*x-1)/
(a*x+1))^(1/2))-3/8*I/a^2*Pi*csgn(I/((a*x+1)/(a*x-1)-1))*csgn(I*(a*x+1)/(a*
x-1)/((a*x+1)/(a*x-1)-1))^2*polylog(2,-1/((a*x-1)/(a*x+1))^(1/2))-3/4*I/a^2
*Pi*csgn(I/((a*x-1)/(a*x+1))^(1/2))*csgn(I*(a*x+1)/(a*x-1))^2*polylog(2,-1/
((a*x-1)/(a*x+1))^(1/2))-3/4*I/a^2*Pi*csgn(I/((a*x-1)/(a*x+1))^(1/2))*csgn(
```

```
I*(a*x+1)/(a*x-1))^2*polylog(2,1/((a*x-1)/(a*x+1))^(1/2))+3/8*I/a^2*Pi*csgn
(I/((a*x+1)/(a*x-1)-1))*csgn(I*(a*x+1)/(a*x-1)/((a*x+1)/(a*x-1)-1))^2*arcco
th(a*x)^2+3/8*I/a^2*Pi*csgn(I*(a*x+1)/(a*x-1))*csgn(I*(a*x+1)/(a*x-1)/((a*x
+1)/(a*x-1)-1))^2*arccoth(a*x)^2+3/8*I/a^2*Pi*csgn(I*(a*x+1)/(a*x-1))^3*arc
coth(a*x)*ln(1-1/((a*x-1)/(a*x+1))^(1/2))-3/8*I/a^2*Pi*csgn(I*(a*x+1)/(a*x-
1))*csgn(I*(a*x+1)/(a*x-1)/((a*x+1)/(a*x-1)-1))^2*polylog(2,1/((a*x-1)/(a*x
+1))^(1/2))+3/8*I/a^2*Pi*csgn(I/((a*x-1)/(a*x+1))^(1/2))^2*csgn(I*(a*x+1)/(
a*x-1))*dilog(1/((a*x-1)/(a*x+1))^(1/2))-3/8*I/a^2*Pi*csgn(I/((a*x-1)/(a*x+
1))^(1/2))^2*csgn(I*(a*x+1)/(a*x-1))*dilog(1+1/((a*x-1)/(a*x+1))^(1/2))-3/8
*I/a^2*Pi*csgn(I*(a*x+1)/(a*x-1)/((a*x+1)/(a*x-1)-1))^3*arccoth(a*x)^2+3/8*
I/a^2*Pi*csgn(I*(a*x+1)/(a*x-1))^3*dilog(1/((a*x-1)/(a*x+1))^(1/2))-3/8*I/a
^2*Pi*csgn(I*(a*x+1)/(a*x-1))^3*dilog(1+1/((a*x-1)/(a*x+1))^(1/2))+3/8*I/a^
2*Pi*csgn(I*(a*x+1)/(a*x-1))^3*polylog(2,-1/((a*x-1)/(a*x+1))^(1/2))+3/8*I/
a^2*Pi*csgn(I*(a*x+1)/(a*x-1))^3*polylog(2,1/((a*x-1)/(a*x+1))^(1/2))+3/8*I
/a^2*Pi*csgn(I*(a*x+1)/(a*x-1))*csgn(I/((a*x+1)/(a*x-1)-1))*csgn(I*(a*x+1)/
(a*x-1)/((a*x+1)/(a*x-1)-1))*polylog(2,-1/((a*x-1)/(a*x+1))^(1/2))-3/8*I/a^
2*Pi*csgn(I/((a*x+1)/(a*x-1)-1))*csgn(I*(a*x+1)/(a*x-1)/((a*x+1)/(a*x-1)-1)
)^2*arccoth(a*x)*ln(1-1/((a*x-1)/(a*x+1))^(1/2))-3/8*I/a^2*Pi*csgn(I*(a*x+1
)/(a*x-1))*csgn(I*(a*x+1)/(a*x-1)/((a*x+1)/(a*x-1)-1))^2*arccoth(a*x)*ln(1-
1/((a*x-1)/(a*x+1))^(1/2))-3/8*I/a^2*Pi*csgn(I*(a*x+1)/(a*x-1))*csgn(I/((a*
x+1)/(a*x-1)-1))*csgn(I*(a*x+1)/(a*x-1)/((a*x+1)/(a*x-1)-1))*dilog(1+1/((a*
x-1)/(a*x+1))^(1/2))-3/8*I/a^2*Pi*csgn(I*(a*x+1)/(a*x-1))*csgn(I/((a*x+1)/(
a*x-1)-1))*csgn(I*(a*x+1)/(a*x-1)/((a*x+1)/(a*x-1)-1))*arccoth(a*x)^2+3/8*I
/a^2*Pi*csgn(I*(a*x+1)/(a*x-1))*csgn(I/((a*x+1)/(a*x-1)-1))*csgn(I*(a*x+1)/
(a*x-1)/((a*x+1)/(a*x-1)-1))*dilog(1/((a*x-1)/(a*x+1))^(1/2))+3/8*I/a^2*Pi*
csgn(I/((a*x-1)/(a*x+1))^(1/2))^2*csgn(I*(a*x+1)/(a*x-1))*arccoth(a*x)*ln(1
-1/((a*x-1)/(a*x+1))^(1/2))+3/8*I/a^2*Pi*csgn(I*(a*x+1)/(a*x-1))*csgn(I/((a
*x+1)/(a*x-1)-1))*csgn(I*(a*x+1)/(a*x-1)/((a*x+1)/(a*x-1)-1))*polylog(2,1/(
(a*x-1)/(a*x+1))^(1/2))-3/4*I/a^2*Pi*csgn(I/((a*x-1)/(a*x+1))^(1/2))*csgn(I
*(a*x+1)/(a*x-1))^2*arccoth(a*x)*ln(1-1/((a*x-1)/(a*x+1))^(1/2))
```

**maxima [B]** time = 0.33, size = 215, normalized size = 2.26

$$\frac{1}{2}x^2\operatorname{arcoth}(ax)^3+\frac{3}{4}a\left(\frac{2x}{a^2}-\frac{\log(ax+1)}{a^3}+\frac{\log(ax-1)}{a^3}\right)\operatorname{arcoth}(ax)^2+\frac{1}{16}a\left(\frac{3\left(\log(ax-1)-2\right)\log(ax+1)^2-\log(ax+1)^3+\log}{}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*arccoth(a*x)^3,x, algorithm="maxima")
```

```
[Out] 1/2*x^2*arccoth(a*x)^3 + 3/4*a*(2*x/a^2 - log(a*x + 1)/a^3 + log(a*x - 1)/a
^3)*arccoth(a*x)^2 + 1/16*a*(((3*(log(a*x - 1) - 2)*log(a*x + 1)^2 - log(a*
x + 1)^3 + log(a*x - 1)^3 - 3*(log(a*x - 1)^2 - 4*log(a*x - 1))*log(a*x + 1
) + 6*log(a*x - 1)^2)/a - 24*(log(a*x - 1)*log(1/2*a*x + 1/2) + dilog(-1/2*
a*x + 1/2))/a)/a^2 - 6*(2*(log(a*x - 1) - 2)*log(a*x + 1) - log(a*x + 1)^2
- log(a*x - 1)^2 - 4*log(a*x - 1))*arccoth(a*x)/a^3)
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.01

$$\int x\operatorname{acoth}(a\,x)^3\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x*acoth(a*x)^3,x)
```

```
[Out] int(x*acoth(a*x)^3, x)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int x\operatorname{acoth}^3(ax)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*acoth(a*x)**3,x)
```

```
[Out] Integral(x*acoth(a*x)**3, x)
```

## 3.28 $\int \coth^{-1}(ax)^3\,dx$

**Optimal**. Leaf size=85

$$\frac{3\text{Li}_3\left(1-\frac{2}{1-ax}\right)}{2a}-\frac{3\text{Li}_2\left(1-\frac{2}{1-ax}\right)\coth^{-1}(ax)}{a}+x\coth^{-1}(ax)^3+\frac{\coth^{-1}(ax)^3}{a}-\frac{3\log\left(\frac{2}{1-ax}\right)\coth^{-1}(ax)^2}{a}$$

```
[Out] arccoth(a*x)^3/a+x*arccoth(a*x)^3-3*arccoth(a*x)^2*ln(2/(-a*x+1))/a-3*arcco
th(a*x)*polylog(2,1-2/(-a*x+1))/a+3/2*polylog(3,1-2/(-a*x+1))/a
```

**Rubi [A]** time = 0.17, antiderivative size = 85, normalized size of antiderivative = 1.00, number of steps used = 5, number of rules used = 6, integrand size = 6, $\frac{\text{number of rules}}{\text{integrand size}}$ = 1.000, Rules used = {5911, 5985, 5919, 5949, 6059, 6610}

$$\frac{3\text{PolyLog}\left(3,1-\frac{2}{1-ax}\right)}{2a}-\frac{3\coth^{-1}(ax)\text{PolyLog}\left(2,1-\frac{2}{1-ax}\right)}{a}+x\coth^{-1}(ax)^3+\frac{\coth^{-1}(ax)^3}{a}-\frac{3\log\left(\frac{2}{1-ax}\right)\coth^{-1}(a\ldots}{a}$$

Antiderivative was successfully verified.

```
[In] Int[ArcCoth[a*x]^3,x]
```

```
[Out] ArcCoth[a*x]^3/a + x*ArcCoth[a*x]^3 - (3*ArcCoth[a*x]^2*Log[2/(1 - a*x)])/a
 - (3*ArcCoth[a*x]*PolyLog[2, 1 - 2/(1 - a*x)])/a + (3*PolyLog[3, 1 - 2/(1
- a*x)])/(2*a)
```

Rule 5911

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.), x_Symbol] :> Simp[x*(a + b*A
rcCoth[c*x])^p, x] - Dist[b*c*p, Int[(x*(a + b*ArcCoth[c*x])^(p - 1))/(1 -
c^2*x^2), x], x] /; FreeQ[{a, b, c}, x] && IGtQ[p, 0]
```

Rule 5919

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)/((d_) + (e_.)*(x_)), x_Symbol
] :> -Simp[((a + b*ArcCoth[c*x])^p*Log[2/(1 + (e*x)/d)])/e, x] + Dist[(b*c*
p)/e, Int[((a + b*ArcCoth[c*x])^(p - 1)*Log[2/(1 + (e*x)/d)])/(1 - c^2*x^2)
, x], x] /; FreeQ[{a, b, c, d, e}, x] && IGtQ[p, 0] && EqQ[c^2*d^2 - e^2, 0
]
```

Rule 5949

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)/((d_) + (e_.)*(x_)^2), x_Symb
ol] :> Simp[(a + b*ArcCoth[c*x])^(p + 1)/(b*c*d*(p + 1)), x] /; FreeQ[{a, b
, c, d, e, p}, x] && EqQ[c^2*d + e, 0] && NeQ[p, -1]
```

Rule 5985

```
Int[(((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)*(x_))/((d_) + (e_.)*(x_)^2),
 x_Symbol] :> Simp[(a + b*ArcCoth[c*x])^(p + 1)/(b*e*(p + 1)), x] + Dist[1/
(c*d), Int[(a + b*ArcCoth[c*x])^p/(1 - c*x), x], x] /; FreeQ[{a, b, c, d, e
}, x] && EqQ[c^2*d + e, 0] && IGtQ[p, 0]
```

Rule 6059

```
Int[(Log[u_]*((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.))/((d_) + (e_.)*(x_)^
2), x_Symbol] :> -Simp[((a + b*ArcCoth[c*x])^p*PolyLog[2, 1 - u])/(2*c*d),
x] + Dist[(b*p)/2, Int[((a + b*ArcCoth[c*x])^(p - 1)*PolyLog[2, 1 - u])/(d
+ e*x^2), x], x] /; FreeQ[{a, b, c, d, e}, x] && IGtQ[p, 0] && EqQ[c^2*d +
e, 0] && EqQ[(1 - u)^2 - (1 - 2/(1 - c*x))^2, 0]
```

Rule 6610

```
Int[(u_)*PolyLog[n_, v_], x_Symbol] :> With[{w = DerivativeDivides[v, u*v,
x]}, Simp[w*PolyLog[n + 1, v], x] /;  !FalseQ[w]] /; FreeQ[n, x]
```

Rubi steps

$$\int \coth^{-1}(ax)^3\,dx = x\coth^{-1}(ax)^3 - (3a)\int \frac{x\coth^{-1}(ax)^2}{1-a^2x^2}\,dx$$
$$= \frac{\coth^{-1}(ax)^3}{a} + x\coth^{-1}(ax)^3 - 3\int \frac{\coth^{-1}(ax)^2}{1-ax}\,dx$$
$$= \frac{\coth^{-1}(ax)^3}{a} + x\coth^{-1}(ax)^3 - \frac{3\coth^{-1}(ax)^2\log\left(\frac{2}{1-ax}\right)}{a} + 6\int \frac{\coth^{-1}(ax)\log\left(\frac{2}{1-ax}\right)}{1-a^2x^2}\,dx$$
$$= \frac{\coth^{-1}(ax)^3}{a} + x\coth^{-1}(ax)^3 - \frac{3\coth^{-1}(ax)^2\log\left(\frac{2}{1-ax}\right)}{a} - \frac{3\coth^{-1}(ax)\mathrm{Li}_2\left(1-\frac{2}{1-ax}\right)}{a} + \ldots$$
$$= \frac{\coth^{-1}(ax)^3}{a} + x\coth^{-1}(ax)^3 - \frac{3\coth^{-1}(ax)^2\log\left(\frac{2}{1-ax}\right)}{a} - \frac{3\coth^{-1}(ax)\mathrm{Li}_2\left(1-\frac{2}{1-ax}\right)}{a} + \ldots$$

**Mathematica [A]** time = 0.10, size = 79, normalized size = 0.93

$$-\frac{3\coth^{-1}(ax)\mathrm{Li}_2\left(e^{2\coth^{-1}(ax)}\right)}{a}+\frac{3\mathrm{Li}_3\left(e^{2\coth^{-1}(ax)}\right)}{2a}+x\coth^{-1}(ax)^3+\frac{\coth^{-1}(ax)^3}{a}-\frac{3\coth^{-1}(ax)^2\log\left(1-e^{2\coth\ldots}\right)}{a}$$

Warning: Unable to verify antiderivative.

```
[In] Integrate[ArcCoth[a*x]^3,x]
```

```
[Out] ArcCoth[a*x]^3/a + x*ArcCoth[a*x]^3 - (3*ArcCoth[a*x]^2*Log[1 - E^(2*ArcCot
h[a*x])])/a - (3*ArcCoth[a*x]*PolyLog[2, E^(2*ArcCoth[a*x])])/a + (3*PolyLo
g[3, E^(2*ArcCoth[a*x])])/(2*a)
```

**fricas [F]** time = 0.39, size = 0, normalized size = 0.00

$$\mathrm{integral}\left(\mathrm{arcoth}\,(ax)^3, x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(a*x)^3,x, algorithm="fricas")
```

```
[Out] integral(arccoth(a*x)^3, x)
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \mathrm{arcoth}\,(ax)^3\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(a*x)^3,x, algorithm="giac")
```

```
[Out] integrate(arccoth(a*x)^3, x)
```

**maple [B]** time = 0.38, size = 180, normalized size = 2.12

$$x\mathrm{arccoth}\,(ax)^3+\frac{\mathrm{arccoth}\,(ax)^3}{a}-\frac{3\mathrm{arccoth}\,(ax)^2\ln\left(1-\frac{1}{\sqrt{\frac{ax-1}{ax+1}}}\right)}{a}-\frac{3\mathrm{arccoth}\,(ax)^2\ln\left(1+\frac{1}{\sqrt{\frac{ax-1}{ax+1}}}\right)}{a}-\frac{6\,\mathrm{arccoth}\,(ax\ldots}{\ldots}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(arccoth(a*x)^3,x)
```

```
[Out] x*arccoth(a*x)^3+arccoth(a*x)^3/a-3/a*arccoth(a*x)^2*ln(1-1/((a*x-1)/(a*x+1
))^(1/2))-3/a*arccoth(a*x)^2*ln(1+1/((a*x-1)/(a*x+1))^(1/2))-6/a*arccoth(a*
x)*polylog(2,1/((a*x-1)/(a*x+1))^(1/2))-6/a*arccoth(a*x)*polylog(2,-1/((a*x
-1)/(a*x+1))^(1/2))+6/a*polylog(3,1/((a*x-1)/(a*x+1))^(1/2))+6/a*polylog(3,
-1/((a*x-1)/(a*x+1))^(1/2))
```

**maxima [F]** time = 0.00, size = 0, normalized size = 0.00

$$\frac{(ax+1)\log(ax+1)^3 - 3(ax-1)\log(ax+1)^2\log(ax-1)}{8a} + \frac{1}{8}\int -\frac{(ax+1)\log(ax-1)^3 - 3\left((ax+1)\log(ax-\right.}{ax+}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(a*x)^3,x, algorithm="maxima")
```

```
[Out] 1/8*((a*x + 1)*log(a*x + 1)^3 - 3*(a*x - 1)*log(a*x + 1)^2*log(a*x - 1))/a
+ 1/8*integrate(-((a*x + 1)*log(a*x - 1)^3 - 3*((a*x + 1)*log(a*x - 1)^2 +
2*(a*x - 1)*log(a*x - 1))*log(a*x + 1))/(a*x + 1), x)
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.01

$$\int \mathrm{acoth}\left(a\,x\right)^3\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(a*x)^3,x)
```

```
[Out] int(acoth(a*x)^3, x)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \mathrm{acoth}^3(ax)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(a*x)**3,x)
```

```
[Out] Integral(acoth(a*x)**3, x)
```

## 3.29 $\int \frac{\coth^{-1}(ax)^3}{x}\,dx$

**Optimal**. Leaf size=150

$$\frac{3}{4}\text{Li}_4\left(1-\frac{2}{ax+1}\right)-\frac{3}{4}\text{Li}_4\left(1-\frac{2ax}{ax+1}\right)+\frac{3}{2}\text{Li}_2\left(1-\frac{2}{ax+1}\right)\coth^{-1}(ax)^2-\frac{3}{2}\text{Li}_2\left(1-\frac{2ax}{ax+1}\right)\coth^{-1}(ax)^2+\frac{3}{2}\text{Li}_3\left(\right.$$

```
[Out] 2*arccoth(a*x)^3*arccoth(1-2/(-a*x+1))+3/2*arccoth(a*x)^2*polylog(2,1-2/(a*
x+1))-3/2*arccoth(a*x)^2*polylog(2,1-2*a*x/(a*x+1))+3/2*arccoth(a*x)*polylo
g(3,1-2/(a*x+1))-3/2*arccoth(a*x)*polylog(3,1-2*a*x/(a*x+1))+3/4*polylog(4,
1-2/(a*x+1))-3/4*polylog(4,1-2*a*x/(a*x+1))
```

**Rubi** [A] time = 0.35, antiderivative size = 150, normalized size of antiderivative = 1.00, number of steps used = 8, number of rules used = 6, integrand size = 10, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.600, Rules used = {5915, 6053, 5949, 6057, 6061, 6610}

$$\frac{3}{4}\text{PolyLog}\left(4,1-\frac{2}{ax+1}\right)-\frac{3}{4}\text{PolyLog}\left(4,1-\frac{2ax}{ax+1}\right)+\frac{3}{2}\coth^{-1}(ax)^2\text{PolyLog}\left(2,1-\frac{2}{ax+1}\right)-\frac{3}{2}\coth^{-1}(ax)^2$$

Antiderivative was successfully verified.

```
[In] Int[ArcCoth[a*x]^3/x,x]
```

```
[Out] 2*ArcCoth[a*x]^3*ArcCoth[1 - 2/(1 - a*x)] + (3*ArcCoth[a*x]^2*PolyLog[2, 1
- 2/(1 + a*x)])/2 - (3*ArcCoth[a*x]^2*PolyLog[2, 1 - (2*a*x)/(1 + a*x)])/2
+ (3*ArcCoth[a*x]*PolyLog[3, 1 - 2/(1 + a*x)])/2 - (3*ArcCoth[a*x]*PolyLog[
3, 1 - (2*a*x)/(1 + a*x)])/2 + (3*PolyLog[4, 1 - 2/(1 + a*x)])/4 - (3*PolyL
og[4, 1 - (2*a*x)/(1 + a*x)])/4
```

Rule 5915

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_)/(x_), x_Symbol] :> Simp[2*(a +
 b*ArcCoth[c*x])^p*ArcCoth[1 - 2/(1 - c*x)], x] - Dist[2*b*c*p, Int[((a + b
*ArcCoth[c*x])^(p - 1)*ArcCoth[1 - 2/(1 - c*x)])/(1 - c^2*x^2), x], x] /; F
reeQ[{a, b, c}, x] && IGtQ[p, 1]
```

Rule 5949

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)/((d_) + (e_.)*(x_)^2), x_Symb
ol] :> Simp[(a + b*ArcCoth[c*x])^(p + 1)/(b*c*d*(p + 1)), x] /; FreeQ[{a, b
, c, d, e, p}, x] && EqQ[c^2*d + e, 0] && NeQ[p, -1]
```

Rule 6053

```
Int[(ArcCoth[u_]*((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.))/((d_) + (e_.)*(
x_)^2), x_Symbol] :> Dist[1/2, Int[(Log[SimplifyIntegrand[1 + 1/u, x]]*(a +
 b*ArcCoth[c*x])^p)/(d + e*x^2), x], x] - Dist[1/2, Int[(Log[SimplifyIntegr
and[1 - 1/u, x]]*(a + b*ArcCoth[c*x])^p)/(d + e*x^2), x], x] /; FreeQ[{a, b
, c, d, e}, x] && IGtQ[p, 0] && EqQ[c^2*d + e, 0] && EqQ[u^2 - (1 - 2/(1 -
c*x))^2, 0]
```

Rule 6057

```
Int[(Log[u_]*((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.))/((d_) + (e_.)*(x_)^
2), x_Symbol] :> Simp[((a + b*ArcCoth[c*x])^p*PolyLog[2, 1 - u])/(2*c*d), x
] - Dist[(b*p)/2, Int[((a + b*ArcCoth[c*x])^(p - 1)*PolyLog[2, 1 - u])/(d +
 e*x^2), x], x] /; FreeQ[{a, b, c, d, e}, x] && IGtQ[p, 0] && EqQ[c^2*d + e
, 0] && EqQ[(1 - u)^2 - (1 - 2/(1 + c*x))^2, 0]
```

Rule 6061

```
Int[(((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)*PolyLog[k_, u_])/((d_) + (e_
.)*(x_)^2), x_Symbol] :> -Simp[((a + b*ArcCoth[c*x])^p*PolyLog[k + 1, u])/(
2*c*d), x] + Dist[(b*p)/2, Int[((a + b*ArcCoth[c*x])^(p - 1)*PolyLog[k + 1,
 u])/(d + e*x^2), x], x] /; FreeQ[{a, b, c, d, e, k}, x] && IGtQ[p, 0] && E
qQ[c^2*d + e, 0] && EqQ[u^2 - (1 - 2/(1 + c*x))^2, 0]
```

Rule 6610

```
Int[(u_)*PolyLog[n_, v_], x_Symbol] :> With[{w = DerivativeDivides[v, u*v,
x]}, Simp[w*PolyLog[n + 1, v], x] /;  !FalseQ[w]] /; FreeQ[n, x]
```

Rubi steps

$$\int \frac{\coth^{-1}(ax)^3}{x}\,dx = 2\coth^{-1}(ax)^3\coth^{-1}\left(1-\frac{2}{1-ax}\right)-(6a)\int \frac{\coth^{-1}(ax)^2\coth^{-1}\left(1-\frac{2}{1-ax}\right)}{1-a^2x^2}\,dx$$
$$= 2\coth^{-1}(ax)^3\coth^{-1}\left(1-\frac{2}{1-ax}\right)+(3a)\int \frac{\coth^{-1}(ax)^2\log\left(\frac{2}{1+ax}\right)}{1-a^2x^2}\,dx-(3a)\int \frac{\coth^{-1}(ax)}{1-}$$
$$= 2\coth^{-1}(ax)^3\coth^{-1}\left(1-\frac{2}{1-ax}\right)+\frac{3}{2}\coth^{-1}(ax)^2\mathrm{Li}_2\left(1-\frac{2}{1+ax}\right)-\frac{3}{2}\coth^{-1}(ax)^2\mathrm{Li}_2\left(1-\right.$$
$$= 2\coth^{-1}(ax)^3\coth^{-1}\left(1-\frac{2}{1-ax}\right)+\frac{3}{2}\coth^{-1}(ax)^2\mathrm{Li}_2\left(1-\frac{2}{1+ax}\right)-\frac{3}{2}\coth^{-1}(ax)^2\mathrm{Li}_2\left(1-\right.$$
$$= 2\coth^{-1}(ax)^3\coth^{-1}\left(1-\frac{2}{1-ax}\right)+\frac{3}{2}\coth^{-1}(ax)^2\mathrm{Li}_2\left(1-\frac{2}{1+ax}\right)-\frac{3}{2}\coth^{-1}(ax)^2\mathrm{Li}_2\left(1-\right.$$

**Mathematica [A]** time = 0.08, size = 156, normalized size = 1.04

$$\frac{1}{64}\left(-96\coth^{-1}(ax)^2\mathrm{Li}_2\left(-e^{-2\coth^{-1}(ax)}\right)-96\coth^{-1}(ax)^2\mathrm{Li}_2\left(e^{2\coth^{-1}(ax)}\right)-96\coth^{-1}(ax)\mathrm{Li}_3\left(-e^{-2\coth^{-1}(ax)}\right)+9\right.$$

Warning: Unable to verify antiderivative.

```
[In] Integrate[ArcCoth[a*x]^3/x,x]
```

```
[Out] (-Pi^4 + 32*ArcCoth[a*x]^4 + 64*ArcCoth[a*x]^3*Log[1 + E^(-2*ArcCoth[a*x])]
 - 64*ArcCoth[a*x]^3*Log[1 - E^(2*ArcCoth[a*x])] - 96*ArcCoth[a*x]^2*PolyLo
g[2, -E^(-2*ArcCoth[a*x])] - 96*ArcCoth[a*x]^2*PolyLog[2, E^(2*ArcCoth[a*x]
)] - 96*ArcCoth[a*x]*PolyLog[3, -E^(-2*ArcCoth[a*x])] + 96*ArcCoth[a*x]*Pol
yLog[3, E^(2*ArcCoth[a*x])] - 48*PolyLog[4, -E^(-2*ArcCoth[a*x])] - 48*Poly
Log[4, E^(2*ArcCoth[a*x])])/64
```

**fricas [F]** time = 0.47, size = 0, normalized size = 0.00

$$\mathrm{integral}\left(\frac{\mathrm{arcoth}\,(ax)^3}{x},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(a*x)^3/x,x, algorithm="fricas")
```

```
[Out] integral(arccoth(a*x)^3/x, x)
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\mathrm{arcoth}\,(ax)^3}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(a*x)^3/x,x, algorithm="giac")
```

```
[Out] integrate(arccoth(a*x)^3/x, x)
```

**maple [C]** time = 0.55, size = 564, normalized size = 3.76

$$\ln(ax)\operatorname{arccoth}(ax)^3+\operatorname{arccoth}(ax)^3\ln\left(\frac{ax+1}{ax-1}-1\right)+\frac{3\operatorname{arccoth}(ax)^2\operatorname{polylog}\left(2,-\frac{ax+1}{ax-1}\right)}{2}-\frac{3\operatorname{arccoth}(ax)\operatorname{poly}}{2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(arccoth(a*x)^3/x,x)
```

```
[Out] ln(a*x)*arccoth(a*x)^3+arccoth(a*x)^3*ln((a*x+1)/(a*x-1)-1)+3/2*arccoth(a*x
)^2*polylog(2,-(a*x+1)/(a*x-1))-3/2*arccoth(a*x)*polylog(3,-(a*x+1)/(a*x-1)
)+3/4*polylog(4,-(a*x+1)/(a*x-1))+1/2*I*Pi*csgn(I*(1+(a*x+1)/(a*x-1)))*csgn
(I/((a*x+1)/(a*x-1)-1))*csgn(I/((a*x+1)/(a*x-1)-1)*(1+(a*x+1)/(a*x-1)))*arc
coth(a*x)^3-1/2*I*Pi*csgn(I/((a*x+1)/(a*x-1)-1))*csgn(I/((a*x+1)/(a*x-1)-1)
*(1+(a*x+1)/(a*x-1)))^2*arccoth(a*x)^3-1/2*I*Pi*csgn(I*(1+(a*x+1)/(a*x-1)))
*csgn(I/((a*x+1)/(a*x-1)-1)*(1+(a*x+1)/(a*x-1)))^2*arccoth(a*x)^3+1/2*I*Pi*
csgn(I/((a*x+1)/(a*x-1)-1)*(1+(a*x+1)/(a*x-1)))^3*arccoth(a*x)^3-arccoth(a*
x)^3*ln(1-1/((a*x-1)/(a*x+1))^(1/2))-3*arccoth(a*x)^2*polylog(2,1/((a*x-1)/
(a*x+1))^(1/2))+6*arccoth(a*x)*polylog(3,1/((a*x-1)/(a*x+1))^(1/2))-6*polyl
og(4,1/((a*x-1)/(a*x+1))^(1/2))-arccoth(a*x)^3*ln(1+1/((a*x-1)/(a*x+1))^(1/
2))-3*arccoth(a*x)^2*polylog(2,-1/((a*x-1)/(a*x+1))^(1/2))+6*arccoth(a*x)*p
olylog(3,-1/((a*x-1)/(a*x+1))^(1/2))-6*polylog(4,-1/((a*x-1)/(a*x+1))^(1/2)
)
```

**maxima [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{arcoth}(ax)^3}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(a*x)^3/x,x, algorithm="maxima")
```

```
[Out] integrate(arccoth(a*x)^3/x, x)
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.01

$$\int \frac{\operatorname{acoth}(a\,x)^3}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(a*x)^3/x,x)
```

```
[Out] int(acoth(a*x)^3/x, x)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{acoth}^3(ax)}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(a*x)**3/x,x)
```

```
[Out] Integral(acoth(a*x)**3/x, x)
```

## 3.30 $\int \frac{\coth^{-1}(ax)^3}{x^2} \, dx$

**Optimal**. Leaf size=79

$$-\frac{3}{2}a\text{Li}_3\left(\frac{2}{ax+1}-1\right)-3a\text{Li}_2\left(\frac{2}{ax+1}-1\right)\coth^{-1}(ax)+a\coth^{-1}(ax)^3-\frac{\coth^{-1}(ax)^3}{x}+3a\log\left(2-\frac{2}{ax+1}\right)\coth^{-1}(a$$

```
[Out] a*arccoth(a*x)^3-arccoth(a*x)^3/x+3*a*arccoth(a*x)^2*ln(2-2/(a*x+1))-3*a*ar
ccoth(a*x)*polylog(2,-1+2/(a*x+1))-3/2*a*polylog(3,-1+2/(a*x+1))
```

**Rubi [A]** time = 0.20, antiderivative size = 79, normalized size of antiderivative = 1.00, number of steps used = 5, number of rules used = 6, integrand size = 10, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.600, Rules used = {5917, 5989, 5933, 5949, 6057, 6610}

$$-\frac{3}{2}a\text{PolyLog}\left(3,\frac{2}{ax+1}-1\right)-3a\coth^{-1}(ax)\text{PolyLog}\left(2,\frac{2}{ax+1}-1\right)+a\coth^{-1}(ax)^3-\frac{\coth^{-1}(ax)^3}{x}+3a\log\left(2-\frac{}{a}\right.$$

Antiderivative was successfully verified.

```
[In] Int[ArcCoth[a*x]^3/x^2,x]
```

```
[Out] a*ArcCoth[a*x]^3 - ArcCoth[a*x]^3/x + 3*a*ArcCoth[a*x]^2*Log[2 - 2/(1 + a*x
)] - 3*a*ArcCoth[a*x]*PolyLog[2, -1 + 2/(1 + a*x)] - (3*a*PolyLog[3, -1 + 2
/(1 + a*x)])/2
```

Rule 5917

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)*((d_.)*(x_))^(m_.), x_Symbol]
 :> Simp[((d*x)^(m + 1)*(a + b*ArcCoth[c*x])^p)/(d*(m + 1)), x] - Dist[(b*c
*p)/(d*(m + 1)), Int[((d*x)^(m + 1)*(a + b*ArcCoth[c*x])^(p - 1))/(1 - c^2*
x^2), x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[p, 0] && (EqQ[p, 1] || In
tegerQ[m]) && NeQ[m, -1]
```

Rule 5933

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)/((x_)*((d_) + (e_.)*(x_))), x
_Symbol] :> Simp[((a + b*ArcCoth[c*x])^p*Log[2 - 2/(1 + (e*x)/d)])/d, x] -
Dist[(b*c*p)/d, Int[((a + b*ArcCoth[c*x])^(p - 1)*Log[2 - 2/(1 + (e*x)/d)])
/(1 - c^2*x^2), x], x] /; FreeQ[{a, b, c, d, e}, x] && IGtQ[p, 0] && EqQ[c^
2*d^2 - e^2, 0]
```

Rule 5949

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)/((d_) + (e_.)*(x_)^2), x_Symb
ol] :> Simp[(a + b*ArcCoth[c*x])^(p + 1)/(b*c*d*(p + 1)), x] /; FreeQ[{a, b
, c, d, e, p}, x] && EqQ[c^2*d + e, 0] && NeQ[p, -1]
```

Rule 5989

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)/((x_)*((d_) + (e_.)*(x_)^2)),
 x_Symbol] :> Simp[(a + b*ArcCoth[c*x])^(p + 1)/(b*d*(p + 1)), x] + Dist[1/
d, Int[(a + b*ArcCoth[c*x])^p/(x*(1 + c*x)), x], x] /; FreeQ[{a, b, c, d, e
}, x] && EqQ[c^2*d + e, 0] && GtQ[p, 0]
```

Rule 6057

```
Int[(Log[u_]*((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.))/((d_) + (e_.)*(x_)^
2), x_Symbol] :> Simp[((a + b*ArcCoth[c*x])^p*PolyLog[2, 1 - u])/(2*c*d), x
] - Dist[(b*p)/2, Int[((a + b*ArcCoth[c*x])^(p - 1)*PolyLog[2, 1 - u])/(d +
 e*x^2), x], x] /; FreeQ[{a, b, c, d, e}, x] && IGtQ[p, 0] && EqQ[c^2*d + e
```

```
, 0] && EqQ[(1 - u)^2 - (1 - 2/(1 + c*x))^2, 0]
```

Rule 6610

```
Int[(u_)*PolyLog[n_, v_], x_Symbol] :> With[{w = DerivativeDivides[v, u*v,
x]}, Simp[w*PolyLog[n + 1, v], x] /;  !FalseQ[w]] /; FreeQ[n, x]
```

Rubi steps

$$\int \frac{\coth^{-1}(ax)^3}{x^2}\,dx = -\frac{\coth^{-1}(ax)^3}{x} + (3a)\int \frac{\coth^{-1}(ax)^2}{x\left(1-a^2x^2\right)}\,dx$$

$$= a\coth^{-1}(ax)^3 - \frac{\coth^{-1}(ax)^3}{x} + (3a)\int \frac{\coth^{-1}(ax)^2}{x(1+ax)}\,dx$$

$$= a\coth^{-1}(ax)^3 - \frac{\coth^{-1}(ax)^3}{x} + 3a\coth^{-1}(ax)^2\log\left(2-\frac{2}{1+ax}\right) - \left(6a^2\right)\int \frac{\coth^{-1}(ax)\,\text{lo}}{1-a}$$

$$= a\coth^{-1}(ax)^3 - \frac{\coth^{-1}(ax)^3}{x} + 3a\coth^{-1}(ax)^2\log\left(2-\frac{2}{1+ax}\right) - 3a\coth^{-1}(ax)\text{Li}_2\left(-1\right.$$

$$= a\coth^{-1}(ax)^3 - \frac{\coth^{-1}(ax)^3}{x} + 3a\coth^{-1}(ax)^2\log\left(2-\frac{2}{1+ax}\right) - 3a\coth^{-1}(ax)\text{Li}_2\left(-1\right.$$

**Mathematica [A]** time = 0.13, size = 72, normalized size = 0.91

$$-3a\coth^{-1}(ax)\text{Li}_2\left(-e^{-2\coth^{-1}(ax)}\right)-\frac{3}{2}a\text{Li}_3\left(-e^{-2\coth^{-1}(ax)}\right)+\frac{(ax-1)\coth^{-1}(ax)^3}{x}+3a\coth^{-1}(ax)^2\log\left(e^{-2\coth^{-1}}\right.$$

Warning: Unable to verify antiderivative.

```
[In] Integrate[ArcCoth[a*x]^3/x^2,x]
```

```
[Out] ((-1 + a*x)*ArcCoth[a*x]^3)/x + 3*a*ArcCoth[a*x]^2*Log[1 + E^(-2*ArcCoth[a*
x])] - 3*a*ArcCoth[a*x]*PolyLog[2, -E^(-2*ArcCoth[a*x])] - (3*a*PolyLog[3,
-E^(-2*ArcCoth[a*x])])/2
```

**fricas [F]** time = 0.81, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{\text{arcoth}\,(ax)^3}{x^2}, x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(a*x)^3/x^2,x, algorithm="fricas")
```

```
[Out] integral(arccoth(a*x)^3/x^2, x)
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\text{arcoth}\,(ax)^3}{x^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(a*x)^3/x^2,x, algorithm="giac")
```

```
[Out] integrate(arccoth(a*x)^3/x^2, x)
```

**maple [C]** time = 0.70, size = 796, normalized size = 10.08

$$-\frac{\operatorname{arccoth}(ax)^{3}}{x}+3a\operatorname{arccoth}(ax)^{2}\ln(ax)-\frac{3a\operatorname{arccoth}(ax)^{2}\ln(ax-1)}{2}-\frac{3a\operatorname{arccoth}(ax)^{2}\ln(ax+1)}{2}-\frac{3a\operatorname{arccoth}(a}{2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(arccoth(a*x)^3/x^2,x)
```

```
[Out] -arccoth(a*x)^3/x+3*a*arccoth(a*x)^2*ln(a*x)-3/2*a*arccoth(a*x)^2*ln(a*x-1)
-3/2*a*arccoth(a*x)^2*ln(a*x+1)-3/2*a*arccoth(a*x)^2*ln((a*x-1)/(a*x+1))-a*
arccoth(a*x)^3+3*a*arccoth(a*x)*polylog(2,-(a*x+1)/(a*x-1))-3/2*a*polylog(3
,-(a*x+1)/(a*x-1))-3/4*I*a*arccoth(a*x)^2*Pi*csgn(I/((a*x+1)/(a*x-1)-1))*cs
gn(I*(a*x+1)/(a*x-1))*csgn(I*(a*x+1)/(a*x-1)/((a*x+1)/(a*x-1)-1))-3/2*I*a*a
rccoth(a*x)^2*Pi*csgn(I/((a*x+1)/(a*x-1)-1)*(1+(a*x+1)/(a*x-1)))^2*csgn(I*(
1+(a*x+1)/(a*x-1)))-3/2*I*a*arccoth(a*x)^2*Pi*csgn(I/((a*x+1)/(a*x-1)-1)*(1
+(a*x+1)/(a*x-1)))^2*csgn(I/((a*x+1)/(a*x-1)-1))+3/4*I*a*arccoth(a*x)^2*Pi*
csgn(I/((a*x+1)/(a*x-1)-1))*csgn(I*(a*x+1)/(a*x-1)/((a*x+1)/(a*x-1)-1))^2-3
/4*I*a*arccoth(a*x)^2*Pi*csgn(I*(a*x+1)/(a*x-1))^3+3/2*I*a*arccoth(a*x)^2*P
i*csgn(I/((a*x+1)/(a*x-1)-1)*(1+(a*x+1)/(a*x-1)))^3+3/4*I*a*arccoth(a*x)^2*
Pi*csgn(I*(a*x+1)/(a*x-1))*csgn(I*(a*x+1)/(a*x-1)/((a*x+1)/(a*x-1)-1))^2-3/
4*I*a*arccoth(a*x)^2*Pi*csgn(I*(a*x+1)/(a*x-1)/((a*x+1)/(a*x-1)-1))^3+3/2*I
*a*arccoth(a*x)^2*Pi*csgn(I*(a*x+1)/(a*x-1))^2*csgn(I/((a*x-1)/(a*x+1))^(1/
2))-3/4*I*a*arccoth(a*x)^2*Pi*csgn(I*(a*x+1)/(a*x-1))*csgn(I/((a*x-1)/(a*x+
1))^(1/2))^2+3/2*I*a*arccoth(a*x)^2*Pi*csgn(I/((a*x+1)/(a*x-1)-1)*(1+(a*x+1
)/(a*x-1)))*csgn(I/((a*x+1)/(a*x-1)-1))*csgn(I*(1+(a*x+1)/(a*x-1)))+3*a*arc
coth(a*x)^2*ln(2)
```

**maxima [F]** time = 0.00, size = 0, normalized size = 0.00

result too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(a*x)^3/x^2,x, algorithm="maxima")
```

```
[Out] 1/8*a*(log(a*x + 1) - log(x))*log(a)^3 + 3/8*a*integrate(x*log(a*x - 1)/(a*
x^3 + x^2), x)*log(a)^2 - 3/8*a*integrate(x*log(x)/(a*x^3 + x^2), x)*log(a)
^2 - 1/8*(a*log(a*x + 1) - a*log(x) - 1/x)*log(a)^3 + 3/4*a^2*integrate(x^2
*log(a*x + 1)*log(a*x - 1)/(a*x^3 + x^2), x) - 3/2*a^2*integrate(x^2*log(a*
x + 1)*log(x)/(a*x^3 + x^2), x) + 3/4*a*integrate(x*log(a*x - 1)*log(x)/(a*
x^3 + x^2), x)*log(a) - 3/8*a*integrate(x*log(x)^2/(a*x^3 + x^2), x)*log(a)
 + 3/8*integrate(log(a*x - 1)/(a*x^3 + x^2), x)*log(a)^2 - 3/8*integrate(lo
g(x)/(a*x^3 + x^2), x)*log(a)^2 + 3/8*a*integrate(x*log(a*x + 1)*log(a*x -
1)^2/(a*x^3 + x^2), x) - 3/8*a*integrate(x*log(a*x - 1)^2*log(x)/(a*x^3 + x
^2), x) + 3/8*a*integrate(x*log(a*x - 1)*log(x)^2/(a*x^3 + x^2), x) - 1/8*a
*integrate(x*log(x)^3/(a*x^3 + x^2), x) - 3/4*a*integrate(x*log(a*x + 1)*lo
g(a*x - 1)/(a*x^3 + x^2), x) - 3/8*integrate(a*x*log(a*x - 1)^2/(a*x^3 + x^
2), x)*log(a) - 3/8*integrate(log(a*x - 1)^2/(a*x^3 + x^2), x)*log(a) + 3/4
*integrate(log(a*x - 1)*log(x)/(a*x^3 + x^2), x)*log(a) - 3/8*integrate(log
(x)^2/(a*x^3 + x^2), x)*log(a) - 3/8*(a^2*log(a*x - 1) - a^2*log(x) + a/x)*
log(-1/(a*x) + 1)^2/a + 1/8*log(-1/(a*x) + 1)^3/x - 1/8*((a*x + 1)*log(a*x
+ 1)^3 - 3*(2*a*x*log(x) - (a*x - 1)*log(a*x - 1))*log(a*x + 1)^2)/x + 1/8*
(3*(a^3*x*log(a*x - 1)^2 + a^3*x*log(x)^2 - 2*a^3*x*log(x) + 2*a^2 - 2*(a^3
*x*log(x) - a^3*x)*log(a*x - 1))*log(-1/(a*x) + 1)/(a*x) - (a^4*x*log(a*x -
 1)^3 - a^4*x*log(x)^3 + 3*a^4*x*log(x)^2 - 6*a^4*x*log(x) + 6*a^3 - 3*(a^4
*x*log(x) - a^4*x)*log(a*x - 1)^2 + 3*(a^4*x*log(x)^2 - 2*a^4*x*log(x) + 2*
a^4*x)*log(a*x - 1))/(a^2*x))/a + 3/8*integrate(log(a*x + 1)*log(a*x - 1)^2
/(a*x^3 + x^2), x) - 3/8*integrate(log(a*x - 1)^2*log(x)/(a*x^3 + x^2), x)
```

```
+ 3/8*integrate(log(a*x - 1)*log(x)^2/(a*x^3 + x^2), x) - 1/8*integrate(log
(x)^3/(a*x^3 + x^2), x)
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.01

$$\int \frac{\operatorname{acoth}(a\,x)^3}{x^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(a*x)^3/x^2,x)
```

```
[Out] int(acoth(a*x)^3/x^2, x)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{acoth}^3(ax)}{x^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(a*x)**3/x**2,x)
```

```
[Out] Integral(acoth(a*x)**3/x**2, x)
```

# 3.31 $\int \frac{\coth^{-1}(ax)^3}{x^3} dx$

**Optimal**. Leaf size=95

$$-\frac{3}{2}a^2\text{Li}_2\left(\frac{2}{ax+1}-1\right)+\frac{1}{2}a^2\coth^{-1}(ax)^3+\frac{3}{2}a^2\coth^{-1}(ax)^2+3a^2\log\left(2-\frac{2}{ax+1}\right)\coth^{-1}(ax)-\frac{\coth^{-1}(ax)^3}{2x^2}-\frac{3a\,\text{co}}{}$$

[Out] 3/2*a^2*arccoth(a*x)^2-3/2*a*arccoth(a*x)^2/x+1/2*a^2*arccoth(a*x)^3-1/2*arccoth(a*x)^3/x^2+3*a^2*arccoth(a*x)*ln(2-2/(a*x+1))-3/2*a^2*polylog(2,-1+2/(a*x+1))

**Rubi [A]** time = 0.22, antiderivative size = 95, normalized size of antiderivative = 1.00, number of steps used = 7, number of rules used = 6, integrand size = 10, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.600, Rules used = {5917, 5983, 5989, 5933, 2447, 5949}

$$-\frac{3}{2}a^2\text{PolyLog}\left(2,\frac{2}{ax+1}-1\right)+\frac{1}{2}a^2\coth^{-1}(ax)^3+\frac{3}{2}a^2\coth^{-1}(ax)^2+3a^2\log\left(2-\frac{2}{ax+1}\right)\coth^{-1}(ax)-\frac{\coth^{-1}(ax)^3}{2x^2}$$

Antiderivative was successfully verified.

[In] Int[ArcCoth[a*x]^3/x^3,x]

[Out] (3*a^2*ArcCoth[a*x]^2)/2 - (3*a*ArcCoth[a*x]^2)/(2*x) + (a^2*ArcCoth[a*x]^3)/2 - ArcCoth[a*x]^3/(2*x^2) + 3*a^2*ArcCoth[a*x]*Log[2 - 2/(1 + a*x)] - (3*a^2*PolyLog[2, -1 + 2/(1 + a*x)])/2

Rule 2447

```
Int[Log[u_]*(Pq_)^(m_.), x_Symbol] :> With[{C = FullSimplify[(Pq^m*(1 - u))/D[u, x]]}, Simp[C*PolyLog[2, 1 - u], x] /; FreeQ[C, x]] /; IntegerQ[m] && PolyQ[Pq, x] && RationalFunctionQ[u, x] && LeQ[RationalFunctionExponents[u, x][[2]], Expon[Pq, x]]
```

Rule 5917

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)*((d_.)*(x_))^(m_.), x_Symbol] :> Simp[((d*x)^(m + 1)*(a + b*ArcCoth[c*x])^p)/(d*(m + 1)), x] - Dist[(b*c*p)/(d*(m + 1)), Int[((d*x)^(m + 1)*(a + b*ArcCoth[c*x])^(p - 1))/(1 - c^2*x^2), x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[p, 0] && (EqQ[p, 1] || IntegerQ[m]) && NeQ[m, -1]
```

Rule 5933

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)/((x_)*((d_) + (e_.)*(x_))), x_Symbol] :> Simp[((a + b*ArcCoth[c*x])^p*Log[2 - 2/(1 + (e*x)/d)])/d, x] - Dist[(b*c*p)/d, Int[((a + b*ArcCoth[c*x])^(p - 1)*Log[2 - 2/(1 + (e*x)/d)])/(1 - c^2*x^2), x], x] /; FreeQ[{a, b, c, d, e}, x] && IGtQ[p, 0] && EqQ[c^2*d^2 - e^2, 0]
```

Rule 5949

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)/((d_) + (e_.)*(x_)^2), x_Symbol] :> Simp[(a + b*ArcCoth[c*x])^(p + 1)/(b*c*d*(p + 1)), x] /; FreeQ[{a, b, c, d, e, p}, x] && EqQ[c^2*d + e, 0] && NeQ[p, -1]
```

Rule 5983

```
Int[(((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)*((f_.)*(x_))^(m_))/((d_) + (e_.)*(x_)^2), x_Symbol] :> Dist[1/d, Int[(f*x)^m*(a + b*ArcCoth[c*x])^p, x], x] - Dist[e/(d*f^2), Int[((f*x)^(m + 2)*(a + b*ArcCoth[c*x])^p)/(d + e*x^
```

```
2), x], x] /; FreeQ[{a, b, c, d, e, f}, x] && GtQ[p, 0] && LtQ[m, -1]
```

Rule 5989

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)/((x_)*((d_) + (e_.)*(x_)^2)),
 x_Symbol] :> Simp[(a + b*ArcCoth[c*x])^(p + 1)/(b*d*(p + 1)), x] + Dist[1/
d, Int[(a + b*ArcCoth[c*x])^p/(x*(1 + c*x)), x], x] /; FreeQ[{a, b, c, d, e
}, x] && EqQ[c^2*d + e, 0] && GtQ[p, 0]
```

Rubi steps

$$\begin{aligned}
\int \frac{\coth^{-1}(ax)^3}{x^3}\,dx &= -\frac{\coth^{-1}(ax)^3}{2x^2}+\frac{1}{2}(3a)\int \frac{\coth^{-1}(ax)^2}{x^2\left(1-a^2x^2\right)}\,dx\\
&= -\frac{\coth^{-1}(ax)^3}{2x^2}+\frac{1}{2}(3a)\int \frac{\coth^{-1}(ax)^2}{x^2}\,dx+\frac{1}{2}\left(3a^3\right)\int \frac{\coth^{-1}(ax)^2}{1-a^2x^2}\,dx\\
&= -\frac{3a\coth^{-1}(ax)^2}{2x}+\frac{1}{2}a^2\coth^{-1}(ax)^3-\frac{\coth^{-1}(ax)^3}{2x^2}+\left(3a^2\right)\int \frac{\coth^{-1}(ax)}{x\left(1-a^2x^2\right)}\,dx\\
&= \frac{3}{2}a^2\coth^{-1}(ax)^2-\frac{3a\coth^{-1}(ax)^2}{2x}+\frac{1}{2}a^2\coth^{-1}(ax)^3-\frac{\coth^{-1}(ax)^3}{2x^2}+\left(3a^2\right)\int \frac{\coth^{-1}(a}{x(1+a.}\\
&= \frac{3}{2}a^2\coth^{-1}(ax)^2-\frac{3a\coth^{-1}(ax)^2}{2x}+\frac{1}{2}a^2\coth^{-1}(ax)^3-\frac{\coth^{-1}(ax)^3}{2x^2}+3a^2\coth^{-1}(ax)\,\mathrm{lo}\\
&= \frac{3}{2}a^2\coth^{-1}(ax)^2-\frac{3a\coth^{-1}(ax)^2}{2x}+\frac{1}{2}a^2\coth^{-1}(ax)^3-\frac{\coth^{-1}(ax)^3}{2x^2}+3a^2\coth^{-1}(ax)\,\mathrm{lo}
\end{aligned}$$

**Mathematica [A]** time = 0.17, size = 79, normalized size = 0.83

$$\frac{1}{2}\left(\frac{\coth^{-1}(ax)\left(\left(a^2x^2-1\right)\coth^{-1}(ax)^2+6a^2x^2\log\left(e^{-2\coth^{-1}(ax)}+1\right)+3ax(ax-1)\coth^{-1}(ax)\right)}{x^2}-3a^2\mathrm{Li}_2\left(-e^{-}\right.\right.$$

Warning: Unable to verify antiderivative.

```
[In] Integrate[ArcCoth[a*x]^3/x^3,x]
```

```
[Out] ((ArcCoth[a*x]*(3*a*x*(-1 + a*x)*ArcCoth[a*x] + (-1 + a^2*x^2)*ArcCoth[a*x]
^2 + 6*a^2*x^2*Log[1 + E^(-2*ArcCoth[a*x])]))/x^2 - 3*a^2*PolyLog[2, -E^(-2
*ArcCoth[a*x])])/2
```

**fricas [F]** time = 0.56, size = 0, normalized size = 0.00

$$\mathrm{integral}\left(\frac{\mathrm{arcoth}\left(ax\right)^3}{x^3},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(a*x)^3/x^3,x, algorithm="fricas")
```

```
[Out] integral(arccoth(a*x)^3/x^3, x)
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\mathrm{arcoth}\left(ax\right)^3}{x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(a*x)^3/x^3,x, algorithm="giac")
```

```
[Out] integrate(arccoth(a*x)^3/x^3, x)
```

**maple [C]** time = 0.86, size = 3673, normalized size = 38.66

output too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(arccoth(a*x)^3/x^3,x)
```

```
[Out] 1/2*a^2*arccoth(a*x)^3-3/2*a^2*arccoth(a*x)^2-3/2*a*arccoth(a*x)^2/x+3/2*a^
2*arccoth(a*x)*ln(1+I/((a*x-1)/(a*x+1))^(1/2))+3/2*a^2*arccoth(a*x)*ln(1-I/
((a*x-1)/(a*x+1))^(1/2))+3/2*a^2*arccoth(a*x)*ln(1+(a*x+1)/(a*x-1))-3/4*a^2
*arccoth(a*x)^2*ln(a*x-1)+3/4*a^2*arccoth(a*x)^2*ln(a*x+1)+3/4*a^2*arccoth(
a*x)^2*ln((a*x-1)/(a*x+1))+3/8*I*a^2*Pi*csgn(I/((a*x+1)/(a*x-1)-1))*csgn(I*
(a*x+1)/(a*x-1)/((a*x+1)/(a*x-1)-1))^2*arccoth(a*x)*ln(1+(a*x+1)/(a*x-1))+3
/4*I*a^2*Pi*csgn(I/((a*x-1)/(a*x+1))^(1/2))*csgn(I*(a*x+1)/(a*x-1))^2*arcco
th(a*x)*ln(1+(a*x+1)/(a*x-1))-3/8*I*a^2*Pi*csgn(I*(a*x+1)/(a*x-1))*csgn(I*(
a*x+1)/(a*x-1)/((a*x+1)/(a*x-1)-1))^2*arccoth(a*x)*ln(1-I/((a*x-1)/(a*x+1))
^(1/2))-3/4*I*a^2*Pi*csgn(I/((a*x-1)/(a*x+1))^(1/2))*csgn(I*(a*x+1)/(a*x-1)
)^2*arccoth(a*x)*ln(1-I/((a*x-1)/(a*x+1))^(1/2))-3/8*I*a^2*Pi*csgn(I/((a*x+
1)/(a*x-1)-1))*csgn(I*(a*x+1)/(a*x-1)/((a*x+1)/(a*x-1)-1))^2*arccoth(a*x)*l
n(1+I/((a*x-1)/(a*x+1))^(1/2))-3/8*I*a^2*Pi*csgn(I/((a*x+1)/(a*x-1)-1))*csg
n(I*(a*x+1)/(a*x-1)/((a*x+1)/(a*x-1)-1))^2*arccoth(a*x)*ln(1-I/((a*x-1)/(a*
x+1))^(1/2))-3/8*I*a^2*Pi*csgn(I*(a*x+1)/(a*x-1))*csgn(I/((a*x+1)/(a*x-1)-1
))*csgn(I*(a*x+1)/(a*x-1)/((a*x+1)/(a*x-1)-1))*arccoth(a*x)*ln(1+(a*x+1)/(a
*x-1))+3/8*I*a^2*Pi*csgn(I*(a*x+1)/(a*x-1))*csgn(I/((a*x+1)/(a*x-1)-1))*csg
n(I*(a*x+1)/(a*x-1)/((a*x+1)/(a*x-1)-1))*arccoth(a*x)*ln(1-I/((a*x-1)/(a*x+
1))^(1/2))+3/8*I*a^2*Pi*csgn(I*(a*x+1)/(a*x-1))*csgn(I/((a*x+1)/(a*x-1)-1))
*csgn(I*(a*x+1)/(a*x-1)/((a*x+1)/(a*x-1)-1))*arccoth(a*x)*ln(1+I/((a*x-1)/(
a*x+1))^(1/2))-3/16*I*a^2*Pi*csgn(I*(a*x+1)/(a*x-1)/((a*x+1)/(a*x-1)-1))^3*
polylog(2,-(a*x+1)/(a*x-1))+3/8*I*a^2*Pi*csgn(I*(a*x+1)/(a*x-1))^3*arccoth(
a*x)^2+3/8*I*a^2*Pi*csgn(I*(a*x+1)/(a*x-1)/((a*x+1)/(a*x-1)-1))^3*arccoth(a
*x)^2-3/16*I*a^2*Pi*csgn(I*(a*x+1)/(a*x-1))^3*polylog(2,-(a*x+1)/(a*x-1))+3
/8*I*a^2*Pi*csgn(I*(a*x+1)/(a*x-1))^3*dilog(1-I/((a*x-1)/(a*x+1))^(1/2))+3/
8*I*a^2*Pi*csgn(I*(a*x+1)/(a*x-1))^3*dilog(1+I/((a*x-1)/(a*x+1))^(1/2))+3/8
*I*a^2*Pi*csgn(I*(a*x+1)/(a*x-1))*csgn(I/((a*x+1)/(a*x-1)-1))*csgn(I*(a*x+1
)/(a*x-1)/((a*x+1)/(a*x-1)-1))*dilog(1+I/((a*x-1)/(a*x+1))^(1/2))+3/2*a^2*d
ilog(1-I/((a*x-1)/(a*x+1))^(1/2))+3/2*a^2*dilog(1+I/((a*x-1)/(a*x+1))^(1/2)
)+3/4*a^2*polylog(2,-(a*x+1)/(a*x-1))+3/8*I*a^2*Pi*csgn(I*(a*x+1)/(a*x-1)/(
(a*x+1)/(a*x-1)-1))^3*dilog(1+I/((a*x-1)/(a*x+1))^(1/2))+3/8*I*a^2*Pi*csgn(
I*(a*x+1)/(a*x-1)/((a*x+1)/(a*x-1)-1))^3*dilog(1-I/((a*x-1)/(a*x+1))^(1/2))
-1/2*arccoth(a*x)^3/x^2-3/8*I*a^2*Pi*csgn(I/((a*x-1)/(a*x+1))^(1/2))^2*csgn
(I*(a*x+1)/(a*x-1))*arccoth(a*x)*ln(1+(a*x+1)/(a*x-1))+3/8*I*a^2*Pi*csgn(I/
((a*x-1)/(a*x+1))^(1/2))^2*csgn(I*(a*x+1)/(a*x-1))*arccoth(a*x)*ln(1-I/((a*
x-1)/(a*x+1))^(1/2))-3/4*I*a^2*Pi*csgn(I/((a*x-1)/(a*x+1))^(1/2))*csgn(I*(a
*x+1)/(a*x-1))^2*arccoth(a*x)*ln(1+I/((a*x-1)/(a*x+1))^(1/2))+3/8*I*a^2*Pi*
csgn(I/((a*x-1)/(a*x+1))^(1/2))^2*csgn(I*(a*x+1)/(a*x-1))*arccoth(a*x)*ln(1
+I/((a*x-1)/(a*x+1))^(1/2))-3/16*I*a^2*Pi*csgn(I*(a*x+1)/(a*x-1))*csgn(I/((
a*x+1)/(a*x-1)-1))*csgn(I*(a*x+1)/(a*x-1)/((a*x+1)/(a*x-1)-1))*polylog(2,-(
a*x+1)/(a*x-1))+3/8*I*a^2*Pi*csgn(I*(a*x+1)/(a*x-1))*csgn(I/((a*x+1)/(a*x-1
)-1))*csgn(I*(a*x+1)/(a*x-1)/((a*x+1)/(a*x-1)-1))*dilog(1-I/((a*x-1)/(a*x+1
))^(1/2))+3/8*I*a^2*Pi*csgn(I*(a*x+1)/(a*x-1))*csgn(I*(a*x+1)/(a*x-1)/((a*x
+1)/(a*x-1)-1))^2*arccoth(a*x)*ln(1+(a*x+1)/(a*x-1))+3/8*I*a^2*Pi*csgn(I*(a
*x+1)/(a*x-1))*csgn(I/((a*x+1)/(a*x-1)-1))*csgn(I*(a*x+1)/(a*x-1)/((a*x+1)/
(a*x-1)-1))*arccoth(a*x)^2-3/8*I*a^2*Pi*csgn(I*(a*x+1)/(a*x-1))*csgn(I*(a*x
+1)/(a*x-1)/((a*x+1)/(a*x-1)-1))^2*arccoth(a*x)*ln(1+I/((a*x-1)/(a*x+1))^(1
```

```
/2))+3/8*I*a^2*Pi*csgn(I*(a*x+1)/(a*x-1))^3*arccoth(a*x)*ln(1-I/((a*x-1)/(a
*x+1))^(1/2))-3/8*I*a^2*Pi*csgn(I*(a*x+1)/(a*x-1))*csgn(I*(a*x+1)/(a*x-1)/(
(a*x+1)/(a*x-1)-1))^2*dilog(1+I/((a*x-1)/(a*x+1))^(1/2))+3/8*I*a^2*Pi*csgn(
I/((a*x-1)/(a*x+1))^(1/2))^2*csgn(I*(a*x+1)/(a*x-1))*arccoth(a*x)^2-3/8*I*a
^2*Pi*csgn(I/((a*x+1)/(a*x-1)-1))*csgn(I*(a*x+1)/(a*x-1)/((a*x+1)/(a*x-1)-1
))^2*arccoth(a*x)^2-3/8*I*a^2*Pi*csgn(I*(a*x+1)/(a*x-1))*csgn(I*(a*x+1)/(a*
x-1)/((a*x+1)/(a*x-1)-1))^2*arccoth(a*x)^2+3/8*I*a^2*Pi*csgn(I/((a*x-1)/(a*
x+1))^(1/2))^2*csgn(I*(a*x+1)/(a*x-1))*dilog(1-I/((a*x-1)/(a*x+1))^(1/2))-3
/8*I*a^2*Pi*csgn(I*(a*x+1)/(a*x-1))^3*arccoth(a*x)*ln(1+(a*x+1)/(a*x-1))+3/
8*I*a^2*Pi*csgn(I/((a*x-1)/(a*x+1))^(1/2))^2*csgn(I*(a*x+1)/(a*x-1))*dilog(
1+I/((a*x-1)/(a*x+1))^(1/2))-3/4*I*a^2*Pi*csgn(I/((a*x-1)/(a*x+1))^(1/2))*c
sgn(I*(a*x+1)/(a*x-1))^2*dilog(1+I/((a*x-1)/(a*x+1))^(1/2))-3/4*I*a^2*Pi*cs
gn(I/((a*x-1)/(a*x+1))^(1/2))*csgn(I*(a*x+1)/(a*x-1))^2*dilog(1-I/((a*x-1)/
(a*x+1))^(1/2))-3/16*I*a^2*Pi*csgn(I/((a*x-1)/(a*x+1))^(1/2))^2*csgn(I*(a*x
+1)/(a*x-1))*polylog(2,-(a*x+1)/(a*x-1))-3/8*I*a^2*Pi*csgn(I*(a*x+1)/(a*x-1
))*csgn(I*(a*x+1)/(a*x-1)/((a*x+1)/(a*x-1)-1))^2*dilog(1-I/((a*x-1)/(a*x+1)
)^(1/2))+3/8*I*a^2*Pi*csgn(I/((a*x-1)/(a*x+1))^(1/2))*csgn(I*(a*x+1)/(a*x-1
))^2*polylog(2,-(a*x+1)/(a*x-1))+3/8*I*a^2*Pi*csgn(I*(a*x+1)/(a*x-1)/((a*x+
1)/(a*x-1)-1))^3*arccoth(a*x)*ln(1+I/((a*x-1)/(a*x+1))^(1/2))+3/8*I*a^2*Pi*
csgn(I*(a*x+1)/(a*x-1)/((a*x+1)/(a*x-1)-1))^3*arccoth(a*x)*ln(1-I/((a*x-1)/
(a*x+1))^(1/2))-3/8*I*a^2*Pi*csgn(I/((a*x+1)/(a*x-1)-1))*csgn(I*(a*x+1)/(a*
x-1)/((a*x+1)/(a*x-1)-1))^2*dilog(1-I/((a*x-1)/(a*x+1))^(1/2))+3/16*I*a^2*P
i*csgn(I/((a*x+1)/(a*x-1)-1))*csgn(I*(a*x+1)/(a*x-1)/((a*x+1)/(a*x-1)-1))^2
*polylog(2,-(a*x+1)/(a*x-1))+3/8*I*a^2*Pi*csgn(I*(a*x+1)/(a*x-1))^3*arccoth
(a*x)*ln(1+I/((a*x-1)/(a*x+1))^(1/2))-3/8*I*a^2*Pi*csgn(I*(a*x+1)/(a*x-1)/(
(a*x+1)/(a*x-1)-1))^3*arccoth(a*x)*ln(1+(a*x+1)/(a*x-1))-3/8*I*a^2*Pi*csgn(
I/((a*x+1)/(a*x-1)-1))*csgn(I*(a*x+1)/(a*x-1)/((a*x+1)/(a*x-1)-1))^2*dilog(
1+I/((a*x-1)/(a*x+1))^(1/2))+3/16*I*a^2*Pi*csgn(I*(a*x+1)/(a*x-1))*csgn(I*(
a*x+1)/(a*x-1)/((a*x+1)/(a*x-1)-1))^2*polylog(2,-(a*x+1)/(a*x-1))-3/4*I*a^2
*Pi*csgn(I/((a*x-1)/(a*x+1))^(1/2))*csgn(I*(a*x+1)/(a*x-1))^2*arccoth(a*x)^
2
```

**maxima [B]** time = 0.33, size = 252, normalized size = 2.65

$$\frac{3}{4}\left(a\log\left(ax+1\right)-a\log\left(ax-1\right)-\frac{2}{x}\right)a\,\mathrm{arcoth}\left(ax\right)^{2}-\frac{1}{16}\left(a^{2}\left(\frac{3\left(\log\left(ax-1\right)-2\right)\log\left(ax+1\right)^{2}-\log\left(ax+1\right)^{3}}{}\right.\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(a*x)^3/x^3,x, algorithm="maxima")
```

```
[Out] 3/4*(a*log(a*x + 1) - a*log(a*x - 1) - 2/x)*a*arccoth(a*x)^2 - 1/16*(a^2*((
3*(log(a*x - 1) - 2)*log(a*x + 1)^2 - log(a*x + 1)^3 + log(a*x - 1)^3 - 3*(
log(a*x - 1)^2 - 4*log(a*x - 1))*log(a*x + 1) + 6*log(a*x - 1)^2)/a - 24*(l
og(a*x - 1)*log(1/2*a*x + 1/2) + dilog(-1/2*a*x + 1/2))/a + 24*(log(a*x + 1
)*log(x) + dilog(-a*x))/a - 24*(log(-a*x + 1)*log(x) + dilog(a*x))/a) - 6*(
2*(log(a*x - 1) - 2)*log(a*x + 1) - log(a*x + 1)^2 - log(a*x - 1)^2 - 4*log
(a*x - 1) + 8*log(x))*a*arccoth(a*x))*a - 1/2*arccoth(a*x)^3/x^2
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.01

$$\int \frac{\mathrm{acoth}\left(a\,x\right)^3}{x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(a*x)^3/x^3,x)
```

```
[Out] int(acoth(a*x)^3/x^3, x)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{acoth}^3(ax)}{x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(a*x)**3/x**3,x)
```

```
[Out] Integral(acoth(a*x)**3/x**3, x)
```

# 3.32 $\int \frac{\coth^{-1}(ax)^3}{x^4}\,dx$

**Optimal**. Leaf size=154

$$-\frac{1}{2}a^3\text{Li}_3\left(\frac{2}{ax+1}-1\right)-a^3\text{Li}_2\left(\frac{2}{ax+1}-1\right)\coth^{-1}(ax)+a^3\log(x)+\frac{1}{3}a^3\coth^{-1}(ax)^3+\frac{1}{2}a^3\coth^{-1}(ax)^2+a^3\log\Bigg($$

```
[Out] -a^2*arccoth(a*x)/x+1/2*a^3*arccoth(a*x)^2-1/2*a*arccoth(a*x)^2/x^2+1/3*a^3
*arccoth(a*x)^3-1/3*arccoth(a*x)^3/x^3+a^3*ln(x)-1/2*a^3*ln(-a^2*x^2+1)+a^3
*arccoth(a*x)^2*ln(2-2/(a*x+1))-a^3*arccoth(a*x)*polylog(2,-1+2/(a*x+1))-1/
2*a^3*polylog(3,-1+2/(a*x+1))
```

**Rubi** [A] time = 0.37, antiderivative size = 154, normalized size of antiderivative = 1.00, number of steps used = 14, number of rules used = 11, integrand size = 10, $\frac{\text{number of rules}}{\text{integrand size}}$ = 1.100, Rules used = {5917, 5983, 266, 36, 29, 31, 5949, 5989, 5933, 6057, 6610}

$$-\frac{1}{2}a^3\text{PolyLog}\left(3,\frac{2}{ax+1}-1\right)-a^3\coth^{-1}(ax)\text{PolyLog}\left(2,\frac{2}{ax+1}-1\right)-\frac{1}{2}a^3\log\left(1-a^2x^2\right)+a^3\log(x)+\frac{1}{3}a^3\coth$$

Antiderivative was successfully verified.

```
[In] Int[ArcCoth[a*x]^3/x^4,x]
```

```
[Out] -((a^2*ArcCoth[a*x])/x) + (a^3*ArcCoth[a*x]^2)/2 - (a*ArcCoth[a*x]^2)/(2*x^
2) + (a^3*ArcCoth[a*x]^3)/3 - ArcCoth[a*x]^3/(3*x^3) + a^3*Log[x] - (a^3*Lo
g[1 - a^2*x^2])/2 + a^3*ArcCoth[a*x]^2*Log[2 - 2/(1 + a*x)] - a^3*ArcCoth[a
*x]*PolyLog[2, -1 + 2/(1 + a*x)] - (a^3*PolyLog[3, -1 + 2/(1 + a*x)])/2
```

Rule 29

```
Int[(x_)^(-1), x_Symbol] :> Simp[Log[x], x]
```

Rule 31

```
Int[((a_) + (b_.)*(x_))^(-1), x_Symbol] :> Simp[Log[RemoveContent[a + b*x,
x]]/b, x] /; FreeQ[{a, b}, x]
```

Rule 36

```
Int[1/(((a_.) + (b_.)*(x_))*((c_.) + (d_.)*(x_))), x_Symbol] :> Dist[b/(b*c
 - a*d), Int[1/(a + b*x), x], x] - Dist[d/(b*c - a*d), Int[1/(c + d*x), x],
 x] /; FreeQ[{a, b, c, d}, x] && NeQ[b*c - a*d, 0]
```

Rule 266

```
Int[(x_)^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Dist[1/n, Subst[
Int[x^(Simplify[(m + 1)/n] - 1)*(a + b*x)^p, x], x, x^n], x] /; FreeQ[{a, b
, m, n, p}, x] && IntegerQ[Simplify[(m + 1)/n]]
```

Rule 5917

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)*((d_.)*(x_))^(m_.), x_Symbol]
 :> Simp[((d*x)^(m + 1)*(a + b*ArcCoth[c*x])^p)/(d*(m + 1)), x] - Dist[(b*c
*p)/(d*(m + 1)), Int[((d*x)^(m + 1)*(a + b*ArcCoth[c*x])^(p - 1))/(1 - c^2*
x^2), x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[p, 0] && (EqQ[p, 1] || In
tegerQ[m]) && NeQ[m, -1]
```

Rule 5933

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)/((x_)*((d_) + (e_.)*(x_))), x
_Symbol] :> Simp[((a + b*ArcCoth[c*x])^p*Log[2 - 2/(1 + (e*x)/d)])/d, x] -
Dist[(b*c*p)/d, Int[((a + b*ArcCoth[c*x])^(p - 1)*Log[2 - 2/(1 + (e*x)/d)])
/(1 - c^2*x^2), x], x] /; FreeQ[{a, b, c, d, e}, x] && IGtQ[p, 0] && EqQ[c^
2*d^2 - e^2, 0]
```

Rule 5949

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)/((d_) + (e_.)*(x_)^2), x_Symb
ol] :> Simp[(a + b*ArcCoth[c*x])^(p + 1)/(b*c*d*(p + 1)), x] /; FreeQ[{a, b
, c, d, e, p}, x] && EqQ[c^2*d + e, 0] && NeQ[p, -1]
```

Rule 5983

```
Int[(((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)*((f_.)*(x_))^(m_))/((d_) + (
e_.)*(x_)^2), x_Symbol] :> Dist[1/d, Int[(f*x)^m*(a + b*ArcCoth[c*x])^p, x]
, x] - Dist[e/(d*f^2), Int[((f*x)^(m + 2)*(a + b*ArcCoth[c*x])^p)/(d + e*x^
2), x], x] /; FreeQ[{a, b, c, d, e, f}, x] && GtQ[p, 0] && LtQ[m, -1]
```

Rule 5989

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)/((x_)*((d_) + (e_.)*(x_)^2)),
 x_Symbol] :> Simp[(a + b*ArcCoth[c*x])^(p + 1)/(b*d*(p + 1)), x] + Dist[1/
d, Int[(a + b*ArcCoth[c*x])^p/(x*(1 + c*x)), x], x] /; FreeQ[{a, b, c, d, e
}, x] && EqQ[c^2*d + e, 0] && GtQ[p, 0]
```

Rule 6057

```
Int[(Log[u_]*((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.))/((d_) + (e_.)*(x_)^
2), x_Symbol] :> Simp[((a + b*ArcCoth[c*x])^p*PolyLog[2, 1 - u])/(2*c*d), x
] - Dist[(b*p)/2, Int[((a + b*ArcCoth[c*x])^(p - 1)*PolyLog[2, 1 - u])/(d +
 e*x^2), x], x] /; FreeQ[{a, b, c, d, e}, x] && IGtQ[p, 0] && EqQ[c^2*d + e
, 0] && EqQ[(1 - u)^2 - (1 - 2/(1 + c*x))^2, 0]
```

Rule 6610

```
Int[(u_)*PolyLog[n_, v_], x_Symbol] :> With[{w = DerivativeDivides[v, u*v,
x]}, Simp[w*PolyLog[n + 1, v], x] /;  !FalseQ[w]] /; FreeQ[n, x]
```

Rubi steps

$$\int \frac{\coth^{-1}(ax)^3}{x^4}dx = -\frac{\coth^{-1}(ax)^3}{3x^3} + a\int \frac{\coth^{-1}(ax)^2}{x^3(1-a^2x^2)}dx$$
$$= -\frac{\coth^{-1}(ax)^3}{3x^3} + a\int \frac{\coth^{-1}(ax)^2}{x^3}dx + a^3\int \frac{\coth^{-1}(ax)^2}{x(1-a^2x^2)}dx$$
$$= -\frac{a\coth^{-1}(ax)^2}{2x^2} + \frac{1}{3}a^3\coth^{-1}(ax)^3 - \frac{\coth^{-1}(ax)^3}{3x^3} + a^2\int \frac{\coth^{-1}(ax)}{x^2(1-a^2x^2)}dx + a^3\int \frac{\coth^{-1}}{x(1-}$$
$$= -\frac{a\coth^{-1}(ax)^2}{2x^2} + \frac{1}{3}a^3\coth^{-1}(ax)^3 - \frac{\coth^{-1}(ax)^3}{3x^3} + a^3\coth^{-1}(ax)^2\log\left(2-\frac{2}{1+ax}\right) + a$$
$$= -\frac{a^2\coth^{-1}(ax)}{x} + \frac{1}{2}a^3\coth^{-1}(ax)^2 - \frac{a\coth^{-1}(ax)^2}{2x^2} + \frac{1}{3}a^3\coth^{-1}(ax)^3 - \frac{\coth^{-1}(ax)^3}{3x^3} +$$
$$= -\frac{a^2\coth^{-1}(ax)}{x} + \frac{1}{2}a^3\coth^{-1}(ax)^2 - \frac{a\coth^{-1}(ax)^2}{2x^2} + \frac{1}{3}a^3\coth^{-1}(ax)^3 - \frac{\coth^{-1}(ax)^3}{3x^3} +$$
$$= -\frac{a^2\coth^{-1}(ax)}{x} + \frac{1}{2}a^3\coth^{-1}(ax)^2 - \frac{a\coth^{-1}(ax)^2}{2x^2} + \frac{1}{3}a^3\coth^{-1}(ax)^3 - \frac{\coth^{-1}(ax)^3}{3x^3} +$$
$$= -\frac{a^2\coth^{-1}(ax)}{x} + \frac{1}{2}a^3\coth^{-1}(ax)^2 - \frac{a\coth^{-1}(ax)^2}{2x^2} + \frac{1}{3}a^3\coth^{-1}(ax)^3 - \frac{\coth^{-1}(ax)^3}{3x^3} +$$

**Mathematica [A]** time = 0.22, size = 142, normalized size = 0.92

$$\frac{1}{6}\left(-6a^3\coth^{-1}(ax)\text{Li}_2\left(-e^{-2\coth^{-1}(ax)}\right) - 3a^3\text{Li}_3\left(-e^{-2\coth^{-1}(ax)}\right) + 2a^3\coth^{-1}(ax)^3 + 3a^3\coth^{-1}(ax)^2 + 6a^3\text{co}\right.$$

Warning: Unable to verify antiderivative.

```
[In] Integrate[ArcCoth[a*x]^3/x^4,x]
```

```
[Out] ((-6*a^2*ArcCoth[a*x])/x + 3*a^3*ArcCoth[a*x]^2 - (3*a*ArcCoth[a*x]^2)/x^2
+ 2*a^3*ArcCoth[a*x]^3 - (2*ArcCoth[a*x]^3)/x^3 + 6*a^3*ArcCoth[a*x]^2*Log[
1 + E^(-2*ArcCoth[a*x])] + 6*a^3*Log[1/Sqrt[1 - 1/(a^2*x^2)]] - 6*a^3*ArcCo
th[a*x]*PolyLog[2, -E^(-2*ArcCoth[a*x])] - 3*a^3*PolyLog[3, -E^(-2*ArcCoth[
a*x])])/6
```

**fricas [F]** time = 0.64, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{\text{arcoth}(ax)^3}{x^4}, x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(a*x)^3/x^4,x, algorithm="fricas")
```

```
[Out] integral(arccoth(a*x)^3/x^4, x)
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\text{arcoth}(ax)^3}{x^4}dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(a*x)^3/x^4,x, algorithm="giac")
```

```
[Out] integrate(arccoth(a*x)^3/x^4, x)
```

**maple [C]** time = 2.41, size = 895, normalized size = 5.81

result too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(arccoth(a*x)^3/x^4,x)
```

```
[Out] -1/3*a^3*arccoth(a*x)^3+1/2*a^3*arccoth(a*x)^2-1/2*a*arccoth(a*x)^2/x^2-a^3
*arccoth(a*x)-1/2*a^3*polylog(3,-(a*x+1)/(a*x-1))+a^3*ln(1+(a*x+1)/(a*x-1))
-a^2*arccoth(a*x)/x-1/3*arccoth(a*x)^3/x^3-1/4*I*a^3*arccoth(a*x)^2*Pi*csgn
(I*(a*x+1)/(a*x-1))^3-1/4*I*a^3*arccoth(a*x)^2*Pi*csgn(I*(a*x+1)/(a*x-1))*c
sgn(I/((a*x+1)/(a*x-1)-1))*csgn(I*(a*x+1)/(a*x-1)/((a*x+1)/(a*x-1)-1))+1/2*
I*a^3*arccoth(a*x)^2*Pi*csgn(I/((a*x+1)/(a*x-1)-1)*(1+(a*x+1)/(a*x-1)))*csg
n(I*(1+(a*x+1)/(a*x-1)))*csgn(I/((a*x+1)/(a*x-1)-1))-1/4*I*a^3*arccoth(a*x)
^2*Pi*csgn(I*(a*x+1)/(a*x-1)/((a*x+1)/(a*x-1)-1))^3+1/2*I*a^3*arccoth(a*x)^
2*Pi*csgn(I/((a*x+1)/(a*x-1)-1)*(1+(a*x+1)/(a*x-1)))^3+1/2*I*a^3*arccoth(a*
x)^2*Pi*csgn(I/((a*x-1)/(a*x+1))^(1/2))*csgn(I*(a*x+1)/(a*x-1))^2+1/4*I*a^3
*arccoth(a*x)^2*Pi*csgn(I*(a*x+1)/(a*x-1))*csgn(I*(a*x+1)/(a*x-1)/((a*x+1)/
(a*x-1)-1))^2-1/4*I*a^3*arccoth(a*x)^2*Pi*csgn(I/((a*x-1)/(a*x+1))^(1/2))^2
*csgn(I*(a*x+1)/(a*x-1))+1/4*I*a^3*arccoth(a*x)^2*Pi*csgn(I/((a*x+1)/(a*x-1
)-1))*csgn(I*(a*x+1)/(a*x-1)/((a*x+1)/(a*x-1)-1))^2-1/2*I*a^3*arccoth(a*x)^
2*Pi*csgn(I/((a*x+1)/(a*x-1)-1)*(1+(a*x+1)/(a*x-1)))^2*csgn(I/((a*x+1)/(a*x
-1)-1))-1/2*I*a^3*arccoth(a*x)^2*Pi*csgn(I/((a*x+1)/(a*x-1)-1)*(1+(a*x+1)/(
a*x-1)))^2*csgn(I*(1+(a*x+1)/(a*x-1)))+a^3*arccoth(a*x)^2*ln(a*x)-1/2*a^3*a
rccoth(a*x)^2*ln(a*x-1)+a^3*arccoth(a*x)*polylog(2,-(a*x+1)/(a*x-1))-1/2*a^
3*arccoth(a*x)^2*ln(a*x+1)-1/2*a^3*arccoth(a*x)^2*ln((a*x-1)/(a*x+1))+a^3*a
rccoth(a*x)^2*ln(2)
```

**maxima [F]** time = 0.00, size = 0, normalized size = 0.00

result too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(a*x)^3/x^4,x, algorithm="maxima")
```

```
[Out] 1/4*a^4*integrate(x^4*log(a*x + 1)*log(a*x - 1)/(a*x^5 + x^4), x) - 1/2*a^4
*integrate(x^4*log(a*x + 1)*log(x)/(a*x^5 + x^4), x) + 1/16*(2*a^2*log(a*x
+ 1) - 2*a^2*log(x) - (2*a*x - 1)/x^2)*a*log(a)^3 + 3/8*a*integrate(x*log(a
*x - 1)/(a*x^5 + x^4), x)*log(a)^2 - 3/8*a*integrate(x*log(x)/(a*x^5 + x^4)
, x)*log(a)^2 - 1/48*(6*a^3*log(a*x + 1) - 6*a^3*log(x) - (6*a^2*x^2 - 3*a*
x + 2)/x^3)*log(a)^3 + 1/4*a^2*integrate(x^2*log(a*x + 1)/(a*x^5 + x^4), x)
 + 3/4*a*integrate(x*log(a*x - 1)*log(x)/(a*x^5 + x^4), x)*log(a) - 3/8*a*i
ntegrate(x*log(x)^2/(a*x^5 + x^4), x)*log(a) + 3/8*integrate(log(a*x - 1)/(
a*x^5 + x^4), x)*log(a)^2 - 3/8*integrate(log(x)/(a*x^5 + x^4), x)*log(a)^2
 + 3/8*a*integrate(x*log(a*x + 1)*log(a*x - 1)^2/(a*x^5 + x^4), x) - 3/8*a*
integrate(x*log(a*x - 1)^2*log(x)/(a*x^5 + x^4), x) + 3/8*a*integrate(x*log
(a*x - 1)*log(x)^2/(a*x^5 + x^4), x) - 1/8*a*integrate(x*log(x)^3/(a*x^5 +
x^4), x) - 1/4*a*integrate(x*log(a*x + 1)*log(a*x - 1)/(a*x^5 + x^4), x) -
3/8*integrate(a*x*log(a*x - 1)^2/(a*x^5 + x^4), x)*log(a) - 3/8*integrate(l
og(a*x - 1)^2/(a*x^5 + x^4), x)*log(a) + 3/4*integrate(log(a*x - 1)*log(x)/
(a*x^5 + x^4), x)*log(a) - 3/8*integrate(log(x)^2/(a*x^5 + x^4), x)*log(a)
- 1/48*(6*a^4*log(a*x - 1) - 6*a^4*log(x) + (6*a^3*x^2 + 3*a^2*x + 2*a)/x^3
)*log(-1/(a*x) + 1)^2/a + 1/864*(6*(18*a^5*x^3*log(a*x - 1)^2 + 18*a^5*x^3*
log(x)^2 - 66*a^5*x^3*log(x) + 66*a^4*x^2 + 15*a^3*x + 4*a^2 - 6*(6*a^5*x^3
*log(x) - 11*a^5*x^3)*log(a*x - 1))*log(-1/(a*x) + 1)/(a*x^3) - (36*a^6*x^3
*log(a*x - 1)^3 - 36*a^6*x^3*log(x)^3 + 198*a^6*x^3*log(x)^2 - 510*a^6*x^3*
```

```
log(x) + 510*a^5*x^2 + 57*a^4*x + 8*a^3 - 18*(6*a^6*x^3*log(x) - 11*a^6*x^3
)*log(a*x - 1)^2 + 6*(18*a^6*x^3*log(x)^2 - 66*a^6*x^3*log(x) + 85*a^6*x^3)
*log(a*x - 1))/(a^2*x^3))/a + 1/24*log(-1/(a*x) + 1)^3/x^3 - 1/24*((a^3*x^3
 + 1)*log(a*x + 1)^3 - 3*(2*a^3*x^3*log(x) - a*x - (a^3*x^3 - 1)*log(a*x -
1))*log(a*x + 1)^2)/x^3 + 3/8*integrate(log(a*x + 1)*log(a*x - 1)^2/(a*x^5
+ x^4), x) - 3/8*integrate(log(a*x - 1)^2*log(x)/(a*x^5 + x^4), x) + 3/8*in
tegrate(log(a*x - 1)*log(x)^2/(a*x^5 + x^4), x) - 1/8*integrate(log(x)^3/(a
*x^5 + x^4), x)
```

**mupad** **[F]** time = 0.00, size = -1, normalized size = -0.01

$$\int \frac{\operatorname{acoth}(a\,x)^3}{x^4}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(a*x)^3/x^4,x)
```

```
[Out] int(acoth(a*x)^3/x^4, x)
```

**sympy** **[F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{acoth}^3(ax)}{x^4}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(a*x)**3/x**4,x)
```

```
[Out] Integral(acoth(a*x)**3/x**4, x)
```

## 3.33 $\int \frac{\coth^{-1}(ax)^3}{x^5} dx$

**Optimal**. Leaf size=141

$$-a^4\text{Li}_2\left(\frac{2}{ax+1}-1\right)+\frac{1}{4}a^4\tanh^{-1}(ax)+\frac{1}{4}a^4\coth^{-1}(ax)^3+a^4\coth^{-1}(ax)^2+2a^4\log\left(2-\frac{2}{ax+1}\right)\coth^{-1}(ax)-\frac{a^3}{4x}-\frac{3}{}$$

```
[Out] -1/4*a^3/x-1/4*a^2*arccoth(a*x)/x^2+a^4*arccoth(a*x)^2-1/4*a*arccoth(a*x)^2
/x^3-3/4*a^3*arccoth(a*x)^2/x+1/4*a^4*arccoth(a*x)^3-1/4*arccoth(a*x)^3/x^4
+1/4*a^4*arctanh(a*x)+2*a^4*arccoth(a*x)*ln(2-2/(a*x+1))-a^4*polylog(2,-1+2
/(a*x+1))
```

**Rubi [A]** time = 0.46, antiderivative size = 141, normalized size of antiderivative = 1.00, number of steps used = 16, number of rules used = 8, integrand size = 10, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.800, Rules used = {5917, 5983, 325, 206, 5989, 5933, 2447, 5949}

$$-a^4\text{PolyLog}\left(2,\frac{2}{ax+1}-1\right)-\frac{a^2\coth^{-1}(ax)}{4x^2}-\frac{a^3}{4x}+\frac{1}{4}a^4\tanh^{-1}(ax)+\frac{1}{4}a^4\coth^{-1}(ax)^3+a^4\coth^{-1}(ax)^2-\frac{3a^3\coth^{-1}(}{4x}$$

Antiderivative was successfully verified.

```
[In] Int[ArcCoth[a*x]^3/x^5,x]
```

```
[Out] -a^3/(4*x) - (a^2*ArcCoth[a*x])/(4*x^2) + a^4*ArcCoth[a*x]^2 - (a*ArcCoth[a
*x]^2)/(4*x^3) - (3*a^3*ArcCoth[a*x]^2)/(4*x) + (a^4*ArcCoth[a*x]^3)/4 - Ar
cCoth[a*x]^3/(4*x^4) + (a^4*ArcTanh[a*x])/4 + 2*a^4*ArcCoth[a*x]*Log[2 - 2/
(1 + a*x)] - a^4*PolyLog[2, -1 + 2/(1 + a*x)]
```

Rule 206

```
Int[((a_) + (b_.)*(x_)^2)^(-1), x_Symbol] :> Simp[(1*ArcTanh[(Rt[-b, 2]*x)/
Rt[a, 2]])/(Rt[a, 2]*Rt[-b, 2]), x] /; FreeQ[{a, b}, x] && NegQ[a/b] && (Gt
Q[a, 0] || LtQ[b, 0])
```

Rule 325

```
Int[((c_.)*(x_))^(m_)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Simp[((c*
x)^(m + 1)*(a + b*x^n)^(p + 1))/(a*c*(m + 1)), x] - Dist[(b*(m + n*(p + 1)
+ 1))/(a*c^n*(m + 1)), Int[(c*x)^(m + n)*(a + b*x^n)^p, x], x] /; FreeQ[{a,
 b, c, p}, x] && IGtQ[n, 0] && LtQ[m, -1] && IntBinomialQ[a, b, c, n, m, p,
 x]
```

Rule 2447

```
Int[Log[u_]*(Pq_)^(m_.), x_Symbol] :> With[{C = FullSimplify[(Pq^m*(1 - u))
/D[u, x]]}, Simp[C*PolyLog[2, 1 - u], x] /; FreeQ[C, x]] /; IntegerQ[m] &&
PolyQ[Pq, x] && RationalFunctionQ[u, x] && LeQ[RationalFunctionExponents[u,
 x][[2]], Expon[Pq, x]]
```

Rule 5917

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)*((d_.)*(x_))^(m_.), x_Symbol]
 :> Simp[((d*x)^(m + 1)*(a + b*ArcCoth[c*x])^p)/(d*(m + 1)), x] - Dist[(b*c
*p)/(d*(m + 1)), Int[((d*x)^(m + 1)*(a + b*ArcCoth[c*x])^(p - 1))/(1 - c^2*
x^2), x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[p, 0] && (EqQ[p, 1] || In
tegerQ[m]) && NeQ[m, -1]
```

Rule 5933

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)/((x_)*((d_) + (e_.)*(x_))), x
_Symbol] :> Simp[((a + b*ArcCoth[c*x])^p*Log[2 - 2/(1 + (e*x)/d)])/d, x] -
Dist[(b*c*p)/d, Int[((a + b*ArcCoth[c*x])^(p - 1)*Log[2 - 2/(1 + (e*x)/d)])
/(1 - c^2*x^2), x], x] /; FreeQ[{a, b, c, d, e}, x] && IGtQ[p, 0] && EqQ[c^
2*d^2 - e^2, 0]
```

Rule 5949

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)/((d_) + (e_.)*(x_)^2), x_Symb
ol] :> Simp[(a + b*ArcCoth[c*x])^(p + 1)/(b*c*d*(p + 1)), x] /; FreeQ[{a, b
, c, d, e, p}, x] && EqQ[c^2*d + e, 0] && NeQ[p, -1]
```

Rule 5983

```
Int[(((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)*((f_.)*(x_))^(m_))/((d_) + (
e_.)*(x_)^2), x_Symbol] :> Dist[1/d, Int[(f*x)^m*(a + b*ArcCoth[c*x])^p, x]
, x] - Dist[e/(d*f^2), Int[((f*x)^(m + 2)*(a + b*ArcCoth[c*x])^p)/(d + e*x^
2), x], x] /; FreeQ[{a, b, c, d, e, f}, x] && GtQ[p, 0] && LtQ[m, -1]
```

Rule 5989

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)/((x_)*((d_) + (e_.)*(x_)^2)),
 x_Symbol] :> Simp[(a + b*ArcCoth[c*x])^(p + 1)/(b*d*(p + 1)), x] + Dist[1/
d, Int[(a + b*ArcCoth[c*x])^p/(x*(1 + c*x)), x], x] /; FreeQ[{a, b, c, d, e
}, x] && EqQ[c^2*d + e, 0] && GtQ[p, 0]
```

Rubi steps

$$\int \frac{\coth^{-1}(ax)^3}{x^5}\,dx = -\frac{\coth^{-1}(ax)^3}{4x^4}+\frac{1}{4}(3a)\int \frac{\coth^{-1}(ax)^2}{x^4\left(1-a^2x^2\right)}\,dx$$

$$= -\frac{\coth^{-1}(ax)^3}{4x^4}+\frac{1}{4}(3a)\int \frac{\coth^{-1}(ax)^2}{x^4}\,dx+\frac{1}{4}\left(3a^3\right)\int \frac{\coth^{-1}(ax)^2}{x^2\left(1-a^2x^2\right)}\,dx$$

$$= -\frac{a\coth^{-1}(ax)^2}{4x^3}-\frac{\coth^{-1}(ax)^3}{4x^4}+\frac{1}{2}a^2\int \frac{\coth^{-1}(ax)}{x^3\left(1-a^2x^2\right)}\,dx+\frac{1}{4}\left(3a^3\right)\int \frac{\coth^{-1}(ax)^2}{x^2}\,dx+$$

$$= -\frac{a\coth^{-1}(ax)^2}{4x^3}-\frac{3a^3\coth^{-1}(ax)^2}{4x}+\frac{1}{4}a^4\coth^{-1}(ax)^3-\frac{\coth^{-1}(ax)^3}{4x^4}+\frac{1}{2}a^2\int \frac{\coth^{-1}(a}{x^3}$$

$$= -\frac{a^2\coth^{-1}(ax)}{4x^2}+a^4\coth^{-1}(ax)^2-\frac{a\coth^{-1}(ax)^2}{4x^3}-\frac{3a^3\coth^{-1}(ax)^2}{4x}+\frac{1}{4}a^4\coth^{-1}(ax)^3$$

$$= -\frac{a^3}{4x}-\frac{a^2\coth^{-1}(ax)}{4x^2}+a^4\coth^{-1}(ax)^2-\frac{a\coth^{-1}(ax)^2}{4x^3}-\frac{3a^3\coth^{-1}(ax)^2}{4x}+\frac{1}{4}a^4\coth^{-1}($$

$$= -\frac{a^3}{4x}-\frac{a^2\coth^{-1}(ax)}{4x^2}+a^4\coth^{-1}(ax)^2-\frac{a\coth^{-1}(ax)^2}{4x^3}-\frac{3a^3\coth^{-1}(ax)^2}{4x}+\frac{1}{4}a^4\coth^{-1}($$

**Mathematica [A]** time = 0.24, size = 118, normalized size = 0.84

$$\frac{-4a^4x^4\text{Li}_2\left(-e^{-2\coth^{-1}(ax)}\right)+\left(a^4x^4-1\right)\coth^{-1}(ax)^3-a^3x^3+a^2x^2\coth^{-1}(ax)\left(a^2x^2+8a^2x^2\log\left(e^{-2\coth^{-1}(ax)}\right.\right.}{4x^4}$$

Warning: Unable to verify antiderivative.

```
[In] Integrate[ArcCoth[a*x]^3/x^5,x]
```

```
[Out] (-(a^3*x^3) + a*x*(-1 - 3*a^2*x^2 + 4*a^3*x^3)*ArcCoth[a*x]^2 + (-1 + a^4*x
^4)*ArcCoth[a*x]^3 + a^2*x^2*ArcCoth[a*x]*(-1 + a^2*x^2 + 8*a^2*x^2*Log[1 +
 E^(-2*ArcCoth[a*x])]) - 4*a^4*x^4*PolyLog[2, -E^(-2*ArcCoth[a*x])])/(4*x^4
)
```

**fricas [F]** time = 0.51, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{\operatorname{arcoth}(ax)^3}{x^5}, x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(a*x)^3/x^5,x, algorithm="fricas")
```

```
[Out] integral(arccoth(a*x)^3/x^5, x)
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{arcoth}(ax)^3}{x^5}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(a*x)^3/x^5,x, algorithm="giac")
```

```
[Out] integrate(arccoth(a*x)^3/x^5, x)
```

**maple [C]** time = 1.50, size = 661, normalized size = 4.69

$$\frac{a^4 \operatorname{arccoth}(ax)}{4}+\frac{a^4}{4}-a^4 \operatorname{arccoth}(ax)^2+\frac{a^4 \operatorname{arccoth}(ax)^3}{4}-\frac{3a^4 \operatorname{arccoth}(ax)^2 \ln(ax-1)}{8}+\frac{3a^4 \operatorname{arccoth}(ax)^2 \ln(ax+}{8}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(arccoth(a*x)^3/x^5,x)
```

```
[Out] 1/4*a^4*arccoth(a*x)+1/4*a^4-a^4*arccoth(a*x)^2+1/4*a^4*arccoth(a*x)^3-3/8*
a^4*arccoth(a*x)^2*ln(a*x-1)+3/8*a^4*arccoth(a*x)^2*ln(a*x+1)+2*a^4*arccoth
(a*x)*ln(1+I/((a*x-1)/(a*x+1))^(1/2))+2*a^4*arccoth(a*x)*ln(1-I/((a*x-1)/(a
*x+1))^(1/2))+3/8*a^4*arccoth(a*x)^2*ln((a*x-1)/(a*x+1))-1/4*arccoth(a*x)^3
/x^4-1/4*a*arccoth(a*x)^2/x^3-3/4*a^3*arccoth(a*x)^2/x-1/4*a^3/x-3/16*I*a^4
*Pi*csgn(I/((a*x+1)/(a*x-1)-1))*csgn(I*(a*x+1)/(a*x-1)/((a*x+1)/(a*x-1)-1))
^2*arccoth(a*x)^2-1/4*a^2*arccoth(a*x)/x^2+2*a^4*dilog(1+I/((a*x-1)/(a*x+1)
)^(1/2))+2*a^4*dilog(1-I/((a*x-1)/(a*x+1))^(1/2))+3/16*I*a^4*Pi*csgn(I/((a*
x-1)/(a*x+1))^(1/2))^2*csgn(I*(a*x+1)/(a*x-1))*arccoth(a*x)^2-3/8*I*a^4*Pi*
csgn(I/((a*x-1)/(a*x+1))^(1/2))*csgn(I*(a*x+1)/(a*x-1))^2*arccoth(a*x)^2+3/
16*I*a^4*Pi*csgn(I*(a*x+1)/(a*x-1))^3*arccoth(a*x)^2+3/16*I*a^4*Pi*csgn(I*(
a*x+1)/(a*x-1)/((a*x+1)/(a*x-1)-1))^3*arccoth(a*x)^2+3/16*I*a^4*Pi*csgn(I*(
a*x+1)/(a*x-1))*csgn(I/((a*x+1)/(a*x-1)-1))*csgn(I*(a*x+1)/(a*x-1)/((a*x+1)
/(a*x-1)-1))*arccoth(a*x)^2-3/16*I*a^4*Pi*csgn(I*(a*x+1)/(a*x-1))*csgn(I*(a
*x+1)/(a*x-1)/((a*x+1)/(a*x-1)-1))^2*arccoth(a*x)^2
```

**maxima [B]** time = 0.34, size = 342, normalized size = 2.43

$$\frac{1}{8}\left(3\,a^3 \log(ax+1) - 3\,a^3 \log(ax-1) - \frac{2\left(3\,a^2x^2+1\right)}{x^3}\right)a \operatorname{arcoth}(ax)^2+\frac{1}{32}\left(\left(32\left(\log(ax-1)\log\left(\frac{1}{2}\,ax+\frac{1}{2}\right)+\text{L}\right.\right.\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(a*x)^3/x^5,x, algorithm="maxima")
```

```
[Out] 1/8*(3*a^3*log(a*x + 1) - 3*a^3*log(a*x - 1) - 2*(3*a^2*x^2 + 1)/x^3)*a*arc
coth(a*x)^2 + 1/32*((32*(log(a*x - 1)*log(1/2*a*x + 1/2) + dilog(-1/2*a*x +
 1/2))*a - 32*(log(a*x + 1)*log(x) + dilog(-a*x))*a + 32*(log(-a*x + 1)*log
(x) + dilog(a*x))*a + 4*a*log(a*x + 1) - 4*a*log(a*x - 1) + (a*x*log(a*x +
1)^3 - a*x*log(a*x - 1)^3 - 8*a*x*log(a*x - 1)^2 - (3*a*x*log(a*x - 1) - 8*
a*x)*log(a*x + 1)^2 + (3*a*x*log(a*x - 1)^2 - 16*a*x*log(a*x - 1))*log(a*x
+ 1) - 8)/x)*a^2 + 2*(32*a^2*log(x) - (3*a^2*x^2*log(a*x + 1)^2 + 3*a^2*x^2
*log(a*x - 1)^2 + 16*a^2*x^2*log(a*x - 1) - 2*(3*a^2*x^2*log(a*x - 1) - 8*a
^2*x^2)*log(a*x + 1) + 4)/x^2)*a*arccoth(a*x))*a - 1/4*arccoth(a*x)^3/x^4
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.01

$$\int \frac{\operatorname{acoth}(a\,x)^3}{x^5}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(a*x)^3/x^5,x)
```

```
[Out] int(acoth(a*x)^3/x^5, x)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{acoth}^{3}(ax)}{x^5}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(a*x)**3/x**5,x)
```

```
[Out] Integral(acoth(a*x)**3/x**5, x)
```

## 3.34 $\int \frac{\coth^{-1}(cx)^2}{d+ex}\,dx$

**Optimal**. Leaf size=164

$$-\frac{\text{Li}_3\left(1-\frac{2c(d+ex)}{(cd+e)(cx+1)}\right)}{2e}-\frac{\coth^{-1}(cx)\text{Li}_2\left(1-\frac{2c(d+ex)}{(cd+e)(cx+1)}\right)}{e}+\frac{\coth^{-1}(cx)^2\log\left(\frac{2c(d+ex)}{(cx+1)(cd+e)}\right)}{e}+\frac{\text{Li}_3\left(1-\frac{2}{cx+1}\right)}{2e}+\frac{\text{Li}_2\left(1-\ldots\right.}{}$$

```
[Out] -arccoth(c*x)^2*ln(2/(c*x+1))/e+arccoth(c*x)^2*ln(2*c*(e*x+d)/(c*d+e)/(c*x+
1))/e+arccoth(c*x)*polylog(2,1-2/(c*x+1))/e-arccoth(c*x)*polylog(2,1-2*c*(e
*x+d)/(c*d+e)/(c*x+1))/e+1/2*polylog(3,1-2/(c*x+1))/e-1/2*polylog(3,1-2*c*(
e*x+d)/(c*d+e)/(c*x+1))/e
```

**Rubi [A]** time = 0.03, antiderivative size = 164, normalized size of antiderivative = 1.00, number of steps used = 1, number of rules used = 1, integrand size = 14, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.071, Rules used = {5923}

$$-\frac{\text{PolyLog}\left(3,1-\frac{2c(d+ex)}{(cx+1)(cd+e)}\right)}{2e}-\frac{\coth^{-1}(cx)\text{PolyLog}\left(2,1-\frac{2c(d+ex)}{(cx+1)(cd+e)}\right)}{e}+\frac{\text{PolyLog}\left(3,1-\frac{2}{cx+1}\right)}{2e}+\frac{\coth^{-1}(cx)\text{PolyL}\ldots}{}$$

Antiderivative was successfully verified.

```
[In] Int[ArcCoth[c*x]^2/(d + e*x),x]
```

```
[Out] -((ArcCoth[c*x]^2*Log[2/(1 + c*x)])/e) + (ArcCoth[c*x]^2*Log[(2*c*(d + e*x)
)/((c*d + e)*(1 + c*x))])/e + (ArcCoth[c*x]*PolyLog[2, 1 - 2/(1 + c*x)])/e
- (ArcCoth[c*x]*PolyLog[2, 1 - (2*c*(d + e*x))/((c*d + e)*(1 + c*x))])/e +
PolyLog[3, 1 - 2/(1 + c*x)]/(2*e) - PolyLog[3, 1 - (2*c*(d + e*x))/((c*d +
e)*(1 + c*x))]/(2*e)
```

Rule 5923

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^2/((d_) + (e_.)*(x_)), x_Symbol] :>
 -Simp[((a + b*ArcCoth[c*x])^2*Log[2/(1 + c*x)])/e, x] + (Simp[((a + b*ArcC
oth[c*x])^2*Log[(2*c*(d + e*x))/((c*d + e)*(1 + c*x))])/e, x] + Simp[(b*(a
+ b*ArcCoth[c*x])*PolyLog[2, 1 - 2/(1 + c*x)])/e, x] - Simp[(b*(a + b*ArcCo
th[c*x])*PolyLog[2, 1 - (2*c*(d + e*x))/((c*d + e)*(1 + c*x))])/e, x] + Sim
p[(b^2*PolyLog[3, 1 - 2/(1 + c*x)])/(2*e), x] - Simp[(b^2*PolyLog[3, 1 - (2
*c*(d + e*x))/((c*d + e)*(1 + c*x))])/(2*e), x]) /; FreeQ[{a, b, c, d, e},
x] && NeQ[c^2*d^2 - e^2, 0]
```

Rubi steps

$$\int \frac{\coth^{-1}(cx)^2}{d+ex}\,dx=-\frac{\coth^{-1}(cx)^2\log\left(\frac{2}{1+cx}\right)}{e}+\frac{\coth^{-1}(cx)^2\log\left(\frac{2c(d+ex)}{(cd+e)(1+cx)}\right)}{e}+\frac{\coth^{-1}(cx)\text{Li}_2\left(1-\frac{2}{1+cx}\right)}{e}-\frac{\text{coth}\ldots}{}$$

**Mathematica [C]** time = 7.80, size = 565, normalized size = 3.45

$$24(e-cd)(cd+e)\left(2cd\sqrt{1-\frac{e^2}{c^2d^2}}\coth^{-1}(cx)^3e^{-\tanh^{-1}\left(\frac{e}{cd}\right)}+3e\coth^{-1}(cx)^2\log\left(\frac{d+ex}{x\sqrt{1-\frac{1}{c^2x^2}}}\right)-3i\pi e\log\left(\frac{1}{\sqrt{1-\frac{1}{c^2x^2}}}\right)\coth^{-1}(cx)-6e\coth^{-1}(cx)\text{Li}_2\left(-e^{\coth^{-1}(\ldots}\right.\right.$$

Warning: Unable to verify antiderivative.

```
[In] Integrate[ArcCoth[c*x]^2/(d + e*x),x]
```

```
[Out] ((-I)*e*Pi^3 + 8*c*d*ArcCoth[c*x]^3 + 8*e*ArcCoth[c*x]^3 - 24*e*ArcCoth[c*x
]^2*Log[1 - E^(2*ArcCoth[c*x])] - 24*e*ArcCoth[c*x]*PolyLog[2, E^(2*ArcCoth
[c*x])] + 12*e*PolyLog[3, E^(2*ArcCoth[c*x])] + (24*(-(c*d) + e)*(c*d + e)*
(-(c*d*ArcCoth[c*x]^3) + 3*e*ArcCoth[c*x]^3 + (2*c*d*Sqrt[1 - e^2/(c^2*d^2)
]*ArcCoth[c*x]^3)/E^ArcTanh[e/(c*d)] + (3*I)*e*Pi*ArcCoth[c*x]*Log[(E^(-Arc
Coth[c*x]) + E^ArcCoth[c*x])/2] - 3*e*ArcCoth[c*x]^2*Log[1 - E^(ArcCoth[c*x
] + ArcTanh[e/(c*d)])] - 3*e*ArcCoth[c*x]^2*Log[1 + E^(ArcCoth[c*x] + ArcTa
nh[e/(c*d)])] - 6*e*ArcCoth[c*x]*ArcTanh[e/(c*d)]*Log[(I/2)*E^(-ArcCoth[c*x
] - ArcTanh[e/(c*d)])*(-1 + E^(2*(ArcCoth[c*x] + ArcTanh[e/(c*d)])))] - 3*e
*ArcCoth[c*x]^2*Log[(c*d*(-1 + E^(2*ArcCoth[c*x])) + e*(1 + E^(2*ArcCoth[c*
x])))/(2*E^ArcCoth[c*x])] - (3*I)*e*Pi*ArcCoth[c*x]*Log[1/Sqrt[1 - 1/(c^2*x
^2)]] + 3*e*ArcCoth[c*x]^2*Log[(d + e*x)/(Sqrt[1 - 1/(c^2*x^2)]*x)] + 6*e*A
rcCoth[c*x]*ArcTanh[e/(c*d)]*Log[I*Sinh[ArcCoth[c*x] + ArcTanh[e/(c*d)]]] -
 6*e*ArcCoth[c*x]*PolyLog[2, -E^(ArcCoth[c*x] + ArcTanh[e/(c*d)])] - 6*e*Ar
cCoth[c*x]*PolyLog[2, E^(ArcCoth[c*x] + ArcTanh[e/(c*d)])] + 6*e*PolyLog[3,
 -E^(ArcCoth[c*x] + ArcTanh[e/(c*d)])] + 6*e*PolyLog[3, E^(ArcCoth[c*x] + A
rcTanh[e/(c*d)])]))/(3*c^2*d^2 - 3*e^2))/(24*e^2)
```

**fricas [F]** time = 0.55, size = 0, normalized size = 0.00

$$\mathrm{integral}\left(\frac{\mathrm{arcoth}\,(cx)^2}{ex+d}, x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(c*x)^2/(e*x+d),x, algorithm="fricas")
```

```
[Out] integral(arccoth(c*x)^2/(e*x + d), x)
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\mathrm{arcoth}\,(cx)^2}{ex+d}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(c*x)^2/(e*x+d),x, algorithm="giac")
```

```
[Out] integrate(arccoth(c*x)^2/(e*x + d), x)
```

**maple [C]** time = 1.29, size = 926, normalized size = 5.65

result too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(arccoth(c*x)^2/(e*x+d),x)
```

```
[Out] ln(c*e*x+c*d)/e*arccoth(c*x)^2-1/e*arccoth(c*x)^2*ln(((c*x+1)/(c*x-1)-1)*d*
c+e*(1+(c*x+1)/(c*x-1)))-1/2*I/e*Pi*arccoth(c*x)^2*csgn(I*(((c*x+1)/(c*x-1)
-1)*d*c+e*(1+(c*x+1)/(c*x-1))))*csgn(I*(((c*x+1)/(c*x-1)-1)*d*c+e*(1+(c*x+1
)/(c*x-1)))/((c*x+1)/(c*x-1)-1))^2-1/2*I/e*Pi*arccoth(c*x)^2*csgn(I/((c*x+1
)/(c*x-1)-1))*csgn(I*(((c*x+1)/(c*x-1)-1)*d*c+e*(1+(c*x+1)/(c*x-1)))/((c*x+
1)/(c*x-1)-1))^2+1/2*I/e*Pi*arccoth(c*x)^2*csgn(I/((c*x+1)/(c*x-1)-1))*csgn
(I*(((c*x+1)/(c*x-1)-1)*d*c+e*(1+(c*x+1)/(c*x-1))))*csgn(I*(((c*x+1)/(c*x-1
)-1)*d*c+e*(1+(c*x+1)/(c*x-1)))/((c*x+1)/(c*x-1)-1))+1/2*I/e*Pi*arccoth(c*x
)^2*csgn(I*(((c*x+1)/(c*x-1)-1)*d*c+e*(1+(c*x+1)/(c*x-1)))/((c*x+1)/(c*x-1)
-1))^3+1/e*arccoth(c*x)^2*ln((c*x+1)/(c*x-1)-1)-1/e*arccoth(c*x)^2*ln(1-1/(
(c*x-1)/(c*x+1))^(1/2))-2/e*arccoth(c*x)*polylog(2,1/((c*x-1)/(c*x+1))^(1/2
))+2/e*polylog(3,1/((c*x-1)/(c*x+1))^(1/2))-1/e*arccoth(c*x)^2*ln(1+1/((c*x
-1)/(c*x+1))^(1/2))-2/e*arccoth(c*x)*polylog(2,-1/((c*x-1)/(c*x+1))^(1/2))+
2/e*polylog(3,-1/((c*x-1)/(c*x+1))^(1/2))+1/(c*d+e)*arccoth(c*x)^2*ln(1-(c*
```

```
d+e)/(c*d-e)*(c*x+1)/(c*x-1))+1/(c*d+e)*arccoth(c*x)*polylog(2,(c*d+e)/(c*d
-e)*(c*x+1)/(c*x-1))-1/2/(c*d+e)*polylog(3,(c*d+e)/(c*d-e)*(c*x+1)/(c*x-1))
+c/e*d/(c*d+e)*arccoth(c*x)^2*ln(1-(c*d+e)/(c*d-e)*(c*x+1)/(c*x-1))+c/e*d/(
c*d+e)*arccoth(c*x)*polylog(2,(c*d+e)/(c*d-e)*(c*x+1)/(c*x-1))-1/2*c/e*d/(c
*d+e)*polylog(3,(c*d+e)/(c*d-e)*(c*x+1)/(c*x-1))
```

**maxima [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{arcoth}(cx)^2}{ex+d}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(c*x)^2/(e*x+d),x, algorithm="maxima")
```

```
[Out] integrate(arccoth(c*x)^2/(e*x + d), x)
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.01

$$\int \frac{\operatorname{acoth}(c\,x)^2}{d+e\,x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(c*x)^2/(d + e*x),x)
```

```
[Out] int(acoth(c*x)^2/(d + e*x), x)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{acoth}^2(cx)}{d+ex}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(c*x)**2/(e*x+d),x)
```

```
[Out] Integral(acoth(c*x)**2/(d + e*x), x)
```

## 3.35 $\int \left(c+dx^2\right)^4 \coth^{-1}(ax)\,dx$

**Optimal**. Leaf size=245

$$\frac{d^3x^6\left(36a^2c+7d\right)}{378a^3}+\frac{d^2x^4\left(378a^4c^2+180a^2cd+35d^2\right)}{1260a^5}+\frac{dx^2\left(420a^6c^3+378a^4c^2d+180a^2cd^2+35d^3\right)}{630a^7}+\frac{\left(315a^8\right.}{}$$

```
[Out] 1/630*d*(420*a^6*c^3+378*a^4*c^2*d+180*a^2*c*d^2+35*d^3)*x^2/a^7+1/1260*d^2
*(378*a^4*c^2+180*a^2*c*d+35*d^2)*x^4/a^5+1/378*d^3*(36*a^2*c+7*d)*x^6/a^3+
1/72*d^4*x^8/a+c^4*x*arccoth(a*x)+4/3*c^3*d*x^3*arccoth(a*x)+6/5*c^2*d^2*x^
5*arccoth(a*x)+4/7*c*d^3*x^7*arccoth(a*x)+1/9*d^4*x^9*arccoth(a*x)+1/630*(3
15*a^8*c^4+420*a^6*c^3*d+378*a^4*c^2*d^2+180*a^2*c*d^3+35*d^4)*ln(-a^2*x^2+
1)/a^9
```

**Rubi [A]** time = 0.18, antiderivative size = 245, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 4, integrand size = 14, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.286, Rules used = {194, 5977, 1810, 260}

$$\frac{d^2x^4\left(378a^4c^2+180a^2cd+35d^2\right)}{1260a^5}+\frac{dx^2\left(378a^4c^2d+420a^6c^3+180a^2cd^2+35d^3\right)}{630a^7}+\frac{\left(378a^4c^2d^2+420a^6c^3d+3\right.}{}$$

Antiderivative was successfully verified.

```
[In] Int[(c + d*x^2)^4*ArcCoth[a*x],x]
```

```
[Out] (d*(420*a^6*c^3 + 378*a^4*c^2*d + 180*a^2*c*d^2 + 35*d^3)*x^2)/(630*a^7) +
(d^2*(378*a^4*c^2 + 180*a^2*c*d + 35*d^2)*x^4)/(1260*a^5) + (d^3*(36*a^2*c
+ 7*d)*x^6)/(378*a^3) + (d^4*x^8)/(72*a) + c^4*x*ArcCoth[a*x] + (4*c^3*d*x^
3*ArcCoth[a*x])/3 + (6*c^2*d^2*x^5*ArcCoth[a*x])/5 + (4*c*d^3*x^7*ArcCoth[a
*x])/7 + (d^4*x^9*ArcCoth[a*x])/9 + ((315*a^8*c^4 + 420*a^6*c^3*d + 378*a^4
*c^2*d^2 + 180*a^2*c*d^3 + 35*d^4)*Log[1 - a^2*x^2])/(630*a^9)
```

Rule 194

```
Int[((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Int[ExpandIntegrand[(a + b*
x^n)^p, x], x] /; FreeQ[{a, b}, x] && IGtQ[n, 0] && IGtQ[p, 0]
```

Rule 260

```
Int[(x_)^(m_.)/((a_) + (b_.)*(x_)^(n_)), x_Symbol] :> Simp[Log[RemoveConten
t[a + b*x^n, x]]/(b*n), x] /; FreeQ[{a, b, m, n}, x] && EqQ[m, n - 1]
```

Rule 1810

```
Int[(Pq_)*((a_) + (b_.)*(x_)^2)^(p_.), x_Symbol] :> Int[ExpandIntegrand[Pq*
(a + b*x^2)^p, x], x] /; FreeQ[{a, b}, x] && PolyQ[Pq, x] && IGtQ[p, -2]
```

Rule 5977

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))*((d_.) + (e_.)*(x_)^2)^(q_.), x_Sym
bol] :> With[{u = IntHide[(d + e*x^2)^q, x]}, Dist[a + b*ArcCoth[c*x], u, x
] - Dist[b*c, Int[u/(1 - c^2*x^2), x], x]] /; FreeQ[{a, b, c, d, e}, x] &&
(IntegerQ[q] || ILtQ[q + 1/2, 0])
```

Rule Rubi steps

$$\int \left(c+dx^2\right)^4 \coth^{-1}(ax)\,dx = c^4x\coth^{-1}(ax)+\frac{4}{3}c^3dx^3\coth^{-1}(ax)+\frac{6}{5}c^2d^2x^5\coth^{-1}(ax)+\frac{4}{7}cd^3x^7\coth^{-1}(ax)+$$

$$= c^4x\coth^{-1}(ax)+\frac{4}{3}c^3dx^3\coth^{-1}(ax)+\frac{6}{5}c^2d^2x^5\coth^{-1}(ax)+\frac{4}{7}cd^3x^7\coth^{-1}(ax)+$$

$$= \frac{d\left(420a^6c^3+378a^4c^2d+180a^2cd^2+35d^3\right)x^2}{630a^7}+\frac{d^2\left(378a^4c^2+180a^2cd+35d^2\right)x^4}{1260a^5}$$

$$= \frac{d\left(420a^6c^3+378a^4c^2d+180a^2cd^2+35d^3\right)x^2}{630a^7}+\frac{d^2\left(378a^4c^2+180a^2cd+35d^2\right)x^4}{1260a^5}$$

**Mathematica [A]** time = 0.12, size = 213, normalized size = 0.87

$$\frac{24a^9x\coth^{-1}(ax)\left(315c^4+420c^3dx^2+378c^2d^2x^4+180cd^3x^6+35d^4x^8\right)+a^2dx^2\left(3a^6\left(1680c^3+756c^2dx^2+240\right.\right.}{}$$

Antiderivative was successfully verified.

```
[In] Integrate[(c + d*x^2)^4*ArcCoth[a*x],x]
```

```
[Out] (a^2*d*x^2*(420*d^3 + 30*a^2*d^2*(72*c + 7*d*x^2) + 4*a^4*d*(1134*c^2 + 270
*c*d*x^2 + 35*d^2*x^4) + 3*a^6*(1680*c^3 + 756*c^2*d*x^2 + 240*c*d^2*x^4 +
35*d^3*x^6)) + 24*a^9*x*(315*c^4 + 420*c^3*d*x^2 + 378*c^2*d^2*x^4 + 180*c*
d^3*x^6 + 35*d^4*x^8)*ArcCoth[a*x] + 12*(315*a^8*c^4 + 420*a^6*c^3*d + 378*
a^4*c^2*d^2 + 180*a^2*c*d^3 + 35*d^4)*Log[1 - a^2*x^2])/(7560*a^9)
```

**fricas [A]** time = 0.56, size = 247, normalized size = 1.01

$$\frac{105\,a^8d^4x^8+20\left(36\,a^8cd^3+7\,a^6d^4\right)x^6+6\left(378\,a^8c^2d^2+180\,a^6cd^3+35\,a^4d^4\right)x^4+12\left(420\,a^8c^3d+378\,a^6c^2d^2+1\right.}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((d*x^2+c)^4*arccoth(a*x),x, algorithm="fricas")
```

```
[Out] 1/7560*(105*a^8*d^4*x^8 + 20*(36*a^8*c*d^3 + 7*a^6*d^4)*x^6 + 6*(378*a^8*c^
2*d^2 + 180*a^6*c*d^3 + 35*a^4*d^4)*x^4 + 12*(420*a^8*c^3*d + 378*a^6*c^2*d
^2 + 180*a^4*c*d^3 + 35*a^2*d^4)*x^2 + 12*(315*a^8*c^4 + 420*a^6*c^3*d + 37
8*a^4*c^2*d^2 + 180*a^2*c*d^3 + 35*d^4)*log(a^2*x^2 - 1) + 12*(35*a^9*d^4*x
^9 + 180*a^9*c*d^3*x^7 + 378*a^9*c^2*d^2*x^5 + 420*a^9*c^3*d*x^3 + 315*a^9*
c^4*x)*log((a*x + 1)/(a*x - 1)))/a^9
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \left(dx^2+c\right)^4 \operatorname{arcoth}(ax)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((d*x^2+c)^4*arccoth(a*x),x, algorithm="giac")
```

```
[Out] integrate((d*x^2 + c)^4*arccoth(a*x), x)
```

**maple [A]** time = 0.04, size = 334, normalized size = 1.36

$$\frac{3c^2d^2x^2}{5a^3}+\frac{2c\,d^3x^6}{21a}+\frac{3c^2d^2x^4}{10a}+\frac{2c^3d\,x^2}{3a}+\frac{2\ln(ax-1)\,c^3d}{3a^3}+\frac{x^4c\,d^3}{7a^3}+\frac{2x^2c\,d^3}{7a^5}+\frac{3\ln(ax-1)\,c^2d^2}{5a^5}+\frac{2\ln(ax-1)\,c\,d^3}{7a^7}+$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((d*x^2+c)^4*arccoth(a*x),x)
```

```
[Out] 3/5/a^3*c^2*d^2*x^2+2/21/a*c*d^3*x^6+3/10/a*c^2*d^2*x^4+2/3/a*c^3*d*x^2+2/3
/a^3*ln(a*x-1)*c^3*d+1/7/a^3*x^4*c*d^3+2/7/a^5*x^2*c*d^3+3/5/a^5*ln(a*x-1)*
c^2*d^2+2/7/a^7*ln(a*x-1)*c*d^3+2/3/a^3*ln(a*x+1)*c^3*d+3/5/a^5*ln(a*x+1)*c
^2*d^2+2/7/a^7*ln(a*x+1)*c*d^3+1/18/a^9*ln(a*x-1)*d^4+1/18/a^9*ln(a*x+1)*d^
4+1/2/a*ln(a*x-1)*c^4+1/54/a^3*x^6*d^4+1/18/a^7*x^2*d^4+1/36/a^5*x^4*d^4+1/
9*d^4*x^9*arccoth(a*x)+1/2*c^4*ln(a*x+1)/a+c^4*x*arccoth(a*x)+1/72*d^4*x^8/
a+4/3*c^3*d*x^3*arccoth(a*x)+6/5*c^2*d^2*x^5*arccoth(a*x)+4/7*c*d^3*x^7*arc
coth(a*x)
```

**maxima [A]** time = 0.31, size = 276, normalized size = 1.13

$$\frac{1}{7560}\, a\left(\frac{105\, a^6 d^4 x^8 + 20\left(36\, a^6 c d^3 + 7\, a^4 d^4\right) x^6 + 6\left(378\, a^6 c^2 d^2 + 180\, a^4 c d^3 + 35\, a^2 d^4\right) x^4 + 12\left(420\, a^6 c^3 d + 37\right.}{a^8}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((d*x^2+c)^4*arccoth(a*x),x, algorithm="maxima")
```

```
[Out] 1/7560*a*((105*a^6*d^4*x^8 + 20*(36*a^6*c*d^3 + 7*a^4*d^4)*x^6 + 6*(378*a^6
*c^2*d^2 + 180*a^4*c*d^3 + 35*a^2*d^4)*x^4 + 12*(420*a^6*c^3*d + 378*a^4*c^
2*d^2 + 180*a^2*c*d^3 + 35*d^4)*x^2)/a^8 + 12*(315*a^8*c^4 + 420*a^6*c^3*d
+ 378*a^4*c^2*d^2 + 180*a^2*c*d^3 + 35*d^4)*log(a*x + 1)/a^10 + 12*(315*a^8
*c^4 + 420*a^6*c^3*d + 378*a^4*c^2*d^2 + 180*a^2*c*d^3 + 35*d^4)*log(a*x -
1)/a^10) + 1/315*(35*d^4*x^9 + 180*c*d^3*x^7 + 378*c^2*d^2*x^5 + 420*c^3*d*
x^3 + 315*c^4*x)*arccoth(a*x)
```

**mupad [B]** time = 1.51, size = 296, normalized size = 1.21

$$\ln\left(\frac{1}{a\,x}+1\right)\left(\frac{c^4\,x}{2}+\frac{2\,c^3\,d\,x^3}{3}+\frac{3\,c^2\,d^2\,x^5}{5}+\frac{2\,c\,d^3\,x^7}{7}+\frac{d^4\,x^9}{18}\right)-\ln\left(1-\frac{1}{a\,x}\right)\left(\frac{c^4\,x}{2}+\frac{2\,c^3\,d\,x^3}{3}+\frac{3\,c^2\,d^2\,x^5}{5}+\ldots\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(a*x)*(c + d*x^2)^4,x)
```

```
[Out] log(1/(a*x) + 1)*((c^4*x)/2 + (d^4*x^9)/18 + (2*c^3*d*x^3)/3 + (2*c*d^3*x^7
)/7 + (3*c^2*d^2*x^5)/5) - log(1 - 1/(a*x))*((c^4*x)/2 + (d^4*x^9)/18 + (2*
c^3*d*x^3)/3 + (2*c*d^3*x^7)/7 + (3*c^2*d^2*x^5)/5) + x^2*(((d^4/(9*a^3) +
(4*c*d^3)/(7*a))/a^2 + (6*c^2*d^2)/(5*a))/(2*a^2) + (2*c^3*d)/(3*a)) + x^6*
(d^4/(54*a^3) + (2*c*d^3)/(21*a)) + x^4*((d^4/(9*a^3) + (4*c*d^3)/(7*a))/(4
*a^2) + (3*c^2*d^2)/(10*a)) + (log(a^2*x^2 - 1)*(35*d^4 + 315*a^8*c^4 + 180
*a^2*c*d^3 + 420*a^6*c^3*d + 378*a^4*c^2*d^2))/(630*a^9) + (d^4*x^8)/(72*a)
```

**sympy [A]** time = 6.99, size = 427, normalized size = 1.74

$$\begin{cases} c^4 x \operatorname{acoth}(ax) + \frac{4c^3 d x^3 \operatorname{acoth}(ax)}{3} + \frac{6c^2 d^2 x^5 \operatorname{acoth}(ax)}{5} + \frac{4c d^3 x^7 \operatorname{acoth}(ax)}{7} + \frac{d^4 x^9 \operatorname{acoth}(ax)}{9} + \frac{c^4 \log\left(x-\frac{1}{a}\right)}{a} + \frac{c^4 \operatorname{acoth}(ax)}{a} + \ldots \\ \frac{i\pi\left(c^4 x + \frac{4c^3 d x^3}{3} + \frac{6c^2 d^2 x^5}{5} + \frac{4c d^3 x^7}{7} + \frac{d^4 x^9}{9}\right)}{2} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((d*x**2+c)**4*acoth(a*x),x)
```

```
[Out] Piecewise((c**4*x*acoth(a*x) + 4*c**3*d*x**3*acoth(a*x)/3 + 6*c**2*d**2*x**
5*acoth(a*x)/5 + 4*c*d**3*x**7*acoth(a*x)/7 + d**4*x**9*acoth(a*x)/9 + c**4
```

```
*log(x - 1/a)/a + c**4*acoth(a*x)/a + 2*c**3*d*x**2/(3*a) + 3*c**2*d**2*x**
4/(10*a) + 2*c*d**3*x**6/(21*a) + d**4*x**8/(72*a) + 4*c**3*d*log(x - 1/a)/
(3*a**3) + 4*c**3*d*acoth(a*x)/(3*a**3) + 3*c**2*d**2*x**2/(5*a**3) + c*d**
3*x**4/(7*a**3) + d**4*x**6/(54*a**3) + 6*c**2*d**2*log(x - 1/a)/(5*a**5) +
 6*c**2*d**2*acoth(a*x)/(5*a**5) + 2*c*d**3*x**2/(7*a**5) + d**4*x**4/(36*a
**5) + 4*c*d**3*log(x - 1/a)/(7*a**7) + 4*c*d**3*acoth(a*x)/(7*a**7) + d**4
*x**2/(18*a**7) + d**4*log(x - 1/a)/(9*a**9) + d**4*acoth(a*x)/(9*a**9), Ne
(a, 0)), (I*pi*(c**4*x + 4*c**3*d*x**3/3 + 6*c**2*d**2*x**5/5 + 4*c*d**3*x*
*7/7 + d**4*x**9/9)/2, True))
```

# 3.36 $\int (c+dx^2)^3 \coth^{-1}(ax)\,dx$

**Optimal**. Leaf size=169

$$\frac{d^2x^4(21a^2c+5d)}{140a^3}+\frac{dx^2(35a^4c^2+21a^2cd+5d^2)}{70a^5}+\frac{(35a^6c^3+35a^4c^2d+21a^2cd^2+5d^3)\log(1-a^2x^2)}{70a^7}+c^3x\,\mathrm{co}$$

```
[Out] 1/70*d*(35*a^4*c^2+21*a^2*c*d+5*d^2)*x^2/a^5+1/140*d^2*(21*a^2*c+5*d)*x^4/a
^3+1/42*d^3*x^6/a+c^3*x*arccoth(a*x)+c^2*d*x^3*arccoth(a*x)+3/5*c*d^2*x^5*a
rccoth(a*x)+1/7*d^3*x^7*arccoth(a*x)+1/70*(35*a^6*c^3+35*a^4*c^2*d+21*a^2*c
*d^2+5*d^3)*ln(-a^2*x^2+1)/a^7
```

**Rubi [A]** time = 0.13, antiderivative size = 169, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 4, integrand size = 14, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.286, Rules used = {194, 5977, 1810, 260}

$$\frac{dx^2(35a^4c^2+21a^2cd+5d^2)}{70a^5}+\frac{(35a^4c^2d+35a^6c^3+21a^2cd^2+5d^3)\log(1-a^2x^2)}{70a^7}+\frac{d^2x^4(21a^2c+5d)}{140a^3}+c^2dx^3$$

Antiderivative was successfully verified.

```
[In] Int[(c + d*x^2)^3*ArcCoth[a*x],x]
```

```
[Out] (d*(35*a^4*c^2 + 21*a^2*c*d + 5*d^2)*x^2)/(70*a^5) + (d^2*(21*a^2*c + 5*d)*
x^4)/(140*a^3) + (d^3*x^6)/(42*a) + c^3*x*ArcCoth[a*x] + c^2*d*x^3*ArcCoth[
a*x] + (3*c*d^2*x^5*ArcCoth[a*x])/5 + (d^3*x^7*ArcCoth[a*x])/7 + ((35*a^6*c
^3 + 35*a^4*c^2*d + 21*a^2*c*d^2 + 5*d^3)*Log[1 - a^2*x^2])/(70*a^7)
```

Rule 194

```
Int[((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Int[ExpandIntegrand[(a + b*
x^n)^p, x], x] /; FreeQ[{a, b}, x] && IGtQ[n, 0] && IGtQ[p, 0]
```

Rule 260

```
Int[(x_)^(m_.)/((a_) + (b_.)*(x_)^(n_)), x_Symbol] :> Simp[Log[RemoveConten
t[a + b*x^n, x]]/(b*n), x] /; FreeQ[{a, b, m, n}, x] && EqQ[m, n - 1]
```

Rule 1810

```
Int[(Pq_)*((a_) + (b_.)*(x_)^2)^(p_.), x_Symbol] :> Int[ExpandIntegrand[Pq*
(a + b*x^2)^p, x], x] /; FreeQ[{a, b}, x] && PolyQ[Pq, x] && IGtQ[p, -2]
```

Rule 5977

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))*((d_.) + (e_.)*(x_)^2)^(q_.), x_Sym
bol] :> With[{u = IntHide[(d + e*x^2)^q, x]}, Dist[a + b*ArcCoth[c*x], u, x
] - Dist[b*c, Int[u/(1 - c^2*x^2), x], x]] /; FreeQ[{a, b, c, d, e}, x] &&
(IntegerQ[q] || ILtQ[q + 1/2, 0])
```

Rubi steps

$$\int \left(c+dx^2\right)^3 \coth^{-1}(ax)\,dx = c^3x\coth^{-1}(ax)+c^2dx^3\coth^{-1}(ax)+\frac{3}{5}cd^2x^5\coth^{-1}(ax)+\frac{1}{7}d^3x^7\coth^{-1}(ax)-a\int$$

$$= c^3x\coth^{-1}(ax)+c^2dx^3\coth^{-1}(ax)+\frac{3}{5}cd^2x^5\coth^{-1}(ax)+\frac{1}{7}d^3x^7\coth^{-1}(ax)-a\int$$

$$= \frac{d\left(35a^4c^2+21a^2cd+5d^2\right)x^2}{70a^5}+\frac{d^2\left(21a^2c+5d\right)x^4}{140a^3}+\frac{d^3x^6}{42a}+c^3x\coth^{-1}(ax)+c^2d$$

$$= \frac{d\left(35a^4c^2+21a^2cd+5d^2\right)x^2}{70a^5}+\frac{d^2\left(21a^2c+5d\right)x^4}{140a^3}+\frac{d^3x^6}{42a}+c^3x\coth^{-1}(ax)+c^2d$$

**Mathematica [A]** time = 0.08, size = 150, normalized size = 0.89

$$\frac{12a^7x\coth^{-1}(ax)\left(35c^3+35c^2dx^2+21cd^2x^4+5d^3x^6\right)+a^2dx^2\left(a^4\left(210c^2+63cdx^2+10d^2x^4\right)+3a^2d\left(42c+5dx\right.\right.}{420a^7}$$

Antiderivative was successfully verified.

```
[In] Integrate[(c + d*x^2)^3*ArcCoth[a*x],x]
```

```
[Out] (a^2*d*x^2*(30*d^2 + 3*a^2*d*(42*c + 5*d*x^2) + a^4*(210*c^2 + 63*c*d*x^2 +
 10*d^2*x^4)) + 12*a^7*x*(35*c^3 + 35*c^2*d*x^2 + 21*c*d^2*x^4 + 5*d^3*x^6)
*ArcCoth[a*x] + 6*(35*a^6*c^3 + 35*a^4*c^2*d + 21*a^2*c*d^2 + 5*d^3)*Log[1
- a^2*x^2])/(420*a^7)
```

**fricas [A]** time = 0.60, size = 177, normalized size = 1.05

$$\frac{10\,a^6d^3x^6+3\left(21\,a^6cd^2+5\,a^4d^3\right)x^4+6\left(35\,a^6c^2d+21\,a^4cd^2+5\,a^2d^3\right)x^2+6\left(35\,a^6c^3+35\,a^4c^2d+21\,a^2cd^2+5\,d\right.}{420\,a^7}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((d*x^2+c)^3*arccoth(a*x),x, algorithm="fricas")
```

```
[Out] 1/420*(10*a^6*d^3*x^6 + 3*(21*a^6*c*d^2 + 5*a^4*d^3)*x^4 + 6*(35*a^6*c^2*d
+ 21*a^4*c*d^2 + 5*a^2*d^3)*x^2 + 6*(35*a^6*c^3 + 35*a^4*c^2*d + 21*a^2*c*d
^2 + 5*d^3)*log(a^2*x^2 - 1) + 6*(5*a^7*d^3*x^7 + 21*a^7*c*d^2*x^5 + 35*a^7
*c^2*d*x^3 + 35*a^7*c^3*x)*log((a*x + 1)/(a*x - 1)))/a^7
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \left(dx^2+c\right)^3 \operatorname{arcoth}(ax)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((d*x^2+c)^3*arccoth(a*x),x, algorithm="giac")
```

```
[Out] integrate((d*x^2 + c)^3*arccoth(a*x), x)
```

**maple [A]** time = 0.03, size = 233, normalized size = 1.38

$$\frac{d^3x^7\operatorname{arccoth}(ax)}{7}+\frac{3c\,d^2x^5\operatorname{arccoth}(ax)}{5}+c^2d\,x^3\operatorname{arccoth}(ax)+c^3x\operatorname{arccoth}(ax)+\frac{3c\,d^2x^2}{10a^3}+\frac{x^2c^2d}{2a}+\frac{3c\,d^2x^4}{20a}+\frac{d^3x^6}{42a}+$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((d*x^2+c)^3*arccoth(a*x),x)
```

```
[Out] 1/7*d^3*x^7*arccoth(a*x)+3/5*c*d^2*x^5*arccoth(a*x)+c^2*d*x^3*arccoth(a*x)+
c^3*x*arccoth(a*x)+3/10/a^3*c*d^2*x^2+1/2/a*x^2*c^2*d+3/20/a*c*d^2*x^4+1/42
*d^3*x^6/a+1/28/a^3*x^4*d^3+1/2/a*ln(a*x-1)*c^3+1/2/a^3*ln(a*x-1)*c^2*d+3/1
0/a^5*ln(a*x-1)*c*d^2+1/14/a^7*ln(a*x-1)*d^3+1/14/a^5*d^3*x^2+1/2*c^3*ln(a*
x+1)/a+1/2/a^3*ln(a*x+1)*c^2*d+3/10/a^5*ln(a*x+1)*c*d^2+1/14/a^7*ln(a*x+1)*
d^3
```

**maxima** [A] time = 0.31, size = 198, normalized size = 1.17

$$\frac{1}{420}\,a\left(\frac{10\,a^4d^3x^6+3\left(21\,a^4cd^2+5\,a^2d^3\right)x^4+6\left(35\,a^4c^2d+21\,a^2cd^2+5\,d^3\right)x^2}{a^6}+\frac{6\left(35\,a^6c^3+35\,a^4c^2d+21\,a^2c\right.}{a^8}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((d*x^2+c)^3*arccoth(a*x),x, algorithm="maxima")
```

```
[Out] 1/420*a*((10*a^4*d^3*x^6 + 3*(21*a^4*c*d^2 + 5*a^2*d^3)*x^4 + 6*(35*a^4*c^2
*d + 21*a^2*c*d^2 + 5*d^3)*x^2)/a^6 + 6*(35*a^6*c^3 + 35*a^4*c^2*d + 21*a^2
*c*d^2 + 5*d^3)*log(a*x + 1)/a^8 + 6*(35*a^6*c^3 + 35*a^4*c^2*d + 21*a^2*c*
d^2 + 5*d^3)*log(a*x - 1)/a^8) + 1/35*(5*d^3*x^7 + 21*c*d^2*x^5 + 35*c^2*d*
x^3 + 35*c^3*x)*arccoth(a*x)
```

**mupad** [B] time = 1.52, size = 190, normalized size = 1.12

$$c^3\,x\,\mathrm{acoth}\left(a\,x\right)+\frac{d^3\,x^7\,\mathrm{acoth}\left(a\,x\right)}{7}+\frac{c^3\,\ln\left(a^2\,x^2-1\right)}{2\,a}+\frac{d^3\,\ln\left(a^2\,x^2-1\right)}{14\,a^7}+\frac{d^3\,x^6}{42\,a}+\frac{d^3\,x^4}{28\,a^3}+\frac{d^3\,x^2}{14\,a^5}+\frac{c^2\,d\,\ln\left(a^2\,x^2-1\right.}{2\,a^3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(a*x)*(c + d*x^2)^3,x)
```

```
[Out] c^3*x*acoth(a*x) + (d^3*x^7*acoth(a*x))/7 + (c^3*log(a^2*x^2 - 1))/(2*a) +
(d^3*log(a^2*x^2 - 1))/(14*a^7) + (d^3*x^6)/(42*a) + (d^3*x^4)/(28*a^3) + (
d^3*x^2)/(14*a^5) + (c^2*d*log(a^2*x^2 - 1))/(2*a^3) + (3*c*d^2*log(a^2*x^2
 - 1))/(10*a^5) + (c^2*d*x^2)/(2*a) + (3*c*d^2*x^4)/(20*a) + (3*c*d^2*x^2)/
(10*a^3) + c^2*d*x^3*acoth(a*x) + (3*c*d^2*x^5*acoth(a*x))/5
```

**sympy** [A] time = 4.75, size = 282, normalized size = 1.67

$$\begin{cases} c^3x\,\mathrm{acoth}\,(ax)+c^2dx^3\,\mathrm{acoth}\,(ax)+\frac{3cd^2x^5\,\mathrm{acoth}\,(ax)}{5}+\frac{d^3x^7\,\mathrm{acoth}\,(ax)}{7}+\frac{c^3\log\left(x-\frac{1}{a}\right)}{a}+\frac{c^3\,\mathrm{acoth}\,(ax)}{a}+\frac{c^2dx^2}{2a}+\frac{3cd^2x^4}{20a}+ \\ \frac{i\pi\left(c^3x+c^2dx^3+\frac{3cd^2x^5}{5}+\frac{d^3x^7}{7}\right)}{2} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((d*x**2+c)**3*acoth(a*x),x)
```

```
[Out] Piecewise((c**3*x*acoth(a*x) + c**2*d*x**3*acoth(a*x) + 3*c*d**2*x**5*acoth
(a*x)/5 + d**3*x**7*acoth(a*x)/7 + c**3*log(x - 1/a)/a + c**3*acoth(a*x)/a
+ c**2*d*x**2/(2*a) + 3*c*d**2*x**4/(20*a) + d**3*x**6/(42*a) + c**2*d*log(
x - 1/a)/a**3 + c**2*d*acoth(a*x)/a**3 + 3*c*d**2*x**2/(10*a**3) + d**3*x**
4/(28*a**3) + 3*c*d**2*log(x - 1/a)/(5*a**5) + 3*c*d**2*acoth(a*x)/(5*a**5)
 + d**3*x**2/(14*a**5) + d**3*log(x - 1/a)/(7*a**7) + d**3*acoth(a*x)/(7*a*
*7), Ne(a, 0)), (I*pi*(c**3*x + c**2*d*x**3 + 3*c*d**2*x**5/5 + d**3*x**7/7
)/2, True))
```

## 3.37 $\int \left(c+dx^2\right)^2 \coth^{-1}(ax)\,dx$

**Optimal**. Leaf size=110

$$\frac{dx^2\left(10a^2c+3d\right)}{30a^3}+\frac{\left(15a^4c^2+10a^2cd+3d^2\right)\log\left(1-a^2x^2\right)}{30a^5}+c^2x\coth^{-1}(ax)+\frac{2}{3}cdx^3\coth^{-1}(ax)+\frac{1}{5}d^2x^5\coth^{-1}(ax)$$

```
[Out] 1/30*d*(10*a^2*c+3*d)*x^2/a^3+1/20*d^2*x^4/a+c^2*x*arccoth(a*x)+2/3*c*d*x^3
*arccoth(a*x)+1/5*d^2*x^5*arccoth(a*x)+1/30*(15*a^4*c^2+10*a^2*c*d+3*d^2)*l
n(-a^2*x^2+1)/a^5
```

**Rubi [A]** time = 0.13, antiderivative size = 110, normalized size of antiderivative = 1.00, number of steps used = 5, number of rules used = 5, integrand size = 14, $\frac{\text{number of rules}}{\text{integrand size}} = 0.357$, Rules used = {194, 5977, 1594, 1247, 698}

$$\frac{\left(15a^4c^2+10a^2cd+3d^2\right)\log\left(1-a^2x^2\right)}{30a^5}+\frac{dx^2\left(10a^2c+3d\right)}{30a^3}+c^2x\coth^{-1}(ax)+\frac{2}{3}cdx^3\coth^{-1}(ax)+\frac{d^2x^4}{20a}+\frac{1}{5}d^2x^5\coth^{-1}(ax)$$

Antiderivative was successfully verified.

```
[In] Int[(c + d*x^2)^2*ArcCoth[a*x],x]
```

```
[Out] (d*(10*a^2*c + 3*d)*x^2)/(30*a^3) + (d^2*x^4)/(20*a) + c^2*x*ArcCoth[a*x] +
 (2*c*d*x^3*ArcCoth[a*x])/3 + (d^2*x^5*ArcCoth[a*x])/5 + ((15*a^4*c^2 + 10*
a^2*c*d + 3*d^2)*Log[1 - a^2*x^2])/(30*a^5)
```

Rule 194

```
Int[((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Int[ExpandIntegrand[(a + b*
x^n)^p, x], x] /; FreeQ[{a, b}, x] && IGtQ[n, 0] && IGtQ[p, 0]
```

Rule 698

```
Int[((d_.) + (e_.)*(x_))^(m_)*((a_.) + (b_.)*(x_) + (c_.)*(x_)^2)^(p_.), x_
Symbol] :> Int[ExpandIntegrand[(d + e*x)^m*(a + b*x + c*x^2)^p, x], x] /; F
reeQ[{a, b, c, d, e, m}, x] && NeQ[b^2 - 4*a*c, 0] && NeQ[c*d^2 - b*d*e + a
*e^2, 0] && NeQ[2*c*d - b*e, 0] && IntegerQ[p] && (GtQ[p, 0] || (EqQ[a, 0]
&& IntegerQ[m]))
```

Rule 1247

```
Int[(x_)*((d_) + (e_.)*(x_)^2)^(q_.)*((a_) + (b_.)*(x_)^2 + (c_.)*(x_)^4)^(
p_.), x_Symbol] :> Dist[1/2, Subst[Int[(d + e*x)^q*(a + b*x + c*x^2)^p, x],
 x, x^2], x] /; FreeQ[{a, b, c, d, e, p, q}, x]
```

Rule 1594

```
Int[(u_.)*((a_.)*(x_)^(p_.) + (b_.)*(x_)^(q_.) + (c_.)*(x_)^(r_.))^(n_.), x
_Symbol] :> Int[u*x^(n*p)*(a + b*x^(q - p) + c*x^(r - p))^n, x] /; FreeQ[{a
, b, c, p, q, r}, x] && IntegerQ[n] && PosQ[q - p] && PosQ[r - p]
```

Rule 5977

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))*((d_.) + (e_.)*(x_)^2)^(q_.), x_Sym
bol] :> With[{u = IntHide[(d + e*x^2)^q, x]}, Dist[a + b*ArcCoth[c*x], u, x
] - Dist[b*c, Int[u/(1 - c^2*x^2), x], x]] /; FreeQ[{a, b, c, d, e}, x] &&
(IntegerQ[q] || ILtQ[q + 1/2, 0])
```

Rubi steps

$$\int \left(c+dx^2\right)^2 \coth^{-1}(ax)\,dx = c^2x\coth^{-1}(ax)+\frac{2}{3}cdx^3\coth^{-1}(ax)+\frac{1}{5}d^2x^5\coth^{-1}(ax)-a\int \frac{c^2x+\frac{2}{3}cdx^3+\frac{d^2}{}}{1-a^2x^2}$$

$$=c^2x\coth^{-1}(ax)+\frac{2}{3}cdx^3\coth^{-1}(ax)+\frac{1}{5}d^2x^5\coth^{-1}(ax)-a\int \frac{x\left(c^2+\frac{2}{3}cdx^2+\right.}{1-a^2x^2}$$

$$=c^2x\coth^{-1}(ax)+\frac{2}{3}cdx^3\coth^{-1}(ax)+\frac{1}{5}d^2x^5\coth^{-1}(ax)-\frac{1}{2}a\,\mathrm{Subst}\left(\int \frac{c^2+\frac{2c}{3}}{1-}\right.$$

$$=c^2x\coth^{-1}(ax)+\frac{2}{3}cdx^3\coth^{-1}(ax)+\frac{1}{5}d^2x^5\coth^{-1}(ax)-\frac{1}{2}a\,\mathrm{Subst}\left(\int\left(-\frac{d\left(10\right.}{}\right.\right.$$

$$=\frac{d\left(10a^2c+3d\right)x^2}{30a^3}+\frac{d^2x^4}{20a}+c^2x\coth^{-1}(ax)+\frac{2}{3}cdx^3\coth^{-1}(ax)+\frac{1}{5}d^2x^5\coth^{-1}$$

**Mathematica [A]** time = 0.05, size = 98, normalized size = 0.89

$$\frac{4a^5x\coth^{-1}(ax)\left(15c^2+10cdx^2+3d^2x^4\right)+a^2dx^2\left(a^2\left(20c+3dx^2\right)+6d\right)+\left(30a^4c^2+20a^2cd+6d^2\right)\log\left(1-\right.}{60a^5}$$

Antiderivative was successfully verified.

```
[In] Integrate[(c + d*x^2)^2*ArcCoth[a*x],x]
```

```
[Out] (a^2*d*x^2*(6*d + a^2*(20*c + 3*d*x^2)) + 4*a^5*x*(15*c^2 + 10*c*d*x^2 + 3*
d^2*x^4)*ArcCoth[a*x] + (30*a^4*c^2 + 20*a^2*c*d + 6*d^2)*Log[1 - a^2*x^2])
/(60*a^5)
```

**fricas [A]** time = 0.46, size = 118, normalized size = 1.07

$$\frac{3\,a^4d^2x^4+2\left(10\,a^4cd+3\,a^2d^2\right)x^2+2\left(15\,a^4c^2+10\,a^2cd+3\,d^2\right)\log\left(a^2x^2-1\right)+2\left(3\,a^5d^2x^5+10\,a^5cdx^3+15\right.}{60\,a^5}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((d*x^2+c)^2*arccoth(a*x),x, algorithm="fricas")
```

```
[Out] 1/60*(3*a^4*d^2*x^4 + 2*(10*a^4*c*d + 3*a^2*d^2)*x^2 + 2*(15*a^4*c^2 + 10*a
^2*c*d + 3*d^2)*log(a^2*x^2 - 1) + 2*(3*a^5*d^2*x^5 + 10*a^5*c*d*x^3 + 15*a
^5*c^2*x)*log((a*x + 1)/(a*x - 1)))/a^5
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \left(dx^2+c\right)^2 \operatorname{arcoth}(ax)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((d*x^2+c)^2*arccoth(a*x),x, algorithm="giac")
```

```
[Out] integrate((d*x^2 + c)^2*arccoth(a*x), x)
```

**maple [A]** time = 0.04, size = 148, normalized size = 1.35

$$\frac{d^2x^5\operatorname{arccoth}(ax)}{5}+\frac{2cd\,x^3\operatorname{arccoth}(ax)}{3}+c^2x\operatorname{arccoth}(ax)+\frac{d^2x^4}{20a}+\frac{cd\,x^2}{3a}+\frac{x^2d^2}{10a^3}+\frac{\ln(ax-1)\,c^2}{2a}+\frac{\ln(ax-1)\,cd}{3a^3}+$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((d*x^2+c)^2*arccoth(a*x),x)
```

```
[Out] 1/5*d^2*x^5*arccoth(a*x)+2/3*c*d*x^3*arccoth(a*x)+c^2*x*arccoth(a*x)+1/20*d
^2*x^4/a+1/3/a*c*d*x^2+1/10/a^3*x^2*d^2+1/2/a*ln(a*x-1)*c^2+1/3/a^3*ln(a*x-
1)*c*d+1/10/a^5*ln(a*x-1)*d^2+1/2*c^2*ln(a*x+1)/a+1/3/a^3*ln(a*x+1)*c*d+1/1
0/a^5*ln(a*x+1)*d^2
```

**maxima [A]** time = 0.30, size = 131, normalized size = 1.19

$$\frac{1}{60}a\left(\frac{3a^2d^2x^4+2\left(10a^2cd+3d^2\right)x^2}{a^4}+\frac{2\left(15a^4c^2+10a^2cd+3d^2\right)\log\left(ax+1\right)}{a^6}+\frac{2\left(15a^4c^2+10a^2cd+3d^2\right)\mathrm{lo}}{a^6}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((d*x^2+c)^2*arccoth(a*x),x, algorithm="maxima")
```

```
[Out] 1/60*a*((3*a^2*d^2*x^4 + 2*(10*a^2*c*d + 3*d^2)*x^2)/a^4 + 2*(15*a^4*c^2 +
10*a^2*c*d + 3*d^2)*log(a*x + 1)/a^6 + 2*(15*a^4*c^2 + 10*a^2*c*d + 3*d^2)*
log(a*x - 1)/a^6) + 1/15*(3*d^2*x^5 + 10*c*d*x^3 + 15*c^2*x)*arccoth(a*x)
```

**mupad [B]** time = 1.37, size = 115, normalized size = 1.05

$$\frac{a^4\left(\frac{c^2\ln\left(a^2x^2-1\right)}{2}+\frac{d^2x^4}{20}+\frac{c\,d\,x^2}{3}\right)+a^2\left(\frac{d^2x^2}{10}+\frac{c\,d\ln\left(a^2x^2-1\right)}{3}\right)+\frac{d^2\ln\left(a^2x^2-1\right)}{10}}{a^5}+c^2x\,\mathrm{acoth}\left(a\,x\right)+\frac{d^2x^5\,\mathrm{acoth}\left(a\,x\right)}{5}+\frac{2\,c}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(a*x)*(c + d*x^2)^2,x)
```

```
[Out] (a^4*((c^2*log(a^2*x^2 - 1))/2 + (d^2*x^4)/20 + (c*d*x^2)/3) + a^2*((d^2*x^
2)/10 + (c*d*log(a^2*x^2 - 1))/3) + (d^2*log(a^2*x^2 - 1))/10)/a^5 + c^2*x*
acoth(a*x) + (d^2*x^5*acoth(a*x))/5 + (2*c*d*x^3*acoth(a*x))/3
```

**sympy [A]** time = 2.13, size = 182, normalized size = 1.65

$$\begin{cases} c^2x\,\mathrm{acoth}\left(ax\right)+\frac{2cdx^3\,\mathrm{acoth}\left(ax\right)}{3}+\frac{d^2x^5\,\mathrm{acoth}\left(ax\right)}{5}+\frac{c^2\log\left(x-\frac{1}{a}\right)}{a}+\frac{c^2\,\mathrm{acoth}\left(ax\right)}{a}+\frac{cdx^2}{3a}+\frac{d^2x^4}{20a}+\frac{2cd\log\left(x-\frac{1}{a}\right)}{3a^3}+\frac{2cd\,\mathrm{acoth}\left(ax\right)}{3a^3} \\ \frac{i\pi\left(c^2x+\frac{2cdx^3}{3}+\frac{d^2x^5}{5}\right)}{2} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((d*x**2+c)**2*acoth(a*x),x)
```

```
[Out] Piecewise((c**2*x*acoth(a*x) + 2*c*d*x**3*acoth(a*x)/3 + d**2*x**5*acoth(a*
x)/5 + c**2*log(x - 1/a)/a + c**2*acoth(a*x)/a + c*d*x**2/(3*a) + d**2*x**4
/(20*a) + 2*c*d*log(x - 1/a)/(3*a**3) + 2*c*d*acoth(a*x)/(3*a**3) + d**2*x*
*2/(10*a**3) + d**2*log(x - 1/a)/(5*a**5) + d**2*acoth(a*x)/(5*a**5), Ne(a,
 0)), (I*pi*(c**2*x + 2*c*d*x**3/3 + d**2*x**5/5)/2, True))
```

## 3.38 $\int \left(c+dx^2\right) \coth^{-1}(ax)\,dx$

**Optimal**. Leaf size=57

$$\frac{\left(3a^2c+d\right)\log\left(1-a^2x^2\right)}{6a^3}+cx\coth^{-1}(ax)+\frac{1}{3}dx^3\coth^{-1}(ax)+\frac{dx^2}{6a}$$

```
[Out] 1/6*d*x^2/a+c*x*arccoth(a*x)+1/3*d*x^3*arccoth(a*x)+1/6*(3*a^2*c+d)*ln(-a^2
*x^2+1)/a^3
```

**Rubi [A]** time = 0.07, antiderivative size = 57, normalized size of antiderivative = 1.00, number of steps used = 5, number of rules used = 4, integrand size = 12, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.333, Rules used = {5977, 1593, 444, 43}

$$\frac{\left(3a^2c+d\right)\log\left(1-a^2x^2\right)}{6a^3}+cx\coth^{-1}(ax)+\frac{dx^2}{6a}+\frac{1}{3}dx^3\coth^{-1}(ax)$$

Antiderivative was successfully verified.

```
[In] Int[(c + d*x^2)*ArcCoth[a*x],x]
```

```
[Out] (d*x^2)/(6*a) + c*x*ArcCoth[a*x] + (d*x^3*ArcCoth[a*x])/3 + ((3*a^2*c + d)*
Log[1 - a^2*x^2])/(6*a^3)
```

Rule 43

```
Int[((a_.) + (b_.)*(x_))^(m_.)*((c_.) + (d_.)*(x_))^(n_.), x_Symbol] :> Int
[ExpandIntegrand[(a + b*x)^m*(c + d*x)^n, x], x] /; FreeQ[{a, b, c, d, n},
x] && NeQ[b*c - a*d, 0] && IGtQ[m, 0] && ( !IntegerQ[n] || (EqQ[c, 0] && Le
Q[7*m + 4*n + 4, 0]) || LtQ[9*m + 5*(n + 1), 0] || GtQ[m + n + 2, 0])
```

Rule 444

```
Int[(x_)^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_.)*((c_) + (d_.)*(x_)^(n_))^(q_.
), x_Symbol] :> Dist[1/n, Subst[Int[(a + b*x)^p*(c + d*x)^q, x], x, x^n], x
] /; FreeQ[{a, b, c, d, m, n, p, q}, x] && NeQ[b*c - a*d, 0] && EqQ[m - n +
 1, 0]
```

Rule 1593

```
Int[(u_.)*((a_.)*(x_)^(p_.) + (b_.)*(x_)^(q_.))^(n_.), x_Symbol] :> Int[u*x
^(n*p)*(a + b*x^(q - p))^n, x] /; FreeQ[{a, b, p, q}, x] && IntegerQ[n] &&
PosQ[q - p]
```

Rule 5977

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))*((d_.) + (e_.)*(x_)^2)^(q_.), x_Sym
bol] :> With[{u = IntHide[(d + e*x^2)^q, x]}, Dist[a + b*ArcCoth[c*x], u, x
] - Dist[b*c, Int[u/(1 - c^2*x^2), x], x]] /; FreeQ[{a, b, c, d, e}, x] &&
(IntegerQ[q] || ILtQ[q + 1/2, 0])
```

Rubi steps

$$\int \left(c+dx^2\right)\coth^{-1}(ax)\,dx = cx\coth^{-1}(ax)+\frac{1}{3}dx^3\coth^{-1}(ax)-a\int \frac{cx+\frac{dx^3}{3}}{1-a^2x^2}\,dx$$
$$= cx\coth^{-1}(ax)+\frac{1}{3}dx^3\coth^{-1}(ax)-a\int \frac{x\left(c+\frac{dx^2}{3}\right)}{1-a^2x^2}\,dx$$
$$= cx\coth^{-1}(ax)+\frac{1}{3}dx^3\coth^{-1}(ax)-\frac{1}{2}a\,\text{Subst}\left(\int \frac{c+\frac{dx}{3}}{1-a^2x}\,dx,x,x^2\right)$$
$$= cx\coth^{-1}(ax)+\frac{1}{3}dx^3\coth^{-1}(ax)-\frac{1}{2}a\,\text{Subst}\left(\int \left(-\frac{d}{3a^2}+\frac{-3a^2c-d}{3a^2\left(-1+a^2x\right)}\right)dx,x,x^2\right)$$
$$= \frac{dx^2}{6a}+cx\coth^{-1}(ax)+\frac{1}{3}dx^3\coth^{-1}(ax)+\frac{\left(3a^2c+d\right)\log\left(1-a^2x^2\right)}{6a^3}$$

**Mathematica** [A] time = 0.01, size = 69, normalized size = 1.21

$$\frac{c\log\left(1-a^2x^2\right)}{2a}+\frac{d\log\left(1-a^2x^2\right)}{6a^3}+cx\coth^{-1}(ax)+\frac{1}{3}dx^3\coth^{-1}(ax)+\frac{dx^2}{6a}$$

Antiderivative was successfully verified.

```
[In] Integrate[(c + d*x^2)*ArcCoth[a*x],x]
```

```
[Out] (d*x^2)/(6*a) + c*x*ArcCoth[a*x] + (d*x^3*ArcCoth[a*x])/3 + (c*Log[1 - a^2*
x^2])/(2*a) + (d*Log[1 - a^2*x^2])/(6*a^3)
```

**fricas** [A] time = 0.49, size = 64, normalized size = 1.12

$$\frac{a^2dx^2+\left(3\,a^2c+d\right)\log\left(a^2x^2-1\right)+\left(a^3dx^3+3\,a^3cx\right)\log\left(\frac{ax+1}{ax-1}\right)}{6\,a^3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((d*x^2+c)*arccoth(a*x),x, algorithm="fricas")
```

```
[Out] 1/6*(a^2*d*x^2 + (3*a^2*c + d)*log(a^2*x^2 - 1) + (a^3*d*x^3 + 3*a^3*c*x)*l
og((a*x + 1)/(a*x - 1)))/a^3
```

**giac** [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \left(dx^2+c\right)\operatorname{arcoth}(ax)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((d*x^2+c)*arccoth(a*x),x, algorithm="giac")
```

```
[Out] integrate((d*x^2 + c)*arccoth(a*x), x)
```

**maple** [A] time = 0.04, size = 76, normalized size = 1.33

$$\frac{d\,x^3\operatorname{arccoth}(ax)}{3}+cx\operatorname{arccoth}(ax)+\frac{d\,x^2}{6a}+\frac{\ln(ax-1)\,c}{2a}+\frac{\ln(ax-1)\,d}{6a^3}+\frac{c\ln(ax+1)}{2a}+\frac{\ln(ax+1)\,d}{6a^3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((d*x^2+c)*arccoth(a*x),x)
```

```
[Out] 1/3*d*x^3*arccoth(a*x)+c*x*arccoth(a*x)+1/6*d*x^2/a+1/2/a*ln(a*x-1)*c+1/6/a
^3*ln(a*x-1)*d+1/2*c*ln(a*x+1)/a+1/6/a^3*ln(a*x+1)*d
```

**maxima [A]** time = 0.30, size = 65, normalized size = 1.14

$$\frac{1}{6}\,a\left(\frac{dx^2}{a^2}+\frac{\left(3\,a^2c+d\right)\log\left(ax+1\right)}{a^4}+\frac{\left(3\,a^2c+d\right)\log\left(ax-1\right)}{a^4}\right)+\frac{1}{3}\left(dx^3+3\,cx\right)\operatorname{arcoth}\left(ax\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((d*x^2+c)*arccoth(a*x),x, algorithm="maxima")
```

```
[Out] 1/6*a*(d*x^2/a^2 + (3*a^2*c + d)*log(a*x + 1)/a^4 + (3*a^2*c + d)*log(a*x -
 1)/a^4) + 1/3*(d*x^3 + 3*c*x)*arccoth(a*x)
```

**mupad [B]** time = 1.27, size = 60, normalized size = 1.05

$$\frac{\frac{d\,\ln\left(a^2\,x^2-1\right)}{6}+a^2\,\left(\frac{c\,\ln\left(a^2\,x^2-1\right)}{2}+\frac{d\,x^2}{6}\right)}{a^3}+\frac{d\,x^3\,\mathrm{acoth}\left(a\,x\right)}{3}+c\,x\,\mathrm{acoth}\left(a\,x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(a*x)*(c + d*x^2),x)
```

```
[Out] ((d*log(a^2*x^2 - 1))/6 + a^2*((c*log(a^2*x^2 - 1))/2 + (d*x^2)/6))/a^3 + (
d*x^3*acoth(a*x))/3 + c*x*acoth(a*x)
```

**sympy [A]** time = 1.06, size = 87, normalized size = 1.53

$$\begin{cases} cx\operatorname{acoth}\left(ax\right)+\frac{dx^3\operatorname{acoth}\left(ax\right)}{3}+\frac{c\log\left(x-\frac{1}{a}\right)}{a}+\frac{c\operatorname{acoth}\left(ax\right)}{a}+\frac{dx^2}{6a}+\frac{d\log\left(x-\frac{1}{a}\right)}{3a^3}+\frac{d\operatorname{acoth}\left(ax\right)}{3a^3} & \text{for}\ a\neq 0\\ \frac{i\pi\left(cx+\frac{dx^3}{3}\right)}{2} & \text{otherwise} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((d*x**2+c)*acoth(a*x),x)
```

```
[Out] Piecewise((c*x*acoth(a*x) + d*x**3*acoth(a*x)/3 + c*log(x - 1/a)/a + c*acot
h(a*x)/a + d*x**2/(6*a) + d*log(x - 1/a)/(3*a**3) + d*acoth(a*x)/(3*a**3),
Ne(a, 0)), (I*pi*(c*x + d*x**3/3)/2, True))
```

## 3.39 $\int \frac{\coth^{-1}(ax)}{c+dx^2} dx$

**Optimal**. Leaf size=390

$$-\frac{i\text{Li}_2\left(\frac{2\sqrt{c}\sqrt{d}(1-ax)}{(ia\sqrt{c}-\sqrt{d})(\sqrt{c}-i\sqrt{d}x)}+1\right)}{4\sqrt{c}\sqrt{d}}+\frac{i\text{Li}_2\left(1-\frac{2\sqrt{c}\sqrt{d}(ax+1)}{(i\sqrt{c}a+\sqrt{d})(\sqrt{c}-i\sqrt{d}x)}\right)}{4\sqrt{c}\sqrt{d}}-\frac{\log\left(1-\frac{1}{ax}\right)\tan^{-1}\left(\frac{\sqrt{d}x}{\sqrt{c}}\right)}{2\sqrt{c}\sqrt{d}}+\frac{\log\left(\frac{1}{ax}+1\right)\tan^{-1}\left(\frac{\sqrt{d}x}{\sqrt{c}}\right)}{2\sqrt{c}\sqrt{d}}$$

```
[Out] -1/2*arctan(x*d^(1/2)/c^(1/2))*ln(1-1/a/x)/c^(1/2)/d^(1/2)+1/2*arctan(x*d^(
1/2)/c^(1/2))*ln(1+1/a/x)/c^(1/2)/d^(1/2)+1/2*arctan(x*d^(1/2)/c^(1/2))*ln(
-2*(-a*x+1)*c^(1/2)*d^(1/2)/(I*a*c^(1/2)-d^(1/2))/(c^(1/2)-I*x*d^(1/2)))/c^
(1/2)/d^(1/2)-1/2*arctan(x*d^(1/2)/c^(1/2))*ln(2*(a*x+1)*c^(1/2)*d^(1/2)/(I
*a*c^(1/2)+d^(1/2))/(c^(1/2)-I*x*d^(1/2)))/c^(1/2)/d^(1/2)-1/4*I*polylog(2,
1+2*(-a*x+1)*c^(1/2)*d^(1/2)/(I*a*c^(1/2)-d^(1/2))/(c^(1/2)-I*x*d^(1/2)))/c
^(1/2)/d^(1/2)+1/4*I*polylog(2,1-2*(a*x+1)*c^(1/2)*d^(1/2)/(I*a*c^(1/2)+d^(
1/2))/(c^(1/2)-I*x*d^(1/2)))/c^(1/2)/d^(1/2)
```

**Rubi [A]** time = 0.95, antiderivative size = 390, normalized size of antiderivative = 1.00, number of steps used = 27, number of rules used = 13, integrand size = 14, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.929, Rules used = {5973, 205, 2470, 12, 260, 6688, 4876, 4848, 2391, 4856, 2402, 2315, 2447}

$$-\frac{i\text{PolyLog}\left(2,1+\frac{2\sqrt{c}\sqrt{d}(1-ax)}{(-\sqrt{d}+ia\sqrt{c})(\sqrt{c}-i\sqrt{d}x)}\right)}{4\sqrt{c}\sqrt{d}}+\frac{i\text{PolyLog}\left(2,1-\frac{2\sqrt{c}\sqrt{d}(ax+1)}{(\sqrt{d}+ia\sqrt{c})(\sqrt{c}-i\sqrt{d}x)}\right)}{4\sqrt{c}\sqrt{d}}-\frac{\log\left(1-\frac{1}{ax}\right)\tan^{-1}\left(\frac{\sqrt{d}x}{\sqrt{c}}\right)}{2\sqrt{c}\sqrt{d}}+\log$$

Antiderivative was successfully verified.

```
[In] Int[ArcCoth[a*x]/(c + d*x^2),x]
```

```
[Out] -(ArcTan[(Sqrt[d]*x)/Sqrt[c]]*Log[1 - 1/(a*x)])/(2*Sqrt[c]*Sqrt[d]) + (ArcT
an[(Sqrt[d]*x)/Sqrt[c]]*Log[1 + 1/(a*x)])/(2*Sqrt[c]*Sqrt[d]) + (ArcTan[(Sq
rt[d]*x)/Sqrt[c]]*Log[(-2*Sqrt[c]*Sqrt[d]*(1 - a*x))/((I*a*Sqrt[c] - Sqrt[d
])*(Sqrt[c] - I*Sqrt[d]*x))])/(2*Sqrt[c]*Sqrt[d]) - (ArcTan[(Sqrt[d]*x)/Sqr
t[c]]*Log[(2*Sqrt[c]*Sqrt[d]*(1 + a*x))/((I*a*Sqrt[c] + Sqrt[d])*(Sqrt[c] -
 I*Sqrt[d]*x))])/(2*Sqrt[c]*Sqrt[d]) - ((I/4)*PolyLog[2, 1 + (2*Sqrt[c]*Sqr
t[d]*(1 - a*x))/((I*a*Sqrt[c] - Sqrt[d])*(Sqrt[c] - I*Sqrt[d]*x))])/(Sqrt[c
]*Sqrt[d]) + ((I/4)*PolyLog[2, 1 - (2*Sqrt[c]*Sqrt[d]*(1 + a*x))/((I*a*Sqrt
[c] + Sqrt[d])*(Sqrt[c] - I*Sqrt[d]*x))])/(Sqrt[c]*Sqrt[d])
```

Rule 12

```
Int[(a_)*(u_), x_Symbol] :> Dist[a, Int[u, x], x] /; FreeQ[a, x] &&  !Match
Q[u, (b_)*(v_) /; FreeQ[b, x]]
```

Rule 205

```
Int[((a_) + (b_.)*(x_)^2)^(-1), x_Symbol] :> Simp[(Rt[a/b, 2]*ArcTan[x/Rt[a
/b, 2]])/a, x] /; FreeQ[{a, b}, x] && PosQ[a/b]
```

Rule 260

```
Int[(x_)^(m_.)/((a_) + (b_.)*(x_)^(n_)), x_Symbol] :> Simp[Log[RemoveConten
t[a + b*x^n, x]]/(b*n), x] /; FreeQ[{a, b, m, n}, x] && EqQ[m, n - 1]
```

Rule 2315

```
Int[Log[(c_.)*(x_)]/((d_) + (e_.)*(x_)), x_Symbol] :> -Simp[PolyLog[2, 1 -
c*x]/e, x] /; FreeQ[{c, d, e}, x] && EqQ[e + c*d, 0]
```

Rule 2391

```
Int[Log[(c_.)*((d_) + (e_.)*(x_)^(n_.))]/(x_), x_Symbol] :> -Simp[PolyLog[2
, -(c*e*x^n)]/n, x] /; FreeQ[{c, d, e, n}, x] && EqQ[c*d, 1]
```

Rule 2402

```
Int[Log[(c_.)/((d_) + (e_.)*(x_))]/((f_) + (g_.)*(x_)^2), x_Symbol] :> -Dis
t[e/g, Subst[Int[Log[2*d*x]/(1 - 2*d*x), x], x, 1/(d + e*x)], x] /; FreeQ[{
c, d, e, f, g}, x] && EqQ[c, 2*d] && EqQ[e^2*f + d^2*g, 0]
```

Rule 2447

```
Int[Log[u_]*(Pq_)^(m_.), x_Symbol] :> With[{C = FullSimplify[(Pq^m*(1 - u))
/D[u, x]]}, Simp[C*PolyLog[2, 1 - u], x] /; FreeQ[C, x]] /; IntegerQ[m] &&
PolyQ[Pq, x] && RationalFunctionQ[u, x] && LeQ[RationalFunctionExponents[u,
 x][[2]], Expon[Pq, x]]
```

Rule 2470

```
Int[((a_.) + Log[(c_.)*((d_) + (e_.)*(x_)^(n_))^(p_.)]*(b_.))/((f_) + (g_.)
*(x_)^2), x_Symbol] :> With[{u = IntHide[1/(f + g*x^2), x]}, Simp[u*(a + b*
Log[c*(d + e*x^n)^p]), x] - Dist[b*e*n*p, Int[(u*x^(n - 1))/(d + e*x^n), x]
, x]] /; FreeQ[{a, b, c, d, e, f, g, n, p}, x] && IntegerQ[n]
```

Rule 4848

```
Int[((a_.) + ArcTan[(c_.)*(x_)]*(b_.))/(x_), x_Symbol] :> Simp[a*Log[x], x]
 + (Dist[(I*b)/2, Int[Log[1 - I*c*x]/x, x], x] - Dist[(I*b)/2, Int[Log[1 +
I*c*x]/x, x], x]) /; FreeQ[{a, b, c}, x]
```

Rule 4856

```
Int[((a_.) + ArcTan[(c_.)*(x_)]*(b_.))/((d_) + (e_.)*(x_)), x_Symbol] :> -S
imp[((a + b*ArcTan[c*x])*Log[2/(1 - I*c*x)])/e, x] + (Dist[(b*c)/e, Int[Log
[2/(1 - I*c*x)]/(1 + c^2*x^2), x], x] - Dist[(b*c)/e, Int[Log[(2*c*(d + e*x
))/((c*d + I*e)*(1 - I*c*x))]/(1 + c^2*x^2), x], x] + Simp[((a + b*ArcTan[c
*x])*Log[(2*c*(d + e*x))/((c*d + I*e)*(1 - I*c*x))])/e, x]) /; FreeQ[{a, b,
 c, d, e}, x] && NeQ[c^2*d^2 + e^2, 0]
```

Rule 4876

```
Int[((a_.) + ArcTan[(c_.)*(x_)]*(b_.))^(p_.)*((f_.)*(x_))^(m_.)*((d_) + (e_
.)*(x_))^(q_.), x_Symbol] :> Int[ExpandIntegrand[(a + b*ArcTan[c*x])^p, (f*
x)^m*(d + e*x)^q, x], x] /; FreeQ[{a, b, c, d, e, f, m}, x] && IGtQ[p, 0] &
& IntegerQ[q] && (GtQ[q, 0] || NeQ[a, 0] || IntegerQ[m])
```

Rule 5973

```
Int[ArcCoth[(c_.)*(x_)]/((d_.) + (e_.)*(x_)^2), x_Symbol] :> Dist[1/2, Int[
Log[1 + 1/(c*x)]/(d + e*x^2), x], x] - Dist[1/2, Int[Log[1 - 1/(c*x)]/(d +
e*x^2), x], x] /; FreeQ[{c, d, e}, x]
```

Rule 6688

```
Int[u_, x_Symbol] :> With[{v = SimplifyIntegrand[u, x]}, Int[v, x] /; Simpl
erIntegrandQ[v, u, x]]
```

Rubi steps

$$\int \frac{\coth^{-1}(ax)}{c+dx^2}\,dx = -\left(\frac{1}{2}\int \frac{\log\left(1-\frac{1}{ax}\right)}{c+dx^2}\,dx\right) + \frac{1}{2}\int \frac{\log\left(1+\frac{1}{ax}\right)}{c+dx^2}\,dx$$

$$= -\frac{\tan^{-1}\left(\frac{\sqrt{d}\,x}{\sqrt{c}}\right)\log\left(1-\frac{1}{ax}\right)}{2\sqrt{c}\,\sqrt{d}} + \frac{\tan^{-1}\left(\frac{\sqrt{d}\,x}{\sqrt{c}}\right)\log\left(1+\frac{1}{ax}\right)}{2\sqrt{c}\,\sqrt{d}} + \frac{\int \frac{\tan^{-1}\left(\frac{\sqrt{d}\,x}{\sqrt{c}}\right)}{\sqrt{c}\,\sqrt{d}\left(1-\frac{1}{ax}\right)x^2}\,dx}{2a} + \frac{\int \frac{\tan^{-1}\left(\frac{\sqrt{d}\,x}{\sqrt{c}}\right)}{\sqrt{c}\,\sqrt{d}\left(1+\frac{1}{ax}\right.}}{2a}$$

$$= -\frac{\tan^{-1}\left(\frac{\sqrt{d}\,x}{\sqrt{c}}\right)\log\left(1-\frac{1}{ax}\right)}{2\sqrt{c}\,\sqrt{d}} + \frac{\tan^{-1}\left(\frac{\sqrt{d}\,x}{\sqrt{c}}\right)\log\left(1+\frac{1}{ax}\right)}{2\sqrt{c}\,\sqrt{d}} + \frac{\int \frac{\tan^{-1}\left(\frac{\sqrt{d}\,x}{\sqrt{c}}\right)}{\left(1-\frac{1}{ax}\right)x^2}\,dx}{2a\sqrt{c}\,\sqrt{d}} + \frac{\int \frac{\tan^{-1}\left(\frac{\sqrt{d}\,x}{\sqrt{c}}\right)}{\left(1+\frac{1}{ax}\right)x^2}\,dx}{2a\sqrt{c}\,\sqrt{d}}$$

$$= -\frac{\tan^{-1}\left(\frac{\sqrt{d}\,x}{\sqrt{c}}\right)\log\left(1-\frac{1}{ax}\right)}{2\sqrt{c}\,\sqrt{d}} + \frac{\tan^{-1}\left(\frac{\sqrt{d}\,x}{\sqrt{c}}\right)\log\left(1+\frac{1}{ax}\right)}{2\sqrt{c}\,\sqrt{d}} + \frac{\int \frac{a\tan^{-1}\left(\frac{\sqrt{d}\,x}{\sqrt{c}}\right)}{x(-1+ax)}\,dx}{2a\sqrt{c}\,\sqrt{d}} + \frac{\int \frac{a\tan^{-1}\left(\frac{\sqrt{d}\,x}{\sqrt{c}}\right)}{x(1+ax)}\,d}{2a\sqrt{c}\,\sqrt{d}}$$

$$= -\frac{\tan^{-1}\left(\frac{\sqrt{d}\,x}{\sqrt{c}}\right)\log\left(1-\frac{1}{ax}\right)}{2\sqrt{c}\,\sqrt{d}} + \frac{\tan^{-1}\left(\frac{\sqrt{d}\,x}{\sqrt{c}}\right)\log\left(1+\frac{1}{ax}\right)}{2\sqrt{c}\,\sqrt{d}} + \frac{\int \frac{\tan^{-1}\left(\frac{\sqrt{d}\,x}{\sqrt{c}}\right)}{x(-1+ax)}\,dx}{2\sqrt{c}\,\sqrt{d}} + \frac{\int \frac{\tan^{-1}\left(\frac{\sqrt{d}\,x}{\sqrt{c}}\right)}{x(1+ax)}\,dx}{2\sqrt{c}\,\sqrt{d}}$$

$$= -\frac{\tan^{-1}\left(\frac{\sqrt{d}\,x}{\sqrt{c}}\right)\log\left(1-\frac{1}{ax}\right)}{2\sqrt{c}\,\sqrt{d}} + \frac{\tan^{-1}\left(\frac{\sqrt{d}\,x}{\sqrt{c}}\right)\log\left(1+\frac{1}{ax}\right)}{2\sqrt{c}\,\sqrt{d}} + \frac{\int \left(-\frac{\tan^{-1}\left(\frac{\sqrt{d}\,x}{\sqrt{c}}\right)}{x} + \frac{a\tan^{-1}\left(\frac{\sqrt{d}\,x}{\sqrt{c}}\right)}{-1+ax}\right)dx}{2\sqrt{c}\,\sqrt{d}} -$$

$$= -\frac{\tan^{-1}\left(\frac{\sqrt{d}\,x}{\sqrt{c}}\right)\log\left(1-\frac{1}{ax}\right)}{2\sqrt{c}\,\sqrt{d}} + \frac{\tan^{-1}\left(\frac{\sqrt{d}\,x}{\sqrt{c}}\right)\log\left(1+\frac{1}{ax}\right)}{2\sqrt{c}\,\sqrt{d}} + \frac{a\int \frac{\tan^{-1}\left(\frac{\sqrt{d}\,x}{\sqrt{c}}\right)}{-1+ax}\,dx}{2\sqrt{c}\,\sqrt{d}} - \frac{a\int \frac{\tan^{-1}\left(\frac{\sqrt{d}\,x}{\sqrt{c}}\right)}{1+ax}}{2\sqrt{c}\,\sqrt{d}}$$

$$= -\frac{\tan^{-1}\left(\frac{\sqrt{d}\,x}{\sqrt{c}}\right)\log\left(1-\frac{1}{ax}\right)}{2\sqrt{c}\,\sqrt{d}} + \frac{\tan^{-1}\left(\frac{\sqrt{d}\,x}{\sqrt{c}}\right)\log\left(1+\frac{1}{ax}\right)}{2\sqrt{c}\,\sqrt{d}} + \frac{\tan^{-1}\left(\frac{\sqrt{d}\,x}{\sqrt{c}}\right)\log\left(-\frac{2\sqrt{c}\,\sqrt{d}\,(1-ax)}{\left(ia\sqrt{c}-\sqrt{d}\right)\left(\sqrt{c}-i\right.}\right.}{2\sqrt{c}\,\sqrt{d}}$$

$$= -\frac{\tan^{-1}\left(\frac{\sqrt{d}\,x}{\sqrt{c}}\right)\log\left(1-\frac{1}{ax}\right)}{2\sqrt{c}\,\sqrt{d}} + \frac{\tan^{-1}\left(\frac{\sqrt{d}\,x}{\sqrt{c}}\right)\log\left(1+\frac{1}{ax}\right)}{2\sqrt{c}\,\sqrt{d}} + \frac{\tan^{-1}\left(\frac{\sqrt{d}\,x}{\sqrt{c}}\right)\log\left(-\frac{2\sqrt{c}\,\sqrt{d}\,(1-ax)}{\left(ia\sqrt{c}-\sqrt{d}\right)\left(\sqrt{c}-i\right.}\right.}{2\sqrt{c}\,\sqrt{d}}$$

**Mathematica [A]** time = 1.39, size = 671, normalized size = 1.72

$$\frac{a\left(i\left(\text{Li}_2\left(\frac{\left(ca^2-d+2i\sqrt{a^2cd}\right)\left(iadx+\sqrt{a^2cd}\right)}{\left(ca^2+d\right)\left(\sqrt{a^2cd}-iadx\right)}\right)-\text{Li}_2\left(\frac{\left(ca^2-d-2i\sqrt{a^2cd}\right)\left(iadx+\sqrt{a^2cd}\right)}{\left(ca^2+d\right)\left(\sqrt{a^2cd}-iadx\right)}\right)\right)-2i\cos^{-1}\left(\frac{a^2c-d}{a^2c+d}\right)\tan^{-1}\left(\frac{ac}{x\sqrt{a^2cd}}\right)+4\,\text{coth}}{}$$

Antiderivative was successfully verified.

```
[In] Integrate[ArcCoth[a*x]/(c + d*x^2),x]
```

```
[Out] (a*((-2*I)*ArcCos[(a^2*c - d)/(a^2*c + d)]*ArcTan[(a*c)/(Sqrt[a^2*c*d]*x)]
+ 4*ArcCoth[a*x]*ArcTan[(a*d*x)/Sqrt[a^2*c*d]] - (ArcCos[(a^2*c - d)/(a^2*c
 + d)] + 2*ArcTan[(a*c)/(Sqrt[a^2*c*d]*x)])*Log[(2*d*(a^2*c - I*Sqrt[a^2*c*
d])*(-1 + a*x))/((a^2*c + d)*(I*Sqrt[a^2*c*d] + a*d*x))] - (ArcCos[(a^2*c -
 d)/(a^2*c + d)] - 2*ArcTan[(a*c)/(Sqrt[a^2*c*d]*x)])*Log[(2*d*(a^2*c + I*S
qrt[a^2*c*d])*(1 + a*x))/((a^2*c + d)*(I*Sqrt[a^2*c*d] + a*d*x))] + (ArcCos
```

```
[(a^2*c - d)/(a^2*c + d)] + 2*(ArcTan[(a*c)/(Sqrt[a^2*c*d]*x)] + ArcTan[(a*
d*x)/Sqrt[a^2*c*d]]))*Log[(Sqrt[2]*Sqrt[a^2*c*d])/(Sqrt[a^2*c + d]*E^ArcCot
h[a*x]*Sqrt[-(a^2*c) + d + (a^2*c + d)*Cosh[2*ArcCoth[a*x]]])] + (ArcCos[(a
^2*c - d)/(a^2*c + d)] - 2*(ArcTan[(a*c)/(Sqrt[a^2*c*d]*x)] + ArcTan[(a*d*x
)/Sqrt[a^2*c*d]]))*Log[(Sqrt[2]*Sqrt[a^2*c*d]*E^ArcCoth[a*x])/(Sqrt[a^2*c +
 d]*Sqrt[-(a^2*c) + d + (a^2*c + d)*Cosh[2*ArcCoth[a*x]]])] + I*(-PolyLog[2
, ((a^2*c - d - (2*I)*Sqrt[a^2*c*d])*(Sqrt[a^2*c*d] + I*a*d*x))/((a^2*c + d
)*(Sqrt[a^2*c*d] - I*a*d*x))] + PolyLog[2, ((a^2*c - d + (2*I)*Sqrt[a^2*c*d
])*(Sqrt[a^2*c*d] + I*a*d*x))/((a^2*c + d)*(Sqrt[a^2*c*d] - I*a*d*x))])))/(
4*Sqrt[a^2*c*d])
```

**fricas [F]** time = 0.52, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{\operatorname{arcoth}(ax)}{dx^2+c},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(a*x)/(d*x^2+c),x, algorithm="fricas")
```

```
[Out] integral(arccoth(a*x)/(d*x^2 + c), x)
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{arcoth}(ax)}{dx^2+c}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(a*x)/(d*x^2+c),x, algorithm="giac")
```

```
[Out] integrate(arccoth(a*x)/(d*x^2 + c), x)
```

**maple [B]** time = 0.68, size = 785, normalized size = 2.01

$$-\frac{a^3 \ln\left(1-\frac{(a^2c+d)(ax+1)}{(ax-1)\left(a^2c-2\sqrt{-a^2cd}-d\right)}\right)\operatorname{arccoth}(ax)\sqrt{-a^2cd}\;c}{2d\left(a^4c^2+2a^2cd+d^2\right)}-\frac{a\ln\left(1-\frac{(a^2c+d)(ax+1)}{(ax-1)\left(a^2c-2\sqrt{-a^2cd}-d\right)}\right)\operatorname{arccoth}(ax)\sqrt{-a^2cd}}{a^4c^2+2a^2cd+d^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(arccoth(a*x)/(d*x^2+c),x)
```

```
[Out] -1/2*a^3/d/(a^4*c^2+2*a^2*c*d+d^2)*ln(1-(a^2*c+d)*(a*x+1)/(a*x-1)/(a^2*c-2*
(-a^2*c*d)^(1/2)-d))*arccoth(a*x)*(-a^2*c*d)^(1/2)*c-a/(a^4*c^2+2*a^2*c*d+d
^2)*ln(1-(a^2*c+d)*(a*x+1)/(a*x-1)/(a^2*c-2*(-a^2*c*d)^(1/2)-d))*arccoth(a*
x)*(-a^2*c*d)^(1/2)+1/2*a^3/d/(a^4*c^2+2*a^2*c*d+d^2)*arccoth(a*x)^2*(-a^2*
c*d)^(1/2)*c+a/(a^4*c^2+2*a^2*c*d+d^2)*arccoth(a*x)^2*(-a^2*c*d)^(1/2)-1/4*
a^3/d/(a^4*c^2+2*a^2*c*d+d^2)*polylog(2,(a^2*c+d)*(a*x+1)/(a*x-1)/(a^2*c-2*
(-a^2*c*d)^(1/2)-d))*(-a^2*c*d)^(1/2)*c-1/2*a/(a^4*c^2+2*a^2*c*d+d^2)*polyl
og(2,(a^2*c+d)*(a*x+1)/(a*x-1)/(a^2*c-2*(-a^2*c*d)^(1/2)-d))*(-a^2*c*d)^(1/
2)-1/2/a/c/(a^4*c^2+2*a^2*c*d+d^2)*ln(1-(a^2*c+d)*(a*x+1)/(a*x-1)/(a^2*c-2*
(-a^2*c*d)^(1/2)-d))*arccoth(a*x)*(-a^2*c*d)^(1/2)*d+1/2/a/c/(a^4*c^2+2*a^2
*c*d+d^2)*arccoth(a*x)^2*(-a^2*c*d)^(1/2)*d-1/4/a/c/(a^4*c^2+2*a^2*c*d+d^2)
*polylog(2,(a^2*c+d)*(a*x+1)/(a*x-1)/(a^2*c-2*(-a^2*c*d)^(1/2)-d))*(-a^2*c*
d)^(1/2)*d+1/2/a*(-a^2*c*d)^(1/2)/c/d*arccoth(a*x)*ln(1-(a^2*c+d)*(a*x+1)/(
a*x-1)/(a^2*c+2*(-a^2*c*d)^(1/2)-d))-1/2/a*(-a^2*c*d)^(1/2)/c/d*arccoth(a*x
)^2+1/4/a*(-a^2*c*d)^(1/2)/c/d*polylog(2,(a^2*c+d)*(a*x+1)/(a*x-1)/(a^2*c+2
*(-a^2*c*d)^(1/2)-d))
```

**maxima** [A] time = 0.54, size = 406, normalized size = 1.04

$$\frac{\operatorname{arcoth}(ax)\arctan\left(\frac{dx}{\sqrt{cd}}\right)}{\sqrt{cd}}+\frac{\left(\arctan\left(\frac{(a^2x+a)\sqrt{c}\sqrt{d}}{a^2c+d},\frac{adx+d}{a^2c+d}\right)-\arctan\left(\frac{(a^2x-a)\sqrt{c}\sqrt{d}}{a^2c+d},-\frac{adx-d}{a^2c+d}\right)\right)\log\left(dx^2+c\right)-\arctan$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(a*x)/(d*x^2+c),x, algorithm="maxima")
```

```
[Out] arccoth(a*x)*arctan(d*x/sqrt(c*d))/sqrt(c*d) + 1/4*((arctan2((a^2*x + a)*sq
rt(c)*sqrt(d)/(a^2*c + d), (a*d*x + d)/(a^2*c + d)) - arctan2((a^2*x - a)*s
qrt(c)*sqrt(d)/(a^2*c + d), -(a*d*x - d)/(a^2*c + d)))*log(d*x^2 + c) - arc
tan(sqrt(d)*x/sqrt(c))*log((a^2*d*x^2 + 2*a*d*x + d)/(a^2*c + d)) + arctan(
sqrt(d)*x/sqrt(c))*log((a^2*d*x^2 - 2*a*d*x + d)/(a^2*c + d)) - I*dilog((a^
2*c + a*d*x - (I*a^2*x - I*a)*sqrt(c)*sqrt(d))/(a^2*c + 2*I*a*sqrt(c)*sqrt(
d) - d)) - I*dilog((a^2*c - a*d*x + (I*a^2*x + I*a)*sqrt(c)*sqrt(d))/(a^2*c
 + 2*I*a*sqrt(c)*sqrt(d) - d)) + I*dilog((a^2*c + a*d*x + (I*a^2*x - I*a)*s
qrt(c)*sqrt(d))/(a^2*c - 2*I*a*sqrt(c)*sqrt(d) - d)) + I*dilog((a^2*c - a*d
*x - (I*a^2*x + I*a)*sqrt(c)*sqrt(d))/(a^2*c - 2*I*a*sqrt(c)*sqrt(d) - d)))
/sqrt(c*d)
```

**mupad** [F] time = 0.00, size = -1, normalized size = -0.00

$$\int \frac{\operatorname{acoth}(a\,x)}{d\,x^2+c}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(a*x)/(c + d*x^2),x)
```

```
[Out] int(acoth(a*x)/(c + d*x^2), x)
```

**sympy** [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{acoth}(ax)}{c+dx^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(a*x)/(d*x**2+c),x)
```

```
[Out] Integral(acoth(a*x)/(c + d*x**2), x)
```

## 3.40 $\int \frac{\coth^{-1}(ax)}{\left(c+dx^2\right)^2} dx$

**Optimal**. Leaf size=590

$$\frac{a\log\left(1-a^2x^2\right)}{4c\left(a^2c+d\right)}-\frac{a\log\left(c+dx^2\right)}{4c\left(a^2c+d\right)}+\frac{i\text{Li}_2\left(\frac{a\left(\sqrt{c}-i\sqrt{d}x\right)}{a\sqrt{c}-i\sqrt{d}}\right)}{8c^{3/2}\sqrt{d}}-\frac{i\text{Li}_2\left(\frac{a\left(\sqrt{c}-i\sqrt{d}x\right)}{\sqrt{c}a+i\sqrt{d}}\right)}{8c^{3/2}\sqrt{d}}+\frac{i\text{Li}_2\left(\frac{a\left(i\sqrt{d}x+\sqrt{c}\right)}{a\sqrt{c}-i\sqrt{d}}\right)}{8c^{3/2}\sqrt{d}}-\frac{i\text{Li}_2\left(\frac{a\left(i\sqrt{d}x+\sqrt{c}\right)}{\sqrt{c}a+i\sqrt{d}}\right)}{8c^{3/2}\sqrt{d}}$$

```
[Out] 1/2*x*arccoth(a*x)/c/(d*x^2+c)+1/4*a*ln(-a^2*x^2+1)/c/(a^2*c+d)-1/4*a*ln(d*
x^2+c)/c/(a^2*c+d)+1/2*arccoth(a*x)*arctan(x*d^(1/2)/c^(1/2))/c^(3/2)/d^(1/
2)-1/8*I*ln(-(a*x+1)*d^(1/2)/(I*a*c^(1/2)-d^(1/2)))*ln(1-I*x*d^(1/2)/c^(1/2
))/c^(3/2)/d^(1/2)+1/8*I*ln((-a*x+1)*d^(1/2)/(I*a*c^(1/2)+d^(1/2)))*ln(1-I*
x*d^(1/2)/c^(1/2))/c^(3/2)/d^(1/2)-1/8*I*ln(-(-a*x+1)*d^(1/2)/(I*a*c^(1/2)-
d^(1/2)))*ln(1+I*x*d^(1/2)/c^(1/2))/c^(3/2)/d^(1/2)+1/8*I*ln((a*x+1)*d^(1/2
)/(I*a*c^(1/2)+d^(1/2)))*ln(1+I*x*d^(1/2)/c^(1/2))/c^(3/2)/d^(1/2)+1/8*I*po
lylog(2,a*(c^(1/2)-I*x*d^(1/2))/(a*c^(1/2)-I*d^(1/2)))/c^(3/2)/d^(1/2)-1/8*
I*polylog(2,a*(c^(1/2)-I*x*d^(1/2))/(a*c^(1/2)+I*d^(1/2)))/c^(3/2)/d^(1/2)+
1/8*I*polylog(2,a*(c^(1/2)+I*x*d^(1/2))/(a*c^(1/2)-I*d^(1/2)))/c^(3/2)/d^(1
/2)-1/8*I*polylog(2,a*(c^(1/2)+I*x*d^(1/2))/(a*c^(1/2)+I*d^(1/2)))/c^(3/2)/
d^(1/2)
```

**Rubi [A]** time = 0.87, antiderivative size = 590, normalized size of antiderivative = 1.00, number of steps used = 25, number of rules used = 13, integrand size = 14, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.929, Rules used = {199, 205, 5977, 6725, 517, 444, 36, 31, 4908, 2409, 2394, 2393, 2391}

$$\frac{i\text{PolyLog}\left(2,\frac{a\left(\sqrt{c}-i\sqrt{d}x\right)}{a\sqrt{c}-i\sqrt{d}}\right)}{8c^{3/2}\sqrt{d}}-\frac{i\text{PolyLog}\left(2,\frac{a\left(\sqrt{c}-i\sqrt{d}x\right)}{a\sqrt{c}+i\sqrt{d}}\right)}{8c^{3/2}\sqrt{d}}+\frac{i\text{PolyLog}\left(2,\frac{a\left(\sqrt{c}+i\sqrt{d}x\right)}{a\sqrt{c}-i\sqrt{d}}\right)}{8c^{3/2}\sqrt{d}}-\frac{i\text{PolyLog}\left(2,\frac{a\left(\sqrt{c}+i\sqrt{d}x\right)}{a\sqrt{c}+i\sqrt{d}}\right)}{8c^{3/2}\sqrt{d}}+$$

Antiderivative was successfully verified.

```
[In] Int[ArcCoth[a*x]/(c + d*x^2)^2,x]
```

```
[Out] (x*ArcCoth[a*x])/(2*c*(c + d*x^2)) + (ArcCoth[a*x]*ArcTan[(Sqrt[d]*x)/Sqrt[
c]])/(2*c^(3/2)*Sqrt[d]) + ((I/8)*Log[(Sqrt[d]*(1 - a*x))/(I*a*Sqrt[c] + Sq
rt[d])]*Log[1 - (I*Sqrt[d]*x)/Sqrt[c]])/(c^(3/2)*Sqrt[d]) - ((I/8)*Log[-((S
qrt[d]*(1 + a*x))/(I*a*Sqrt[c] - Sqrt[d]))]*Log[1 - (I*Sqrt[d]*x)/Sqrt[c]])
/(c^(3/2)*Sqrt[d]) - ((I/8)*Log[-((Sqrt[d]*(1 - a*x))/(I*a*Sqrt[c] - Sqrt[d
]))]*Log[1 + (I*Sqrt[d]*x)/Sqrt[c]])/(c^(3/2)*Sqrt[d]) + ((I/8)*Log[(Sqrt[d
]*(1 + a*x))/(I*a*Sqrt[c] + Sqrt[d])]*Log[1 + (I*Sqrt[d]*x)/Sqrt[c]])/(c^(3
/2)*Sqrt[d]) + (a*Log[1 - a^2*x^2])/(4*c*(a^2*c + d)) - (a*Log[c + d*x^2])/
(4*c*(a^2*c + d)) + ((I/8)*PolyLog[2, (a*(Sqrt[c] - I*Sqrt[d]*x))/(a*Sqrt[c
] - I*Sqrt[d])])/(c^(3/2)*Sqrt[d]) - ((I/8)*PolyLog[2, (a*(Sqrt[c] - I*Sqrt
[d]*x))/(a*Sqrt[c] + I*Sqrt[d])])/(c^(3/2)*Sqrt[d]) + ((I/8)*PolyLog[2, (a*
(Sqrt[c] + I*Sqrt[d]*x))/(a*Sqrt[c] - I*Sqrt[d])])/(c^(3/2)*Sqrt[d]) - ((I/
8)*PolyLog[2, (a*(Sqrt[c] + I*Sqrt[d]*x))/(a*Sqrt[c] + I*Sqrt[d])])/(c^(3/2
)*Sqrt[d])
```

Rule 31

```
Int[((a_) + (b_.)*(x_))^(-1), x_Symbol] :> Simp[Log[RemoveContent[a + b*x,
x]]/b, x] /; FreeQ[{a, b}, x]
```

Rule 36

```
Int[1/(((a_.) + (b_.)*(x_))*((c_.) + (d_.)*(x_))), x_Symbol] :> Dist[b/(b*c
 - a*d), Int[1/(a + b*x), x], x] - Dist[d/(b*c - a*d), Int[1/(c + d*x), x],
```

```
x] /; FreeQ[{a, b, c, d}, x] && NeQ[b*c - a*d, 0]
```

Rule 199

```
Int[((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> -Simp[(x*(a + b*x^n)^(p + 1
))/(a*n*(p + 1)), x] + Dist[(n*(p + 1) + 1)/(a*n*(p + 1)), Int[(a + b*x^n)^
(p + 1), x], x] /; FreeQ[{a, b}, x] && IGtQ[n, 0] && LtQ[p, -1] && (Integer
Q[2*p] || (n == 2 && IntegerQ[4*p]) || (n == 2 && IntegerQ[3*p]) || Denomin
ator[p + 1/n] < Denominator[p])
```

Rule 205

```
Int[((a_) + (b_.)*(x_)^2)^(-1), x_Symbol] :> Simp[(Rt[a/b, 2]*ArcTan[x/Rt[a
/b, 2]])/a, x] /; FreeQ[{a, b}, x] && PosQ[a/b]
```

Rule 444

```
Int[(x_)^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_.)*((c_) + (d_.)*(x_)^(n_))^(q_.
), x_Symbol] :> Dist[1/n, Subst[Int[(a + b*x)^p*(c + d*x)^q, x], x, x^n], x
] /; FreeQ[{a, b, c, d, m, n, p, q}, x] && NeQ[b*c - a*d, 0] && EqQ[m - n +
 1, 0]
```

Rule 517

```
Int[(u_.)*((c_) + (d_.)*(x_)^(n_.))^(q_.)*((a1_) + (b1_.)*(x_)^(non2_.))^(p
_.)*((a2_) + (b2_.)*(x_)^(non2_.))^(p_.), x_Symbol] :> Int[u*(a1*a2 + b1*b2
*x^n)^p*(c + d*x^n)^q, x] /; FreeQ[{a1, b1, a2, b2, c, d, n, p, q}, x] && E
qQ[non2, n/2] && EqQ[a2*b1 + a1*b2, 0] && (IntegerQ[p] || (GtQ[a1, 0] && Gt
Q[a2, 0]))
```

Rule 2391

```
Int[Log[(c_.)*((d_) + (e_.)*(x_)^(n_.))]/(x_), x_Symbol] :> -Simp[PolyLog[2
, -(c*e*x^n)]/n, x] /; FreeQ[{c, d, e, n}, x] && EqQ[c*d, 1]
```

Rule 2393

```
Int[((a_.) + Log[(c_.)*((d_) + (e_.)*(x_))]*(b_.))/((f_.) + (g_.)*(x_)), x_
Symbol] :> Dist[1/g, Subst[Int[(a + b*Log[1 + (c*e*x)/g])/x, x], x, f + g*x
], x] /; FreeQ[{a, b, c, d, e, f, g}, x] && NeQ[e*f - d*g, 0] && EqQ[g + c*
(e*f - d*g), 0]
```

Rule 2394

```
Int[((a_.) + Log[(c_.)*((d_) + (e_.)*(x_))^(n_.)]*(b_.))/((f_.) + (g_.)*(x_
)), x_Symbol] :> Simp[(Log[(e*(f + g*x))/(e*f - d*g)]*(a + b*Log[c*(d + e*x
)^n]))/g, x] - Dist[(b*e*n)/g, Int[Log[(e*(f + g*x))/(e*f - d*g)]/(d + e*x)
, x], x] /; FreeQ[{a, b, c, d, e, f, g, n}, x] && NeQ[e*f - d*g, 0]
```

Rule 2409

```
Int[((a_.) + Log[(c_.)*((d_) + (e_.)*(x_))^(n_.)]*(b_.))^(p_.)*((f_) + (g_.
)*(x_)^(r_))^(q_.), x_Symbol] :> Int[ExpandIntegrand[(a + b*Log[c*(d + e*x)
^n])^p, (f + g*x^r)^q, x], x] /; FreeQ[{a, b, c, d, e, f, g, n, r}, x] && I
GtQ[p, 0] && IntegerQ[q] && (GtQ[q, 0] || (IntegerQ[r] && NeQ[r, 1]))
```

Rule 4908

```
Int[ArcTan[(c_.)*(x_)]/((d_.) + (e_.)*(x_)^2), x_Symbol] :> Dist[I/2, Int[L
og[1 - I*c*x]/(d + e*x^2), x], x] - Dist[I/2, Int[Log[1 + I*c*x]/(d + e*x^2
), x], x] /; FreeQ[{c, d, e}, x]
```

Rule 5977

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))*((d_.) + (e_.)*(x_)^2)^(q_.), x_Sym
bol] :> With[{u = IntHide[(d + e*x^2)^q, x]}, Dist[a + b*ArcCoth[c*x], u, x
] - Dist[b*c, Int[u/(1 - c^2*x^2), x], x]] /; FreeQ[{a, b, c, d, e}, x] &&
(IntegerQ[q] || ILtQ[q + 1/2, 0])
```

Rule 6725

```
Int[(u_)/((a_) + (b_.)*(x_)^(n_)), x_Symbol] :> With[{v = RationalFunctionE
xpand[u/(a + b*x^n), x]}, Int[v, x] /; SumQ[v]] /; FreeQ[{a, b}, x] && IGtQ
[n, 0]
```

Rubi steps

$$\int \frac{\coth^{-1}(ax)}{\left(c+dx^2\right)^2}\,dx = \frac{x\coth^{-1}(ax)}{2c\left(c+dx^2\right)} + \frac{\coth^{-1}(ax)\tan^{-1}\left(\frac{\sqrt{d}\,x}{\sqrt{c}}\right)}{2c^{3/2}\sqrt{d}} - a\int \frac{\frac{x}{2c\left(c+dx^2\right)} + \frac{\tan^{-1}\left(\frac{\sqrt{d}\,x}{\sqrt{c}}\right)}{2c^{3/2}\sqrt{d}}}{1-a^2x^2}\,dx$$

$$= \frac{x\coth^{-1}(ax)}{2c\left(c+dx^2\right)} + \frac{\coth^{-1}(ax)\tan^{-1}\left(\frac{\sqrt{d}\,x}{\sqrt{c}}\right)}{2c^{3/2}\sqrt{d}} - a\int\left(-\frac{x}{2c(-1+ax)(1+ax)\left(c+dx^2\right)} - \frac{\tan^{-1}}{2c^{3/2}\sqrt{d}\,(}\right.$$

$$= \frac{x\coth^{-1}(ax)}{2c\left(c+dx^2\right)} + \frac{\coth^{-1}(ax)\tan^{-1}\left(\frac{\sqrt{d}\,x}{\sqrt{c}}\right)}{2c^{3/2}\sqrt{d}} + \frac{a\int \frac{x}{(-1+ax)(1+ax)\left(c+dx^2\right)}\,dx}{2c} + \frac{a\int \frac{\tan^{-1}\left(\frac{\sqrt{d}\,x}{\sqrt{c}}\right)}{-1+a^2x^2}\,dx}{2c^{3/2}\sqrt{d}}$$

$$= \frac{x\coth^{-1}(ax)}{2c\left(c+dx^2\right)} + \frac{\coth^{-1}(ax)\tan^{-1}\left(\frac{\sqrt{d}\,x}{\sqrt{c}}\right)}{2c^{3/2}\sqrt{d}} + \frac{a\int \frac{x}{\left(-1+a^2x^2\right)\left(c+dx^2\right)}\,dx}{2c} + \frac{(ia)\int \frac{\log\left(1-\frac{i\sqrt{d}\,x}{\sqrt{c}}\right)}{-1+a^2x^2}\,dx}{4c^{3/2}\sqrt{d}} - \frac{(i}{}$$

$$= \frac{x\coth^{-1}(ax)}{2c\left(c+dx^2\right)} + \frac{\coth^{-1}(ax)\tan^{-1}\left(\frac{\sqrt{d}\,x}{\sqrt{c}}\right)}{2c^{3/2}\sqrt{d}} + \frac{a\,\text{Subst}\left(\int \frac{1}{\left(-1+a^2x\right)(c+dx)}\,dx, x, x^2\right)}{4c} + \frac{(ia)\int\left(-\frac{\log(}{2(}\right.}{}$$

$$= \frac{x\coth^{-1}(ax)}{2c\left(c+dx^2\right)} + \frac{\coth^{-1}(ax)\tan^{-1}\left(\frac{\sqrt{d}\,x}{\sqrt{c}}\right)}{2c^{3/2}\sqrt{d}} - \frac{(ia)\int \frac{\log\left(1-\frac{i\sqrt{d}\,x}{\sqrt{c}}\right)}{1-ax}\,dx}{8c^{3/2}\sqrt{d}} - \frac{(ia)\int \frac{\log\left(1-\frac{i\sqrt{d}\,x}{\sqrt{c}}\right)}{1+ax}\,dx}{8c^{3/2}\sqrt{d}} + \frac{(ia)}{}$$

$$= \frac{x\coth^{-1}(ax)}{2c\left(c+dx^2\right)} + \frac{\coth^{-1}(ax)\tan^{-1}\left(\frac{\sqrt{d}\,x}{\sqrt{c}}\right)}{2c^{3/2}\sqrt{d}} + \frac{i\log\left(\frac{\sqrt{d}\,(1-ax)}{ia\sqrt{c}+\sqrt{d}}\right)\log\left(1-\frac{i\sqrt{d}\,x}{\sqrt{c}}\right)}{8c^{3/2}\sqrt{d}} - \frac{i\log\left(-\frac{\sqrt{d}\,(1+ax)}{ia\sqrt{c}-\sqrt{d}}\right.}{8c^{3/2}}$$

$$= \frac{x\coth^{-1}(ax)}{2c\left(c+dx^2\right)} + \frac{\coth^{-1}(ax)\tan^{-1}\left(\frac{\sqrt{d}\,x}{\sqrt{c}}\right)}{2c^{3/2}\sqrt{d}} + \frac{i\log\left(\frac{\sqrt{d}\,(1-ax)}{ia\sqrt{c}+\sqrt{d}}\right)\log\left(1-\frac{i\sqrt{d}\,x}{\sqrt{c}}\right)}{8c^{3/2}\sqrt{d}} - \frac{i\log\left(-\frac{\sqrt{d}\,(1+ax)}{ia\sqrt{c}-\sqrt{d}}\right.}{8c^{3/2}}$$

$$= \frac{x\coth^{-1}(ax)}{2c\left(c+dx^2\right)} + \frac{\coth^{-1}(ax)\tan^{-1}\left(\frac{\sqrt{d}\,x}{\sqrt{c}}\right)}{2c^{3/2}\sqrt{d}} + \frac{i\log\left(\frac{\sqrt{d}\,(1-ax)}{ia\sqrt{c}+\sqrt{d}}\right)\log\left(1-\frac{i\sqrt{d}\,x}{\sqrt{c}}\right)}{8c^{3/2}\sqrt{d}} - \frac{i\log\left(-\frac{\sqrt{d}\,(1+ax)}{ia\sqrt{c}-\sqrt{d}}\right.}{8c^{3/2}}$$

**Mathematica [A]** time = 7.78, size = 755, normalized size = 1.28

$$-\frac{a\left(\frac{i\left(\text{Li}_2\left(\frac{\left(ca^2-d-2i\sqrt{a^2cd}\right)\left(iadx+\sqrt{a^2cd}\right)}{\left(ca^2+d\right)\left(\sqrt{a^2cd}-iadx\right)}\right)-\text{Li}_2\left(\frac{\left(ca^2-d+2i\sqrt{a^2cd}\right)\left(iadx+\sqrt{a^2cd}\right)}{\left(ca^2+d\right)\left(\sqrt{a^2cd}-iadx\right)}\right)\right)+2i\cos^{-1}\left(\frac{a^2c-d}{a^2c+d}\right)\tan^{-1}\left(\frac{ac}{x\sqrt{a^2cd}}\right)-4\coth^{-1}(ax)\tan^{-1}\left(\frac{adx}{\sqrt{a^2cd}}\right)+\log\left(\frac{2d(}{(a^2}\right.}{}\right.}{}$$

Warning: Unable to verify antiderivative.

```
[In] Integrate[ArcCoth[a*x]/(c + d*x^2)^2,x]
```

[Out] -1/8*(a*((2*Log[1 - ((a^2*c + d)*Cosh[2*ArcCoth[a*x]])/(a^2*c - d)])/(a^2*c + d) + ((2*I)*ArcCos[(a^2*c - d)/(a^2*c + d)]*ArcTan[(a*c)/(Sqrt[a^2*c*d]*x)] - 4*ArcCoth[a*x]*ArcTan[(a*d*x)/Sqrt[a^2*c*d]] + (ArcCos[(a^2*c - d)/(a^2*c + d)] + 2*ArcTan[(a*c)/(Sqrt[a^2*c*d]*x)])*Log[(2*d*(a^2*c - I*Sqrt[a^2*c*d])*(-1 + a*x))/((a^2*c + d)*(I*Sqrt[a^2*c*d] + a*d*x))] + (ArcCos[(a^2*c - d)/(a^2*c + d)] - 2*ArcTan[(a*c)/(Sqrt[a^2*c*d]*x)])*Log[(2*d*(a^2*c + I*Sqrt[a^2*c*d])*(1 + a*x))/((a^2*c + d)*(I*Sqrt[a^2*c*d] + a*d*x))] - (ArcCos[(a^2*c - d)/(a^2*c + d)] + 2*(ArcTan[(a*c)/(Sqrt[a^2*c*d]*x)] + ArcTan[(a*d*x)/Sqrt[a^2*c*d]]))*Log[(Sqrt[2]*Sqrt[a^2*c*d])/(Sqrt[a^2*c + d]*E^ArcCoth[a*x]*Sqrt[-(a^2*c) + d + (a^2*c + d)*Cosh[2*ArcCoth[a*x]]])] - (ArcCos[(a^2*c - d)/(a^2*c + d)] - 2*(ArcTan[(a*c)/(Sqrt[a^2*c*d]*x)] + ArcTan[(a*d*x)/Sqrt[a^2*c*d]]))*Log[(Sqrt[2]*Sqrt[a^2*c*d]*E^ArcCoth[a*x])/(Sqrt[a^2*c + d]*Sqrt[-(a^2*c) + d + (a^2*c + d)*Cosh[2*ArcCoth[a*x]]])] + I*(PolyLog[2, ((a^2*c - d - (2*I)*Sqrt[a^2*c*d])*(Sqrt[a^2*c*d] + I*a*d*x))/((a^2*c + d)*(Sqrt[a^2*c*d] - I*a*d*x))] - PolyLog[2, ((a^2*c - d + (2*I)*Sqrt[a^2*c*d])*(Sqrt[a^2*c*d] + I*a*d*x))/((a^2*c + d)*(Sqrt[a^2*c*d] - I*a*d*x))]))/Sqrt[a^2*c*d] - (4*ArcCoth[a*x]*Sinh[2*ArcCoth[a*x]])/(-(a^2*c) + d + (a^2*c + d)*Cosh[2*ArcCoth[a*x]])))/c

**fricas [F]** time = 0.60, size = 0, normalized size = 0.00

$$\mathrm{integral}\left(\frac{\operatorname{arcoth}(ax)}{d^2x^4 + 2\,cdx^2 + c^2}, x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

[In] integrate(arccoth(a*x)/(d*x^2+c)^2,x, algorithm="fricas")

[Out] integral(arccoth(a*x)/(d^2*x^4 + 2*c*d*x^2 + c^2), x)

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{arcoth}(ax)}{\left(dx^2 + c\right)^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

[In] integrate(arccoth(a*x)/(d*x^2+c)^2,x, algorithm="giac")

[Out] integrate(arccoth(a*x)/(d*x^2 + c)^2, x)

**maple [B]** time = 0.64, size = 2218, normalized size = 3.76

result too large to display

Verification of antiderivative is not currently implemented for this CAS.

[In] int(arccoth(a*x)/(d*x^2+c)^2,x)

[Out] 3/4*a^3*arccoth(a*x)^2/(a^4*c^2+2*a^2*c*d+d^2)/(a^2*c+d)*(-a^2*c*d)^(1/2)-1/2*a^3*arccoth(a*x)/c/(a^2*c+d)/(a^2*d*x^2+a^2*c)*d*x^2+1/2*a^2*arccoth(a*x)/c/(a^2*c+d)/(a^2*d*x^2+a^2*c)*x*d-1/8/a/(a^2*c+d)/c^2*d^2/(a^4*c^2+2*a^2*c*d+d^2)*polylog(2,(a^2*c+d)*(a*x+1)/(a*x-1)/(a^2*c-2*(-a^2*c*d)^(1/2)-d))*(-a^2*c*d)^(1/2)+1/4/a/(a^2*c+d)/c^2*d^2/(a^4*c^2+2*a^2*c*d+d^2)*arccoth(a*x)^2*(-a^2*c*d)^(1/2)-1/8*a^5/d/(a^2*c+d)/(a^4*c^2+2*a^2*c*d+d^2)*polylog(2,(a^2*c+d)*(a*x+1)/(a*x-1)/(a^2*c-2*(-a^2*c*d)^(1/2)-d))*(-a^2*c*d)^(1/2)*c+1/4*a*(-a^2*c*d)^(1/2)/c/d/(a^2*c+d)*arccoth(a*x)*ln(1-(a^2*c+d)*(a*x+1)/(a*x-1)/(a^2*c+2*(-a^2*c*d)^(1/2)-d))-3/8*a/(a^2*c+d)/c*d/(a^4*c^2+2*a^2*c*d+d^2)*polylog(2,(a^2*c+d)*(a*x+1)/(a*x-1)/(a^2*c-2*(-a^2*c*d)^(1/2)-d))*(-a^2*c*d)^(1/2)+1/4*a^5/d/(a^2*c+d)/(a^4*c^2+2*a^2*c*d+d^2)*arccoth(a*x)^2*(-a^2*c*d)^(1/2)*c+3/4*a/(a^2*c+d)/c*d/(a^4*c^2+2*a^2*c*d+d^2)*arccoth(a*x)^2

```
*(-a^2*c*d)^(1/2)-1/4*a^5/d/(a^2*c+d)/(a^4*c^2+2*a^2*c*d+d^2)*ln(1-(a^2*c+d
)*(a*x+1)/(a*x-1)/(a^2*c-2*(-a^2*c*d)^(1/2)-d))*arccoth(a*x)*(-a^2*c*d)^(1/
2)*c-1/4/a/(a^2*c+d)/c^2*d^2/(a^4*c^2+2*a^2*c*d+d^2)*ln(1-(a^2*c+d)*(a*x+1)
/(a*x-1)/(a^2*c-2*(-a^2*c*d)^(1/2)-d))*arccoth(a*x)*(-a^2*c*d)^(1/2)-3/4*a*
d*ln(1-(a^2*c+d)*(a*x+1)/(a*x-1)/(a^2*c-2*(-a^2*c*d)^(1/2)-d))*arccoth(a*x)
/(a^2*c+d)/c/(a^4*c^2+2*a^2*c*d+d^2)*(-a^2*c*d)^(1/2)-1/4*a^4*(c*d)^(1/2)/d
/(a^2*c+d)^2*arctan(a/d*(c*d)^(1/2))+1/4*(c*d)^(1/2)/c^2*d/(a^2*c+d)^2*arct
an(a/d*(c*d)^(1/2))-1/4*a/(a^2*c+d)^2/c*d*ln(a^2*c/(a*x-1)^2*(a*x+1)^2-2*a^
2*c*(a*x+1)/(a*x-1)+d/(a*x-1)^2*(a*x+1)^2+a^2*c+2*(a*x+1)/(a*x-1)*d+d)+1/2*
a^4*arccoth(a*x)/(a^2*c+d)/(a^2*d*x^2+a^2*c)*x-1/4/a*(-a^2*c*d)^(1/2)/(a^2*
c+d)/c^2*arccoth(a*x)^2+1/8/a*(-a^2*c*d)^(1/2)/(a^2*c+d)/c^2*polylog(2,(a^2
*c+d)*(a*x+1)/(a*x-1)/(a^2*c+2*(-a^2*c*d)^(1/2)-d))-1/2*a/(a^2*c+d)^2/c*d*l
n((a*x-1)/(a*x+1))-1/4*a^4*(c*d)^(1/2)/d/(a^2*c+d)^2*arctan(1/(a^2*c+d)*d^2
/(c*d)^(1/2)*x+1/(a^2*c+d)*d/(c*d)^(1/2)*a*c+a^2/(a^2*c+d)*(c*d)^(1/2)*x-a/
(a^2*c+d)*(c*d)^(1/2))-3/8*a^3*polylog(2,(a^2*c+d)*(a*x+1)/(a*x-1)/(a^2*c-2
*(-a^2*c*d)^(1/2)-d))/(a^4*c^2+2*a^2*c*d+d^2)/(a^2*c+d)*(-a^2*c*d)^(1/2)+1/
4*(c*d)^(1/2)/c^2*d/(a^2*c+d)^2*arctan(1/(a^2*c+d)*d^2/(c*d)^(1/2)*x+1/(a^2
*c+d)*d/(c*d)^(1/2)*a*c+a^2/(a^2*c+d)*(c*d)^(1/2)*x-a/(a^2*c+d)*(c*d)^(1/2)
)-1/4*(c*d)^(1/2)/c^2/(a^2*c+d)*arctan(a/d*(c*d)^(1/2))-1/4*(c*d)^(1/2)/c^2
/(a^2*c+d)*arctan(1/(a^2*c+d)*d^2/(c*d)^(1/2)*x+1/(a^2*c+d)*d/(c*d)^(1/2)*a
*c+a^2/(a^2*c+d)*(c*d)^(1/2)*x-a/(a^2*c+d)*(c*d)^(1/2))-1/2*a^3*arccoth(a*x
)/(a^2*c+d)/(a^2*d*x^2+a^2*c)-1/2*a^3/(a^2*c+d)^2*ln((a*x-1)/(a*x+1))-1/4*a
^3/(a^2*c+d)^2*ln(a^2*c/(a*x-1)^2*(a*x+1)^2-2*a^2*c*(a*x+1)/(a*x-1)+d/(a*x-
1)^2*(a*x+1)^2+a^2*c+2*(a*x+1)/(a*x-1)*d+d)-3/4*a^3/(a^2*c+d)/(a^4*c^2+2*a^
2*c*d+d^2)*ln(1-(a^2*c+d)*(a*x+1)/(a*x-1)/(a^2*c-2*(-a^2*c*d)^(1/2)-d))*arc
coth(a*x)*(-a^2*c*d)^(1/2)+1/4*a^2*(c*d)^(1/2)/c/d/(a^2*c+d)*arctan(1/(a^2*
c+d)*d^2/(c*d)^(1/2)*x+1/(a^2*c+d)*d/(c*d)^(1/2)*a*c+a^2/(a^2*c+d)*(c*d)^(1
/2)*x-a/(a^2*c+d)*(c*d)^(1/2))-1/4*a*(-a^2*c*d)^(1/2)/c/d/(a^2*c+d)*arccoth
(a*x)^2+1/4/a*(-a^2*c*d)^(1/2)/(a^2*c+d)/c^2*arccoth(a*x)*ln(1-(a^2*c+d)*(a
*x+1)/(a*x-1)/(a^2*c+2*(-a^2*c*d)^(1/2)-d))+1/8*a*(-a^2*c*d)^(1/2)/c/d/(a^2
*c+d)*polylog(2,(a^2*c+d)*(a*x+1)/(a*x-1)/(a^2*c+2*(-a^2*c*d)^(1/2)-d))+1/4
*a^2*(c*d)^(1/2)/c/d/(a^2*c+d)*arctan(a/d*(c*d)^(1/2))
```

**maxima** [A] time = 0.51, size = 550, normalized size = 0.93

$$\frac{1}{2}\left(\frac{x}{cdx^2+c^2}+\frac{\arctan\left(\frac{dx}{\sqrt{cd}}\right)}{\sqrt{cd}\,c}\right)\operatorname{arcoth}(ax)-\frac{\left(2\,acd\log\left(dx^2+c\right)-2\,acd\log\left(ax+1\right)-2\,acd\log\left(ax-1\right)+\left(\left(a^2c\right.\right.\right.}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(a*x)/(d*x^2+c)^2,x, algorithm="maxima")
```

```
[Out] 1/2*(x/(c*d*x^2 + c^2) + arctan(d*x/sqrt(c*d))/(sqrt(c*d)*c))*arccoth(a*x)
- 1/8*(2*a*c*d*log(d*x^2 + c) - 2*a*c*d*log(a*x + 1) - 2*a*c*d*log(a*x - 1)
 + ((a^2*c + d)*arctan(sqrt(d)*x/sqrt(c))*log((a^2*d*x^2 + 2*a*d*x + d)/(a^
2*c + d)) - (a^2*c + d)*arctan(sqrt(d)*x/sqrt(c))*log((a^2*d*x^2 - 2*a*d*x
+ d)/(a^2*c + d)) + (I*a^2*c + I*d)*dilog((a^2*c + a*d*x - (I*a^2*x - I*a)*
sqrt(c)*sqrt(d))/(a^2*c + 2*I*a*sqrt(c)*sqrt(d) - d)) + (I*a^2*c + I*d)*dil
og((a^2*c - a*d*x + (I*a^2*x + I*a)*sqrt(c)*sqrt(d))/(a^2*c + 2*I*a*sqrt(c)
*sqrt(d) - d)) + (-I*a^2*c - I*d)*dilog((a^2*c + a*d*x + (I*a^2*x - I*a)*sq
rt(c)*sqrt(d))/(a^2*c - 2*I*a*sqrt(c)*sqrt(d) - d)) + (-I*a^2*c - I*d)*dilo
g((a^2*c - a*d*x - (I*a^2*x + I*a)*sqrt(c)*sqrt(d))/(a^2*c - 2*I*a*sqrt(c)*
sqrt(d) - d)) - ((a^2*c + d)*arctan2((a^2*x + a)*sqrt(c)*sqrt(d)/(a^2*c + d
), (a*d*x + d)/(a^2*c + d)) - (a^2*c + d)*arctan2((a^2*x - a)*sqrt(c)*sqrt(
d)/(a^2*c + d), -(a*d*x - d)/(a^2*c + d)))*log(d*x^2 + c))*sqrt(c)*sqrt(d))
*a/(a^3*c^3*d + a*c^2*d^2)
```

**mupad** **[F]** time = 0.00, size = -1, normalized size = -0.00

$$\int \frac{\operatorname{acoth}(a\,x)}{\left(d\,x^2+c\right)^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(a*x)/(c + d*x^2)^2,x)
[Out] int(acoth(a*x)/(c + d*x^2)^2, x)
```

**sympy** **[F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{acoth}(ax)}{\left(c+dx^2\right)^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(a*x)/(d*x**2+c)**2,x)
[Out] Integral(acoth(a*x)/(c + d*x**2)**2, x)
```

# 3.41 $\int \frac{\coth^{-1}(ax)}{(c+dx^2)^3}\,dx$

**Optimal**. Leaf size=657

$$\frac{a\left(5a^2c+3d\right)\log\left(1-a^2x^2\right)}{16c^2\left(a^2c+d\right)^2}-\frac{a\left(5a^2c+3d\right)\log\left(c+dx^2\right)}{16c^2\left(a^2c+d\right)^2}+\frac{a}{8c\left(a^2c+d\right)\left(c+dx^2\right)}+\frac{3i\text{Li}_2\left(\frac{a\left(\sqrt{c}-i\sqrt{d}x\right)}{a\sqrt{c}-i\sqrt{d}}\right)}{32c^{5/2}\sqrt{d}}-\frac{3i\text{Li}_2\left(\frac{a(\sqrt{\ }}{}\right.}{32c^{5/}}$$

```
[Out] 1/8*a/c/(a^2*c+d)/(d*x^2+c)+1/4*x*arccoth(a*x)/c/(d*x^2+c)^2+3/8*x*arccoth(
a*x)/c^2/(d*x^2+c)+1/16*a*(5*a^2*c+3*d)*ln(-a^2*x^2+1)/c^2/(a^2*c+d)^2-1/16
*a*(5*a^2*c+3*d)*ln(d*x^2+c)/c^2/(a^2*c+d)^2+3/8*arccoth(a*x)*arctan(x*d^(1
/2)/c^(1/2))/c^(5/2)/d^(1/2)-3/32*I*ln(-(a*x+1)*d^(1/2)/(I*a*c^(1/2)-d^(1/2
)))*ln(1-I*x*d^(1/2)/c^(1/2))/c^(5/2)/d^(1/2)+3/32*I*ln((-a*x+1)*d^(1/2)/(I
*a*c^(1/2)+d^(1/2)))*ln(1-I*x*d^(1/2)/c^(1/2))/c^(5/2)/d^(1/2)-3/32*I*ln(-(
-a*x+1)*d^(1/2)/(I*a*c^(1/2)-d^(1/2)))*ln(1+I*x*d^(1/2)/c^(1/2))/c^(5/2)/d^
(1/2)+3/32*I*ln((a*x+1)*d^(1/2)/(I*a*c^(1/2)+d^(1/2)))*ln(1+I*x*d^(1/2)/c^(
1/2))/c^(5/2)/d^(1/2)+3/32*I*polylog(2,a*(c^(1/2)-I*x*d^(1/2))/(a*c^(1/2)-I
*d^(1/2)))/c^(5/2)/d^(1/2)-3/32*I*polylog(2,a*(c^(1/2)-I*x*d^(1/2))/(a*c^(1
/2)+I*d^(1/2)))/c^(5/2)/d^(1/2)+3/32*I*polylog(2,a*(c^(1/2)+I*x*d^(1/2))/(a
*c^(1/2)-I*d^(1/2)))/c^(5/2)/d^(1/2)-3/32*I*polylog(2,a*(c^(1/2)+I*x*d^(1/2
))/(a*c^(1/2)+I*d^(1/2)))/c^(5/2)/d^(1/2)
```

**Rubi [A]** time = 0.95, antiderivative size = 657, normalized size of antiderivative = 1.00, number of steps used = 23, number of rules used = 11, integrand size = 14, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.786, Rules used = {199, 205, 5977, 6725, 571, 77, 4908, 2409, 2394, 2393, 2391}

$$\frac{3i\text{PolyLog}\left(2,\frac{a\left(\sqrt{c}-i\sqrt{d}x\right)}{a\sqrt{c}-i\sqrt{d}}\right)}{32c^{5/2}\sqrt{d}}-\frac{3i\text{PolyLog}\left(2,\frac{a\left(\sqrt{c}-i\sqrt{d}x\right)}{a\sqrt{c}+i\sqrt{d}}\right)}{32c^{5/2}\sqrt{d}}+\frac{3i\text{PolyLog}\left(2,\frac{a\left(\sqrt{c}+i\sqrt{d}x\right)}{a\sqrt{c}-i\sqrt{d}}\right)}{32c^{5/2}\sqrt{d}}-\frac{3i\text{PolyLog}\left(2,\frac{a\left(\sqrt{c}+i\sqrt{d}x\right)}{a\sqrt{c}+i\sqrt{d}}\right)}{32c^{5/2}\sqrt{d}}$$

Antiderivative was successfully verified.

```
[In] Int[ArcCoth[a*x]/(c + d*x^2)^3,x]
```

```
[Out] a/(8*c*(a^2*c + d)*(c + d*x^2)) + (x*ArcCoth[a*x])/(4*c*(c + d*x^2)^2) + (3
*x*ArcCoth[a*x])/(8*c^2*(c + d*x^2)) + (3*ArcCoth[a*x]*ArcTan[(Sqrt[d]*x)/S
qrt[c]])/(8*c^(5/2)*Sqrt[d]) + (((3*I)/32)*Log[(Sqrt[d]*(1 - a*x))/(I*a*Sqr
t[c] + Sqrt[d])]*Log[1 - (I*Sqrt[d]*x)/Sqrt[c]])/(c^(5/2)*Sqrt[d]) - (((3*I
)/32)*Log[-((Sqrt[d]*(1 + a*x))/(I*a*Sqrt[c] - Sqrt[d]))]*Log[1 - (I*Sqrt[d
]*x)/Sqrt[c]])/(c^(5/2)*Sqrt[d]) - (((3*I)/32)*Log[-((Sqrt[d]*(1 - a*x))/(I
*a*Sqrt[c] - Sqrt[d]))]*Log[1 + (I*Sqrt[d]*x)/Sqrt[c]])/(c^(5/2)*Sqrt[d]) +
 (((3*I)/32)*Log[(Sqrt[d]*(1 + a*x))/(I*a*Sqrt[c] + Sqrt[d])]*Log[1 + (I*Sq
rt[d]*x)/Sqrt[c]])/(c^(5/2)*Sqrt[d]) + (a*(5*a^2*c + 3*d)*Log[1 - a^2*x^2])
/(16*c^2*(a^2*c + d)^2) - (a*(5*a^2*c + 3*d)*Log[c + d*x^2])/(16*c^2*(a^2*c
 + d)^2) + (((3*I)/32)*PolyLog[2, (a*(Sqrt[c] - I*Sqrt[d]*x))/(a*Sqrt[c] -
I*Sqrt[d])])/(c^(5/2)*Sqrt[d]) - (((3*I)/32)*PolyLog[2, (a*(Sqrt[c] - I*Sqr
t[d]*x))/(a*Sqrt[c] + I*Sqrt[d])])/(c^(5/2)*Sqrt[d]) + (((3*I)/32)*PolyLog[
2, (a*(Sqrt[c] + I*Sqrt[d]*x))/(a*Sqrt[c] - I*Sqrt[d])])/(c^(5/2)*Sqrt[d])
- (((3*I)/32)*PolyLog[2, (a*(Sqrt[c] + I*Sqrt[d]*x))/(a*Sqrt[c] + I*Sqrt[d]
)])/(c^(5/2)*Sqrt[d])
```

Rule 77

```
Int[((a_.) + (b_.)*(x_))*((c_) + (d_.)*(x_))^(n_.)*((e_.) + (f_.)*(x_))^(p_
.), x_Symbol] :> Int[ExpandIntegrand[(a + b*x)*(c + d*x)^n*(e + f*x)^p, x],
 x] /; FreeQ[{a, b, c, d, e, f, n}, x] && NeQ[b*c - a*d, 0] && ((ILtQ[n, 0]
 && ILtQ[p, 0]) || EqQ[p, 1] || (IGtQ[p, 0] && ( !IntegerQ[n] || LeQ[9*p +
```

```
5*(n + 2), 0] || GeQ[n + p + 1, 0] || (GeQ[n + p + 2, 0] && RationalQ[a, b,
 c, d, e, f]))))
```

Rule 199

```
Int[((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> -Simp[(x*(a + b*x^n)^(p + 1
))/(a*n*(p + 1)), x] + Dist[(n*(p + 1) + 1)/(a*n*(p + 1)), Int[(a + b*x^n)^
(p + 1), x], x] /; FreeQ[{a, b}, x] && IGtQ[n, 0] && LtQ[p, -1] && (Integer
Q[2*p] || (n == 2 && IntegerQ[4*p]) || (n == 2 && IntegerQ[3*p]) || Denomin
ator[p + 1/n] < Denominator[p])
```

Rule 205

```
Int[((a_) + (b_.)*(x_)^2)^(-1), x_Symbol] :> Simp[(Rt[a/b, 2]*ArcTan[x/Rt[a
/b, 2]])/a, x] /; FreeQ[{a, b}, x] && PosQ[a/b]
```

Rule 571

```
Int[(x_)^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_.)*((c_) + (d_.)*(x_)^(n_))^(q_.
)*((e_) + (f_.)*(x_)^(n_))^(r_.), x_Symbol] :> Dist[1/n, Subst[Int[(a + b*x
)^p*(c + d*x)^q*(e + f*x)^r, x], x, x^n], x] /; FreeQ[{a, b, c, d, e, f, m,
 n, p, q, r}, x] && EqQ[m - n + 1, 0]
```

Rule 2391

```
Int[Log[(c_.)*((d_) + (e_.)*(x_)^(n_.))]/(x_), x_Symbol] :> -Simp[PolyLog[2
, -(c*e*x^n)]/n, x] /; FreeQ[{c, d, e, n}, x] && EqQ[c*d, 1]
```

Rule 2393

```
Int[((a_.) + Log[(c_.)*((d_) + (e_.)*(x_))]*(b_.))/((f_.) + (g_.)*(x_)), x_
Symbol] :> Dist[1/g, Subst[Int[(a + b*Log[1 + (c*e*x)/g])/x, x], x, f + g*x
], x] /; FreeQ[{a, b, c, d, e, f, g}, x] && NeQ[e*f - d*g, 0] && EqQ[g + c*
(e*f - d*g), 0]
```

Rule 2394

```
Int[((a_.) + Log[(c_.)*((d_) + (e_.)*(x_))^(n_.)]*(b_.))/((f_.) + (g_.)*(x_
)), x_Symbol] :> Simp[(Log[(e*(f + g*x))/(e*f - d*g)]*(a + b*Log[c*(d + e*x
)^n]))/g, x] - Dist[(b*e*n)/g, Int[Log[(e*(f + g*x))/(e*f - d*g)]/(d + e*x)
, x], x] /; FreeQ[{a, b, c, d, e, f, g, n}, x] && NeQ[e*f - d*g, 0]
```

Rule 2409

```
Int[((a_.) + Log[(c_.)*((d_) + (e_.)*(x_))^(n_.)]*(b_.))^(p_.)*((f_) + (g_.
)*(x_)^(r_))^(q_.), x_Symbol] :> Int[ExpandIntegrand[(a + b*Log[c*(d + e*x)
^n])^p, (f + g*x^r)^q, x], x] /; FreeQ[{a, b, c, d, e, f, g, n, r}, x] && I
GtQ[p, 0] && IntegerQ[q] && (GtQ[q, 0] || (IntegerQ[r] && NeQ[r, 1]))
```

Rule 4908

```
Int[ArcTan[(c_.)*(x_)]/((d_.) + (e_.)*(x_)^2), x_Symbol] :> Dist[I/2, Int[L
og[1 - I*c*x]/(d + e*x^2), x], x] - Dist[I/2, Int[Log[1 + I*c*x]/(d + e*x^2
), x], x] /; FreeQ[{c, d, e}, x]
```

Rule 5977

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))*((d_.) + (e_.)*(x_)^2)^(q_.), x_Sym
bol] :> With[{u = IntHide[(d + e*x^2)^q, x]}, Dist[a + b*ArcCoth[c*x], u, x
```

```
] - Dist[b*c, Int[u/(1 - c^2*x^2), x], x]] /; FreeQ[{a, b, c, d, e}, x] &&
(IntegerQ[q] || ILtQ[q + 1/2, 0])
```

Rule 6725

```
Int[(u_)/((a_) + (b_.)*(x_)^(n_)), x_Symbol] :> With[{v = RationalFunctionE
xpand[u/(a + b*x^n), x]}, Int[v, x] /; SumQ[v]] /; FreeQ[{a, b}, x] && IGtQ
[n, 0]
```

Rubi steps

$$\int \frac{\coth^{-1}(ax)}{\left(c+dx^2\right)^3}\,dx = \frac{x\coth^{-1}(ax)}{4c\left(c+dx^2\right)^2}+\frac{3x\coth^{-1}(ax)}{8c^2\left(c+dx^2\right)}+\frac{3\coth^{-1}(ax)\tan^{-1}\left(\frac{\sqrt{d}\,x}{\sqrt{c}}\right)}{8c^{5/2}\sqrt{d}}-a\int \frac{\frac{x}{4c\left(c+dx^2\right)^2}+\frac{3x}{8c^2\left(c+dx^2\right)}+\cdots}{1-a^2x^2}$$

$$= \frac{x\coth^{-1}(ax)}{4c\left(c+dx^2\right)^2}+\frac{3x\coth^{-1}(ax)}{8c^2\left(c+dx^2\right)}+\frac{3\coth^{-1}(ax)\tan^{-1}\left(\frac{\sqrt{d}\,x}{\sqrt{c}}\right)}{8c^{5/2}\sqrt{d}}-a\int\left(-\frac{x\left(5c+3dx^2\right)}{8c^2\left(-1+a^2x^2\right)\left(c+dx\cdots\right.}\right.$$

$$= \frac{x\coth^{-1}(ax)}{4c\left(c+dx^2\right)^2}+\frac{3x\coth^{-1}(ax)}{8c^2\left(c+dx^2\right)}+\frac{3\coth^{-1}(ax)\tan^{-1}\left(\frac{\sqrt{d}\,x}{\sqrt{c}}\right)}{8c^{5/2}\sqrt{d}}+\frac{a\int\frac{x\left(5c+3dx^2\right)}{\left(-1+a^2x^2\right)\left(c+dx^2\right)^2}\,dx}{8c^2}+\frac{(3a)\cdots}{\cdots}$$

$$= \frac{x\coth^{-1}(ax)}{4c\left(c+dx^2\right)^2}+\frac{3x\coth^{-1}(ax)}{8c^2\left(c+dx^2\right)}+\frac{3\coth^{-1}(ax)\tan^{-1}\left(\frac{\sqrt{d}\,x}{\sqrt{c}}\right)}{8c^{5/2}\sqrt{d}}+\frac{a\,\text{Subst}\left(\int\frac{5c+3dx}{\left(-1+a^2x\right)(c+dx)^2}\,dx,x\cdots\right)}{16c^2}$$

$$= \frac{x\coth^{-1}(ax)}{4c\left(c+dx^2\right)^2}+\frac{3x\coth^{-1}(ax)}{8c^2\left(c+dx^2\right)}+\frac{3\coth^{-1}(ax)\tan^{-1}\left(\frac{\sqrt{d}\,x}{\sqrt{c}}\right)}{8c^{5/2}\sqrt{d}}+\frac{a\,\text{Subst}\left(\int\left(\frac{a^2\left(5a^2c+3d\right)}{\left(a^2c+d\right)^2\left(-1+a^2x\right)}-\cdots\right.\right.}{\cdots}$$

$$= \frac{a}{8c\left(a^2c+d\right)\left(c+dx^2\right)}+\frac{x\coth^{-1}(ax)}{4c\left(c+dx^2\right)^2}+\frac{3x\coth^{-1}(ax)}{8c^2\left(c+dx^2\right)}+\frac{3\coth^{-1}(ax)\tan^{-1}\left(\frac{\sqrt{d}\,x}{\sqrt{c}}\right)}{8c^{5/2}\sqrt{d}}+\frac{a\left(5a^{\cdots}\right.}{\cdots}$$

$$= \frac{a}{8c\left(a^2c+d\right)\left(c+dx^2\right)}+\frac{x\coth^{-1}(ax)}{4c\left(c+dx^2\right)^2}+\frac{3x\coth^{-1}(ax)}{8c^2\left(c+dx^2\right)}+\frac{3\coth^{-1}(ax)\tan^{-1}\left(\frac{\sqrt{d}\,x}{\sqrt{c}}\right)}{8c^{5/2}\sqrt{d}}+\frac{3i\log\cdots}{\cdots}$$

$$= \frac{a}{8c\left(a^2c+d\right)\left(c+dx^2\right)}+\frac{x\coth^{-1}(ax)}{4c\left(c+dx^2\right)^2}+\frac{3x\coth^{-1}(ax)}{8c^2\left(c+dx^2\right)}+\frac{3\coth^{-1}(ax)\tan^{-1}\left(\frac{\sqrt{d}\,x}{\sqrt{c}}\right)}{8c^{5/2}\sqrt{d}}+\frac{3i\log\cdots}{\cdots}$$

$$= \frac{a}{8c\left(a^2c+d\right)\left(c+dx^2\right)}+\frac{x\coth^{-1}(ax)}{4c\left(c+dx^2\right)^2}+\frac{3x\coth^{-1}(ax)}{8c^2\left(c+dx^2\right)}+\frac{3\coth^{-1}(ax)\tan^{-1}\left(\frac{\sqrt{d}\,x}{\sqrt{c}}\right)}{8c^{5/2}\sqrt{d}}+\frac{3i\log\cdots}{\cdots}$$

**Mathematica [B]** time = 12.95, size = 1846, normalized size = 2.81

result too large to display

Warning: Unable to verify antiderivative.

```
[In] Integrate[ArcCoth[a*x]/(c + d*x^2)^3,x]
```

```
[Out] a^5*((-5*Log[1 - ((-(a^2*c) - d)*Cosh[2*ArcCoth[a*x]])/(-(a^2*c) + d)])/(16
*a^2*c*(a^2*c + d)^2) - (3*d*Log[1 - ((-(a^2*c) - d)*Cosh[2*ArcCoth[a*x]])/
(-(a^2*c) + d)])/(16*a^4*c^2*(a^2*c + d)^2) + (3*((-2*I)*ArcCos[(a^2*c - d)
/(a^2*c + d)]*ArcTan[(a*c)/(Sqrt[a^2*c*d]*x)] + 4*ArcCoth[a*x]*ArcTan[(a*d*
x)/Sqrt[a^2*c*d]] - (ArcCos[(a^2*c - d)/(a^2*c + d)] - 2*ArcTan[(a*c)/(Sqrt
[a^2*c*d]*x)])*Log[1 - ((-(a^2*c) + d - (2*I)*Sqrt[a^2*c*d])*(2*d - ((2*I)*
Sqrt[a^2*c*d])/(a*x)))/((a^2*c + d)*(2*d + ((2*I)*Sqrt[a^2*c*d])/(a*x)))] +
 (-ArcCos[(a^2*c - d)/(a^2*c + d)] - 2*ArcTan[(a*c)/(Sqrt[a^2*c*d]*x)])*Log
[1 - ((-(a^2*c) + d + (2*I)*Sqrt[a^2*c*d])*(2*d - ((2*I)*Sqrt[a^2*c*d])/(a*
x)))/((a^2*c + d)*(2*d + ((2*I)*Sqrt[a^2*c*d])/(a*x)))] + (ArcCos[(a^2*c -
d)/(a^2*c + d)] + (2*I)*((-I)*ArcTan[(a*c)/(Sqrt[a^2*c*d]*x)] - I*ArcTan[(a
*d*x)/Sqrt[a^2*c*d]]))*Log[(Sqrt[2]*Sqrt[a^2*c*d])/(Sqrt[a^2*c + d]*E^ArcCo
th[a*x]*Sqrt[-(a^2*c) + d + (a^2*c + d)*Cosh[2*ArcCoth[a*x]]])] + (ArcCos[(
a^2*c - d)/(a^2*c + d)] - (2*I)*((-I)*ArcTan[(a*c)/(Sqrt[a^2*c*d]*x)] - I*A
rcTan[(a*d*x)/Sqrt[a^2*c*d]]))*Log[(Sqrt[2]*Sqrt[a^2*c*d]*E^ArcCoth[a*x])/(
Sqrt[a^2*c + d]*Sqrt[-(a^2*c) + d + (a^2*c + d)*Cosh[2*ArcCoth[a*x]]])] + I
*(PolyLog[2, ((-(a^2*c) + d - (2*I)*Sqrt[a^2*c*d])*(2*d - ((2*I)*Sqrt[a^2*c
*d])/(a*x)))/((a^2*c + d)*(2*d + ((2*I)*Sqrt[a^2*c*d])/(a*x)))] - PolyLog[2
, ((-(a^2*c) + d + (2*I)*Sqrt[a^2*c*d])*(2*d - ((2*I)*Sqrt[a^2*c*d])/(a*x))
)/((a^2*c + d)*(2*d + ((2*I)*Sqrt[a^2*c*d])/(a*x)))])))/(32*a^2*c*Sqrt[a^2*
c*d]*(a^2*c + d)) + (3*d*((-2*I)*ArcCos[(a^2*c - d)/(a^2*c + d)]*ArcTan[(a*
c)/(Sqrt[a^2*c*d]*x)] + 4*ArcCoth[a*x]*ArcTan[(a*d*x)/Sqrt[a^2*c*d]] - (Arc
Cos[(a^2*c - d)/(a^2*c + d)] - 2*ArcTan[(a*c)/(Sqrt[a^2*c*d]*x)])*Log[1 - (
(-(a^2*c) + d - (2*I)*Sqrt[a^2*c*d])*(2*d - ((2*I)*Sqrt[a^2*c*d])/(a*x)))/(
(a^2*c + d)*(2*d + ((2*I)*Sqrt[a^2*c*d])/(a*x)))] + (-ArcCos[(a^2*c - d)/(a
^2*c + d)] - 2*ArcTan[(a*c)/(Sqrt[a^2*c*d]*x)])*Log[1 - ((-(a^2*c) + d + (2
*I)*Sqrt[a^2*c*d])*(2*d - ((2*I)*Sqrt[a^2*c*d])/(a*x)))/((a^2*c + d)*(2*d +
 ((2*I)*Sqrt[a^2*c*d])/(a*x)))] + (ArcCos[(a^2*c - d)/(a^2*c + d)] + (2*I)*
((-I)*ArcTan[(a*c)/(Sqrt[a^2*c*d]*x)] - I*ArcTan[(a*d*x)/Sqrt[a^2*c*d]]))*L
og[(Sqrt[2]*Sqrt[a^2*c*d])/(Sqrt[a^2*c + d]*E^ArcCoth[a*x]*Sqrt[-(a^2*c) +
d + (a^2*c + d)*Cosh[2*ArcCoth[a*x]]])] + (ArcCos[(a^2*c - d)/(a^2*c + d)]
- (2*I)*((-I)*ArcTan[(a*c)/(Sqrt[a^2*c*d]*x)] - I*ArcTan[(a*d*x)/Sqrt[a^2*c
*d]]))*Log[(Sqrt[2]*Sqrt[a^2*c*d]*E^ArcCoth[a*x])/(Sqrt[a^2*c + d]*Sqrt[-(a
^2*c) + d + (a^2*c + d)*Cosh[2*ArcCoth[a*x]]])] + I*(PolyLog[2, ((-(a^2*c)
+ d - (2*I)*Sqrt[a^2*c*d])*(2*d - ((2*I)*Sqrt[a^2*c*d])/(a*x)))/((a^2*c + d
)*(2*d + ((2*I)*Sqrt[a^2*c*d])/(a*x)))] - PolyLog[2, ((-(a^2*c) + d + (2*I)
*Sqrt[a^2*c*d])*(2*d - ((2*I)*Sqrt[a^2*c*d])/(a*x)))/((a^2*c + d)*(2*d + ((
2*I)*Sqrt[a^2*c*d])/(a*x)))])))/(32*a^4*c^2*Sqrt[a^2*c*d]*(a^2*c + d)) - (d
*ArcCoth[a*x]*Sinh[2*ArcCoth[a*x]])/(2*a^2*c*(a^2*c + d)*(-(a^2*c) + d + a^
2*c*Cosh[2*ArcCoth[a*x]] + d*Cosh[2*ArcCoth[a*x]])^2) - (2*a^2*c*d - 5*a^4*
c^2*ArcCoth[a*x]*Sinh[2*ArcCoth[a*x]] - 8*a^2*c*d*ArcCoth[a*x]*Sinh[2*ArcCo
th[a*x]] - 3*d^2*ArcCoth[a*x]*Sinh[2*ArcCoth[a*x]])/(8*a^4*c^2*(a^2*c + d)^
2*(-(a^2*c) + d + a^2*c*Cosh[2*ArcCoth[a*x]] + d*Cosh[2*ArcCoth[a*x]])))
```

**fricas [F]** time = 0.80, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{\operatorname{arcoth}\left(ax\right)}{d^{3}x^{6} + 3\,cd^{2}x^{4} + 3\,c^{2}dx^{2} + c^{3}}, x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(a*x)/(d*x^2+c)^3,x, algorithm="fricas")
```

```
[Out] integral(arccoth(a*x)/(d^3*x^6 + 3*c*d^2*x^4 + 3*c^2*d*x^2 + c^3), x)
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{arcoth}(ax)}{\left(dx^2+c\right)^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(a*x)/(d*x^2+c)^3,x, algorithm="giac")
```

```
[Out] integrate(arccoth(a*x)/(d*x^2 + c)^3, x)
```

**maple [B]** time = 0.84, size = 4128, normalized size = 6.28

output too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(arccoth(a*x)/(d*x^2+c)^3,x)
```

```
[Out] -3/16*a^4*(c*d)^(1/2)/c/(a^4*c^2+2*a^2*c*d+d^2)/(a^2*c+d)*arctan(a/d*(c*d)^
(1/2))+1/8*a^5/(a^4*c^2+2*a^2*c*d+d^2)/(a^2*d*x^2+a^2*c)^2*d-5/8*a^5/(a^4*c
^2+2*a^2*c*d+d^2)/(a^2*c+d)*ln((a*x-1)/(a*x+1))-5/16*a^5/(a^4*c^2+2*a^2*c*d
+d^2)/(a^2*c+d)*ln(a^2*c/(a*x-1)^2*(a*x+1)^2-2*a^2*c*(a*x+1)/(a*x-1)+d/(a*x
-1)^2*(a*x+1)^2+a^2*c+2*(a*x+1)/(a*x-1)*d+d)+3/4*a^5*arccoth(a*x)^2/(a^4*c^
2+2*a^2*c*d+d^2)^2*(-a^2*c*d)^(1/2)-3/8*a^5/(a^4*c^2+2*a^2*c*d+d^2)^2*polyl
og(2,(a^2*c+d)*(a*x+1)/(a*x-1)/(a^2*c-2*(-a^2*c*d)^(1/2)-d))*(-a^2*c*d)^(1/
2)-5/16*a^6*(c*d)^(1/2)/d/(a^4*c^2+2*a^2*c*d+d^2)/(a^2*c+d)*arctan(a/d*(c*d
)^(1/2))+5/16*a^4*(c*d)^(1/2)/c/d/(a^4*c^2+2*a^2*c*d+d^2)*arctan(a/d*(c*d)^
(1/2))+3/16*(c*d)^(1/2)/c^3*d^2/(a^4*c^2+2*a^2*c*d+d^2)/(a^2*c+d)*arctan(a/
d*(c*d)^(1/2))+5/8*a^8/(a^4*c^2+2*a^2*c*d+d^2)/(a^2*d*x^2+a^2*c)^2*c*arccot
h(a*x)*x+3/8*a*(-a^2*c*d)^(1/2)/c^2/(a^4*c^2+2*a^2*c*d+d^2)*arccoth(a*x)*ln
(1-(a^2*c+d)*(a*x+1)/(a*x-1)/(a^2*c+2*(-a^2*c*d)^(1/2)-d))-3/32*a^7/d/(a^4*
c^2+2*a^2*c*d+d^2)^2*polylog(2,(a^2*c+d)*(a*x+1)/(a*x-1)/(a^2*c-2*(-a^2*c*d
)^(1/2)-d))*(-a^2*c*d)^(1/2)*c+3/16*a^7/d/(a^4*c^2+2*a^2*c*d+d^2)^2*arccoth
(a*x)^2*(-a^2*c*d)^(1/2)*c-3/16/a*(-a^2*c*d)^(1/2)/c^3*d/(a^4*c^2+2*a^2*c*d
+d^2)*arccoth(a*x)^2+3/32/a*(-a^2*c*d)^(1/2)/c^3*d/(a^4*c^2+2*a^2*c*d+d^2)*
polylog(2,(a^2*c+d)*(a*x+1)/(a*x-1)/(a^2*c+2*(-a^2*c*d)^(1/2)-d))-3/32/a/c^
3*d^3/(a^4*c^2+2*a^2*c*d+d^2)^2*polylog(2,(a^2*c+d)*(a*x+1)/(a*x-1)/(a^2*c-
2*(-a^2*c*d)^(1/2)-d))*(-a^2*c*d)^(1/2)+3/16/a/c^3*d^3/(a^4*c^2+2*a^2*c*d+d
^2)^2*arccoth(a*x)^2*(-a^2*c*d)^(1/2)+3/8*a^8/(a^4*c^2+2*a^2*c*d+d^2)/(a^2*
d*x^2+a^2*c)^2*arccoth(a*x)*x^3*d-5/4*a^7/(a^4*c^2+2*a^2*c*d+d^2)/(a^2*d*x^
2+a^2*c)^2*arccoth(a*x)*x^2*d+5/4*a^6/(a^4*c^2+2*a^2*c*d+d^2)/(a^2*d*x^2+a^
2*c)^2*arccoth(a*x)*x*d-3/16*a^4*(c*d)^(1/2)/c/(a^4*c^2+2*a^2*c*d+d^2)/(a^2
*c+d)*arctan(1/(a^2*c+d)*d^2/(c*d)^(1/2)*x+1/(a^2*c+d)*d/(c*d)^(1/2)*a*c+a^
2/(a^2*c+d)*(c*d)^(1/2)*x-a/(a^2*c+d)*(c*d)^(1/2))+3/32*a^3*(-a^2*c*d)^(1/2
)/c/d/(a^4*c^2+2*a^2*c*d+d^2)*polylog(2,(a^2*c+d)*(a*x+1)/(a*x-1)/(a^2*c+2*
(-a^2*c*d)^(1/2)-d))-3/16*a^3*(-a^2*c*d)^(1/2)/c/d/(a^4*c^2+2*a^2*c*d+d^2)*
arccoth(a*x)^2-9/16*a^3/c/(a^4*c^2+2*a^2*c*d+d^2)^2*polylog(2,(a^2*c+d)*(a*
x+1)/(a*x-1)/(a^2*c-2*(-a^2*c*d)^(1/2)-d))*(-a^2*c*d)^(1/2)*d+3/4*a*d^2*arc
coth(a*x)^2/c^2/(a^4*c^2+2*a^2*c*d+d^2)^2*(-a^2*c*d)^(1/2)-3/8*a*d^2*polylo
g(2,(a^2*c+d)*(a*x+1)/(a*x-1)/(a^2*c-2*(-a^2*c*d)^(1/2)-d))/c^2/(a^4*c^2+2*
a^2*c*d+d^2)^2*(-a^2*c*d)^(1/2)-5/16*a^6*(c*d)^(1/2)/d/(a^4*c^2+2*a^2*c*d+d
^2)/(a^2*c+d)*arctan(1/(a^2*c+d)*d^2/(c*d)^(1/2)*x+1/(a^2*c+d)*d/(c*d)^(1/2
)*a*c+a^2/(a^2*c+d)*(c*d)^(1/2)*x-a/(a^2*c+d)*(c*d)^(1/2))-3/16*a/c^2/(a^4*
c^2+2*a^2*c*d+d^2)*d^2/(a^2*c+d)*ln(a^2*c/(a*x-1)^2*(a*x+1)^2-2*a^2*c*(a*x+
1)/(a*x-1)+d/(a*x-1)^2*(a*x+1)^2+a^2*c+2*(a*x+1)/(a*x-1)*d+d)-3/8*a/c^2/(a^
4*c^2+2*a^2*c*d+d^2)*d^2/(a^2*c+d)*ln((a*x-1)/(a*x+1))-a^3/c/(a^4*c^2+2*a^2
*c*d+d^2)*d/(a^2*c+d)*ln((a*x-1)/(a*x+1))+5/16*a^4*(c*d)^(1/2)/c/d/(a^4*c^2
+2*a^2*c*d+d^2)*arctan(1/(a^2*c+d)*d^2/(c*d)^(1/2)*x+1/(a^2*c+d)*d/(c*d)^(1
```

```
/2)*a*c+a^2/(a^2*c+d)*(c*d)^(1/2)*x-a/(a^2*c+d)*(c*d)^(1/2))-1/2*a^3/c/(a^4
*c^2+2*a^2*c*d+d^2)*d/(a^2*c+d)*ln(a^2*c/(a*x-1)^2*(a*x+1)^2-2*a^2*c*(a*x+1
)/(a*x-1)+d/(a*x-1)^2*(a*x+1)^2+a^2*c+2*(a*x+1)/(a*x-1)*d+d)+9/8*a^3*d*arcc
oth(a*x)^2/c/(a^4*c^2+2*a^2*c*d+d^2)^2*(-a^2*c*d)^(1/2)+3/16*(c*d)^(1/2)/c^
3*d^2/(a^4*c^2+2*a^2*c*d+d^2)/(a^2*c+d)*arctan(1/(a^2*c+d)*d^2/(c*d)^(1/2)*
x+1/(a^2*c+d)*d/(c*d)^(1/2)*a*c+a^2/(a^2*c+d)*(c*d)^(1/2)*x-a/(a^2*c+d)*(c*
d)^(1/2))-1/8*a^7/(a^4*c^2+2*a^2*c*d+d^2)/(a^2*d*x^2+a^2*c)^2/c*d^2*x^4+1/8
*a^5/(a^4*c^2+2*a^2*c*d+d^2)/(a^2*d*x^2+a^2*c)^2/c*d^2*x^2-1/8*a^2*(c*d)^(1
/2)/c^2/(a^4*c^2+2*a^2*c*d+d^2)*arctan(a/d*(c*d)^(1/2))-3/16*(c*d)^(1/2)/c^
3*d/(a^4*c^2+2*a^2*c*d+d^2)*arctan(a/d*(c*d)^(1/2))-1/8*a^7/(a^4*c^2+2*a^2*
c*d+d^2)/(a^2*d*x^2+a^2*c)^2*d*x^2-3/4*a^5*ln(1-(a^2*c+d)*(a*x+1)/(a*x-1)/(
a^2*c-2*(-a^2*c*d)^(1/2)-d))*arccoth(a*x)/(a^4*c^2+2*a^2*c*d+d^2)^2*(-a^2*c
*d)^(1/2)-5/8*a^7/(a^4*c^2+2*a^2*c*d+d^2)/(a^2*d*x^2+a^2*c)^2*c*arccoth(a*x
)-1/8*a^2*(c*d)^(1/2)/c^2/(a^4*c^2+2*a^2*c*d+d^2)*arctan(1/(a^2*c+d)*d^2/(c
*d)^(1/2)*x+1/(a^2*c+d)*d/(c*d)^(1/2)*a*c+a^2/(a^2*c+d)*(c*d)^(1/2)*x-a/(a^
2*c+d)*(c*d)^(1/2))-3/8*a^5/(a^4*c^2+2*a^2*c*d+d^2)/(a^2*d*x^2+a^2*c)^2*d*a
rccoth(a*x)-3/8*a*(-a^2*c*d)^(1/2)/c^2/(a^4*c^2+2*a^2*c*d+d^2)*arccoth(a*x)
^2+3/16*a*(-a^2*c*d)^(1/2)/c^2/(a^4*c^2+2*a^2*c*d+d^2)*polylog(2,(a^2*c+d)*
(a*x+1)/(a*x-1)/(a^2*c+2*(-a^2*c*d)^(1/2)-d))-3/16*(c*d)^(1/2)/c^3*d/(a^4*c
^2+2*a^2*c*d+d^2)*arctan(1/(a^2*c+d)*d^2/(c*d)^(1/2)*x+1/(a^2*c+d)*d/(c*d)^
(1/2)*a*c+a^2/(a^2*c+d)*(c*d)^(1/2)*x-a/(a^2*c+d)*(c*d)^(1/2))+3/16/a*(-a^2
*c*d)^(1/2)/c^3*d/(a^4*c^2+2*a^2*c*d+d^2)*arccoth(a*x)*ln(1-(a^2*c+d)*(a*x+
1)/(a*x-1)/(a^2*c+2*(-a^2*c*d)^(1/2)-d))-9/8*a^3/c*d/(a^4*c^2+2*a^2*c*d+d^2
)^2*ln(1-(a^2*c+d)*(a*x+1)/(a*x-1)/(a^2*c-2*(-a^2*c*d)^(1/2)-d))*arccoth(a*
x)*(-a^2*c*d)^(1/2)-3/4*a/c^2*d^2/(a^4*c^2+2*a^2*c*d+d^2)^2*ln(1-(a^2*c+d)*
(a*x+1)/(a*x-1)/(a^2*c-2*(-a^2*c*d)^(1/2)-d))*arccoth(a*x)*(-a^2*c*d)^(1/2)
-3/16*a^7/d/(a^4*c^2+2*a^2*c*d+d^2)^2*ln(1-(a^2*c+d)*(a*x+1)/(a*x-1)/(a^2*c
-2*(-a^2*c*d)^(1/2)-d))*arccoth(a*x)*(-a^2*c*d)^(1/2)*c-5/8*a^7/(a^4*c^2+2*
a^2*c*d+d^2)/(a^2*d*x^2+a^2*c)^2/c*arccoth(a*x)*x^4*d^2-3/8*a^5/(a^4*c^2+2*
a^2*c*d+d^2)/(a^2*d*x^2+a^2*c)^2/c^2*arccoth(a*x)*x^4*d^3+3/4*a^6/(a^4*c^2+
2*a^2*c*d+d^2)/(a^2*d*x^2+a^2*c)^2/c*arccoth(a*x)*x^3*d^2+3/8*a^4/(a^4*c^2+
2*a^2*c*d+d^2)/(a^2*d*x^2+a^2*c)^2/c^2*arccoth(a*x)*x^3*d^3-3/4*a^5/(a^4*c^
2+2*a^2*c*d+d^2)/(a^2*d*x^2+a^2*c)^2/c*arccoth(a*x)*x^2*d^2+5/8*a^4/(a^4*c^
2+2*a^2*c*d+d^2)/(a^2*d*x^2+a^2*c)^2/c*arccoth(a*x)*x*d^2+5/16*a^2*(c*d)^(1
/2)/c^2*d/(a^4*c^2+2*a^2*c*d+d^2)/(a^2*c+d)*arctan(1/(a^2*c+d)*d^2/(c*d)^(1
/2)*x+1/(a^2*c+d)*d/(c*d)^(1/2)*a*c+a^2/(a^2*c+d)*(c*d)^(1/2)*x-a/(a^2*c+d)
*(c*d)^(1/2))+3/16*a^3*(-a^2*c*d)^(1/2)/c/d/(a^4*c^2+2*a^2*c*d+d^2)*arccoth
(a*x)*ln(1-(a^2*c+d)*(a*x+1)/(a*x-1)/(a^2*c+2*(-a^2*c*d)^(1/2)-d))-3/16/a/c
^3*d^3/(a^4*c^2+2*a^2*c*d+d^2)^2*ln(1-(a^2*c+d)*(a*x+1)/(a*x-1)/(a^2*c-2*(-
a^2*c*d)^(1/2)-d))*arccoth(a*x)*(-a^2*c*d)^(1/2)+5/16*a^2*(c*d)^(1/2)/c^2*d
/(a^4*c^2+2*a^2*c*d+d^2)/(a^2*c+d)*arctan(a/d*(c*d)^(1/2))
```

**maxima [B]** time = 0.58, size = 1084, normalized size = 1.65

result too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(a*x)/(d*x^2+c)^3,x, algorithm="maxima")
```

```
[Out] 1/8*((3*d*x^3 + 5*c*x)/(c^2*d^2*x^4 + 2*c^3*d*x^2 + c^4) + 3*arctan(d*x/sqr
t(c*d))/(sqrt(c*d)*c^2))*arccoth(a*x) + 1/32*(4*a^3*c^3*d + 4*a*c^2*d^2 - (
3*(a^4*c^3 + 2*a^2*c^2*d + c*d^2 + (a^4*c^2*d + 2*a^2*c*d^2 + d^3)*x^2)*arc
tan(sqrt(d)*x/sqrt(c))*log((a^2*d*x^2 + 2*a*d*x + d)/(a^2*c + d)) - 3*(a^4*
c^3 + 2*a^2*c^2*d + c*d^2 + (a^4*c^2*d + 2*a^2*c*d^2 + d^3)*x^2)*arctan(sqr
t(d)*x/sqrt(c))*log((a^2*d*x^2 - 2*a*d*x + d)/(a^2*c + d)) + (3*I*a^4*c^3 +
 6*I*a^2*c^2*d + 3*I*c*d^2 + (3*I*a^4*c^2*d + 6*I*a^2*c*d^2 + 3*I*d^3)*x^2)
*dilog((a^2*c + a*d*x - (I*a^2*x - I*a)*sqrt(c)*sqrt(d))/(a^2*c + 2*I*a*sqr
t(c)*sqrt(d) - d)) + (3*I*a^4*c^3 + 6*I*a^2*c^2*d + 3*I*c*d^2 + (3*I*a^4*c^
2*d + 6*I*a^2*c*d^2 + 3*I*d^3)*x^2)*dilog((a^2*c - a*d*x + (I*a^2*x + I*a)*
sqrt(c)*sqrt(d))/(a^2*c + 2*I*a*sqrt(c)*sqrt(d) - d)) + (-3*I*a^4*c^3 - 6*I
```

```
*a^2*c^2*d - 3*I*c*d^2 + (-3*I*a^4*c^2*d - 6*I*a^2*c*d^2 - 3*I*d^3)*x^2)*di
log((a^2*c + a*d*x + (I*a^2*x - I*a)*sqrt(c)*sqrt(d))/(a^2*c - 2*I*a*sqrt(c
)*sqrt(d) - d)) + (-3*I*a^4*c^3 - 6*I*a^2*c^2*d - 3*I*c*d^2 + (-3*I*a^4*c^2
*d - 6*I*a^2*c*d^2 - 3*I*d^3)*x^2)*dilog((a^2*c - a*d*x - (I*a^2*x + I*a)*s
qrt(c)*sqrt(d))/(a^2*c - 2*I*a*sqrt(c)*sqrt(d) - d)) - 3*((a^4*c^3 + 2*a^2*
c^2*d + c*d^2 + (a^4*c^2*d + 2*a^2*c*d^2 + d^3)*x^2)*arctan2((a^2*x + a)*sq
rt(c)*sqrt(d)/(a^2*c + d), (a*d*x + d)/(a^2*c + d)) - (a^4*c^3 + 2*a^2*c^2*
d + c*d^2 + (a^4*c^2*d + 2*a^2*c*d^2 + d^3)*x^2)*arctan2((a^2*x - a)*sqrt(c
)*sqrt(d)/(a^2*c + d), -(a*d*x - d)/(a^2*c + d)))*log(d*x^2 + c))*sqrt(c)*s
qrt(d) - 2*(5*a^3*c^3*d + 3*a*c^2*d^2 + (5*a^3*c^2*d^2 + 3*a*c*d^3)*x^2)*lo
g(d*x^2 + c) + 2*(5*a^3*c^3*d + 3*a*c^2*d^2 + (5*a^3*c^2*d^2 + 3*a*c*d^3)*x
^2)*log(a*x + 1) + 2*(5*a^3*c^3*d + 3*a*c^2*d^2 + (5*a^3*c^2*d^2 + 3*a*c*d^
3)*x^2)*log(a*x - 1))*a/(a^5*c^6*d + 2*a^3*c^5*d^2 + a*c^4*d^3 + (a^5*c^5*d
^2 + 2*a^3*c^4*d^3 + a*c^3*d^4)*x^2)
```

**mupad** [**F**] time = 0.00, size = -1, normalized size = -0.00

$$\int \frac{\operatorname{acoth}(a\,x)}{{\left(d\,x^2+c\right)}^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(a*x)/(c + d*x^2)^3,x)
```

```
[Out] int(acoth(a*x)/(c + d*x^2)^3, x)
```

**sympy** [**F(-1)**] time = 0.00, size = 0, normalized size = 0.00

Timed out

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(a*x)/(d*x**2+c)**3,x)
```

```
[Out] Timed out
```

## 3.42 $\int \sqrt{c+dx^2} \coth^{-1}(ax) \, dx$

**Optimal**. Leaf size=19

$$\text{Int}\left(\coth^{-1}(ax)\sqrt{c+dx^2},x\right)$$

```
[Out] Unintegrable((d*x^2+c)^(1/2)*arccoth(a*x),x)
```

**Rubi [A]** time = 0.02, antiderivative size = 0, normalized size of antiderivative = 0.00, number of steps used = 0, number of rules used = 0, integrand size = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int \sqrt{c+dx^2} \coth^{-1}(ax) \, dx$$

Verification is Not applicable to the result.

```
[In] Int[Sqrt[c + d*x^2]*ArcCoth[a*x],x]
```

```
[Out] Defer[Int][Sqrt[c + d*x^2]*ArcCoth[a*x], x]
```

Rubi steps

$$\int \sqrt{c+dx^2} \coth^{-1}(ax) \, dx = \int \sqrt{c+dx^2} \coth^{-1}(ax) \, dx$$

**Mathematica [A]** time = 26.74, size = 0, normalized size = 0.00

$$\int \sqrt{c+dx^2} \coth^{-1}(ax) \, dx$$

Verification is Not applicable to the result.

```
[In] Integrate[Sqrt[c + d*x^2]*ArcCoth[a*x],x]
```

```
[Out] Integrate[Sqrt[c + d*x^2]*ArcCoth[a*x], x]
```

**fricas [A]** time = 0.50, size = 0, normalized size = 0.00

$$\text{integral}\left(\sqrt{dx^2+c} \,\text{arcoth}(ax),x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((d*x^2+c)^(1/2)*arccoth(a*x),x, algorithm="fricas")
```

```
[Out] integral(sqrt(d*x^2 + c)*arccoth(a*x), x)
```

**giac [A]** time = 0.00, size = 0, normalized size = 0.00

$$\int \sqrt{dx^2+c} \,\text{arcoth}(ax) \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((d*x^2+c)^(1/2)*arccoth(a*x),x, algorithm="giac")
```

```
[Out] integrate(sqrt(d*x^2 + c)*arccoth(a*x), x)
```

**maple [A]** time = 1.27, size = 0, normalized size = 0.00

$$\int \sqrt{d\,x^2+c}\,\text{arccoth}(ax) \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((d*x^2+c)^(1/2)*arccoth(a*x),x)
```

```
[Out] int((d*x^2+c)^(1/2)*arccoth(a*x),x)
```

**maxima [A]** time = 0.00, size = 0, normalized size = 0.00

$$\int \sqrt{dx^2 + c}\,\operatorname{arcoth}(ax)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((d*x^2+c)^(1/2)*arccoth(a*x),x, algorithm="maxima")
```

```
[Out] integrate(sqrt(d*x^2 + c)*arccoth(a*x), x)
```

**mupad [A]** time = 0.00, size = -1, normalized size = -0.05

$$\int \operatorname{acoth}(a\,x)\,\sqrt{d\,x^2 + c}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(a*x)*(c + d*x^2)^(1/2),x)
```

```
[Out] int(acoth(a*x)*(c + d*x^2)^(1/2), x)
```

**sympy [A]** time = 0.00, size = 0, normalized size = 0.00

$$\int \sqrt{c + dx^2}\,\operatorname{acoth}(ax)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((d*x**2+c)**(1/2)*acoth(a*x),x)
```

```
[Out] Integral(sqrt(c + d*x**2)*acoth(a*x), x)
```

## 3.43 $\int \frac{\coth^{-1}(ax)}{\sqrt{c+dx^2}}\,dx$

**Optimal**. Leaf size=19

$$\text{Int}\left(\frac{\coth^{-1}(ax)}{\sqrt{c+dx^2}},x\right)$$

```
[Out] Unintegrable(arccoth(a*x)/(d*x^2+c)^(1/2),x)
```

**Rubi [A]** time = 0.02, antiderivative size = 0, normalized size of antiderivative = 0.00, number of steps used = 0, number of rules used = 0, integrand size = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int \frac{\coth^{-1}(ax)}{\sqrt{c+dx^2}}\,dx$$

Verification is Not applicable to the result.

```
[In] Int[ArcCoth[a*x]/Sqrt[c + d*x^2],x]
```

```
[Out] Defer[Int][ArcCoth[a*x]/Sqrt[c + d*x^2], x]
```

Rubi steps

$$\int \frac{\coth^{-1}(ax)}{\sqrt{c+dx^2}}\,dx = \int \frac{\coth^{-1}(ax)}{\sqrt{c+dx^2}}\,dx$$

**Mathematica [A]** time = 4.38, size = 0, normalized size = 0.00

$$\int \frac{\coth^{-1}(ax)}{\sqrt{c+dx^2}}\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[ArcCoth[a*x]/Sqrt[c + d*x^2],x]
```

```
[Out] Integrate[ArcCoth[a*x]/Sqrt[c + d*x^2], x]
```

**fricas [A]** time = 0.42, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{\text{arcoth}\,(ax)}{\sqrt{dx^2+c}},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(a*x)/(d*x^2+c)^(1/2),x, algorithm="fricas")
```

```
[Out] integral(arccoth(a*x)/sqrt(d*x^2 + c), x)
```

**giac [A]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\text{arcoth}\,(ax)}{\sqrt{dx^2+c}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(a*x)/(d*x^2+c)^(1/2),x, algorithm="giac")
```

```
[Out] integrate(arccoth(a*x)/sqrt(d*x^2 + c), x)
```

**maple** [A] time = 1.01, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{arccoth}(ax)}{\sqrt{d\,x^{2}+c}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(arccoth(a*x)/(d*x^2+c)^(1/2),x)
[Out] int(arccoth(a*x)/(d*x^2+c)^(1/2),x)
```

**maxima** [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{arcoth}(ax)}{\sqrt{dx^{2}+c}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(a*x)/(d*x^2+c)^(1/2),x, algorithm="maxima")
[Out] integrate(arccoth(a*x)/sqrt(d*x^2 + c), x)
```

**mupad** [A] time = 0.00, size = -1, normalized size = -0.05

$$\int \frac{\operatorname{acoth}(a\,x)}{\sqrt{d\,x^{2}+c}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(a*x)/(c + d*x^2)^(1/2),x)
[Out] int(acoth(a*x)/(c + d*x^2)^(1/2), x)
```

**sympy** [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{acoth}(ax)}{\sqrt{c+dx^{2}}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(a*x)/(d*x**2+c)**(1/2),x)
[Out] Integral(acoth(a*x)/sqrt(c + d*x**2), x)
```

# 3.44 $\int \frac{\coth^{-1}(ax)}{(c+dx^2)^{3/2}}\,dx$

**Optimal**. Leaf size=62

$$\frac{x\coth^{-1}(ax)}{c\sqrt{c+dx^2}}-\frac{\tanh^{-1}\left(\frac{a\sqrt{c+dx^2}}{\sqrt{a^2c+d}}\right)}{c\sqrt{a^2c+d}}$$

```
[Out] -arctanh(a*(d*x^2+c)^(1/2)/(a^2*c+d)^(1/2))/c/(a^2*c+d)^(1/2)+x*arccoth(a*x
)/c/(d*x^2+c)^(1/2)
```

**Rubi [A]** time = 0.11, antiderivative size = 62, normalized size of antiderivative = 1.00, number of steps used = 5, number of rules used = 6, integrand size = 16, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.375, Rules used = {191, 5977, 12, 444, 63, 208}

$$\frac{x\coth^{-1}(ax)}{c\sqrt{c+dx^2}}-\frac{\tanh^{-1}\left(\frac{a\sqrt{c+dx^2}}{\sqrt{a^2c+d}}\right)}{c\sqrt{a^2c+d}}$$

Antiderivative was successfully verified.

```
[In] Int[ArcCoth[a*x]/(c + d*x^2)^(3/2),x]
```

```
[Out] (x*ArcCoth[a*x])/(c*Sqrt[c + d*x^2]) - ArcTanh[(a*Sqrt[c + d*x^2])/Sqrt[a^2
*c + d]]/(c*Sqrt[a^2*c + d])
```

Rule 12

```
Int[(a_)*(u_), x_Symbol] :> Dist[a, Int[u, x], x] /; FreeQ[a, x] &&  !Match
Q[u, (b_)*(v_) /; FreeQ[b, x]]
```

Rule 63

```
Int[((a_.) + (b_.)*(x_))^(m_)*((c_.) + (d_.)*(x_))^(n_), x_Symbol] :> With[
{p = Denominator[m]}, Dist[p/b, Subst[Int[x^(p*(m + 1) - 1)*(c - (a*d)/b +
(d*x^p)/b)^n, x], x, (a + b*x)^(1/p)], x]] /; FreeQ[{a, b, c, d}, x] && NeQ
[b*c - a*d, 0] && LtQ[-1, m, 0] && LeQ[-1, n, 0] && LeQ[Denominator[n], Den
ominator[m]] && IntLinearQ[a, b, c, d, m, n, x]
```

Rule 191

```
Int[((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Simp[(x*(a + b*x^n)^(p + 1)
)/a, x] /; FreeQ[{a, b, n, p}, x] && EqQ[1/n + p + 1, 0]
```

Rule 208

```
Int[((a_) + (b_.)*(x_)^2)^(-1), x_Symbol] :> Simp[(Rt[-(a/b), 2]*ArcTanh[x/
Rt[-(a/b), 2]])/a, x] /; FreeQ[{a, b}, x] && NegQ[a/b]
```

Rule 444

```
Int[(x_)^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_.)*((c_) + (d_.)*(x_)^(n_))^(q_.
), x_Symbol] :> Dist[1/n, Subst[Int[(a + b*x)^p*(c + d*x)^q, x], x, x^n], x
] /; FreeQ[{a, b, c, d, m, n, p, q}, x] && NeQ[b*c - a*d, 0] && EqQ[m - n +
 1, 0]
```

Rule 5977

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))*((d_.) + (e_.)*(x_)^2)^(q_.), x_Sym
bol] :> With[{u = IntHide[(d + e*x^2)^q, x]}, Dist[a + b*ArcCoth[c*x], u, x
```

```
] - Dist[b*c, Int[u/(1 - c^2*x^2), x], x]] /; FreeQ[{a, b, c, d, e}, x] &&
(IntegerQ[q] || ILtQ[q + 1/2, 0])
```

Rubi steps

$$\begin{aligned}
\int \frac{\coth^{-1}(ax)}{\left(c+dx^2\right)^{3/2}}\,dx &= \frac{x\coth^{-1}(ax)}{c\sqrt{c+dx^2}} - a\int \frac{x}{c\left(1-a^2x^2\right)\sqrt{c+dx^2}}\,dx \\
&= \frac{x\coth^{-1}(ax)}{c\sqrt{c+dx^2}} - \frac{a\int \frac{x}{\left(1-a^2x^2\right)\sqrt{c+dx^2}}\,dx}{c} \\
&= \frac{x\coth^{-1}(ax)}{c\sqrt{c+dx^2}} - \frac{a\,\text{Subst}\left(\int \frac{1}{\left(1-a^2x\right)\sqrt{c+dx}}\,dx, x, x^2\right)}{2c} \\
&= \frac{x\coth^{-1}(ax)}{c\sqrt{c+dx^2}} - \frac{a\,\text{Subst}\left(\int \frac{1}{1+\frac{a^2c}{d}-\frac{a^2x^2}{d}}\,dx, x, \sqrt{c+dx^2}\right)}{cd} \\
&= \frac{x\coth^{-1}(ax)}{c\sqrt{c+dx^2}} - \frac{\tanh^{-1}\left(\frac{a\sqrt{c+dx^2}}{\sqrt{a^2c+d}}\right)}{c\sqrt{a^2c+d}}
\end{aligned}$$

**Mathematica [A]** time = 0.11, size = 119, normalized size = 1.92

$$\frac{\frac{-\log\left(\sqrt{a^2c+d}\sqrt{c+dx^2}+ac-dx\right)-\log\left(\sqrt{a^2c+d}\sqrt{c+dx^2}+ac+dx\right)+\log(1-ax)+\log(ax+1)}{\sqrt{a^2c+d}}+\frac{2x\coth^{-1}(ax)}{\sqrt{c+dx^2}}}{2c}$$

Antiderivative was successfully verified.

```
[In] Integrate[ArcCoth[a*x]/(c + d*x^2)^(3/2),x]
```

```
[Out] ((2*x*ArcCoth[a*x])/Sqrt[c + d*x^2] + (Log[1 - a*x] + Log[1 + a*x] - Log[a*
c - d*x + Sqrt[a^2*c + d]*Sqrt[c + d*x^2]] - Log[a*c + d*x + Sqrt[a^2*c + d
]*Sqrt[c + d*x^2]])/Sqrt[a^2*c + d])/(2*c)
```

**fricas [B]** time = 0.50, size = 354, normalized size = 5.71

$$\left[\frac{2\left(a^2c+d\right)\sqrt{dx^2+c}\,x\log\left(\frac{ax+1}{ax-1}\right)+\sqrt{a^2c+d}\left(dx^2+c\right)\log\left(\frac{a^4d^2x^4+8a^4c^2+8a^2cd+2\left(4a^4cd+3a^2d^2\right)x^2-4\left(a^3dx^2+2a^3c+ad\right)\sqrt{a^2}}{a^4x^4-2a^2x^2+1}\right.}{4\left(a^2c^3+c^2d+\left(a^2c^2d+cd^2\right)x^2\right)}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(a*x)/(d*x^2+c)^(3/2),x, algorithm="fricas")
```

```
[Out] [1/4*(2*(a^2*c + d)*sqrt(d*x^2 + c)*x*log((a*x + 1)/(a*x - 1)) + sqrt(a^2*c
 + d)*(d*x^2 + c)*log((a^4*d^2*x^4 + 8*a^4*c^2 + 8*a^2*c*d + 2*(4*a^4*c*d +
 3*a^2*d^2)*x^2 - 4*(a^3*d*x^2 + 2*a^3*c + a*d)*sqrt(a^2*c + d)*sqrt(d*x^2
+ c) + d^2)/(a^4*x^4 - 2*a^2*x^2 + 1)))/(a^2*c^3 + c^2*d + (a^2*c^2*d + c*d
^2)*x^2), 1/2*((a^2*c + d)*sqrt(d*x^2 + c)*x*log((a*x + 1)/(a*x - 1)) + sqr
t(-a^2*c - d)*(d*x^2 + c)*arctan(1/2*(a^2*d*x^2 + 2*a^2*c + d)*sqrt(-a^2*c
- d)*sqrt(d*x^2 + c)/(a^3*c^2 + a*c*d + (a^3*c*d + a*d^2)*x^2)))/(a^2*c^3 +
 c^2*d + (a^2*c^2*d + c*d^2)*x^2)]
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{arcoth}(ax)}{\left(dx^2+c\right)^{\frac{3}{2}}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(a*x)/(d*x^2+c)^(3/2),x, algorithm="giac")
[Out] integrate(arccoth(a*x)/(d*x^2 + c)^(3/2), x)
```

**maple [F]** time = 0.94, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{arccoth}(ax)}{\left(d\,x^2+c\right)^{\frac{3}{2}}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(arccoth(a*x)/(d*x^2+c)^(3/2),x)
[Out] int(arccoth(a*x)/(d*x^2+c)^(3/2),x)
```

**maxima [B]** time = 0.34, size = 153, normalized size = 2.47

$$\frac{a^2\left(\frac{\operatorname{arsinh}\left(-\frac{2\,a^2c}{\sqrt{cd}\,|2\,a^2x+2\,a|}+\frac{2\,adx}{\sqrt{cd}\,|2\,a^2x+2\,a|}\right)}{a^3\sqrt{c+\frac{d}{a^2}}}-\frac{\operatorname{arsinh}\left(\frac{2\,a^2c}{\sqrt{cd}\,|2\,a^2x-2\,a|}+\frac{2\,adx}{\sqrt{cd}\,|2\,a^2x-2\,a|}\right)}{a^3\sqrt{c+\frac{d}{a^2}}}\right)}{2\,c}+\frac{x\operatorname{arcoth}(ax)}{\sqrt{dx^2+c}\,c}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(a*x)/(d*x^2+c)^(3/2),x, algorithm="maxima")
[Out] 1/2*a^2*(arcsinh(-2*a^2*c/(sqrt(c*d)*abs(2*a^2*x + 2*a)) + 2*a*d*x/(sqrt(c*
d)*abs(2*a^2*x + 2*a)))/(a^3*sqrt(c + d/a^2)) - arcsinh(2*a^2*c/(sqrt(c*d)*
abs(2*a^2*x - 2*a)) + 2*a*d*x/(sqrt(c*d)*abs(2*a^2*x - 2*a)))/(a^3*sqrt(c +
 d/a^2)))/c + x*arccoth(a*x)/(sqrt(d*x^2 + c)*c)
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.02

$$\int \frac{\operatorname{acoth}(a\,x)}{\left(d\,x^2+c\right)^{3/2}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(a*x)/(c + d*x^2)^(3/2),x)
[Out] int(acoth(a*x)/(c + d*x^2)^(3/2), x)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{acoth}(ax)}{\left(c+dx^2\right)^{\frac{3}{2}}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(a*x)/(d*x**2+c)**(3/2),x)
[Out] Integral(acoth(a*x)/(c + d*x**2)**(3/2), x)
```

# 3.45 $\int \frac{\coth^{-1}(ax)}{\left(c+dx^2\right)^{5/2}}\,dx$

**Optimal**. Leaf size=128

$$-\frac{\left(3a^2c+2d\right)\tanh^{-1}\left(\frac{a\sqrt{c+dx^2}}{\sqrt{a^2c+d}}\right)}{3c^2\left(a^2c+d\right)^{3/2}}+\frac{a}{3c\left(a^2c+d\right)\sqrt{c+dx^2}}+\frac{2x\coth^{-1}(ax)}{3c^2\sqrt{c+dx^2}}+\frac{x\coth^{-1}(ax)}{3c\left(c+dx^2\right)^{3/2}}$$

```
[Out] 1/3*x*arccoth(a*x)/c/(d*x^2+c)^(3/2)-1/3*(3*a^2*c+2*d)*arctanh(a*(d*x^2+c)^
(1/2)/(a^2*c+d)^(1/2))/c^2/(a^2*c+d)^(3/2)+1/3*a/c/(a^2*c+d)/(d*x^2+c)^(1/2
)+2/3*x*arccoth(a*x)/c^2/(d*x^2+c)^(1/2)
```

**Rubi [A]** time = 0.34, antiderivative size = 128, normalized size of antiderivative = 1.00, number of steps used = 7, number of rules used = 9, integrand size = 16, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.562, Rules used = {192, 191, 5977, 6688, 12, 571, 78, 63, 208}

$$-\frac{\left(3a^2c+2d\right)\tanh^{-1}\left(\frac{a\sqrt{c+dx^2}}{\sqrt{a^2c+d}}\right)}{3c^2\left(a^2c+d\right)^{3/2}}+\frac{a}{3c\left(a^2c+d\right)\sqrt{c+dx^2}}+\frac{2x\coth^{-1}(ax)}{3c^2\sqrt{c+dx^2}}+\frac{x\coth^{-1}(ax)}{3c\left(c+dx^2\right)^{3/2}}$$

Antiderivative was successfully verified.

```
[In] Int[ArcCoth[a*x]/(c + d*x^2)^(5/2),x]
```

```
[Out] a/(3*c*(a^2*c + d)*Sqrt[c + d*x^2]) + (x*ArcCoth[a*x])/(3*c*(c + d*x^2)^(3/
2)) + (2*x*ArcCoth[a*x])/(3*c^2*Sqrt[c + d*x^2]) - ((3*a^2*c + 2*d)*ArcTanh
[(a*Sqrt[c + d*x^2])/Sqrt[a^2*c + d]])/(3*c^2*(a^2*c + d)^(3/2))
```

Rule 12

```
Int[(a_)*(u_), x_Symbol] :> Dist[a, Int[u, x], x] /; FreeQ[a, x] &&  !Match
Q[u, (b_)*(v_) /; FreeQ[b, x]]
```

Rule 63

```
Int[((a_.) + (b_.)*(x_))^(m_)*((c_.) + (d_.)*(x_))^(n_), x_Symbol] :> With[
{p = Denominator[m]}, Dist[p/b, Subst[Int[x^(p*(m + 1) - 1)*(c - (a*d)/b +
(d*x^p)/b)^n, x], x, (a + b*x)^(1/p)], x]] /; FreeQ[{a, b, c, d}, x] && NeQ
[b*c - a*d, 0] && LtQ[-1, m, 0] && LeQ[-1, n, 0] && LeQ[Denominator[n], Den
ominator[m]] && IntLinearQ[a, b, c, d, m, n, x]
```

Rule 78

```
Int[((a_.) + (b_.)*(x_))*((c_.) + (d_.)*(x_))^(n_.)*((e_.) + (f_.)*(x_))^(p
_.), x_Symbol] :> -Simp[((b*e - a*f)*(c + d*x)^(n + 1)*(e + f*x)^(p + 1))/(
f*(p + 1)*(c*f - d*e)), x] - Dist[(a*d*f*(n + p + 2) - b*(d*e*(n + 1) + c*f
*(p + 1)))/(f*(p + 1)*(c*f - d*e)), Int[(c + d*x)^n*(e + f*x)^(p + 1), x],
x] /; FreeQ[{a, b, c, d, e, f, n}, x] && LtQ[p, -1] && ( !LtQ[n, -1] || Int
egerQ[p] ||  !(IntegerQ[n] ||  !(EqQ[e, 0] ||  !(EqQ[c, 0] || LtQ[p, n]))))
```

Rule 191

```
Int[((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Simp[(x*(a + b*x^n)^(p + 1)
)/a, x] /; FreeQ[{a, b, n, p}, x] && EqQ[1/n + p + 1, 0]
```

Rule 192

```
Int[((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> -Simp[(x*(a + b*x^n)^(p + 1
))/(a*n*(p + 1)), x] + Dist[(n*(p + 1) + 1)/(a*n*(p + 1)), Int[(a + b*x^n)^
(p + 1), x], x] /; FreeQ[{a, b, n, p}, x] && ILtQ[Simplify[1/n + p + 1], 0]
 && NeQ[p, -1]
```

Rule 208

```
Int[((a_) + (b_.)*(x_)^2)^(-1), x_Symbol] :> Simp[(Rt[-(a/b), 2]*ArcTanh[x/
Rt[-(a/b), 2]])/a, x] /; FreeQ[{a, b}, x] && NegQ[a/b]
```

Rule 571

```
Int[(x_)^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_.)*((c_) + (d_.)*(x_)^(n_))^(q_.
)*((e_) + (f_.)*(x_)^(n_))^(r_.), x_Symbol] :> Dist[1/n, Subst[Int[(a + b*x
)^p*(c + d*x)^q*(e + f*x)^r, x], x, x^n], x] /; FreeQ[{a, b, c, d, e, f, m,
 n, p, q, r}, x] && EqQ[m - n + 1, 0]
```

Rule 5977

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))*((d_.) + (e_.)*(x_)^2)^(q_.), x_Sym
bol] :> With[{u = IntHide[(d + e*x^2)^q, x]}, Dist[a + b*ArcCoth[c*x], u, x
] - Dist[b*c, Int[u/(1 - c^2*x^2), x], x]] /; FreeQ[{a, b, c, d, e}, x] &&
(IntegerQ[q] || ILtQ[q + 1/2, 0])
```

Rule 6688

```
Int[u_, x_Symbol] :> With[{v = SimplifyIntegrand[u, x]}, Int[v, x] /; Simpl
erIntegrandQ[v, u, x]]
```

Rubi steps

$$\int \frac{\coth^{-1}(ax)}{\left(c+dx^2\right)^{5/2}}\,dx = \frac{x\coth^{-1}(ax)}{3c\left(c+dx^2\right)^{3/2}} + \frac{2x\coth^{-1}(ax)}{3c^2\sqrt{c+dx^2}} - a\int \frac{\frac{x}{3c\left(c+dx^2\right)^{3/2}} + \frac{2x}{3c^2\sqrt{c+dx^2}}}{1-a^2x^2}\,dx$$

$$= \frac{x\coth^{-1}(ax)}{3c\left(c+dx^2\right)^{3/2}} + \frac{2x\coth^{-1}(ax)}{3c^2\sqrt{c+dx^2}} - a\int \frac{x\left(3c+2dx^2\right)}{3c^2\left(1-a^2x^2\right)\left(c+dx^2\right)^{3/2}}\,dx$$

$$= \frac{x\coth^{-1}(ax)}{3c\left(c+dx^2\right)^{3/2}} + \frac{2x\coth^{-1}(ax)}{3c^2\sqrt{c+dx^2}} - \frac{a\int \frac{x\left(3c+2dx^2\right)}{\left(1-a^2x^2\right)\left(c+dx^2\right)^{3/2}}\,dx}{3c^2}$$

$$= \frac{x\coth^{-1}(ax)}{3c\left(c+dx^2\right)^{3/2}} + \frac{2x\coth^{-1}(ax)}{3c^2\sqrt{c+dx^2}} - \frac{a\,\text{Subst}\left(\int \frac{3c+2dx}{\left(1-a^2x\right)(c+dx)^{3/2}}\,dx, x, x^2\right)}{6c^2}$$

$$= \frac{a}{3c\left(a^2c+d\right)\sqrt{c+dx^2}} + \frac{x\coth^{-1}(ax)}{3c\left(c+dx^2\right)^{3/2}} + \frac{2x\coth^{-1}(ax)}{3c^2\sqrt{c+dx^2}} - \frac{\left(a\left(3a^2c+2d\right)\right)\text{Subst}\left(\int \frac{1}{\left(1-a^2x\right)\ldots}\right.}{6c^2\left(a^2c+d\right)}$$

$$= \frac{a}{3c\left(a^2c+d\right)\sqrt{c+dx^2}} + \frac{x\coth^{-1}(ax)}{3c\left(c+dx^2\right)^{3/2}} + \frac{2x\coth^{-1}(ax)}{3c^2\sqrt{c+dx^2}} - \frac{\left(a\left(3a^2c+2d\right)\right)\text{Subst}\left(\int \frac{1}{1+\frac{a^2c}{d}-\ldots}\right.}{3c^2d\left(a^2c+\ldots\right.}$$

$$= \frac{a}{3c\left(a^2c+d\right)\sqrt{c+dx^2}} + \frac{x\coth^{-1}(ax)}{3c\left(c+dx^2\right)^{3/2}} + \frac{2x\coth^{-1}(ax)}{3c^2\sqrt{c+dx^2}} - \frac{\left(3a^2c+2d\right)\tanh^{-1}\left(\frac{a\sqrt{c+dx^2}}{\sqrt{a^2c+d}}\right)}{3c^2\left(a^2c+d\right)^{3/2}}$$

**Mathematica [A]** time = 0.30, size = 226, normalized size = 1.77

$$\frac{\frac{2ac}{\left(a^2c+d\right)\sqrt{c+dx^2}} - \frac{\left(3a^2c+2d\right)\log\left(\sqrt{a^2c+d}\sqrt{c+dx^2}+ac-dx\right)}{\left(a^2c+d\right)^{3/2}} - \frac{\left(3a^2c+2d\right)\log\left(\sqrt{a^2c+d}\sqrt{c+dx^2}+ac+dx\right)}{\left(a^2c+d\right)^{3/2}} + \frac{\left(3a^2c+2d\right)\log(1-ax)}{\left(a^2c+d\right)^{3/2}} + \frac{\left(3a^2c+2d\right)\log\ldots}{\left(a^2c+d\right)\ldots}}{6c^2}$$

Antiderivative was successfully verified.

```
[In] Integrate[ArcCoth[a*x]/(c + d*x^2)^(5/2),x]
```

```
[Out] ((2*a*c)/((a^2*c + d)*Sqrt[c + d*x^2]) + (2*x*(3*c + 2*d*x^2)*ArcCoth[a*x])
/(c + d*x^2)^(3/2) + ((3*a^2*c + 2*d)*Log[1 - a*x])/(a^2*c + d)^(3/2) + ((3
*a^2*c + 2*d)*Log[1 + a*x])/(a^2*c + d)^(3/2) - ((3*a^2*c + 2*d)*Log[a*c -
d*x + Sqrt[a^2*c + d]*Sqrt[c + d*x^2]])/(a^2*c + d)^(3/2) - ((3*a^2*c + 2*d
)*Log[a*c + d*x + Sqrt[a^2*c + d]*Sqrt[c + d*x^2]])/(a^2*c + d)^(3/2))/(6*c
^2)
```

**fricas [B]** time = 0.69, size = 728, normalized size = 5.69

$$\left[\frac{\left(3\,a^2c^3 + \left(3\,a^2cd^2 + 2\,d^3\right)x^4 + 2\,c^2d + 2\left(3\,a^2c^2d + 2\,cd^2\right)x^2\right)\sqrt{a^2c+d}\,\log\left(\frac{a^4d^2x^4 + 8\,a^4c^2 + 8\,a^2cd + 2\left(4\,a^4cd + 3\,a^2d^2\right)x^2 - 4\,(a\ldots}{a^4x^4 - 2\,a^2x^2 + \ldots}\right.}{12\left(a^4c^6 + 2\,a^2c^5d + c^4d^2\ldots\right.}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(a*x)/(d*x^2+c)^(5/2),x, algorithm="fricas")
```

```
[Out] [1/12*((3*a^2*c^3 + (3*a^2*c*d^2 + 2*d^3)*x^4 + 2*c^2*d + 2*(3*a^2*c^2*d +
2*c*d^2)*x^2)*sqrt(a^2*c + d)*log((a^4*d^2*x^4 + 8*a^4*c^2 + 8*a^2*c*d + 2*
(4*a^4*c*d + 3*a^2*d^2)*x^2 - 4*(a^3*d*x^2 + 2*a^3*c + a*d)*sqrt(a^2*c + d)
*sqrt(d*x^2 + c) + d^2)/(a^4*x^4 - 2*a^2*x^2 + 1)) + 2*(2*a^3*c^3 + 2*a*c^2
*d + 2*(a^3*c^2*d + a*c*d^2)*x^2 + (2*(a^4*c^2*d + 2*a^2*c*d^2 + d^3)*x^3 +
 3*(a^4*c^3 + 2*a^2*c^2*d + c*d^2)*x)*log((a*x + 1)/(a*x - 1)))*sqrt(d*x^2
+ c))/(a^4*c^6 + 2*a^2*c^5*d + c^4*d^2 + (a^4*c^4*d^2 + 2*a^2*c^3*d^3 + c^2
*d^4)*x^4 + 2*(a^4*c^5*d + 2*a^2*c^4*d^2 + c^3*d^3)*x^2), 1/6*((3*a^2*c^3 +
 (3*a^2*c*d^2 + 2*d^3)*x^4 + 2*c^2*d + 2*(3*a^2*c^2*d + 2*c*d^2)*x^2)*sqrt(
-a^2*c - d)*arctan(1/2*(a^2*d*x^2 + 2*a^2*c + d)*sqrt(-a^2*c - d)*sqrt(d*x^
2 + c)/(a^3*c^2 + a*c*d + (a^3*c*d + a*d^2)*x^2)) + (2*a^3*c^3 + 2*a*c^2*d
+ 2*(a^3*c^2*d + a*c*d^2)*x^2 + (2*(a^4*c^2*d + 2*a^2*c*d^2 + d^3)*x^3 + 3*
(a^4*c^3 + 2*a^2*c^2*d + c*d^2)*x)*log((a*x + 1)/(a*x - 1)))*sqrt(d*x^2 + c
))/(a^4*c^6 + 2*a^2*c^5*d + c^4*d^2 + (a^4*c^4*d^2 + 2*a^2*c^3*d^3 + c^2*d^
4)*x^4 + 2*(a^4*c^5*d + 2*a^2*c^4*d^2 + c^3*d^3)*x^2)]
```

**giac** [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{arcoth}\left(ax\right)}{\left(dx^2+c\right)^{\frac{5}{2}}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(a*x)/(d*x^2+c)^(5/2),x, algorithm="giac")
```

```
[Out] integrate(arccoth(a*x)/(d*x^2 + c)^(5/2), x)
```

**maple** [F] time = 0.94, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{arccoth}\left(ax\right)}{\left(d\,x^2+c\right)^{\frac{5}{2}}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(arccoth(a*x)/(d*x^2+c)^(5/2),x)
```

```
[Out] int(arccoth(a*x)/(d*x^2+c)^(5/2),x)
```

**maxima** [B] time = 0.41, size = 223, normalized size = 1.74

$$\frac{1}{6}\,a\left(\frac{\frac{ad\log\left(\frac{\sqrt{dx^2+c}\,a^2-\sqrt{a^2c+d}\,a}{\sqrt{dx^2+c}\,a^2+\sqrt{a^2c+d}\,a}\right)}{\left(a^2c^2+cd\right)\sqrt{a^2c+d}}+\frac{2\,d}{\left(a^2c^2+cd\right)\sqrt{dx^2+c}}}{d}+\frac{2\,\log\left(\frac{\sqrt{dx^2+c}\,a^2-\sqrt{a^2c+d}\,a}{\sqrt{dx^2+c}\,a^2+\sqrt{a^2c+d}\,a}\right)}{\sqrt{a^2c+d}\,ac^2}\right)+\frac{1}{3}\left(\frac{2\,x}{\sqrt{dx^2+c}\,c^2}+\frac{x}{\left(dx^2+c\right)^{\frac{3}{2}}c}\right)\mathrm{arc}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(a*x)/(d*x^2+c)^(5/2),x, algorithm="maxima")
```

```
[Out] 1/6*a*((a*d*log((sqrt(d*x^2 + c)*a^2 - sqrt(a^2*c + d)*a)/(sqrt(d*x^2 + c)*
a^2 + sqrt(a^2*c + d)*a))/((a^2*c^2 + c*d)*sqrt(a^2*c + d)) + 2*d/((a^2*c^2
 + c*d)*sqrt(d*x^2 + c)))/d + 2*log((sqrt(d*x^2 + c)*a^2 - sqrt(a^2*c + d)*
a)/(sqrt(d*x^2 + c)*a^2 + sqrt(a^2*c + d)*a))/(sqrt(a^2*c + d)*a*c^2)) + 1/
3*(2*x/(sqrt(d*x^2 + c)*c^2) + x/((d*x^2 + c)^(3/2)*c))*arccoth(a*x)
```

**mupad** [F] time = 0.00, size = -1, normalized size = -0.01

$$\int \frac{\mathrm{acoth}\left(a\,x\right)}{{\left(d\,x^2+c\right)}^{5/2}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(a*x)/(c + d*x^2)^(5/2),x)
```

```
[Out] int(acoth(a*x)/(c + d*x^2)^(5/2), x)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{acoth}(ax)}{(c+dx^2)^{\frac{5}{2}}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(a*x)/(d*x**2+c)**(5/2),x)
```

```
[Out] Integral(acoth(a*x)/(c + d*x**2)**(5/2), x)
```

## 3.46 $\int \frac{\coth^{-1}(ax)}{\left(c+dx^2\right)^{7/2}}\,dx$

**Optimal**. Leaf size=200

$$\frac{a\left(7a^2c+4d\right)}{15c^2\left(a^2c+d\right)^2\sqrt{c+dx^2}}+\frac{a}{15c\left(a^2c+d\right)\left(c+dx^2\right)^{3/2}}-\frac{\left(15a^4c^2+20a^2cd+8d^2\right)\tanh^{-1}\left(\frac{a\sqrt{c+dx^2}}{\sqrt{a^2c+d}}\right)}{15c^3\left(a^2c+d\right)^{5/2}}+\frac{8x\coth^{-1}(}{15c^3\sqrt{c+}}$$

```
[Out] 1/15*a/c/(a^2*c+d)/(d*x^2+c)^(3/2)+1/5*x*arccoth(a*x)/c/(d*x^2+c)^(5/2)+4/1
5*x*arccoth(a*x)/c^2/(d*x^2+c)^(3/2)-1/15*(15*a^4*c^2+20*a^2*c*d+8*d^2)*arc
tanh(a*(d*x^2+c)^(1/2)/(a^2*c+d)^(1/2))/c^3/(a^2*c+d)^(5/2)+1/15*a*(7*a^2*c
+4*d)/c^2/(a^2*c+d)^2/(d*x^2+c)^(1/2)+8/15*x*arccoth(a*x)/c^3/(d*x^2+c)^(1/
2)
```

**Rubi** [A] time = 1.05, antiderivative size = 200, normalized size of antiderivative = 1.00, number of steps used = 8, number of rules used = 9, integrand size = 16, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.562, Rules used = {192, 191, 5977, 6688, 12, 6715, 897, 1261, 208}

$$-\frac{\left(15a^4c^2+20a^2cd+8d^2\right)\tanh^{-1}\left(\frac{a\sqrt{c+dx^2}}{\sqrt{a^2c+d}}\right)}{15c^3\left(a^2c+d\right)^{5/2}}+\frac{a\left(7a^2c+4d\right)}{15c^2\left(a^2c+d\right)^2\sqrt{c+dx^2}}+\frac{a}{15c\left(a^2c+d\right)\left(c+dx^2\right)^{3/2}}+\frac{8x\coth^{-}}{15c^3\sqrt{c+}}$$

Antiderivative was successfully verified.

```
[In] Int[ArcCoth[a*x]/(c + d*x^2)^(7/2),x]
```

```
[Out] a/(15*c*(a^2*c + d)*(c + d*x^2)^(3/2)) + (a*(7*a^2*c + 4*d))/(15*c^2*(a^2*c
 + d)^2*Sqrt[c + d*x^2]) + (x*ArcCoth[a*x])/(5*c*(c + d*x^2)^(5/2)) + (4*x*
ArcCoth[a*x])/(15*c^2*(c + d*x^2)^(3/2)) + (8*x*ArcCoth[a*x])/(15*c^3*Sqrt[
c + d*x^2]) - ((15*a^4*c^2 + 20*a^2*c*d + 8*d^2)*ArcTanh[(a*Sqrt[c + d*x^2]
)/Sqrt[a^2*c + d]])/(15*c^3*(a^2*c + d)^(5/2))
```

Rule 12

```
Int[(a_)*(u_), x_Symbol] :> Dist[a, Int[u, x], x] /; FreeQ[a, x] &&  !Match
Q[u, (b_)*(v_) /; FreeQ[b, x]]
```

Rule 191

```
Int[((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Simp[(x*(a + b*x^n)^(p + 1)
)/a, x] /; FreeQ[{a, b, n, p}, x] && EqQ[1/n + p + 1, 0]
```

Rule 192

```
Int[((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> -Simp[(x*(a + b*x^n)^(p + 1
))/(a*n*(p + 1)), x] + Dist[(n*(p + 1) + 1)/(a*n*(p + 1)), Int[(a + b*x^n)^
(p + 1), x], x] /; FreeQ[{a, b, n, p}, x] && ILtQ[Simplify[1/n + p + 1], 0]
 && NeQ[p, -1]
```

Rule 208

```
Int[((a_) + (b_.)*(x_)^2)^(-1), x_Symbol] :> Simp[(Rt[-(a/b), 2]*ArcTanh[x/
Rt[-(a/b), 2]])/a, x] /; FreeQ[{a, b}, x] && NegQ[a/b]
```

Rule 897

```
Int[((d_.) + (e_.)*(x_))^(m_)*((f_.) + (g_.)*(x_))^(n_)*((a_.) + (b_.)*(x_)
 + (c_.)*(x_)^2)^(p_.), x_Symbol] :> With[{q = Denominator[m]}, Dist[q/e, S
```

```
ubst[Int[x^(q*(m + 1) - 1)*((e*f - d*g)/e + (g*x^q)/e)^n*((c*d^2 - b*d*e +
a*e^2)/e^2 - ((2*c*d - b*e)*x^q)/e^2 + (c*x^(2*q))/e^2)^p, x], x, (d + e*x)
^(1/q)], x]] /; FreeQ[{a, b, c, d, e, f, g}, x] && NeQ[e*f - d*g, 0] && NeQ
[b^2 - 4*a*c, 0] && NeQ[c*d^2 - b*d*e + a*e^2, 0] && IntegersQ[n, p] && Fra
ctionQ[m]
```

Rule 1261

```
Int[((f_.)*(x_))^(m_.)*((d_) + (e_.)*(x_)^2)^(q_.)*((a_) + (b_.)*(x_)^2 + (
c_.)*(x_)^4)^(p_.), x_Symbol] :> Int[ExpandIntegrand[(f*x)^m*(d + e*x^2)^q*
(a + b*x^2 + c*x^4)^p, x], x] /; FreeQ[{a, b, c, d, e, f, m, q}, x] && NeQ[
b^2 - 4*a*c, 0] && IGtQ[p, 0] && IGtQ[q, -2]
```

Rule 5977

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))*((d_.) + (e_.)*(x_)^2)^(q_.), x_Sym
bol] :> With[{u = IntHide[(d + e*x^2)^q, x]}, Dist[a + b*ArcCoth[c*x], u, x
] - Dist[b*c, Int[u/(1 - c^2*x^2), x], x]] /; FreeQ[{a, b, c, d, e}, x] &&
(IntegerQ[q] || ILtQ[q + 1/2, 0])
```

Rule 6688

```
Int[u_, x_Symbol] :> With[{v = SimplifyIntegrand[u, x]}, Int[v, x] /; Simpl
erIntegrandQ[v, u, x]]
```

Rule 6715

```
Int[(u_)*(x_)^(m_.), x_Symbol] :> Dist[1/(m + 1), Subst[Int[SubstFor[x^(m +
 1), u, x], x], x, x^(m + 1)], x] /; FreeQ[m, x] && NeQ[m, -1] && FunctionO
fQ[x^(m + 1), u, x]
```

Rubi steps

$$\int \frac{\coth^{-1}(ax)}{(c+dx^2)^{7/2}}\,dx = \frac{x\coth^{-1}(ax)}{5c(c+dx^2)^{5/2}} + \frac{4x\coth^{-1}(ax)}{15c^2(c+dx^2)^{3/2}} + \frac{8x\coth^{-1}(ax)}{15c^3\sqrt{c+dx^2}} - a\int \frac{\frac{x}{5c(c+dx^2)^{5/2}} + \frac{4x}{15c^2(c+dx^2)^{3/2}} + \frac{}{15}}{1-a^2x^2}$$

$$= \frac{x\coth^{-1}(ax)}{5c(c+dx^2)^{5/2}} + \frac{4x\coth^{-1}(ax)}{15c^2(c+dx^2)^{3/2}} + \frac{8x\coth^{-1}(ax)}{15c^3\sqrt{c+dx^2}} - a\int \frac{x(15c^2+20cdx^2+8d^2x^4)}{15c^3(1-a^2x^2)(c+dx^2)^{5/2}}\,d$$

$$= \frac{x\coth^{-1}(ax)}{5c(c+dx^2)^{5/2}} + \frac{4x\coth^{-1}(ax)}{15c^2(c+dx^2)^{3/2}} + \frac{8x\coth^{-1}(ax)}{15c^3\sqrt{c+dx^2}} - \frac{a\int \frac{x(15c^2+20cdx^2+8d^2x^4)}{(1-a^2x^2)(c+dx^2)^{5/2}}\,dx}{15c^3}$$

$$= \frac{x\coth^{-1}(ax)}{5c(c+dx^2)^{5/2}} + \frac{4x\coth^{-1}(ax)}{15c^2(c+dx^2)^{3/2}} + \frac{8x\coth^{-1}(ax)}{15c^3\sqrt{c+dx^2}} - \frac{a\,\text{Subst}\left(\int \frac{15c^2+20cdx+8d^2x^2}{(1-a^2x)(c+dx)^{5/2}}\,dx, x, x\right.}{30c^3}$$

$$= \frac{x\coth^{-1}(ax)}{5c(c+dx^2)^{5/2}} + \frac{4x\coth^{-1}(ax)}{15c^2(c+dx^2)^{3/2}} + \frac{8x\coth^{-1}(ax)}{15c^3\sqrt{c+dx^2}} - \frac{a\,\text{Subst}\left(\int \frac{3c^2+4cx^2+8x^4}{x^4\left(\frac{a^2c+d}{d}-\frac{a^2x^2}{d}\right)}\,dx, x, \sqrt{c}\right.}{15c^3d}$$

$$= \frac{x\coth^{-1}(ax)}{5c(c+dx^2)^{5/2}} + \frac{4x\coth^{-1}(ax)}{15c^2(c+dx^2)^{3/2}} + \frac{8x\coth^{-1}(ax)}{15c^3\sqrt{c+dx^2}} - \frac{a\,\text{Subst}\left(\int\left(\frac{3c^2d}{(a^2c+d)x^4} + \frac{cd(7a^2c+4d)}{(a^2c+d)^2x^2}\right.\right.}{}$$

$$= \frac{a}{15c(a^2c+d)(c+dx^2)^{3/2}} + \frac{a(7a^2c+4d)}{15c^2(a^2c+d)^2\sqrt{c+dx^2}} + \frac{x\coth^{-1}(ax)}{5c(c+dx^2)^{5/2}} + \frac{4x\coth^{-1}(ax)}{15c^2(c+dx^2)}$$

$$= \frac{a}{15c(a^2c+d)(c+dx^2)^{3/2}} + \frac{a(7a^2c+4d)}{15c^2(a^2c+d)^2\sqrt{c+dx^2}} + \frac{x\coth^{-1}(ax)}{5c(c+dx^2)^{5/2}} + \frac{4x\coth^{-1}(ax)}{15c^2(c+dx^2)}$$

**Mathematica [A]** time = 0.57, size = 329, normalized size = 1.64

$$\frac{2x(a^2c+d)^{5/2}\coth^{-1}(ax)(15c^2+20cdx^2+8d^2x^4) + 2ac\sqrt{a^2c+d}\,(c+dx^2)(a^2c(8c+7dx^2)+d(5c+4dx^2)}{}$$

Antiderivative was successfully verified.

```
[In] Integrate[ArcCoth[a*x]/(c + d*x^2)^(7/2),x]
```

```
[Out] (2*a*c*Sqrt[a^2*c + d]*(c + d*x^2)*(d*(5*c + 4*d*x^2) + a^2*c*(8*c + 7*d*x^
2)) + 2*(a^2*c + d)^(5/2)*x*(15*c^2 + 20*c*d*x^2 + 8*d^2*x^4)*ArcCoth[a*x]
+ (15*a^4*c^2 + 20*a^2*c*d + 8*d^2)*(c + d*x^2)^(5/2)*Log[1 - a*x] + (15*a^
4*c^2 + 20*a^2*c*d + 8*d^2)*(c + d*x^2)^(5/2)*Log[1 + a*x] - (15*a^4*c^2 +
20*a^2*c*d + 8*d^2)*(c + d*x^2)^(5/2)*Log[a*c - d*x + Sqrt[a^2*c + d]*Sqrt[
c + d*x^2]] - (15*a^4*c^2 + 20*a^2*c*d + 8*d^2)*(c + d*x^2)^(5/2)*Log[a*c +
 d*x + Sqrt[a^2*c + d]*Sqrt[c + d*x^2]])/(30*c^3*(a^2*c + d)^(5/2)*(c + d*x
^2)^(5/2))
```

**fricas [B]** time = 0.75, size = 1278, normalized size = 6.39

result too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(a*x)/(d*x^2+c)^(7/2),x, algorithm="fricas")
```

```
[Out] [1/60*((15*a^4*c^5 + 20*a^2*c^4*d + (15*a^4*c^2*d^3 + 20*a^2*c*d^4 + 8*d^5)
*x^6 + 8*c^3*d^2 + 3*(15*a^4*c^3*d^2 + 20*a^2*c^2*d^3 + 8*c*d^4)*x^4 + 3*(1
5*a^4*c^4*d + 20*a^2*c^3*d^2 + 8*c^2*d^3)*x^2)*sqrt(a^2*c + d)*log((a^4*d^2
*x^4 + 8*a^4*c^2 + 8*a^2*c*d + 2*(4*a^4*c*d + 3*a^2*d^2)*x^2 - 4*(a^3*d*x^2
 + 2*a^3*c + a*d)*sqrt(a^2*c + d)*sqrt(d*x^2 + c) + d^2)/(a^4*x^4 - 2*a^2*x
^2 + 1)) + 2*(16*a^5*c^5 + 26*a^3*c^4*d + 10*a*c^3*d^2 + 2*(7*a^5*c^3*d^2 +
 11*a^3*c^2*d^3 + 4*a*c*d^4)*x^4 + 6*(5*a^5*c^4*d + 8*a^3*c^3*d^2 + 3*a*c^2
*d^3)*x^2 + (8*(a^6*c^3*d^2 + 3*a^4*c^2*d^3 + 3*a^2*c*d^4 + d^5)*x^5 + 20*(
a^6*c^4*d + 3*a^4*c^3*d^2 + 3*a^2*c^2*d^3 + c*d^4)*x^3 + 15*(a^6*c^5 + 3*a^
4*c^4*d + 3*a^2*c^3*d^2 + c^2*d^3)*x)*log((a*x + 1)/(a*x - 1)))*sqrt(d*x^2
+ c))/(a^6*c^9 + 3*a^4*c^8*d + 3*a^2*c^7*d^2 + c^6*d^3 + (a^6*c^6*d^3 + 3*a
^4*c^5*d^4 + 3*a^2*c^4*d^5 + c^3*d^6)*x^6 + 3*(a^6*c^7*d^2 + 3*a^4*c^6*d^3
+ 3*a^2*c^5*d^4 + c^4*d^5)*x^4 + 3*(a^6*c^8*d + 3*a^4*c^7*d^2 + 3*a^2*c^6*d
^3 + c^5*d^4)*x^2), 1/30*((15*a^4*c^5 + 20*a^2*c^4*d + (15*a^4*c^2*d^3 + 20
*a^2*c*d^4 + 8*d^5)*x^6 + 8*c^3*d^2 + 3*(15*a^4*c^3*d^2 + 20*a^2*c^2*d^3 +
8*c*d^4)*x^4 + 3*(15*a^4*c^4*d + 20*a^2*c^3*d^2 + 8*c^2*d^3)*x^2)*sqrt(-a^2
*c - d)*arctan(1/2*(a^2*d*x^2 + 2*a^2*c + d)*sqrt(-a^2*c - d)*sqrt(d*x^2 +
c)/(a^3*c^2 + a*c*d + (a^3*c*d + a*d^2)*x^2)) + (16*a^5*c^5 + 26*a^3*c^4*d
+ 10*a*c^3*d^2 + 2*(7*a^5*c^3*d^2 + 11*a^3*c^2*d^3 + 4*a*c*d^4)*x^4 + 6*(5*
a^5*c^4*d + 8*a^3*c^3*d^2 + 3*a*c^2*d^3)*x^2 + (8*(a^6*c^3*d^2 + 3*a^4*c^2*
d^3 + 3*a^2*c*d^4 + d^5)*x^5 + 20*(a^6*c^4*d + 3*a^4*c^3*d^2 + 3*a^2*c^2*d^
3 + c*d^4)*x^3 + 15*(a^6*c^5 + 3*a^4*c^4*d + 3*a^2*c^3*d^2 + c^2*d^3)*x)*lo
g((a*x + 1)/(a*x - 1)))*sqrt(d*x^2 + c))/(a^6*c^9 + 3*a^4*c^8*d + 3*a^2*c^7
*d^2 + c^6*d^3 + (a^6*c^6*d^3 + 3*a^4*c^5*d^4 + 3*a^2*c^4*d^5 + c^3*d^6)*x^
6 + 3*(a^6*c^7*d^2 + 3*a^4*c^6*d^3 + 3*a^2*c^5*d^4 + c^4*d^5)*x^4 + 3*(a^6*
c^8*d + 3*a^4*c^7*d^2 + 3*a^2*c^6*d^3 + c^5*d^4)*x^2)]
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{arcoth}(ax)}{\left(dx^2+c\right)^{\frac{7}{2}}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(a*x)/(d*x^2+c)^(7/2),x, algorithm="giac")
```

```
[Out] integrate(arccoth(a*x)/(d*x^2 + c)^(7/2), x)
```

**maple [F]** time = 0.95, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{arccoth}(ax)}{\left(d\,x^2+c\right)^{\frac{7}{2}}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(arccoth(a*x)/(d*x^2+c)^(7/2),x)
```

```
[Out] int(arccoth(a*x)/(d*x^2+c)^(7/2),x)
```

**maxima [B]** time = 0.42, size = 401, normalized size = 2.00

$$\frac{1}{30}\,a\left(\frac{\frac{3\,a^3d\log\left(\frac{\sqrt{dx^2+c}\,a^2-\sqrt{a^2c+d}\,a}{\sqrt{dx^2+c}\,a^2+\sqrt{a^2c+d}\,a}\right)}{\left(a^4c^3+2\,a^2c^2d+cd^2\right)\sqrt{a^2c+d}}+\frac{2\left(3\left(dx^2+c\right)a^2d+a^2cd+d^2\right)}{\left(a^4c^3+2\,a^2c^2d+cd^2\right)\left(dx^2+c\right)^{\frac{3}{2}}}}{d}+\frac{4\left(\frac{ad\log\left(\frac{\sqrt{dx^2+c}\,a^2-\sqrt{a^2c+d}\,a}{\sqrt{dx^2+c}\,a^2+\sqrt{a^2c+d}\,a}\right)}{\left(a^2c^3+c^2d\right)\sqrt{a^2c+d}}+\frac{2\,d}{\left(a^2c^3+c^2d\right)\sqrt{dx^2+c}}\right)}{d}+\frac{8\,\log\left(\cdots\right.}{\sqrt{\cdots}}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(a*x)/(d*x^2+c)^(7/2),x, algorithm="maxima")
```

```
[Out] 1/30*a*((3*a^3*d*log((sqrt(d*x^2 + c)*a^2 - sqrt(a^2*c + d)*a)/(sqrt(d*x^2
+ c)*a^2 + sqrt(a^2*c + d)*a))/((a^4*c^3 + 2*a^2*c^2*d + c*d^2)*sqrt(a^2*c
+ d)) + 2*(3*(d*x^2 + c)*a^2*d + a^2*c*d + d^2)/((a^4*c^3 + 2*a^2*c^2*d + c
*d^2)*(d*x^2 + c)^(3/2)))/d + 4*(a*d*log((sqrt(d*x^2 + c)*a^2 - sqrt(a^2*c
+ d)*a)/(sqrt(d*x^2 + c)*a^2 + sqrt(a^2*c + d)*a))/((a^2*c^3 + c^2*d)*sqrt(
a^2*c + d)) + 2*d/((a^2*c^3 + c^2*d)*sqrt(d*x^2 + c)))/d + 8*log((sqrt(d*x^
2 + c)*a^2 - sqrt(a^2*c + d)*a)/(sqrt(d*x^2 + c)*a^2 + sqrt(a^2*c + d)*a))/
(sqrt(a^2*c + d)*a*c^3)) + 1/15*(8*x/(sqrt(d*x^2 + c)*c^3) + 4*x/((d*x^2 +
c)^(3/2)*c^2) + 3*x/((d*x^2 + c)^(5/2)*c))*arccoth(a*x)
```

**mupad** **[F]** time = 0.00, size = -1, normalized size = -0.00

$$\int \frac{\operatorname{acoth}(a\,x)}{\left(d\,x^2+c\right)^{7/2}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(a*x)/(c + d*x^2)^(7/2),x)
```

```
[Out] int(acoth(a*x)/(c + d*x^2)^(7/2), x)
```

**sympy** **[F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{acoth}(ax)}{\left(c+dx^2\right)^{\frac{7}{2}}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(a*x)/(d*x**2+c)**(7/2),x)
```

```
[Out] Integral(acoth(a*x)/(c + d*x**2)**(7/2), x)
```

# 3.47 $\int \frac{\coth^{-1}(ax)}{(c+dx^2)^{9/2}}\,dx$

**Optimal**. Leaf size=283

$$\frac{a\left(11a^2c+6d\right)}{105c^2\left(a^2c+d\right)^2\left(c+dx^2\right)^{3/2}}+\frac{a}{35c\left(a^2c+d\right)\left(c+dx^2\right)^{5/2}}+\frac{a\left(19a^4c^2+22a^2cd+8d^2\right)}{35c^3\left(a^2c+d\right)^3\sqrt{c+dx^2}}-\frac{\left(35a^6c^3+70a^4c^2d+56a^2c\right.}{35c^4\left(a\right.}$$

```
[Out] 1/35*a/c/(a^2*c+d)/(d*x^2+c)^(5/2)+1/105*a*(11*a^2*c+6*d)/c^2/(a^2*c+d)^2/(
d*x^2+c)^(3/2)+1/7*x*arccoth(a*x)/c/(d*x^2+c)^(7/2)+6/35*x*arccoth(a*x)/c^2
/(d*x^2+c)^(5/2)+8/35*x*arccoth(a*x)/c^3/(d*x^2+c)^(3/2)-1/35*(35*a^6*c^3+7
0*a^4*c^2*d+56*a^2*c*d^2+16*d^3)*arctanh(a*(d*x^2+c)^(1/2)/(a^2*c+d)^(1/2))
/c^4/(a^2*c+d)^(7/2)+1/35*a*(19*a^4*c^2+22*a^2*c*d+8*d^2)/c^3/(a^2*c+d)^3/(
d*x^2+c)^(1/2)+16/35*x*arccoth(a*x)/c^4/(d*x^2+c)^(1/2)
```

**Rubi [A]** time = 1.34, antiderivative size = 283, normalized size of antiderivative = 1.00, number of steps used = 8, number of rules used = 9, integrand size = 16, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.562, Rules used = {192, 191, 5977, 6688, 12, 6715, 1619, 63, 208}

$$\frac{a\left(19a^4c^2+22a^2cd+8d^2\right)}{35c^3\left(a^2c+d\right)^3\sqrt{c+dx^2}}-\frac{\left(70a^4c^2d+35a^6c^3+56a^2cd^2+16d^3\right)\tanh^{-1}\left(\frac{a\sqrt{c+dx^2}}{\sqrt{a^2c+d}}\right)}{35c^4\left(a^2c+d\right)^{7/2}}+\frac{a\left(11a^2c+6d\right)}{105c^2\left(a^2c+d\right)^2\left(c+dx^2\right)^{3}}$$

Antiderivative was successfully verified.

```
[In] Int[ArcCoth[a*x]/(c + d*x^2)^(9/2),x]
```

```
[Out] a/(35*c*(a^2*c + d)*(c + d*x^2)^(5/2)) + (a*(11*a^2*c + 6*d))/(105*c^2*(a^2
*c + d)^2*(c + d*x^2)^(3/2)) + (a*(19*a^4*c^2 + 22*a^2*c*d + 8*d^2))/(35*c^
3*(a^2*c + d)^3*Sqrt[c + d*x^2]) + (x*ArcCoth[a*x])/(7*c*(c + d*x^2)^(7/2))
 + (6*x*ArcCoth[a*x])/(35*c^2*(c + d*x^2)^(5/2)) + (8*x*ArcCoth[a*x])/(35*c
^3*(c + d*x^2)^(3/2)) + (16*x*ArcCoth[a*x])/(35*c^4*Sqrt[c + d*x^2]) - ((35
*a^6*c^3 + 70*a^4*c^2*d + 56*a^2*c*d^2 + 16*d^3)*ArcTanh[(a*Sqrt[c + d*x^2]
)/Sqrt[a^2*c + d]])/(35*c^4*(a^2*c + d)^(7/2))
```

Rule 12

```
Int[(a_)*(u_), x_Symbol] :> Dist[a, Int[u, x], x] /; FreeQ[a, x] &&  !Match
Q[u, (b_)*(v_) /; FreeQ[b, x]]
```

Rule 63

```
Int[((a_.) + (b_.)*(x_))^(m_)*((c_.) + (d_.)*(x_))^(n_), x_Symbol] :> With[
{p = Denominator[m]}, Dist[p/b, Subst[Int[x^(p*(m + 1) - 1)*(c - (a*d)/b +
(d*x^p)/b)^n, x], x, (a + b*x)^(1/p)], x]] /; FreeQ[{a, b, c, d}, x] && NeQ
[b*c - a*d, 0] && LtQ[-1, m, 0] && LeQ[-1, n, 0] && LeQ[Denominator[n], Den
ominator[m]] && IntLinearQ[a, b, c, d, m, n, x]
```

Rule 191

```
Int[((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Simp[(x*(a + b*x^n)^(p + 1)
)/a, x] /; FreeQ[{a, b, n, p}, x] && EqQ[1/n + p + 1, 0]
```

Rule 192

```
Int[((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> -Simp[(x*(a + b*x^n)^(p + 1
))/(a*n*(p + 1)), x] + Dist[(n*(p + 1) + 1)/(a*n*(p + 1)), Int[(a + b*x^n)^
(p + 1), x], x] /; FreeQ[{a, b, n, p}, x] && ILtQ[Simplify[1/n + p + 1], 0]
```

```
&& NeQ[p, -1]
```

Rule 208

```
Int[((a_) + (b_.)*(x_)^2)^(-1), x_Symbol] :> Simp[(Rt[-(a/b), 2]*ArcTanh[x/
Rt[-(a/b), 2]])/a, x] /; FreeQ[{a, b}, x] && NegQ[a/b]
```

Rule 1619

```
Int[((Px_)*((c_.) + (d_.)*(x_))^(n_.))/((a_.) + (b_.)*(x_)), x_Symbol] :> I
nt[ExpandIntegrand[1/Sqrt[c + d*x], (Px*(c + d*x)^(n + 1/2))/(a + b*x), x],
 x] /; FreeQ[{a, b, c, d, n}, x] && PolyQ[Px, x] && ILtQ[n + 1/2, 0] && GtQ
[Expon[Px, x], 2]
```

Rule 5977

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))*((d_.) + (e_.)*(x_)^2)^(q_.), x_Sym
bol] :> With[{u = IntHide[(d + e*x^2)^q, x]}, Dist[a + b*ArcCoth[c*x], u, x
] - Dist[b*c, Int[u/(1 - c^2*x^2), x], x]] /; FreeQ[{a, b, c, d, e}, x] &&
(IntegerQ[q] || ILtQ[q + 1/2, 0])
```

Rule 6688

```
Int[u_, x_Symbol] :> With[{v = SimplifyIntegrand[u, x]}, Int[v, x] /; Simpl
erIntegrandQ[v, u, x]]
```

Rule 6715

```
Int[(u_)*(x_)^(m_.), x_Symbol] :> Dist[1/(m + 1), Subst[Int[SubstFor[x^(m +
 1), u, x], x], x, x^(m + 1)], x] /; FreeQ[m, x] && NeQ[m, -1] && FunctionO
fQ[x^(m + 1), u, x]
```

Rubi steps

$$\int \frac{\coth^{-1}(ax)}{(c+dx^2)^{9/2}}\,dx = \frac{x\coth^{-1}(ax)}{7c(c+dx^2)^{7/2}} + \frac{6x\coth^{-1}(ax)}{35c^2(c+dx^2)^{5/2}} + \frac{8x\coth^{-1}(ax)}{35c^3(c+dx^2)^{3/2}} + \frac{16x\coth^{-1}(ax)}{35c^4\sqrt{c+dx^2}} - a\int \frac{\frac{x}{7c(c+dx^2)^{7/2}}}{}$$

$$= \frac{x\coth^{-1}(ax)}{7c(c+dx^2)^{7/2}} + \frac{6x\coth^{-1}(ax)}{35c^2(c+dx^2)^{5/2}} + \frac{8x\coth^{-1}(ax)}{35c^3(c+dx^2)^{3/2}} + \frac{16x\coth^{-1}(ax)}{35c^4\sqrt{c+dx^2}} - a\int \frac{x(35c^3+7}{35c^4}$$

$$= \frac{x\coth^{-1}(ax)}{7c(c+dx^2)^{7/2}} + \frac{6x\coth^{-1}(ax)}{35c^2(c+dx^2)^{5/2}} + \frac{8x\coth^{-1}(ax)}{35c^3(c+dx^2)^{3/2}} + \frac{16x\coth^{-1}(ax)}{35c^4\sqrt{c+dx^2}} - \frac{a\int \frac{x(35c^3+70c^2dx^2}{(1-a^2x^2}}{3}$$

$$= \frac{x\coth^{-1}(ax)}{7c(c+dx^2)^{7/2}} + \frac{6x\coth^{-1}(ax)}{35c^2(c+dx^2)^{5/2}} + \frac{8x\coth^{-1}(ax)}{35c^3(c+dx^2)^{3/2}} + \frac{16x\coth^{-1}(ax)}{35c^4\sqrt{c+dx^2}} - \frac{a\,\mathrm{Subst}\left(\int \frac{35c^3+}{}\right.}{}$$

$$= \frac{x\coth^{-1}(ax)}{7c(c+dx^2)^{7/2}} + \frac{6x\coth^{-1}(ax)}{35c^2(c+dx^2)^{5/2}} + \frac{8x\coth^{-1}(ax)}{35c^3(c+dx^2)^{3/2}} + \frac{16x\coth^{-1}(ax)}{35c^4\sqrt{c+dx^2}} - \frac{a\,\mathrm{Subst}\left(\int\left(\frac{}{(a^2c}\right.\right.}{}$$

$$= \frac{a}{35c(a^2c+d)(c+dx^2)^{5/2}} + \frac{a(11a^2c+6d)}{105c^2(a^2c+d)^2(c+dx^2)^{3/2}} + \frac{a(19a^4c^2+22a^2cd+8d^2)}{35c^3(a^2c+d)^3\sqrt{c+dx^2}} + \frac{x}{7c}$$

$$= \frac{a}{35c(a^2c+d)(c+dx^2)^{5/2}} + \frac{a(11a^2c+6d)}{105c^2(a^2c+d)^2(c+dx^2)^{3/2}} + \frac{a(19a^4c^2+22a^2cd+8d^2)}{35c^3(a^2c+d)^3\sqrt{c+dx^2}} + \frac{x}{7c}$$

$$= \frac{a}{35c(a^2c+d)(c+dx^2)^{5/2}} + \frac{a(11a^2c+6d)}{105c^2(a^2c+d)^2(c+dx^2)^{3/2}} + \frac{a(19a^4c^2+22a^2cd+8d^2)}{35c^3(a^2c+d)^3\sqrt{c+dx^2}} + \frac{x}{7c}$$

**Mathematica [A]** time = 0.94, size = 431, normalized size = 1.52

$$\frac{6x(a^2c+d)^{7/2}\coth^{-1}(ax)(35c^3+70c^2dx^2+56cd^2x^4+16d^3x^6)+2ac\sqrt{a^2c+d}\,(c+dx^2)\left(3c^2(a^2c+d)^2+c(11\right.}{}$$

Antiderivative was successfully verified.

```
[In] Integrate[ArcCoth[a*x]/(c + d*x^2)^(9/2),x]
```

```
[Out] (2*a*c*Sqrt[a^2*c + d]*(c + d*x^2)*(3*c^2*(a^2*c + d)^2 + c*(a^2*c + d)*(11
*a^2*c + 6*d)*(c + d*x^2) + 3*(19*a^4*c^2 + 22*a^2*c*d + 8*d^2)*(c + d*x^2)
^2) + 6*(a^2*c + d)^(7/2)*x*(35*c^3 + 70*c^2*d*x^2 + 56*c*d^2*x^4 + 16*d^3*
x^6)*ArcCoth[a*x] + 3*(35*a^6*c^3 + 70*a^4*c^2*d + 56*a^2*c*d^2 + 16*d^3)*(
c + d*x^2)^(7/2)*Log[1 - a*x] + 3*(35*a^6*c^3 + 70*a^4*c^2*d + 56*a^2*c*d^2
 + 16*d^3)*(c + d*x^2)^(7/2)*Log[1 + a*x] - 3*(35*a^6*c^3 + 70*a^4*c^2*d +
56*a^2*c*d^2 + 16*d^3)*(c + d*x^2)^(7/2)*Log[a*c - d*x + Sqrt[a^2*c + d]*Sq
rt[c + d*x^2]] - 3*(35*a^6*c^3 + 70*a^4*c^2*d + 56*a^2*c*d^2 + 16*d^3)*(c +
 d*x^2)^(7/2)*Log[a*c + d*x + Sqrt[a^2*c + d]*Sqrt[c + d*x^2]])/(210*c^4*(a
^2*c + d)^(7/2)*(c + d*x^2)^(7/2))
```

**fricas [B]** time = 0.93, size = 2004, normalized size = 7.08

result too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(a*x)/(d*x^2+c)^(9/2),x, algorithm="fricas")
```

```
[Out] [1/420*(3*(35*a^6*c^7 + 70*a^4*c^6*d + 56*a^2*c^5*d^2 + (35*a^6*c^3*d^4 + 7
0*a^4*c^2*d^5 + 56*a^2*c*d^6 + 16*d^7)*x^8 + 16*c^4*d^3 + 4*(35*a^6*c^4*d^3
 + 70*a^4*c^3*d^4 + 56*a^2*c^2*d^5 + 16*c*d^6)*x^6 + 6*(35*a^6*c^5*d^2 + 70
*a^4*c^4*d^3 + 56*a^2*c^3*d^4 + 16*c^2*d^5)*x^4 + 4*(35*a^6*c^6*d + 70*a^4*
c^5*d^2 + 56*a^2*c^4*d^3 + 16*c^3*d^4)*x^2)*sqrt(a^2*c + d)*log((a^4*d^2*x^
4 + 8*a^4*c^2 + 8*a^2*c*d + 2*(4*a^4*c*d + 3*a^2*d^2)*x^2 - 4*(a^3*d*x^2 +
2*a^3*c + a*d)*sqrt(a^2*c + d)*sqrt(d*x^2 + c) + d^2)/(a^4*x^4 - 2*a^2*x^2
+ 1)) + 2*(142*a^7*c^7 + 320*a^5*c^6*d + 244*a^3*c^5*d^2 + 66*a*c^4*d^3 + 6
*(19*a^7*c^4*d^3 + 41*a^5*c^3*d^4 + 30*a^3*c^2*d^5 + 8*a*c*d^6)*x^6 + 2*(18
2*a^7*c^5*d^2 + 397*a^5*c^4*d^3 + 293*a^3*c^3*d^4 + 78*a*c^2*d^5)*x^4 + 2*(
196*a^7*c^6*d + 434*a^5*c^5*d^2 + 325*a^3*c^4*d^3 + 87*a*c^3*d^4)*x^2 + 3*(
16*(a^8*c^4*d^3 + 4*a^6*c^3*d^4 + 6*a^4*c^2*d^5 + 4*a^2*c*d^6 + d^7)*x^7 +
56*(a^8*c^5*d^2 + 4*a^6*c^4*d^3 + 6*a^4*c^3*d^4 + 4*a^2*c^2*d^5 + c*d^6)*x^
5 + 70*(a^8*c^6*d + 4*a^6*c^5*d^2 + 6*a^4*c^4*d^3 + 4*a^2*c^3*d^4 + c^2*d^5
)*x^3 + 35*(a^8*c^7 + 4*a^6*c^6*d + 6*a^4*c^5*d^2 + 4*a^2*c^4*d^3 + c^3*d^4
)*x)*log((a*x + 1)/(a*x - 1)))*sqrt(d*x^2 + c))/(a^8*c^12 + 4*a^6*c^11*d +
6*a^4*c^10*d^2 + 4*a^2*c^9*d^3 + c^8*d^4 + (a^8*c^8*d^4 + 4*a^6*c^7*d^5 + 6
*a^4*c^6*d^6 + 4*a^2*c^5*d^7 + c^4*d^8)*x^8 + 4*(a^8*c^9*d^3 + 4*a^6*c^8*d^
4 + 6*a^4*c^7*d^5 + 4*a^2*c^6*d^6 + c^5*d^7)*x^6 + 6*(a^8*c^10*d^2 + 4*a^6*
c^9*d^3 + 6*a^4*c^8*d^4 + 4*a^2*c^7*d^5 + c^6*d^6)*x^4 + 4*(a^8*c^11*d + 4*
a^6*c^10*d^2 + 6*a^4*c^9*d^3 + 4*a^2*c^8*d^4 + c^7*d^5)*x^2), 1/210*(3*(35*
a^6*c^7 + 70*a^4*c^6*d + 56*a^2*c^5*d^2 + (35*a^6*c^3*d^4 + 70*a^4*c^2*d^5
+ 56*a^2*c*d^6 + 16*d^7)*x^8 + 16*c^4*d^3 + 4*(35*a^6*c^4*d^3 + 70*a^4*c^3*
d^4 + 56*a^2*c^2*d^5 + 16*c*d^6)*x^6 + 6*(35*a^6*c^5*d^2 + 70*a^4*c^4*d^3 +
 56*a^2*c^3*d^4 + 16*c^2*d^5)*x^4 + 4*(35*a^6*c^6*d + 70*a^4*c^5*d^2 + 56*a
^2*c^4*d^3 + 16*c^3*d^4)*x^2)*sqrt(-a^2*c - d)*arctan(1/2*(a^2*d*x^2 + 2*a^
2*c + d)*sqrt(-a^2*c - d)*sqrt(d*x^2 + c)/(a^3*c^2 + a*c*d + (a^3*c*d + a*d
^2)*x^2)) + (142*a^7*c^7 + 320*a^5*c^6*d + 244*a^3*c^5*d^2 + 66*a*c^4*d^3 +
 6*(19*a^7*c^4*d^3 + 41*a^5*c^3*d^4 + 30*a^3*c^2*d^5 + 8*a*c*d^6)*x^6 + 2*(
182*a^7*c^5*d^2 + 397*a^5*c^4*d^3 + 293*a^3*c^3*d^4 + 78*a*c^2*d^5)*x^4 + 2
*(196*a^7*c^6*d + 434*a^5*c^5*d^2 + 325*a^3*c^4*d^3 + 87*a*c^3*d^4)*x^2 + 3
*(16*(a^8*c^4*d^3 + 4*a^6*c^3*d^4 + 6*a^4*c^2*d^5 + 4*a^2*c*d^6 + d^7)*x^7
+ 56*(a^8*c^5*d^2 + 4*a^6*c^4*d^3 + 6*a^4*c^3*d^4 + 4*a^2*c^2*d^5 + c*d^6)*
x^5 + 70*(a^8*c^6*d + 4*a^6*c^5*d^2 + 6*a^4*c^4*d^3 + 4*a^2*c^3*d^4 + c^2*d
^5)*x^3 + 35*(a^8*c^7 + 4*a^6*c^6*d + 6*a^4*c^5*d^2 + 4*a^2*c^4*d^3 + c^3*d
^4)*x)*log((a*x + 1)/(a*x - 1)))*sqrt(d*x^2 + c))/(a^8*c^12 + 4*a^6*c^11*d
+ 6*a^4*c^10*d^2 + 4*a^2*c^9*d^3 + c^8*d^4 + (a^8*c^8*d^4 + 4*a^6*c^7*d^5 +
 6*a^4*c^6*d^6 + 4*a^2*c^5*d^7 + c^4*d^8)*x^8 + 4*(a^8*c^9*d^3 + 4*a^6*c^8*
d^4 + 6*a^4*c^7*d^5 + 4*a^2*c^6*d^6 + c^5*d^7)*x^6 + 6*(a^8*c^10*d^2 + 4*a^
6*c^9*d^3 + 6*a^4*c^8*d^4 + 4*a^2*c^7*d^5 + c^6*d^6)*x^4 + 4*(a^8*c^11*d +
4*a^6*c^10*d^2 + 6*a^4*c^9*d^3 + 4*a^2*c^8*d^4 + c^7*d^5)*x^2)]
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{arcoth}(ax)}{\left(dx^2+c\right)^{\frac{9}{2}}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(a*x)/(d*x^2+c)^(9/2),x, algorithm="giac")
```

```
[Out] integrate(arccoth(a*x)/(d*x^2 + c)^(9/2), x)
```

**maple [F]** time = 0.94, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{arccoth}(ax)}{\left(d\,x^2+c\right)^{\frac{9}{2}}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(arccoth(a*x)/(d*x^2+c)^(9/2),x)
```

```
[Out] int(arccoth(a*x)/(d*x^2+c)^(9/2),x)
```

**maxima [B]** time = 0.43, size = 639, normalized size = 2.26

$$\frac{1}{210}a\left(\frac{\frac{15\,a^5d\log\left(\frac{\sqrt{dx^2+c}\,a^2-\sqrt{a^2c+d}\,a}{\sqrt{dx^2+c}\,a^2+\sqrt{a^2c+d}\,a}\right)}{\left(a^6c^4+3\,a^4c^3d+3\,a^2c^2d^2+cd^3\right)\sqrt{a^2c+d}}+\frac{2\left(15\left(dx^2+c\right)^2a^4d+3\,a^4c^2d+6\,a^2cd^2+3\,d^3+5\left(a^4cd+a^2d^2\right)\left(dx^2+c\right)\right)}{\left(a^6c^4+3\,a^4c^3d+3\,a^2c^2d^2+cd^3\right)\left(dx^2+c\right)^{\frac{5}{2}}}}{d}+\frac{6\left(\frac{3\,a^3d\log\left(\frac{\sqrt{dx^2+c}\,a^2-\sqrt{\cdots}}{\sqrt{dx^2+c}\,a^2+\sqrt{\cdots}}\right)}{\left(a^4c^4+2\,a^2c^3d+c^2d^2\right)\sqrt{\cdots}}\cdots\right.}{\cdots}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(a*x)/(d*x^2+c)^(9/2),x, algorithm="maxima")
```

```
[Out] 1/210*a*((15*a^5*d*log((sqrt(d*x^2 + c)*a^2 - sqrt(a^2*c + d)*a)/(sqrt(d*x^
2 + c)*a^2 + sqrt(a^2*c + d)*a))/((a^6*c^4 + 3*a^4*c^3*d + 3*a^2*c^2*d^2 +
c*d^3)*sqrt(a^2*c + d)) + 2*(15*(d*x^2 + c)^2*a^4*d + 3*a^4*c^2*d + 6*a^2*c
*d^2 + 3*d^3 + 5*(a^4*c*d + a^2*d^2)*(d*x^2 + c))/((a^6*c^4 + 3*a^4*c^3*d +
 3*a^2*c^2*d^2 + c*d^3)*(d*x^2 + c)^(5/2)))/d + 6*(3*a^3*d*log((sqrt(d*x^2
+ c)*a^2 - sqrt(a^2*c + d)*a)/(sqrt(d*x^2 + c)*a^2 + sqrt(a^2*c + d)*a))/((
a^4*c^4 + 2*a^2*c^3*d + c^2*d^2)*sqrt(a^2*c + d)) + 2*(3*(d*x^2 + c)*a^2*d
+ a^2*c*d + d^2)/((a^4*c^4 + 2*a^2*c^3*d + c^2*d^2)*(d*x^2 + c)^(3/2)))/d +
 24*(a*d*log((sqrt(d*x^2 + c)*a^2 - sqrt(a^2*c + d)*a)/(sqrt(d*x^2 + c)*a^2
 + sqrt(a^2*c + d)*a))/((a^2*c^4 + c^3*d)*sqrt(a^2*c + d)) + 2*d/((a^2*c^4
+ c^3*d)*sqrt(d*x^2 + c)))/d + 48*log((sqrt(d*x^2 + c)*a^2 - sqrt(a^2*c + d
)*a)/(sqrt(d*x^2 + c)*a^2 + sqrt(a^2*c + d)*a))/(sqrt(a^2*c + d)*a*c^4)) +
1/35*(16*x/(sqrt(d*x^2 + c)*c^4) + 8*x/((d*x^2 + c)^(3/2)*c^3) + 6*x/((d*x^
2 + c)^(5/2)*c^2) + 5*x/((d*x^2 + c)^(7/2)*c))*arccoth(a*x)
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.00

$$\int \frac{\mathrm{acoth}\left(a\,x\right)}{{\left(d\,x^2+c\right)}^{9/2}} \,d x$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(a*x)/(c + d*x^2)^(9/2),x)
```

```
[Out] int(acoth(a*x)/(c + d*x^2)^(9/2), x)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{acoth}{\left(ax \right)}}{\left(c + dx^{2}\right)^{\frac{9}{2}}}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(a*x)/(d*x**2+c)**(9/2),x)
```

```
[Out] Integral(acoth(a*x)/(c + d*x**2)**(9/2), x)
```

# 3.48 $\int \sqrt{a-ax^2}\,\coth^{-1}(x)\,dx$

**Optimal**. Leaf size=186

$$-\frac{ia\sqrt{1-x^2}\,\text{Li}_2\left(-\frac{i\sqrt{1-x}}{\sqrt{x+1}}\right)}{2\sqrt{a-ax^2}}+\frac{ia\sqrt{1-x^2}\,\text{Li}_2\left(\frac{i\sqrt{1-x}}{\sqrt{x+1}}\right)}{2\sqrt{a-ax^2}}+\frac{1}{2}\sqrt{a-ax^2}+\frac{1}{2}x\sqrt{a-ax^2}\,\coth^{-1}(x)-\frac{a\sqrt{1-x^2}\,\tan^{-1}\left(\frac{\sqrt{1-x}}{\sqrt{x+1}}\right)}{\sqrt{a-ax^2}}$$

```
[Out] -a*arccoth(x)*arctan((1-x)^(1/2)/(1+x)^(1/2))*(-x^2+1)^(1/2)/(-a*x^2+a)^(1/
2)-1/2*I*a*polylog(2,-I*(1-x)^(1/2)/(1+x)^(1/2))*(-x^2+1)^(1/2)/(-a*x^2+a)^
(1/2)+1/2*I*a*polylog(2,I*(1-x)^(1/2)/(1+x)^(1/2))*(-x^2+1)^(1/2)/(-a*x^2+a
)^(1/2)+1/2*(-a*x^2+a)^(1/2)+1/2*x*arccoth(x)*(-a*x^2+a)^(1/2)
```

**Rubi [A]** time = 0.08, antiderivative size = 186, normalized size of antiderivative = 1.00, number of steps used = 3, number of rules used = 3, integrand size = 15, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.200, Rules used = {5943, 5955, 5951}

$$-\frac{ia\sqrt{1-x^2}\,\text{PolyLog}\left(2,-\frac{i\sqrt{1-x}}{\sqrt{x+1}}\right)}{2\sqrt{a-ax^2}}+\frac{ia\sqrt{1-x^2}\,\text{PolyLog}\left(2,\frac{i\sqrt{1-x}}{\sqrt{x+1}}\right)}{2\sqrt{a-ax^2}}+\frac{1}{2}\sqrt{a-ax^2}+\frac{1}{2}x\sqrt{a-ax^2}\,\coth^{-1}(x)-\frac{a\sqrt{1-x^2}\,\tan^{-1}\left(\frac{\sqrt{1-x}}{\sqrt{x+1}}\right)}{\sqrt{a-ax^2}}$$

Antiderivative was successfully verified.

```
[In] Int[Sqrt[a - a*x^2]*ArcCoth[x],x]
```

```
[Out] Sqrt[a - a*x^2]/2 + (x*Sqrt[a - a*x^2]*ArcCoth[x])/2 - (a*Sqrt[1 - x^2]*Arc
Coth[x]*ArcTan[Sqrt[1 - x]/Sqrt[1 + x]])/Sqrt[a - a*x^2] - ((I/2)*a*Sqrt[1
- x^2]*PolyLog[2, ((-I)*Sqrt[1 - x])/Sqrt[1 + x]])/Sqrt[a - a*x^2] + ((I/2)
*a*Sqrt[1 - x^2]*PolyLog[2, (I*Sqrt[1 - x])/Sqrt[1 + x]])/Sqrt[a - a*x^2]
```

Rule 5943

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))*((d_) + (e_.)*(x_)^2)^(q_.), x_Symb
ol] :> Simp[(b*(d + e*x^2)^q)/(2*c*q*(2*q + 1)), x] + (Dist[(2*d*q)/(2*q +
1), Int[(d + e*x^2)^(q - 1)*(a + b*ArcCoth[c*x]), x], x] + Simp[(x*(d + e*x
^2)^q*(a + b*ArcCoth[c*x]))/(2*q + 1), x]) /; FreeQ[{a, b, c, d, e}, x] &&
EqQ[c^2*d + e, 0] && GtQ[q, 0]
```

Rule 5951

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))/Sqrt[(d_) + (e_.)*(x_)^2], x_Symbol
] :> Simp[(-2*(a + b*ArcCoth[c*x])*ArcTan[Sqrt[1 - c*x]/Sqrt[1 + c*x]])/(c*
Sqrt[d]), x] + (-Simp[(I*b*PolyLog[2, -((I*Sqrt[1 - c*x])/Sqrt[1 + c*x])])/
(c*Sqrt[d]), x] + Simp[(I*b*PolyLog[2, (I*Sqrt[1 - c*x])/Sqrt[1 + c*x]])/(c
*Sqrt[d]), x]) /; FreeQ[{a, b, c, d, e}, x] && EqQ[c^2*d + e, 0] && GtQ[d,
0]
```

Rule 5955

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)/Sqrt[(d_) + (e_.)*(x_)^2], x_
Symbol] :> Dist[Sqrt[1 - c^2*x^2]/Sqrt[d + e*x^2], Int[(a + b*ArcCoth[c*x])
^p/Sqrt[1 - c^2*x^2], x], x] /; FreeQ[{a, b, c, d, e}, x] && EqQ[c^2*d + e,
 0] && IGtQ[p, 0] &&  !GtQ[d, 0]
```

Rubi steps

$$\int \sqrt{a-ax^2}\coth^{-1}(x)\,dx = \frac{1}{2}\sqrt{a-ax^2} + \frac{1}{2}x\sqrt{a-ax^2}\coth^{-1}(x) + \frac{1}{2}a\int \frac{\coth^{-1}(x)}{\sqrt{a-ax^2}}\,dx$$
$$= \frac{1}{2}\sqrt{a-ax^2} + \frac{1}{2}x\sqrt{a-ax^2}\coth^{-1}(x) + \frac{\left(a\sqrt{1-x^2}\right)\int \frac{\coth^{-1}(x)}{\sqrt{1-x^2}}\,dx}{2\sqrt{a-ax^2}}$$
$$= \frac{1}{2}\sqrt{a-ax^2} + \frac{1}{2}x\sqrt{a-ax^2}\coth^{-1}(x) - \frac{a\sqrt{1-x^2}\coth^{-1}(x)\tan^{-1}\left(\frac{\sqrt{1-x}}{\sqrt{1+x}}\right)}{\sqrt{a-ax^2}} - \frac{ia\sqrt{1-}}{2}$$

**Mathematica [A]** time = 0.97, size = 125, normalized size = 0.67

$$-\frac{\sqrt{a-ax^2}\left(-4\text{Li}_2\left(-e^{-\coth^{-1}(x)}\right) + 4\text{Li}_2\left(e^{-\coth^{-1}(x)}\right) - 2\coth\left(\frac{1}{2}\coth^{-1}(x)\right) - 4\coth^{-1}(x)\log\left(1-e^{-\coth^{-1}(x)}\right) + 4\right.}{8}$$

Warning: Unable to verify antiderivative.

```
[In] Integrate[Sqrt[a - a*x^2]*ArcCoth[x],x]
```

```
[Out] -1/8*(Sqrt[a - a*x^2]*(-2*Coth[ArcCoth[x]/2] - ArcCoth[x]*Csch[ArcCoth[x]/2
]^2 - 4*ArcCoth[x]*Log[1 - E^(-ArcCoth[x])] + 4*ArcCoth[x]*Log[1 + E^(-ArcC
oth[x])] - 4*PolyLog[2, -E^(-ArcCoth[x])] + 4*PolyLog[2, E^(-ArcCoth[x])] -
 ArcCoth[x]*Sech[ArcCoth[x]/2]^2 + 2*Tanh[ArcCoth[x]/2]))/(Sqrt[1 - x^(-2)]
*x)
```

**fricas [F]** time = 0.81, size = 0, normalized size = 0.00

$$\text{integral}\left(\sqrt{-ax^2+a}\,\text{arcoth}(x), x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((-a*x^2+a)^(1/2)*arccoth(x),x, algorithm="fricas")
```

```
[Out] integral(sqrt(-a*x^2 + a)*arccoth(x), x)
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \sqrt{-ax^2+a}\,\text{arcoth}(x)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((-a*x^2+a)^(1/2)*arccoth(x),x, algorithm="giac")
```

```
[Out] integrate(sqrt(-a*x^2 + a)*arccoth(x), x)
```

**maple [A]** time = 0.66, size = 199, normalized size = 1.07

$$\frac{(\text{arccoth}(x)x+1)\sqrt{-(-1+x)(1+x)a}}{2} + \frac{\sqrt{-(-1+x)(1+x)a}\,\sqrt{\frac{-1+x}{1+x}}\,\text{arccoth}(x)\ln\left(1-\frac{1}{\sqrt{\frac{-1+x}{1+x}}}\right)}{-2+2x} + \frac{\sqrt{-(-1+x)(}}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((-a*x^2+a)^(1/2)*arccoth(x),x)
```

```
[Out] 1/2*(arccoth(x)*x+1)*(-(-1+x)*(1+x)*a)^(1/2)+1/2*(-(-1+x)*(1+x)*a)^(1/2)*((
-1+x)/(1+x))^(1/2)/(-1+x)*arccoth(x)*ln(1-1/((-1+x)/(1+x))^(1/2))+1/2*(-(-1
```

```
+x)*(1+x)*a)^(1/2)*((-1+x)/(1+x))^(1/2)/(-1+x)*polylog(2,1/((-1+x)/(1+x))^(
1/2))-1/2*(-(-1+x)*(1+x)*a)^(1/2)*((-1+x)/(1+x))^(1/2)/(-1+x)*arccoth(x)*ln
(1+1/((-1+x)/(1+x))^(1/2))-1/2*(-(-1+x)*(1+x)*a)^(1/2)*((-1+x)/(1+x))^(1/2)
/(-1+x)*polylog(2,-1/((-1+x)/(1+x))^(1/2))
```

**maxima [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \sqrt{-ax^2 + a}\, \operatorname{arcoth}(x)\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((-a*x^2+a)^(1/2)*arccoth(x),x, algorithm="maxima")
```

```
[Out] integrate(sqrt(-a*x^2 + a)*arccoth(x), x)
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.01

$$\int \operatorname{acoth}(x)\, \sqrt{a - a\, x^2}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(x)*(a - a*x^2)^(1/2),x)
```

```
[Out] int(acoth(x)*(a - a*x^2)^(1/2), x)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \sqrt{-a\,(x-1)\,(x+1)}\, \operatorname{acoth}(x)\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((-a*x**2+a)**(1/2)*acoth(x),x)
```

```
[Out] Integral(sqrt(-a*(x - 1)*(x + 1))*acoth(x), x)
```

# 3.49 $\int \frac{\coth^{-1}(x)}{\sqrt{a-ax^2}}\,dx$

**Optimal**. Leaf size=144

$$-\frac{i\sqrt{1-x^2}\,\text{Li}_2\left(-\frac{i\sqrt{1-x}}{\sqrt{x+1}}\right)}{\sqrt{a-ax^2}}+\frac{i\sqrt{1-x^2}\,\text{Li}_2\left(\frac{i\sqrt{1-x}}{\sqrt{x+1}}\right)}{\sqrt{a-ax^2}}-\frac{2\sqrt{1-x^2}\,\tan^{-1}\left(\frac{\sqrt{1-x}}{\sqrt{x+1}}\right)\coth^{-1}(x)}{\sqrt{a-ax^2}}$$

```
[Out] -2*arccoth(x)*arctan((1-x)^(1/2)/(1+x)^(1/2))*(-x^2+1)^(1/2)/(-a*x^2+a)^(1/
2)-I*polylog(2,-I*(1-x)^(1/2)/(1+x)^(1/2))*(-x^2+1)^(1/2)/(-a*x^2+a)^(1/2)+
I*polylog(2,I*(1-x)^(1/2)/(1+x)^(1/2))*(-x^2+1)^(1/2)/(-a*x^2+a)^(1/2)
```

**Rubi [A]** time = 0.05, antiderivative size = 144, normalized size of antiderivative = 1.00, number of steps used = 2, number of rules used = 2, integrand size = 15, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.133, Rules used = {5955, 5951}

$$-\frac{i\sqrt{1-x^2}\,\text{PolyLog}\left(2,-\frac{i\sqrt{1-x}}{\sqrt{x+1}}\right)}{\sqrt{a-ax^2}}+\frac{i\sqrt{1-x^2}\,\text{PolyLog}\left(2,\frac{i\sqrt{1-x}}{\sqrt{x+1}}\right)}{\sqrt{a-ax^2}}-\frac{2\sqrt{1-x^2}\,\tan^{-1}\left(\frac{\sqrt{1-x}}{\sqrt{x+1}}\right)\coth^{-1}(x)}{\sqrt{a-ax^2}}$$

Antiderivative was successfully verified.

```
[In] Int[ArcCoth[x]/Sqrt[a - a*x^2],x]
```

```
[Out] (-2*Sqrt[1 - x^2]*ArcCoth[x]*ArcTan[Sqrt[1 - x]/Sqrt[1 + x]])/Sqrt[a - a*x^
2] - (I*Sqrt[1 - x^2]*PolyLog[2, ((-I)*Sqrt[1 - x])/Sqrt[1 + x]])/Sqrt[a -
a*x^2] + (I*Sqrt[1 - x^2]*PolyLog[2, (I*Sqrt[1 - x])/Sqrt[1 + x]])/Sqrt[a -
 a*x^2]
```

Rule 5951

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))/Sqrt[(d_) + (e_.)*(x_)^2], x_Symbol
] :> Simp[(-2*(a + b*ArcCoth[c*x])*ArcTan[Sqrt[1 - c*x]/Sqrt[1 + c*x]])/(c*
Sqrt[d]), x] + (-Simp[(I*b*PolyLog[2, -((I*Sqrt[1 - c*x])/Sqrt[1 + c*x])])/
(c*Sqrt[d]), x] + Simp[(I*b*PolyLog[2, (I*Sqrt[1 - c*x])/Sqrt[1 + c*x]])/(c
*Sqrt[d]), x]) /; FreeQ[{a, b, c, d, e}, x] && EqQ[c^2*d + e, 0] && GtQ[d,
0]
```

Rule 5955

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)/Sqrt[(d_) + (e_.)*(x_)^2], x_
Symbol] :> Dist[Sqrt[1 - c^2*x^2]/Sqrt[d + e*x^2], Int[(a + b*ArcCoth[c*x])
^p/Sqrt[1 - c^2*x^2], x], x] /; FreeQ[{a, b, c, d, e}, x] && EqQ[c^2*d + e,
 0] && IGtQ[p, 0] &&  !GtQ[d, 0]
```

Rubi steps

$$\begin{aligned}\int \frac{\coth^{-1}(x)}{\sqrt{a-ax^2}}\,dx &= \frac{\sqrt{1-x^2}\int \frac{\coth^{-1}(x)}{\sqrt{1-x^2}}\,dx}{\sqrt{a-ax^2}}\\ &= -\frac{2\sqrt{1-x^2}\,\coth^{-1}(x)\tan^{-1}\left(\frac{\sqrt{1-x}}{\sqrt{1+x}}\right)}{\sqrt{a-ax^2}}-\frac{i\sqrt{1-x^2}\,\text{Li}_2\left(-\frac{i\sqrt{1-x}}{\sqrt{1+x}}\right)}{\sqrt{a-ax^2}}+\frac{i\sqrt{1-x^2}\,\text{Li}_2\left(\frac{i\sqrt{1-x}}{\sqrt{1+x}}\right)}{\sqrt{a-ax^2}}\end{aligned}$$

**Mathematica [A]** time = 0.12, size = 77, normalized size = 0.53

$$\frac{\sqrt{a-ax^2}\left(\text{Li}_2\left(-e^{-\coth^{-1}(x)}\right)-\text{Li}_2\left(e^{-\coth^{-1}(x)}\right)+\coth^{-1}(x)\left(\log\left(1-e^{-\coth^{-1}(x)}\right)-\log\left(e^{-\coth^{-1}(x)}+1\right)\right)\right)}{a\sqrt{1-\frac{1}{x^2}}\,x}$$

Warning: Unable to verify antiderivative.

```
[In] Integrate[ArcCoth[x]/Sqrt[a - a*x^2],x]
```

```
[Out] (Sqrt[a - a*x^2]*(ArcCoth[x]*(Log[1 - E^(-ArcCoth[x])] - Log[1 + E^(-ArcCot
h[x])]) + PolyLog[2, -E^(-ArcCoth[x])] - PolyLog[2, E^(-ArcCoth[x])]))/(a*S
qrt[1 - x^(-2)]*x)
```

**fricas [F]** time = 0.51, size = 0, normalized size = 0.00

$$\text{integral}\left(-\frac{\sqrt{-ax^2+a}\,\text{arcoth}(x)}{ax^2-a}, x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(x)/(-a*x^2+a)^(1/2),x, algorithm="fricas")
```

```
[Out] integral(-sqrt(-a*x^2 + a)*arccoth(x)/(a*x^2 - a), x)
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\text{arcoth}(x)}{\sqrt{-ax^2+a}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(x)/(-a*x^2+a)^(1/2),x, algorithm="giac")
```

```
[Out] integrate(arccoth(x)/sqrt(-a*x^2 + a), x)
```

**maple [A]** time = 0.56, size = 190, normalized size = 1.32

$$\frac{\ln\left(1-\frac{1}{\sqrt{\frac{-1+x}{1+x}}}\right)\text{arccoth}(x)\sqrt{\frac{-1+x}{1+x}}\,\sqrt{-(-1+x)(1+x)a}}{(-1+x)\,a}+\frac{\text{polylog}\left(2,\frac{1}{\sqrt{\frac{-1+x}{1+x}}}\right)\sqrt{\frac{-1+x}{1+x}}\,\sqrt{-(-1+x)(1+x)a}}{(-1+x)\,a}-\ln$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(arccoth(x)/(-a*x^2+a)^(1/2),x)
```

```
[Out] ln(1-1/((-1+x)/(1+x))^(1/2))*arccoth(x)*((-1+x)/(1+x))^(1/2)*(-(-1+x)*(1+x)
*a)^(1/2)/(-1+x)/a+polylog(2,1/((-1+x)/(1+x))^(1/2))*((-1+x)/(1+x))^(1/2)*(
-(-1+x)*(1+x)*a)^(1/2)/(-1+x)/a-ln(1+1/((-1+x)/(1+x))^(1/2))*arccoth(x)*((-
1+x)/(1+x))^(1/2)*(-(-1+x)*(1+x)*a)^(1/2)/(-1+x)/a-polylog(2,-1/((-1+x)/(1+
x))^(1/2))*((-1+x)/(1+x))^(1/2)*(-(-1+x)*(1+x)*a)^(1/2)/(-1+x)/a
```

**maxima [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\text{arcoth}(x)}{\sqrt{-ax^2+a}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(x)/(-a*x^2+a)^(1/2),x, algorithm="maxima")
```

```
[Out] integrate(arccoth(x)/sqrt(-a*x^2 + a), x)
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.01

$$\int \frac{\text{acoth}(x)}{\sqrt{a-a\,x^2}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(x)/(a - a*x^2)^(1/2),x)
```

```
[Out] int(acoth(x)/(a - a*x^2)^(1/2), x)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{acoth}(x)}{\sqrt{-a(x-1)(x+1)}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(x)/(-a*x**2+a)**(1/2),x)
```

```
[Out] Integral(acoth(x)/sqrt(-a*(x - 1)*(x + 1)), x)
```

# 3.50 $\int \frac{\coth^{-1}(x)}{(a-ax^2)^{3/2}} dx$

**Optimal**. Leaf size=37

$$\frac{x\coth^{-1}(x)}{a\sqrt{a-ax^2}}-\frac{1}{a\sqrt{a-ax^2}}$$

```
[Out] -1/a/(-a*x^2+a)^(1/2)+x*arccoth(x)/a/(-a*x^2+a)^(1/2)
```

**Rubi [A]** time = 0.03, antiderivative size = 37, normalized size of antiderivative = 1.00, number of steps used = 1, number of rules used = 1, integrand size = 15, $\frac{\text{number of rules}}{\text{integrand size}} = 0.067$, Rules used = {5959}

$$\frac{x\coth^{-1}(x)}{a\sqrt{a-ax^2}}-\frac{1}{a\sqrt{a-ax^2}}$$

Antiderivative was successfully verified.

```
[In] Int[ArcCoth[x]/(a - a*x^2)^(3/2),x]
```

```
[Out] -(1/(a*Sqrt[a - a*x^2])) + (x*ArcCoth[x])/(a*Sqrt[a - a*x^2])
```

Rule 5959

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))/((d_) + (e_.)*(x_)^2)^(3/2), x_Symb
ol] :> -Simp[b/(c*d*Sqrt[d + e*x^2]), x] + Simp[(x*(a + b*ArcCoth[c*x]))/(d
*Sqrt[d + e*x^2]), x] /; FreeQ[{a, b, c, d, e}, x] && EqQ[c^2*d + e, 0]
```

Rubi steps

$$\int \frac{\coth^{-1}(x)}{(a-ax^2)^{3/2}}\,dx = -\frac{1}{a\sqrt{a-ax^2}}+\frac{x\coth^{-1}(x)}{a\sqrt{a-ax^2}}$$

**Mathematica [A]** time = 0.05, size = 30, normalized size = 0.81

$$\frac{\sqrt{a-ax^2}\left(1-x\coth^{-1}(x)\right)}{a^2\left(x^2-1\right)}$$

Antiderivative was successfully verified.

```
[In] Integrate[ArcCoth[x]/(a - a*x^2)^(3/2),x]
```

```
[Out] (Sqrt[a - a*x^2]*(1 - x*ArcCoth[x]))/(a^2*(-1 + x^2))
```

**fricas [A]** time = 0.47, size = 41, normalized size = 1.11

$$-\frac{\sqrt{-ax^2+a}\left(x\log\left(\frac{x+1}{x-1}\right)-2\right)}{2\left(a^2x^2-a^2\right)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(x)/(-a*x^2+a)^(3/2),x, algorithm="fricas")
```

```
[Out] -1/2*sqrt(-a*x^2 + a)*(x*log((x + 1)/(x - 1)) - 2)/(a^2*x^2 - a^2)
```

**giac** [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{arcoth}(x)}{\left(-ax^2+a\right)^{\frac{3}{2}}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(x)/(-a*x^2+a)^(3/2),x, algorithm="giac")
[Out] integrate(arccoth(x)/(-a*x^2 + a)^(3/2), x)
```

**maple** [A] time = 0.48, size = 52, normalized size = 1.41

$$-\frac{(\operatorname{arccoth}(x)-1)\sqrt{-(-1+x)(1+x)a}}{2(-1+x)a^2}-\frac{(\operatorname{arccoth}(x)+1)\sqrt{-(-1+x)(1+x)a}}{2(1+x)a^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(arccoth(x)/(-a*x^2+a)^(3/2),x)
[Out] -1/2*(arccoth(x)-1)*(-(-1+x)*(1+x)*a)^(1/2)/(-1+x)/a^2-1/2*(arccoth(x)+1)*(
-(-1+x)*(1+x)*a)^(1/2)/(1+x)/a^2
```

**maxima** [A] time = 0.41, size = 63, normalized size = 1.70

$$\frac{x\operatorname{arcoth}(x)}{\sqrt{-ax^2+a}\,a}-\frac{\frac{\sqrt{-ax^2+a}}{ax+a}-\frac{\sqrt{-ax^2+a}}{ax-a}}{2a}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(x)/(-a*x^2+a)^(3/2),x, algorithm="maxima")
[Out] x*arccoth(x)/(sqrt(-a*x^2 + a)*a) - 1/2*(sqrt(-a*x^2 + a)/(a*x + a) - sqrt(
-a*x^2 + a)/(a*x - a))/a
```

**mupad** [F] time = 0.00, size = -1, normalized size = -0.03

$$\int \frac{\operatorname{acoth}(x)}{\left(a-a\,x^2\right)^{3/2}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(x)/(a - a*x^2)^(3/2),x)
[Out] int(acoth(x)/(a - a*x^2)^(3/2), x)
```

**sympy** [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{acoth}(x)}{\left(-a(x-1)(x+1)\right)^{\frac{3}{2}}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(x)/(-a*x**2+a)**(3/2),x)
[Out] Integral(acoth(x)/(-a*(x - 1)*(x + 1))**(3/2), x)
```

## 3.51 $\int \frac{\coth^{-1}(x)}{\left(a-ax^2\right)^{5/2}} \, dx$

**Optimal**. Leaf size=83

$$-\frac{2}{3a^2\sqrt{a-ax^2}}+\frac{2x\coth^{-1}(x)}{3a^2\sqrt{a-ax^2}}-\frac{1}{9a\left(a-ax^2\right)^{3/2}}+\frac{x\coth^{-1}(x)}{3a\left(a-ax^2\right)^{3/2}}$$

```
[Out] -1/9/a/(-a*x^2+a)^(3/2)+1/3*x*arccoth(x)/a/(-a*x^2+a)^(3/2)-2/3/a^2/(-a*x^2
+a)^(1/2)+2/3*x*arccoth(x)/a^2/(-a*x^2+a)^(1/2)
```

**Rubi** [A] time = 0.05, antiderivative size = 83, normalized size of antiderivative = 1.00, number of steps used = 2, number of rules used = 2, integrand size = 15, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.133, Rules used = {5961, 5959}

$$-\frac{2}{3a^2\sqrt{a-ax^2}}+\frac{2x\coth^{-1}(x)}{3a^2\sqrt{a-ax^2}}-\frac{1}{9a\left(a-ax^2\right)^{3/2}}+\frac{x\coth^{-1}(x)}{3a\left(a-ax^2\right)^{3/2}}$$

Antiderivative was successfully verified.

```
[In] Int[ArcCoth[x]/(a - a*x^2)^(5/2),x]
```

```
[Out] -1/(9*a*(a - a*x^2)^(3/2)) - 2/(3*a^2*Sqrt[a - a*x^2]) + (x*ArcCoth[x])/(3*
a*(a - a*x^2)^(3/2)) + (2*x*ArcCoth[x])/(3*a^2*Sqrt[a - a*x^2])
```

Rule 5959

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))/((d_) + (e_.)*(x_)^2)^(3/2), x_Symb
ol] :> -Simp[b/(c*d*Sqrt[d + e*x^2]), x] + Simp[(x*(a + b*ArcCoth[c*x]))/(d
*Sqrt[d + e*x^2]), x] /; FreeQ[{a, b, c, d, e}, x] && EqQ[c^2*d + e, 0]
```

Rule 5961

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))*((d_) + (e_.)*(x_)^2)^(q_), x_Symbo
l] :> -Simp[(b*(d + e*x^2)^(q + 1))/(4*c*d*(q + 1)^2), x] + (Dist[(2*q + 3)
/(2*d*(q + 1)), Int[(d + e*x^2)^(q + 1)*(a + b*ArcCoth[c*x]), x], x] - Simp
[(x*(d + e*x^2)^(q + 1)*(a + b*ArcCoth[c*x]))/(2*d*(q + 1)), x]) /; FreeQ[{
a, b, c, d, e}, x] && EqQ[c^2*d + e, 0] && LtQ[q, -1] && NeQ[q, -3/2]
```

Rubi steps

$$\begin{aligned}\int \frac{\coth^{-1}(x)}{\left(a-ax^2\right)^{5/2}} \, dx &= -\frac{1}{9a\left(a-ax^2\right)^{3/2}}+\frac{x\coth^{-1}(x)}{3a\left(a-ax^2\right)^{3/2}}+\frac{2\int \frac{\coth^{-1}(x)}{\left(a-ax^2\right)^{3/2}} \, dx}{3a}\\ &= -\frac{1}{9a\left(a-ax^2\right)^{3/2}}-\frac{2}{3a^2\sqrt{a-ax^2}}+\frac{x\coth^{-1}(x)}{3a\left(a-ax^2\right)^{3/2}}+\frac{2x\coth^{-1}(x)}{3a^2\sqrt{a-ax^2}}\end{aligned}$$

**Mathematica** [A] time = 0.05, size = 45, normalized size = 0.54

$$-\frac{\sqrt{a-ax^2}\left(\left(6x^3-9x\right)\coth^{-1}(x)-6x^2+7\right)}{9a^3\left(x^2-1\right)^2}$$

Antiderivative was successfully verified.

```
[In] Integrate[ArcCoth[x]/(a - a*x^2)^(5/2),x]
```

```
[Out] -1/9*(Sqrt[a - a*x^2]*(7 - 6*x^2 + (-9*x + 6*x^3)*ArcCoth[x]))/(a^3*(-1 + x
^2)^2)
```

**fricas [A]** time = 0.47, size = 61, normalized size = 0.73

$$\frac{\sqrt{-ax^2+a}\left(12\,x^2-3\left(2\,x^3-3\,x\right)\log\left(\frac{x+1}{x-1}\right)-14\right)}{18\left(a^3x^4-2\,a^3x^2+a^3\right)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(x)/(-a*x^2+a)^(5/2),x, algorithm="fricas")
```

```
[Out] 1/18*sqrt(-a*x^2 + a)*(12*x^2 - 3*(2*x^3 - 3*x)*log((x + 1)/(x - 1)) - 14)/
(a^3*x^4 - 2*a^3*x^2 + a^3)
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int\frac{\operatorname{arcoth}(x)}{\left(-ax^2+a\right)^{\frac{5}{2}}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(x)/(-a*x^2+a)^(5/2),x, algorithm="giac")
```

```
[Out] integrate(arccoth(x)/(-a*x^2 + a)^(5/2), x)
```

**maple [A]** time = 0.51, size = 112, normalized size = 1.35

$$\frac{(1+x)(-1+3\,\mathrm{arccoth}(x))\sqrt{-(-1+x)(1+x)a}}{72(-1+x)^2a^3}-\frac{3(\mathrm{arccoth}(x)-1)\sqrt{-(-1+x)(1+x)a}}{8(-1+x)a^3}-\frac{3(\mathrm{arccoth}(x)+1)\sqrt{}}{8(1+}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(arccoth(x)/(-a*x^2+a)^(5/2),x)
```

```
[Out] 1/72*(1+x)*(-1+3*arccoth(x))*(-(-1+x)*(1+x)*a)^(1/2)/(-1+x)^2/a^3-3/8*(arcc
oth(x)-1)*(-(-1+x)*(1+x)*a)^(1/2)/(-1+x)/a^3-3/8*(arccoth(x)+1)*(-(-1+x)*(1
+x)*a)^(1/2)/(1+x)/a^3+1/72*(1+3*arccoth(x))*(-1+x)*(-(-1+x)*(1+x)*a)^(1/2)
/(1+x)^2/a^3
```

**maxima [A]** time = 0.32, size = 67, normalized size = 0.81

$$\frac{1}{3}\left(\frac{2\,x}{\sqrt{-ax^2+a}\,a^2}+\frac{x}{\left(-ax^2+a\right)^{\frac{3}{2}}a}\right)\operatorname{arcoth}(x)-\frac{2}{3\sqrt{-ax^2+a}\,a^2}-\frac{1}{9\left(-ax^2+a\right)^{\frac{3}{2}}a}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(x)/(-a*x^2+a)^(5/2),x, algorithm="maxima")
```

```
[Out] 1/3*(2*x/(sqrt(-a*x^2 + a)*a^2) + x/((-a*x^2 + a)^(3/2)*a))*arccoth(x) - 2/
3/(sqrt(-a*x^2 + a)*a^2) - 1/9/((-a*x^2 + a)^(3/2)*a)
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.01

$$\int\frac{\mathrm{acoth}(x)}{\left(a-a\,x^2\right)^{5/2}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(x)/(a - a*x^2)^(5/2),x)
```

```
[Out] int(acoth(x)/(a - a*x^2)^(5/2), x)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{acoth}(x)}{(-a(x-1)(x+1))^{\frac{5}{2}}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(x)/(-a*x**2+a)**(5/2),x)
```

```
[Out] Integral(acoth(x)/(-a*(x - 1)*(x + 1))**(5/2), x)
```

## 3.52 $\int \frac{\coth^{-1}(x)}{(a-ax^2)^{7/2}}\,dx$

**Optimal**. Leaf size=124

$$-\frac{8}{15a^3\sqrt{a-ax^2}}+\frac{8x\coth^{-1}(x)}{15a^3\sqrt{a-ax^2}}-\frac{4}{45a^2\left(a-ax^2\right)^{3/2}}+\frac{4x\coth^{-1}(x)}{15a^2\left(a-ax^2\right)^{3/2}}-\frac{1}{25a\left(a-ax^2\right)^{5/2}}+\frac{x\coth^{-1}(x)}{5a\left(a-ax^2\right)^{5/2}}$$

```
[Out] -1/25/a/(-a*x^2+a)^(5/2)-4/45/a^2/(-a*x^2+a)^(3/2)+1/5*x*arccoth(x)/a/(-a*x
^2+a)^(5/2)+4/15*x*arccoth(x)/a^2/(-a*x^2+a)^(3/2)-8/15/a^3/(-a*x^2+a)^(1/2
)+8/15*x*arccoth(x)/a^3/(-a*x^2+a)^(1/2)
```

**Rubi [A]** time = 0.08, antiderivative size = 124, normalized size of antiderivative = 1.00, number of steps used = 3, number of rules used = 2, integrand size = 15, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.133, Rules used = {5961, 5959}

$$-\frac{8}{15a^3\sqrt{a-ax^2}}-\frac{4}{45a^2\left(a-ax^2\right)^{3/2}}+\frac{8x\coth^{-1}(x)}{15a^3\sqrt{a-ax^2}}+\frac{4x\coth^{-1}(x)}{15a^2\left(a-ax^2\right)^{3/2}}-\frac{1}{25a\left(a-ax^2\right)^{5/2}}+\frac{x\coth^{-1}(x)}{5a\left(a-ax^2\right)^{5/2}}$$

Antiderivative was successfully verified.

```
[In] Int[ArcCoth[x]/(a - a*x^2)^(7/2),x]
```

```
[Out] -1/(25*a*(a - a*x^2)^(5/2)) - 4/(45*a^2*(a - a*x^2)^(3/2)) - 8/(15*a^3*Sqrt
[a - a*x^2]) + (x*ArcCoth[x])/(5*a*(a - a*x^2)^(5/2)) + (4*x*ArcCoth[x])/(1
5*a^2*(a - a*x^2)^(3/2)) + (8*x*ArcCoth[x])/(15*a^3*Sqrt[a - a*x^2])
```

Rule 5959

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))/((d_) + (e_.)*(x_)^2)^(3/2), x_Symb
ol] :> -Simp[b/(c*d*Sqrt[d + e*x^2]), x] + Simp[(x*(a + b*ArcCoth[c*x]))/(d
*Sqrt[d + e*x^2]), x] /; FreeQ[{a, b, c, d, e}, x] && EqQ[c^2*d + e, 0]
```

Rule 5961

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))*((d_) + (e_.)*(x_)^2)^(q_), x_Symbo
l] :> -Simp[(b*(d + e*x^2)^(q + 1))/(4*c*d*(q + 1)^2), x] + (Dist[(2*q + 3)
/(2*d*(q + 1)), Int[(d + e*x^2)^(q + 1)*(a + b*ArcCoth[c*x]), x], x] - Simp
[(x*(d + e*x^2)^(q + 1)*(a + b*ArcCoth[c*x]))/(2*d*(q + 1)), x]) /; FreeQ[{
a, b, c, d, e}, x] && EqQ[c^2*d + e, 0] && LtQ[q, -1] && NeQ[q, -3/2]
```

Rubi steps

$$\int \frac{\coth^{-1}(x)}{\left(a-ax^2\right)^{7/2}}\,dx=-\frac{1}{25a\left(a-ax^2\right)^{5/2}}+\frac{x\coth^{-1}(x)}{5a\left(a-ax^2\right)^{5/2}}+\frac{4\int \frac{\coth^{-1}(x)}{\left(a-ax^2\right)^{5/2}}\,dx}{5a}$$

$$=-\frac{1}{25a\left(a-ax^2\right)^{5/2}}-\frac{4}{45a^2\left(a-ax^2\right)^{3/2}}+\frac{x\coth^{-1}(x)}{5a\left(a-ax^2\right)^{5/2}}+\frac{4x\coth^{-1}(x)}{15a^2\left(a-ax^2\right)^{3/2}}+\frac{8\int \frac{\coth^{-1}(x)}{\left(a-ax^2\right)^{3/2}}}{15a^2}$$

$$=-\frac{1}{25a\left(a-ax^2\right)^{5/2}}-\frac{4}{45a^2\left(a-ax^2\right)^{3/2}}-\frac{8}{15a^3\sqrt{a-ax^2}}+\frac{x\coth^{-1}(x)}{5a\left(a-ax^2\right)^{5/2}}+\frac{4x\coth^{-1}(x)}{15a^2\left(a-ax^2\right)^{3/}}$$

**Mathematica [A]** time = 0.06, size = 55, normalized size = 0.44

$$\frac{\sqrt{a-ax^2}\left(120x^4-260x^2-15\left(8x^4-20x^2+15\right)x\coth^{-1}(x)+149\right)}{225a^4\left(x^2-1\right)^3}$$

Antiderivative was successfully verified.

```
[In] Integrate[ArcCoth[x]/(a - a*x^2)^(7/2),x]
```

```
[Out] (Sqrt[a - a*x^2]*(149 - 260*x^2 + 120*x^4 - 15*x*(15 - 20*x^2 + 8*x^4)*ArcC
oth[x]))/(225*a^4*(-1 + x^2)^3)
```

**fricas [A]** time = 0.55, size = 81, normalized size = 0.65

$$\frac{\left(240\,x^4-520\,x^2-15\left(8\,x^5-20\,x^3+15\,x\right)\log\left(\frac{x+1}{x-1}\right)+298\right)\sqrt{-ax^2+a}}{450\left(a^4x^6-3\,a^4x^4+3\,a^4x^2-a^4\right)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(x)/(-a*x^2+a)^(7/2),x, algorithm="fricas")
```

```
[Out] 1/450*(240*x^4 - 520*x^2 - 15*(8*x^5 - 20*x^3 + 15*x)*log((x + 1)/(x - 1))
+ 298)*sqrt(-a*x^2 + a)/(a^4*x^6 - 3*a^4*x^4 + 3*a^4*x^2 - a^4)
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int\frac{\operatorname{arcoth}(x)}{\left(-ax^2+a\right)^{\frac{7}{2}}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(x)/(-a*x^2+a)^(7/2),x, algorithm="giac")
```

```
[Out] integrate(arccoth(x)/(-a*x^2 + a)^(7/2), x)
```

**maple [A]** time = 0.52, size = 176, normalized size = 1.42

$$-\frac{(1+x)^2\,(-1+5\,\mathrm{arccoth}(x))\,\sqrt{-(-1+x)\,(1+x)\,a}}{800\,(-1+x)^3\,a^4}+\frac{5\,(1+x)\,(-1+3\,\mathrm{arccoth}(x))\,\sqrt{-(-1+x)\,(1+x)\,a}}{288\,(-1+x)^2\,a^4}-\frac{5\,(a$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(arccoth(x)/(-a*x^2+a)^(7/2),x)
```

```
[Out] -1/800*(1+x)^2*(-1+5*arccoth(x))*(-(-1+x)*(1+x)*a)^(1/2)/(-1+x)^3/a^4+5/288
*(1+x)*(-1+3*arccoth(x))*(-(-1+x)*(1+x)*a)^(1/2)/(-1+x)^2/a^4-5/16*(arccoth
(x)-1)*(-(-1+x)*(1+x)*a)^(1/2)/(-1+x)/a^4-5/16*(arccoth(x)+1)*(-(-1+x)*(1+x
)*a)^(1/2)/(1+x)/a^4+5/288*(1+3*arccoth(x))*(-1+x)*(-(-1+x)*(1+x)*a)^(1/2)/
(1+x)^2/a^4-1/800*(1+5*arccoth(x))*(-1+x)^2*(-(-1+x)*(1+x)*a)^(1/2)/(1+x)^3
/a^4
```

**maxima [A]** time = 0.32, size = 99, normalized size = 0.80

$$\frac{1}{15}\left(\frac{8\,x}{\sqrt{-ax^2+a}\,a^3}+\frac{4\,x}{\left(-ax^2+a\right)^{\frac{3}{2}}a^2}+\frac{3\,x}{\left(-ax^2+a\right)^{\frac{5}{2}}a}\right)\mathrm{arcoth}(x)-\frac{8}{15\,\sqrt{-ax^2+a}\,a^3}-\frac{4}{45\left(-ax^2+a\right)^{\frac{3}{2}}a^2}-\frac{}{25\,(-a}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(x)/(-a*x^2+a)^(7/2),x, algorithm="maxima")
```

```
[Out] 1/15*(8*x/(sqrt(-a*x^2 + a)*a^3) + 4*x/((-a*x^2 + a)^(3/2)*a^2) + 3*x/((-a*
x^2 + a)^(5/2)*a))*arccoth(x) - 8/15/(sqrt(-a*x^2 + a)*a^3) - 4/45/((-a*x^2
 + a)^(3/2)*a^2) - 1/25/((-a*x^2 + a)^(5/2)*a)
```

**mupad** **[F]** time = 0.00, size = -1, normalized size = -0.01

$$\int \frac{\mathrm{acoth}(x)}{\left(a-a\,x^2\right)^{7/2}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(x)/(a - a*x^2)^(7/2),x)
```

```
[Out] int(acoth(x)/(a - a*x^2)^(7/2), x)
```

**sympy** **[F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\mathrm{acoth}\,(x)}{(-a\,(x-1)\,(x+1))^{\frac{7}{2}}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(x)/(-a*x**2+a)**(7/2),x)
```

```
[Out] Integral(acoth(x)/(-a*(x - 1)*(x + 1))**(7/2), x)
```

## 3.53 $\int \frac{1}{(1-x^2)\coth^{-1}(x)}\,dx$

**Optimal**. Leaf size=3

$$\log\left(\coth^{-1}(x)\right)$$

```
[Out] ln(arccoth(x))
```

**Rubi [A]** time = 0.02, antiderivative size = 3, normalized size of antiderivative = 1.00, number of steps used = 1, number of rules used = 1, integrand size = 14, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.071, Rules used = {5947}

$$\log\left(\coth^{-1}(x)\right)$$

Antiderivative was successfully verified.

```
[In] Int[1/((1 - x^2)*ArcCoth[x]),x]
[Out] Log[ArcCoth[x]]
```

Rule 5947

```
Int[1/(((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))*((d_) + (e_.)*(x_)^2)), x_Symbol
] :> Simp[Log[RemoveContent[a + b*ArcCoth[c*x], x]]/(b*c*d), x] /; FreeQ[{a
, b, c, d, e}, x] && EqQ[c^2*d + e, 0]
```

Rubi steps

$$\int \frac{1}{(1-x^2)\coth^{-1}(x)}\,dx = \log\left(\coth^{-1}(x)\right)$$

**Mathematica [A]** time = 0.03, size = 3, normalized size = 1.00

$$\log\left(\coth^{-1}(x)\right)$$

Antiderivative was successfully verified.

```
[In] Integrate[1/((1 - x^2)*ArcCoth[x]),x]
[Out] Log[ArcCoth[x]]
```

**fricas [B]** time = 0.47, size = 11, normalized size = 3.67

$$\log\left(\log\left(\frac{x+1}{x-1}\right)\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(-x^2+1)/arccoth(x),x, algorithm="fricas")
[Out] log(log((x + 1)/(x - 1)))
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int -\frac{1}{(x^2-1)\,\mathrm{arcoth}(x)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(-x^2+1)/arccoth(x),x, algorithm="giac")
```

```
[Out] integrate(-1/((x^2 - 1)*arccoth(x)), x)
```

**maple** [A] time = 0.06, size = 4, normalized size = 1.33

$$\ln(\operatorname{arccoth}(x))$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(1/(-x^2+1)/arccoth(x),x)
[Out] ln(arccoth(x))
```

**maxima** [A] time = 0.30, size = 3, normalized size = 1.00

$$\log(\operatorname{arcoth}(x))$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(-x^2+1)/arccoth(x),x, algorithm="maxima")
[Out] log(arccoth(x))
```

**mupad** [B] time = 0.30, size = 3, normalized size = 1.00

$$\ln(\operatorname{acoth}(x))$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(-1/(acoth(x)*(x^2 - 1)),x)
[Out] log(acoth(x))
```

**sympy** [A] time = 0.28, size = 3, normalized size = 1.00

$$\log(\operatorname{acoth}(x))$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(-x**2+1)/acoth(x),x)
[Out] log(acoth(x))
```

## 3.54 $\int \frac{\coth^{-1}(x)^n}{1-x^2} \, dx$

**Optimal**. Leaf size=12

$$\frac{\coth^{-1}(x)^{n+1}}{n+1}$$

[Out] arccoth(x)^(1+n)/(1+n)

**Rubi [A]** time = 0.03, antiderivative size = 12, normalized size of antiderivative = 1.00, number of steps used = 1, number of rules used = 1, integrand size = 14, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.071, Rules used = {5949}

$$\frac{\coth^{-1}(x)^{n+1}}{n+1}$$

Antiderivative was successfully verified.

[In] Int[ArcCoth[x]^n/(1 - x^2),x]

[Out] ArcCoth[x]^(1 + n)/(1 + n)

Rule 5949

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)/((d_) + (e_.)*(x_)^2), x_Symb
ol] :> Simp[(a + b*ArcCoth[c*x])^(p + 1)/(b*c*d*(p + 1)), x] /; FreeQ[{a, b
, c, d, e, p}, x] && EqQ[c^2*d + e, 0] && NeQ[p, -1]
```

Rubi steps

$$\int \frac{\coth^{-1}(x)^n}{1-x^2} \, dx = \frac{\coth^{-1}(x)^{1+n}}{1+n}$$

**Mathematica [A]** time = 0.01, size = 12, normalized size = 1.00

$$\frac{\coth^{-1}(x)^{n+1}}{n+1}$$

Antiderivative was successfully verified.

[In] Integrate[ArcCoth[x]^n/(1 - x^2),x]

[Out] ArcCoth[x]^(1 + n)/(1 + n)

**fricas [B]** time = 0.60, size = 62, normalized size = 5.17

$$\frac{\cosh\left(n\log\left(\frac{1}{2}\,\log\left(\frac{x+1}{x-1}\right)\right)\right)\log\left(\frac{x+1}{x-1}\right) + \log\left(\frac{x+1}{x-1}\right)\sinh\left(n\log\left(\frac{1}{2}\,\log\left(\frac{x+1}{x-1}\right)\right)\right)}{2\,(n+1)}$$

Verification of antiderivative is not currently implemented for this CAS.

[In] integrate(arccoth(x)^n/(-x^2+1),x, algorithm="fricas")

[Out] 1/2*(cosh(n*log(1/2*log((x + 1)/(x - 1))))*log((x + 1)/(x - 1)) + log((x + 1)/(x - 1))*sinh(n*log(1/2*log((x + 1)/(x - 1)))))/(n + 1)

**giac [A]** time = 0.12, size = 1, normalized size = 0.08

$$+\infty$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(x)^n/(-x^2+1),x, algorithm="giac")
```

```
[Out] +Infinity
```

**maple** [A] time = 0.06, size = 13, normalized size = 1.08

$$\frac{\operatorname{arccoth}(x)^{1+n}}{1+n}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(arccoth(x)^n/(-x^2+1),x)
```

```
[Out] arccoth(x)^(1+n)/(1+n)
```

**maxima** [A] time = 0.30, size = 12, normalized size = 1.00

$$\frac{\operatorname{arcoth}(x)^{n+1}}{n+1}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(x)^n/(-x^2+1),x, algorithm="maxima")
```

```
[Out] arccoth(x)^(n + 1)/(n + 1)
```

**mupad** [B] time = 1.36, size = 22, normalized size = 1.83

$$\begin{cases} \ln\left(\operatorname{acoth}(x)\right) & \text{if } n = -1 \\ \frac{\operatorname{acoth}(x)^{n+1}}{n+1} & \text{if } n \neq -1 \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(-acoth(x)^n/(x^2 - 1),x)
```

```
[Out] piecewise(n == -1, log(acoth(x)), n ~= -1, acoth(x)^(n + 1)/(n + 1))
```

**sympy** [A] time = 1.72, size = 15, normalized size = 1.25

$$\begin{cases} \frac{\operatorname{acoth}^{n+1}(x)}{n+1} & \text{for } n \neq -1 \\ \log\left(\operatorname{acoth}(x)\right) & \text{otherwise} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(x)**n/(-x**2+1),x)
```

```
[Out] Piecewise((acoth(x)**(n + 1)/(n + 1), Ne(n, -1)), (log(acoth(x)), True))
```

# 3.55 $\int \frac{\coth^{-1}(x)^2}{\left(1-x^2\right)^2} dx$

**Optimal**. Leaf size=62

$$\frac{x}{4\left(1-x^2\right)}+\frac{x\coth^{-1}(x)^2}{2\left(1-x^2\right)}-\frac{\coth^{-1}(x)}{2\left(1-x^2\right)}+\frac{1}{4}\tanh^{-1}(x)+\frac{1}{6}\coth^{-1}(x)^3$$

```
[Out] 1/4*x/(-x^2+1)-1/2*arccoth(x)/(-x^2+1)+1/2*x*arccoth(x)^2/(-x^2+1)+1/6*arcc
oth(x)^3+1/4*arctanh(x)
```

**Rubi [A]** time = 0.05, antiderivative size = 62, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 4, integrand size = 14, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.286, Rules used = {5957, 5995, 199, 206}

$$\frac{x}{4\left(1-x^2\right)}+\frac{x\coth^{-1}(x)^2}{2\left(1-x^2\right)}-\frac{\coth^{-1}(x)}{2\left(1-x^2\right)}+\frac{1}{4}\tanh^{-1}(x)+\frac{1}{6}\coth^{-1}(x)^3$$

Antiderivative was successfully verified.

```
[In] Int[ArcCoth[x]^2/(1 - x^2)^2,x]
```

```
[Out] x/(4*(1 - x^2)) - ArcCoth[x]/(2*(1 - x^2)) + (x*ArcCoth[x]^2)/(2*(1 - x^2))
 + ArcCoth[x]^3/6 + ArcTanh[x]/4
```

Rule 199

```
Int[((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> -Simp[(x*(a + b*x^n)^(p + 1
))/(a*n*(p + 1)), x] + Dist[(n*(p + 1) + 1)/(a*n*(p + 1)), Int[(a + b*x^n)^
(p + 1), x], x] /; FreeQ[{a, b}, x] && IGtQ[n, 0] && LtQ[p, -1] && (Integer
Q[2*p] || (n == 2 && IntegerQ[4*p]) || (n == 2 && IntegerQ[3*p]) || Denomin
ator[p + 1/n] < Denominator[p])
```

Rule 206

```
Int[((a_) + (b_.)*(x_)^2)^(-1), x_Symbol] :> Simp[(1*ArcTanh[(Rt[-b, 2]*x)/
Rt[a, 2]])/(Rt[a, 2]*Rt[-b, 2]), x] /; FreeQ[{a, b}, x] && NegQ[a/b] && (Gt
Q[a, 0] || LtQ[b, 0])
```

Rule 5957

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)/((d_) + (e_.)*(x_)^2)^2, x_Sy
mbol] :> Simp[(x*(a + b*ArcCoth[c*x])^p)/(2*d*(d + e*x^2)), x] + (-Dist[(b*
c*p)/2, Int[(x*(a + b*ArcCoth[c*x])^(p - 1))/(d + e*x^2)^2, x], x] + Simp[(
a + b*ArcCoth[c*x])^(p + 1)/(2*b*c*d^2*(p + 1)), x]) /; FreeQ[{a, b, c, d,
e}, x] && EqQ[c^2*d + e, 0] && GtQ[p, 0]
```

Rule 5995

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)*(x_)*((d_) + (e_.)*(x_)^2)^(q
_.), x_Symbol] :> Simp[((d + e*x^2)^(q + 1)*(a + b*ArcCoth[c*x])^p)/(2*e*(q
 + 1)), x] + Dist[(b*p)/(2*c*(q + 1)), Int[(d + e*x^2)^q*(a + b*ArcCoth[c*x
])^(p - 1), x], x] /; FreeQ[{a, b, c, d, e, q}, x] && EqQ[c^2*d + e, 0] &&
GtQ[p, 0] && NeQ[q, -1]
```

Rubi steps

$$\begin{aligned}\int \frac{\coth^{-1}(x)^2}{\left(1-x^2\right)^2}\,dx &= \frac{x\coth^{-1}(x)^2}{2\left(1-x^2\right)} + \frac{1}{6}\coth^{-1}(x)^3 - \int \frac{x\coth^{-1}(x)}{\left(1-x^2\right)^2}\,dx \\ &= -\frac{\coth^{-1}(x)}{2\left(1-x^2\right)} + \frac{x\coth^{-1}(x)^2}{2\left(1-x^2\right)} + \frac{1}{6}\coth^{-1}(x)^3 + \frac{1}{2}\int \frac{1}{\left(1-x^2\right)^2}\,dx \\ &= \frac{x}{4\left(1-x^2\right)} - \frac{\coth^{-1}(x)}{2\left(1-x^2\right)} + \frac{x\coth^{-1}(x)^2}{2\left(1-x^2\right)} + \frac{1}{6}\coth^{-1}(x)^3 + \frac{1}{4}\int \frac{1}{1-x^2}\,dx \\ &= \frac{x}{4\left(1-x^2\right)} - \frac{\coth^{-1}(x)}{2\left(1-x^2\right)} + \frac{x\coth^{-1}(x)^2}{2\left(1-x^2\right)} + \frac{1}{6}\coth^{-1}(x)^3 + \frac{1}{4}\tanh^{-1}(x)\end{aligned}$$

**Mathematica [A]** time = 0.07, size = 61, normalized size = 0.98

$$\frac{-3\left(x^2-1\right)\log(1-x)+3\left(x^2-1\right)\log(x+1)+4\left(x^2-1\right)\coth^{-1}(x)^3-6x-12x\coth^{-1}(x)^2+12\coth^{-1}(x)}{24\left(x^2-1\right)}$$

Antiderivative was successfully verified.

```
[In] Integrate[ArcCoth[x]^2/(1 - x^2)^2,x]
```

```
[Out] (-6*x + 12*ArcCoth[x] - 12*x*ArcCoth[x]^2 + 4*(-1 + x^2)*ArcCoth[x]^3 - 3*(
-1 + x^2)*Log[1 - x] + 3*(-1 + x^2)*Log[1 + x])/(24*(-1 + x^2))
```

**fricas [A]** time = 0.53, size = 63, normalized size = 1.02

$$\frac{\left(x^2-1\right)\log\left(\frac{x+1}{x-1}\right)^3-6\,x\log\left(\frac{x+1}{x-1}\right)^2+6\left(x^2+1\right)\log\left(\frac{x+1}{x-1}\right)-12\,x}{48\left(x^2-1\right)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(x)^2/(-x^2+1)^2,x, algorithm="fricas")
```

```
[Out] 1/48*((x^2 - 1)*log((x + 1)/(x - 1))^3 - 6*x*log((x + 1)/(x - 1))^2 + 6*(x^
2 + 1)*log((x + 1)/(x - 1)) - 12*x)/(x^2 - 1)
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{arcoth}(x)^2}{\left(x^2-1\right)^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(x)^2/(-x^2+1)^2,x, algorithm="giac")
```

```
[Out] integrate(arccoth(x)^2/(x^2 - 1)^2, x)
```

**maple [C]** time = 2.00, size = 707, normalized size = 11.40

result too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(arccoth(x)^2/(-x^2+1)^2,x)
```

```
[Out] -1/4*arccoth(x)^2/(-1+x)-1/4*arccoth(x)^2*ln(-1+x)-1/4*arccoth(x)^2/(1+x)+1
/4*arccoth(x)^2*ln(1+x)+1/4*arccoth(x)^2*ln((-1+x)/(1+x))+1/24*(-3*I*arccot
```

```
h(x)^2*Pi*csgn(I/((1+x)/(-1+x)-1))*csgn(I*(1+x)/(-1+x)/((1+x)/(-1+x)-1))^2*
x^2+3*I*arccoth(x)^2*Pi*csgn(I*(1+x)/(-1+x))*csgn(I/((-1+x)/(1+x))^(1/2))^2
*x^2+3*I*csgn(I*(1+x)/(-1+x)/((1+x)/(-1+x)-1))^2*csgn(I/((1+x)/(-1+x)-1))*a
rccoth(x)^2*Pi+3*I*arccoth(x)^2*Pi*csgn(I*(1+x)/(-1+x))*csgn(I/((1+x)/(-1+x
)-1))*csgn(I*(1+x)/(-1+x)/((1+x)/(-1+x)-1))*x^2+3*I*arccoth(x)^2*Pi*csgn(I*
(1+x)/(-1+x))^3*x^2-3*I*csgn(I*(1+x)/(-1+x)/((1+x)/(-1+x)-1))*csgn(I/((1+x)
/(-1+x)-1))*csgn(I*(1+x)/(-1+x))*arccoth(x)^2*Pi+6*I*csgn(I*(1+x)/(-1+x))^2
*csgn(I/((-1+x)/(1+x))^(1/2))*arccoth(x)^2*Pi+3*I*csgn(I*(1+x)/(-1+x)/((1+x
)/(-1+x)-1))^2*csgn(I*(1+x)/(-1+x))*arccoth(x)^2*Pi+3*I*arccoth(x)^2*Pi*csg
n(I*(1+x)/(-1+x)/((1+x)/(-1+x)-1))^3*x^2-3*I*csgn(I*(1+x)/(-1+x))*csgn(I/((
-1+x)/(1+x))^(1/2))^2*arccoth(x)^2*Pi-6*I*arccoth(x)^2*Pi*csgn(I*(1+x)/(-1+
x))^2*csgn(I/((-1+x)/(1+x))^(1/2))*x^2-3*I*csgn(I*(1+x)/(-1+x)/((1+x)/(-1+x
)-1))^3*arccoth(x)^2*Pi-3*I*arccoth(x)^2*Pi*csgn(I*(1+x)/(-1+x))*csgn(I*(1+
x)/(-1+x)/((1+x)/(-1+x)-1))^2*x^2-3*I*csgn(I*(1+x)/(-1+x))^3*arccoth(x)^2*P
i+4*arccoth(x)^3*x^2-4*arccoth(x)^3+6*arccoth(x)*x^2+6*arccoth(x)-6*x)/(-1+
x)/(1+x)
```

**maxima [B]** time = 0.31, size = 171, normalized size = 2.76

$$-\frac{1}{4}\left(\frac{2x}{x^2-1}-\log(x+1)+\log(x-1)\right)\operatorname{arcoth}(x)^2-\frac{\left(\left(x^2-1\right)\log(x+1)^2-2\left(x^2-1\right)\log(x+1)\log(x-1)+\right.}{8\left(x^2-1\right)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(x)^2/(-x^2+1)^2,x, algorithm="maxima")
```

```
[Out] -1/4*(2*x/(x^2 - 1) - log(x + 1) + log(x - 1))*arccoth(x)^2 - 1/8*((x^2 - 1
)*log(x + 1)^2 - 2*(x^2 - 1)*log(x + 1)*log(x - 1) + (x^2 - 1)*log(x - 1)^2
 - 4)*arccoth(x)/(x^2 - 1) + 1/48*((x^2 - 1)*log(x + 1)^3 - 3*(x^2 - 1)*log
(x + 1)^2*log(x - 1) - (x^2 - 1)*log(x - 1)^3 + 3*((x^2 - 1)*log(x - 1)^2 +
 2*x^2 - 2)*log(x + 1) - 6*(x^2 - 1)*log(x - 1) - 12*x)/(x^2 - 1)
```

**mupad [B]** time = 2.68, size = 201, normalized size = 3.24

$$\frac{\ln\left(\frac{1}{x}+1\right)^3}{48}-\frac{\ln\left(1-\frac{1}{x}\right)^3}{48}-\frac{x}{4\left(x^2-1\right)}+\ln\left(1-\frac{1}{x}\right)\left(\frac{\frac{3x}{32}-\frac{1}{8}}{x^2-1}-\frac{\frac{x}{8}+\frac{1}{8}}{x^2-1}-\frac{\ln\left(\frac{1}{x}+1\right)^2}{16}+\frac{x}{32\left(x^2-1\right)}+\ln\left(\frac{1}{x}+1\right)\left(\right.\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(x)^2/(x^2 - 1)^2,x)
```

```
[Out] log(1/x + 1)^3/48 - (atan(x*1i)*1i)/4 - log(1 - 1/x)^3/48 - x/(4*(x^2 - 1))
 + log(1 - 1/x)*(((3*x)/32 - 1/8)/(x^2 - 1) - (x/8 + 1/8)/(x^2 - 1) - log(1
/x + 1)^2/16 + x/(32*(x^2 - 1)) + log(1/x + 1)*((x/4 + 1/16)/(x^2 - 1) - 1/
(16*(x^2 - 1)))) + log(1 - 1/x)^2*(log(1/x + 1)/16 - x/(8*(x^2 - 1))) + log
(1/x + 1)/(4*(x^2 - 1)) - (x*log(1/x + 1)^2)/(8*(x^2 - 1))
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int\frac{\operatorname{acoth}^2(x)}{(x-1)^2(x+1)^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(x)**2/(-x**2+1)**2,x)
```

```
[Out] Integral(acoth(x)**2/((x - 1)**2*(x + 1)**2), x)
```

# 3.56 $\int \frac{x \coth^{-1}(x)}{1-x^2} \, dx$

**Optimal**. Leaf size=37

$$\frac{1}{2}\text{Li}_2\left(\frac{x+1}{x-1}\right)-\frac{1}{2}\coth^{-1}(x)^2+\log\left(\frac{2}{1-x}\right)\coth^{-1}(x)$$

```
[Out] -1/2*arccoth(x)^2+arccoth(x)*ln(2/(1-x))+1/2*polylog(2,(1+x)/(-1+x))
```

**Rubi [A]** time = 0.06, antiderivative size = 37, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 4, integrand size = 13, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.308, Rules used = {5985, 5919, 2402, 2315}

$$\frac{1}{2}\text{PolyLog}\left(2,\frac{x+1}{x-1}\right)-\frac{1}{2}\coth^{-1}(x)^2+\log\left(\frac{2}{1-x}\right)\coth^{-1}(x)$$

Antiderivative was successfully verified.

```
[In] Int[(x*ArcCoth[x])/(1 - x^2),x]
```

```
[Out] -ArcCoth[x]^2/2 + ArcCoth[x]*Log[2/(1 - x)] + PolyLog[2, (1 + x)/(-1 + x)]/
2
```

Rule 2315

```
Int[Log[(c_.)*(x_)]/((d_) + (e_.)*(x_)), x_Symbol] :> -Simp[PolyLog[2, 1 -
c*x]/e, x] /; FreeQ[{c, d, e}, x] && EqQ[e + c*d, 0]
```

Rule 2402

```
Int[Log[(c_.)/((d_) + (e_.)*(x_))]/((f_) + (g_.)*(x_)^2), x_Symbol] :> -Dis
t[e/g, Subst[Int[Log[2*d*x]/(1 - 2*d*x), x], x, 1/(d + e*x)], x] /; FreeQ[{
c, d, e, f, g}, x] && EqQ[c, 2*d] && EqQ[e^2*f + d^2*g, 0]
```

Rule 5919

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)/((d_) + (e_.)*(x_)), x_Symbol
] :> -Simp[((a + b*ArcCoth[c*x])^p*Log[2/(1 + (e*x)/d)])/e, x] + Dist[(b*c*
p)/e, Int[((a + b*ArcCoth[c*x])^(p - 1)*Log[2/(1 + (e*x)/d)])/(1 - c^2*x^2)
, x], x] /; FreeQ[{a, b, c, d, e}, x] && IGtQ[p, 0] && EqQ[c^2*d^2 - e^2, 0
]
```

Rule 5985

```
Int[(((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)*(x_))/((d_) + (e_.)*(x_)^2),
 x_Symbol] :> Simp[(a + b*ArcCoth[c*x])^(p + 1)/(b*e*(p + 1)), x] + Dist[1/
(c*d), Int[(a + b*ArcCoth[c*x])^p/(1 - c*x), x], x] /; FreeQ[{a, b, c, d, e
}, x] && EqQ[c^2*d + e, 0] && IGtQ[p, 0]
```

Rubi steps

$$\begin{aligned}
\int \frac{x\coth^{-1}(x)}{1-x^2}\,dx &= -\frac{1}{2}\coth^{-1}(x)^2 + \int \frac{\coth^{-1}(x)}{1-x}\,dx \\
&= -\frac{1}{2}\coth^{-1}(x)^2 + \coth^{-1}(x)\log\left(\frac{2}{1-x}\right) - \int \frac{\log\left(\frac{2}{1-x}\right)}{1-x^2}\,dx \\
&= -\frac{1}{2}\coth^{-1}(x)^2 + \coth^{-1}(x)\log\left(\frac{2}{1-x}\right) + \text{Subst}\left(\int \frac{\log(2x)}{1-2x}\,dx, x, \frac{1}{1-x}\right) \\
&= -\frac{1}{2}\coth^{-1}(x)^2 + \coth^{-1}(x)\log\left(\frac{2}{1-x}\right) + \frac{1}{2}\text{Li}_2\left(\frac{1+x}{-1+x}\right)
\end{aligned}$$

**Mathematica [A]** time = 0.05, size = 34, normalized size = 0.92

$$\frac{1}{2}\left(\coth^{-1}(x)\left(\coth^{-1}(x) + 2\log\left(1-e^{-2\coth^{-1}(x)}\right)\right) - \text{Li}_2\left(e^{-2\coth^{-1}(x)}\right)\right)$$

Warning: Unable to verify antiderivative.

```
[In] Integrate[(x*ArcCoth[x])/(1 - x^2),x]
[Out] (ArcCoth[x]*(ArcCoth[x] + 2*Log[1 - E^(-2*ArcCoth[x])]) - PolyLog[2, E^(-2*
ArcCoth[x])])/2
```

**fricas [F]** time = 0.44, size = 0, normalized size = 0.00

$$\text{integral}\left(-\frac{x\,\text{arcoth}(x)}{x^2-1}, x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*arccoth(x)/(-x^2+1),x, algorithm="fricas")
[Out] integral(-x*arccoth(x)/(x^2 - 1), x)
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int -\frac{x\,\text{arcoth}(x)}{x^2-1}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*arccoth(x)/(-x^2+1),x, algorithm="giac")
[Out] integrate(-x*arccoth(x)/(x^2 - 1), x)
```

**maple [B]** time = 0.05, size = 75, normalized size = 2.03

$$-\frac{\text{arccoth}(x)\ln(-1+x)}{2} - \frac{\text{arccoth}(x)\ln(1+x)}{2} - \frac{\ln(-1+x)^2}{8} + \frac{\text{dilog}\left(\frac{1}{2}+\frac{x}{2}\right)}{2} + \frac{\ln(-1+x)\ln\left(\frac{1}{2}+\frac{x}{2}\right)}{4} + \frac{\ln(1+$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x*arccoth(x)/(-x^2+1),x)
[Out] -1/2*arccoth(x)*ln(-1+x)-1/2*arccoth(x)*ln(1+x)-1/8*ln(-1+x)^2+1/2*dilog(1/
2+1/2*x)+1/4*ln(-1+x)*ln(1/2+1/2*x)+1/8*ln(1+x)^2-1/4*(ln(1+x)-ln(1/2+1/2*x
))*ln(-1/2*x+1/2)
```

**maxima [B]** time = 0.30, size = 76, normalized size = 2.05

$$\frac{1}{4}\left(\log(x+1)-\log(x-1)\right)\log\left(x^2-1\right)-\frac{1}{2}\operatorname{arcoth}(x)\log\left(x^2-1\right)-\frac{1}{8}\log(x+1)^2-\frac{1}{4}\log(x+1)\log(x-1)+\frac{1}{8}\ 1$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*arccoth(x)/(-x^2+1),x, algorithm="maxima")
```

```
[Out] 1/4*(log(x + 1) - log(x - 1))*log(x^2 - 1) - 1/2*arccoth(x)*log(x^2 - 1) -
1/8*log(x + 1)^2 - 1/4*log(x + 1)*log(x - 1) + 1/8*log(x - 1)^2 + 1/2*log(x
 - 1)*log(1/2*x + 1/2) + 1/2*dilog(-1/2*x + 1/2)
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.03

$$-\int \frac{x\,\mathrm{acoth}(x)}{x^2-1}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(-(x*acoth(x))/(x^2 - 1),x)
```

```
[Out] -int((x*acoth(x))/(x^2 - 1), x)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$-\int \frac{x\,\mathrm{acoth}\,(x)}{x^2-1}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*acoth(x)/(-x**2+1),x)
```

```
[Out] -Integral(x*acoth(x)/(x**2 - 1), x)
```

## 3.57 $\int \frac{\coth^{-1}(x)}{1-x^2} \, dx$

**Optimal**. Leaf size=8

$$\frac{1}{2}\coth^{-1}(x)^2$$

```
[Out] 1/2*arccoth(x)^2
```

**Rubi [A]** time = 0.01, antiderivative size = 8, normalized size of antiderivative = 1.00, number of steps used = 1, number of rules used = 1, integrand size = 12, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.083, Rules used = {5949}

$$\frac{1}{2}\coth^{-1}(x)^2$$

Antiderivative was successfully verified.

```
[In] Int[ArcCoth[x]/(1 - x^2),x]
```

```
[Out] ArcCoth[x]^2/2
```

Rule 5949

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)/((d_) + (e_.)*(x_)^2), x_Symb
ol] :> Simp[(a + b*ArcCoth[c*x])^(p + 1)/(b*c*d*(p + 1)), x] /; FreeQ[{a, b
, c, d, e, p}, x] && EqQ[c^2*d + e, 0] && NeQ[p, -1]
```

Rubi steps

$$\int \frac{\coth^{-1}(x)}{1-x^2} \, dx = \frac{1}{2}\coth^{-1}(x)^2$$

**Mathematica [A]** time = 0.00, size = 8, normalized size = 1.00

$$\frac{1}{2}\coth^{-1}(x)^2$$

Antiderivative was successfully verified.

```
[In] Integrate[ArcCoth[x]/(1 - x^2),x]
```

```
[Out] ArcCoth[x]^2/2
```

**fricas [B]** time = 0.41, size = 14, normalized size = 1.75

$$\frac{1}{8}\log\left(\frac{x+1}{x-1}\right)^2$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(x)/(-x^2+1),x, algorithm="fricas")
```

```
[Out] 1/8*log((x + 1)/(x - 1))^2
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int -\frac{\operatorname{arcoth}(x)}{x^2-1} \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(x)/(-x^2+1),x, algorithm="giac")
[Out] integrate(-arccoth(x)/(x^2 - 1), x)
```

**maple** [A] time = 0.04, size = 13, normalized size = 1.62

$$\operatorname{arctanh}(x)\operatorname{arccoth}(x) - \frac{\operatorname{arctanh}(x)^2}{2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(arccoth(x)/(-x^2+1),x)
[Out] arctanh(x)*arccoth(x)-1/2*arctanh(x)^2
```

**maxima** [A] time = 0.30, size = 6, normalized size = 0.75

$$\frac{1}{2}\operatorname{arcoth}(x)^2$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(x)/(-x^2+1),x, algorithm="maxima")
[Out] 1/2*arccoth(x)^2
```

**mupad** [B] time = 1.20, size = 21, normalized size = 2.62

$$\frac{\left(\ln\left(1 - \frac{1}{x}\right) - \ln\left(\frac{1}{x} + 1\right)\right)^2}{8}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(-acoth(x)/(x^2 - 1),x)
[Out] (log(1 - 1/x) - log(1/x + 1))^2/8
```

**sympy** [A] time = 0.70, size = 5, normalized size = 0.62

$$\frac{\operatorname{acoth}^2(x)}{2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(x)/(-x**2+1),x)
[Out] acoth(x)**2/2
```

## 3.58 $\int \frac{x\coth^{-1}(x)}{(1-x^2)^2}\,dx$

**Optimal**. Leaf size=36

$$-\frac{x}{4(1-x^2)}+\frac{\coth^{-1}(x)}{2(1-x^2)}-\frac{1}{4}\tanh^{-1}(x)$$

```
[Out] -1/4*x/(-x^2+1)+1/2*arccoth(x)/(-x^2+1)-1/4*arctanh(x)
```

**Rubi [A]** time = 0.03, antiderivative size = 36, normalized size of antiderivative = 1.00, number of steps used = 3, number of rules used = 3, integrand size = 13, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.231, Rules used = {5995, 199, 206}

$$-\frac{x}{4(1-x^2)}+\frac{\coth^{-1}(x)}{2(1-x^2)}-\frac{1}{4}\tanh^{-1}(x)$$

Antiderivative was successfully verified.

```
[In] Int[(x*ArcCoth[x])/(1 - x^2)^2,x]
```

```
[Out] -x/(4*(1 - x^2)) + ArcCoth[x]/(2*(1 - x^2)) - ArcTanh[x]/4
```

Rule 199

```
Int[((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> -Simp[(x*(a + b*x^n)^(p + 1
))/(a*n*(p + 1)), x] + Dist[(n*(p + 1) + 1)/(a*n*(p + 1)), Int[(a + b*x^n)^
(p + 1), x], x] /; FreeQ[{a, b}, x] && IGtQ[n, 0] && LtQ[p, -1] && (Integer
Q[2*p] || (n == 2 && IntegerQ[4*p]) || (n == 2 && IntegerQ[3*p]) || Denomin
ator[p + 1/n] < Denominator[p])
```

Rule 206

```
Int[((a_) + (b_.)*(x_)^2)^(-1), x_Symbol] :> Simp[(1*ArcTanh[(Rt[-b, 2]*x)/
Rt[a, 2]])/(Rt[a, 2]*Rt[-b, 2]), x] /; FreeQ[{a, b}, x] && NegQ[a/b] && (Gt
Q[a, 0] || LtQ[b, 0])
```

Rule 5995

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)*(x_)*((d_) + (e_.)*(x_)^2)^(q
_.), x_Symbol] :> Simp[((d + e*x^2)^(q + 1)*(a + b*ArcCoth[c*x])^p)/(2*e*(q
 + 1)), x] + Dist[(b*p)/(2*c*(q + 1)), Int[(d + e*x^2)^q*(a + b*ArcCoth[c*x
])^(p - 1), x], x] /; FreeQ[{a, b, c, d, e, q}, x] && EqQ[c^2*d + e, 0] &&
GtQ[p, 0] && NeQ[q, -1]
```

Rubi steps

$$\begin{aligned}\int \frac{x\coth^{-1}(x)}{(1-x^2)^2}\,dx &= \frac{\coth^{-1}(x)}{2(1-x^2)}-\frac{1}{2}\int \frac{1}{(1-x^2)^2}\,dx\\ &= -\frac{x}{4(1-x^2)}+\frac{\coth^{-1}(x)}{2(1-x^2)}-\frac{1}{4}\int \frac{1}{1-x^2}\,dx\\ &= -\frac{x}{4(1-x^2)}+\frac{\coth^{-1}(x)}{2(1-x^2)}-\frac{1}{4}\tanh^{-1}(x)\end{aligned}$$

**Mathematica** [A] time = 0.03, size = 44, normalized size = 1.22

$$\frac{x}{4(x^2-1)}-\frac{\coth^{-1}(x)}{2(x^2-1)}+\frac{1}{8}\log(1-x)-\frac{1}{8}\log(x+1)$$

Antiderivative was successfully verified.

```
[In] Integrate[(x*ArcCoth[x])/(1 - x^2)^2,x]
[Out] x/(4*(-1 + x^2)) - ArcCoth[x]/(2*(-1 + x^2)) + Log[1 - x]/8 - Log[1 + x]/8
```

**fricas** [A] time = 0.39, size = 29, normalized size = 0.81

$$-\frac{(x^2+1)\log\left(\frac{x+1}{x-1}\right)-2x}{8(x^2-1)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*arccoth(x)/(-x^2+1)^2,x, algorithm="fricas")
[Out] -1/8*((x^2 + 1)*log((x + 1)/(x - 1)) - 2*x)/(x^2 - 1)
```

**giac** [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{x\,\text{arcoth}(x)}{(x^2-1)^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*arccoth(x)/(-x^2+1)^2,x, algorithm="giac")
[Out] integrate(x*arccoth(x)/(x^2 - 1)^2, x)
```

**maple** [A] time = 0.04, size = 39, normalized size = 1.08

$$-\frac{\text{arccoth}(x)}{2(x^2-1)}+\frac{1}{-8+8x}+\frac{\ln(-1+x)}{8}+\frac{1}{8+8x}-\frac{\ln(1+x)}{8}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x*arccoth(x)/(-x^2+1)^2,x)
[Out] -1/2/(x^2-1)*arccoth(x)+1/8/(-1+x)+1/8*ln(-1+x)+1/8/(1+x)-1/8*ln(1+x)
```

**maxima** [A] time = 0.30, size = 34, normalized size = 0.94

$$\frac{x}{4(x^2-1)}-\frac{\text{arcoth}(x)}{2(x^2-1)}-\frac{1}{8}\log(x+1)+\frac{1}{8}\log(x-1)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*arccoth(x)/(-x^2+1)^2,x, algorithm="maxima")
[Out] 1/4*x/(x^2 - 1) - 1/2*arccoth(x)/(x^2 - 1) - 1/8*log(x + 1) + 1/8*log(x - 1
)
```

**mupad** [B] time = 1.16, size = 21, normalized size = 0.58

$$\frac{\frac{x}{4}-\frac{\text{acoth}(x)}{2}}{x^2-1}-\frac{\text{acoth}(x)}{4}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((x*acoth(x))/(x^2 - 1)^2,x)
```

```
[Out] (x/4 - acoth(x)/2)/(x^2 - 1) - acoth(x)/4
```

**sympy [A]** time = 0.56, size = 31, normalized size = 0.86

$$-\frac{x^2 \operatorname{acoth}(x)}{4x^2-4}+\frac{x}{4x^2-4}-\frac{\operatorname{acoth}(x)}{4x^2-4}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*acoth(x)/(-x**2+1)**2,x)
```

```
[Out] -x**2*acoth(x)/(4*x**2 - 4) + x/(4*x**2 - 4) - acoth(x)/(4*x**2 - 4)
```

# 3.59 $\int \frac{\coth^{-1}(x)}{(1-x^2)^2} \, dx$

**Optimal**. Leaf size=38

$$-\frac{1}{4(1-x^2)}+\frac{x\coth^{-1}(x)}{2(1-x^2)}+\frac{1}{4}\coth^{-1}(x)^2$$

```
[Out] -1/4/(-x^2+1)+1/2*x*arccoth(x)/(-x^2+1)+1/4*arccoth(x)^2
```

**Rubi [A]** time = 0.02, antiderivative size = 38, normalized size of antiderivative = 1.00, number of steps used = 2, number of rules used = 2, integrand size = 12, $\frac{\text{number of rules}}{\text{integrand size}} = 0.167$, Rules used = {5957, 261}

$$-\frac{1}{4(1-x^2)}+\frac{x\coth^{-1}(x)}{2(1-x^2)}+\frac{1}{4}\coth^{-1}(x)^2$$

Antiderivative was successfully verified.

```
[In] Int[ArcCoth[x]/(1 - x^2)^2,x]
[Out] -1/(4*(1 - x^2)) + (x*ArcCoth[x])/(2*(1 - x^2)) + ArcCoth[x]^2/4
```

Rule 261

```
Int[(x_)^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Simp[(a + b*x^n)
^(p + 1)/(b*n*(p + 1)), x] /; FreeQ[{a, b, m, n, p}, x] && EqQ[m, n - 1] &&
 NeQ[p, -1]
```

Rule 5957

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)/((d_) + (e_.)*(x_)^2)^2, x_Sy
mbol] :> Simp[(x*(a + b*ArcCoth[c*x])^p)/(2*d*(d + e*x^2)), x] + (-Dist[(b*
c*p)/2, Int[(x*(a + b*ArcCoth[c*x])^(p - 1))/(d + e*x^2)^2, x], x] + Simp[(
a + b*ArcCoth[c*x])^(p + 1)/(2*b*c*d^2*(p + 1)), x]) /; FreeQ[{a, b, c, d,
e}, x] && EqQ[c^2*d + e, 0] && GtQ[p, 0]
```

Rubi steps

$$\begin{aligned}\int \frac{\coth^{-1}(x)}{(1-x^2)^2}\,dx &= \frac{x\coth^{-1}(x)}{2(1-x^2)}+\frac{1}{4}\coth^{-1}(x)^2-\frac{1}{2}\int \frac{x}{(1-x^2)^2}\,dx\\ &= -\frac{1}{4(1-x^2)}+\frac{x\coth^{-1}(x)}{2(1-x^2)}+\frac{1}{4}\coth^{-1}(x)^2\end{aligned}$$

**Mathematica [A]** time = 0.03, size = 28, normalized size = 0.74

$$\frac{(x^2-1)\coth^{-1}(x)^2-2x\coth^{-1}(x)+1}{4(x^2-1)}$$

Antiderivative was successfully verified.

```
[In] Integrate[ArcCoth[x]/(1 - x^2)^2,x]
[Out] (1 - 2*x*ArcCoth[x] + (-1 + x^2)*ArcCoth[x]^2)/(4*(-1 + x^2))
```

**fricas [A]** time = 0.52, size = 42, normalized size = 1.11

$$\frac{(x^2-1)\log\left(\frac{x+1}{x-1}\right)^2-4\,x\log\left(\frac{x+1}{x-1}\right)+4}{16\,(x^2-1)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(x)/(-x^2+1)^2,x, algorithm="fricas")
```

```
[Out] 1/16*((x^2 - 1)*log((x + 1)/(x - 1))^2 - 4*x*log((x + 1)/(x - 1)) + 4)/(x^2
 - 1)
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{arcoth}(x)}{(x^2-1)^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(x)/(-x^2+1)^2,x, algorithm="giac")
```

```
[Out] integrate(arccoth(x)/(x^2 - 1)^2, x)
```

**maple [B]** time = 0.06, size = 99, normalized size = 2.61

$$-\frac{\operatorname{arccoth}(x)}{4\,(-1+x)}-\frac{\operatorname{arccoth}(x)\ln(-1+x)}{4}-\frac{\operatorname{arccoth}(x)}{4\,(1+x)}+\frac{\operatorname{arccoth}(x)\ln(1+x)}{4}-\frac{\ln(1+x)^2}{16}+\frac{\left(\ln(1+x)-\ln\left(\frac{1}{2}+\frac{x}{2}\right.\right.}{8}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(arccoth(x)/(-x^2+1)^2,x)
```

```
[Out] -1/4*arccoth(x)/(-1+x)-1/4*arccoth(x)*ln(-1+x)-1/4*arccoth(x)/(1+x)+1/4*arc
coth(x)*ln(1+x)-1/16*ln(1+x)^2+1/8*(ln(1+x)-ln(1/2+1/2*x))*ln(-1/2*x+1/2)-1
/16*ln(-1+x)^2+1/8*ln(-1+x)*ln(1/2+1/2*x)+1/8/(-1+x)-1/8/(1+x)
```

**maxima [B]** time = 0.30, size = 76, normalized size = 2.00

$$-\frac{1}{4}\left(\frac{2\,x}{x^2-1}-\log(x+1)+\log(x-1)\right)\operatorname{arcoth}(x)-\frac{(x^2-1)\log(x+1)^2-2\,(x^2-1)\log(x+1)\log(x-1)+(x}{16\,(x^2-1)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(x)/(-x^2+1)^2,x, algorithm="maxima")
```

```
[Out] -1/4*(2*x/(x^2 - 1) - log(x + 1) + log(x - 1))*arccoth(x) - 1/16*((x^2 - 1)
*log(x + 1)^2 - 2*(x^2 - 1)*log(x + 1)*log(x - 1) + (x^2 - 1)*log(x - 1)^2
- 4)/(x^2 - 1)
```

**mupad [B]** time = 1.22, size = 81, normalized size = 2.13

$$\frac{\ln\left(\frac{1}{x}+1\right)^2}{16}-\ln\left(1-\frac{1}{x}\right)\left(\frac{\ln\left(\frac{1}{x}+1\right)}{8}-\frac{x}{4\,(x^2-1)}\right)+\frac{\ln\left(1-\frac{1}{x}\right)^2}{16}+\frac{1}{4\,(x^2-1)}-\frac{x\,\ln\left(\frac{1}{x}+1\right)}{4\,(x^2-1)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(x)/(x^2 - 1)^2,x)
```

```
[Out] log(1/x + 1)^2/16 - log(1 - 1/x)*(log(1/x + 1)/8 - x/(4*(x^2 - 1))) + log(1
 - 1/x)^2/16 + 1/(4*(x^2 - 1)) - (x*log(1/x + 1))/(4*(x^2 - 1))
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{acoth}(x)}{(x-1)^2 (x+1)^2}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(x)/(-x**2+1)**2,x)
```

```
[Out] Integral(acoth(x)/((x - 1)**2*(x + 1)**2), x)
```

# 3.60 $\int \frac{x\coth^{-1}(x)}{(1-x^2)^3}\,dx$

**Optimal**. Leaf size=50

$$-\frac{3x}{32\left(1-x^2\right)}-\frac{x}{16\left(1-x^2\right)^2}+\frac{\coth^{-1}(x)}{4\left(1-x^2\right)^2}-\frac{3}{32}\tanh^{-1}(x)$$

```
[Out] -1/16*x/(-x^2+1)^2-3/32*x/(-x^2+1)+1/4*arccoth(x)/(-x^2+1)^2-3/32*arctanh(x
)
```

**Rubi [A]** time = 0.03, antiderivative size = 50, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 3, integrand size = 13, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.231, Rules used = {5995, 199, 206}

$$-\frac{3x}{32\left(1-x^2\right)}-\frac{x}{16\left(1-x^2\right)^2}+\frac{\coth^{-1}(x)}{4\left(1-x^2\right)^2}-\frac{3}{32}\tanh^{-1}(x)$$

Antiderivative was successfully verified.

```
[In] Int[(x*ArcCoth[x])/(1 - x^2)^3,x]
```

```
[Out] -x/(16*(1 - x^2)^2) - (3*x)/(32*(1 - x^2)) + ArcCoth[x]/(4*(1 - x^2)^2) - (
3*ArcTanh[x])/32
```

Rule 199

```
Int[((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> -Simp[(x*(a + b*x^n)^(p + 1
))/(a*n*(p + 1)), x] + Dist[(n*(p + 1) + 1)/(a*n*(p + 1)), Int[(a + b*x^n)^
(p + 1), x], x] /; FreeQ[{a, b}, x] && IGtQ[n, 0] && LtQ[p, -1] && (Integer
Q[2*p] || (n == 2 && IntegerQ[4*p]) || (n == 2 && IntegerQ[3*p]) || Denomin
ator[p + 1/n] < Denominator[p])
```

Rule 206

```
Int[((a_) + (b_.)*(x_)^2)^(-1), x_Symbol] :> Simp[(1*ArcTanh[(Rt[-b, 2]*x)/
Rt[a, 2]])/(Rt[a, 2]*Rt[-b, 2]), x] /; FreeQ[{a, b}, x] && NegQ[a/b] && (Gt
Q[a, 0] || LtQ[b, 0])
```

Rule 5995

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)*(x_)*((d_) + (e_.)*(x_)^2)^(q
_.), x_Symbol] :> Simp[((d + e*x^2)^(q + 1)*(a + b*ArcCoth[c*x])^p)/(2*e*(q
 + 1)), x] + Dist[(b*p)/(2*c*(q + 1)), Int[(d + e*x^2)^q*(a + b*ArcCoth[c*x
])^(p - 1), x], x] /; FreeQ[{a, b, c, d, e, q}, x] && EqQ[c^2*d + e, 0] &&
GtQ[p, 0] && NeQ[q, -1]
```

Rubi steps

$$\int \frac{x\coth^{-1}(x)}{\left(1-x^2\right)^3}\,dx = \frac{\coth^{-1}(x)}{4\left(1-x^2\right)^2} - \frac{1}{4}\int \frac{1}{\left(1-x^2\right)^3}\,dx$$
$$= -\frac{x}{16\left(1-x^2\right)^2} + \frac{\coth^{-1}(x)}{4\left(1-x^2\right)^2} - \frac{3}{16}\int \frac{1}{\left(1-x^2\right)^2}\,dx$$
$$= -\frac{x}{16\left(1-x^2\right)^2} - \frac{3x}{32\left(1-x^2\right)} + \frac{\coth^{-1}(x)}{4\left(1-x^2\right)^2} - \frac{3}{32}\int \frac{1}{1-x^2}\,dx$$
$$= -\frac{x}{16\left(1-x^2\right)^2} - \frac{3x}{32\left(1-x^2\right)} + \frac{\coth^{-1}(x)}{4\left(1-x^2\right)^2} - \frac{3}{32}\tanh^{-1}(x)$$

**Mathematica** [A] time = 0.05, size = 50, normalized size = 1.00

$$\frac{1}{64}\left(\frac{6x}{x^2-1} - \frac{4x}{\left(x^2-1\right)^2} + \frac{16\coth^{-1}(x)}{\left(x^2-1\right)^2} + 3\log(1-x) - 3\log(x+1)\right)$$

Antiderivative was successfully verified.

```
[In] Integrate[(x*ArcCoth[x])/(1 - x^2)^3,x]
```

```
[Out] ((-4*x)/(-1 + x^2)^2 + (6*x)/(-1 + x^2) + (16*ArcCoth[x])/(-1 + x^2)^2 + 3*
Log[1 - x] - 3*Log[1 + x])/64
```

**fricas** [A] time = 0.61, size = 47, normalized size = 0.94

$$\frac{6\,x^3 - \left(3\,x^4 - 6\,x^2 - 5\right)\log\left(\frac{x+1}{x-1}\right) - 10\,x}{64\left(x^4 - 2\,x^2 + 1\right)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*arccoth(x)/(-x^2+1)^3,x, algorithm="fricas")
```

```
[Out] 1/64*(6*x^3 - (3*x^4 - 6*x^2 - 5)*log((x + 1)/(x - 1)) - 10*x)/(x^4 - 2*x^2
 + 1)
```

**giac** [F] time = 0.00, size = 0, normalized size = 0.00

$$\int -\frac{x\,\mathrm{arcoth}(x)}{\left(x^2-1\right)^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*arccoth(x)/(-x^2+1)^3,x, algorithm="giac")
```

```
[Out] integrate(-x*arccoth(x)/(x^2 - 1)^3, x)
```

**maple** [A] time = 0.04, size = 53, normalized size = 1.06

$$\frac{\mathrm{arccoth}(x)}{4\left(x^2-1\right)^2} - \frac{1}{64\left(-1+x\right)^2} + \frac{3}{64\left(-1+x\right)} + \frac{3\ln\left(-1+x\right)}{64} + \frac{1}{64\left(1+x\right)^2} + \frac{3}{64\left(1+x\right)} - \frac{3\ln\left(1+x\right)}{64}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x*arccoth(x)/(-x^2+1)^3,x)
```

```
[Out] 1/4/(x^2-1)^2*arccoth(x)-1/64/(-1+x)^2+3/64/(-1+x)+3/64*ln(-1+x)+1/64/(1+x)
^2+3/64/(1+x)-3/64*ln(1+x)
```

**maxima** [A] time = 0.30, size = 47, normalized size = 0.94

$$\frac{3\,x^3 - 5\,x}{32\,\left(x^4 - 2\,x^2 + 1\right)} + \frac{\operatorname{arcoth}(x)}{4\,\left(x^2 - 1\right)^2} - \frac{3}{64}\,\log\left(x + 1\right) + \frac{3}{64}\,\log\left(x - 1\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*arccoth(x)/(-x^2+1)^3,x, algorithm="maxima")
```

```
[Out] 1/32*(3*x^3 - 5*x)/(x^4 - 2*x^2 + 1) + 1/4*arccoth(x)/(x^2 - 1)^2 - 3/64*lo
g(x + 1) + 3/64*log(x - 1)
```

**mupad** [B] time = 1.21, size = 34, normalized size = 0.68

$$\frac{3\,\ln\left(x - 1\right)}{64} - \frac{3\,\ln\left(x + 1\right)}{64} + \frac{\frac{\operatorname{acoth}(x)}{4} - \frac{5\,x}{32} + \frac{3\,x^3}{32}}{\left(x^2 - 1\right)^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(-(x*acoth(x))/(x^2 - 1)^3,x)
```

```
[Out] (3*log(x - 1))/64 - (3*log(x + 1))/64 + (acoth(x)/4 - (5*x)/32 + (3*x^3)/32
)/(x^2 - 1)^2
```

**sympy** [B] time = 0.91, size = 88, normalized size = 1.76

$$-\frac{3x^4\operatorname{acoth}\left(x\right)}{32x^4 - 64x^2 + 32} + \frac{3x^3}{32x^4 - 64x^2 + 32} + \frac{6x^2\operatorname{acoth}\left(x\right)}{32x^4 - 64x^2 + 32} - \frac{5x}{32x^4 - 64x^2 + 32} + \frac{5\operatorname{acoth}\left(x\right)}{32x^4 - 64x^2 + 32}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*acoth(x)/(-x**2+1)**3,x)
```

```
[Out] -3*x**4*acoth(x)/(32*x**4 - 64*x**2 + 32) + 3*x**3/(32*x**4 - 64*x**2 + 32)
 + 6*x**2*acoth(x)/(32*x**4 - 64*x**2 + 32) - 5*x/(32*x**4 - 64*x**2 + 32)
+ 5*acoth(x)/(32*x**4 - 64*x**2 + 32)
```

## 3.61 $\int \frac{\coth^{-1}(x)}{(1-x^2)^3}\,dx$

**Optimal**. Leaf size=67

$$-\frac{3}{16(1-x^2)}-\frac{1}{16(1-x^2)^2}+\frac{3x\coth^{-1}(x)}{8(1-x^2)}+\frac{x\coth^{-1}(x)}{4(1-x^2)^2}+\frac{3}{16}\coth^{-1}(x)^2$$

```
[Out] -1/16/(-x^2+1)^2-3/16/(-x^2+1)+1/4*x*arccoth(x)/(-x^2+1)^2+3/8*x*arccoth(x)
/(-x^2+1)+3/16*arccoth(x)^2
```

**Rubi [A]** time = 0.04, antiderivative size = 67, normalized size of antiderivative = 1.00, number of steps used = 3, number of rules used = 3, integrand size = 12, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.250, Rules used = {5961, 5957, 261}

$$-\frac{3}{16(1-x^2)}-\frac{1}{16(1-x^2)^2}+\frac{3x\coth^{-1}(x)}{8(1-x^2)}+\frac{x\coth^{-1}(x)}{4(1-x^2)^2}+\frac{3}{16}\coth^{-1}(x)^2$$

Antiderivative was successfully verified.

```
[In] Int[ArcCoth[x]/(1 - x^2)^3,x]
```

```
[Out] -1/(16*(1 - x^2)^2) - 3/(16*(1 - x^2)) + (x*ArcCoth[x])/(4*(1 - x^2)^2) + (
3*x*ArcCoth[x])/(8*(1 - x^2)) + (3*ArcCoth[x]^2)/16
```

Rule 261

```
Int[(x_)^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Simp[(a + b*x^n)
^(p + 1)/(b*n*(p + 1)), x] /; FreeQ[{a, b, m, n, p}, x] && EqQ[m, n - 1] &&
 NeQ[p, -1]
```

Rule 5957

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)/((d_) + (e_.)*(x_)^2)^2, x_Sy
mbol] :> Simp[(x*(a + b*ArcCoth[c*x])^p)/(2*d*(d + e*x^2)), x] + (-Dist[(b*
c*p)/2, Int[(x*(a + b*ArcCoth[c*x])^(p - 1))/(d + e*x^2)^2, x], x] + Simp[(
a + b*ArcCoth[c*x])^(p + 1)/(2*b*c*d^2*(p + 1)), x]) /; FreeQ[{a, b, c, d,
e}, x] && EqQ[c^2*d + e, 0] && GtQ[p, 0]
```

Rule 5961

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))*((d_) + (e_.)*(x_)^2)^(q_), x_Symbo
l] :> -Simp[(b*(d + e*x^2)^(q + 1))/(4*c*d*(q + 1)^2), x] + (Dist[(2*q + 3)
/(2*d*(q + 1)), Int[(d + e*x^2)^(q + 1)*(a + b*ArcCoth[c*x]), x], x] - Simp
[(x*(d + e*x^2)^(q + 1)*(a + b*ArcCoth[c*x]))/(2*d*(q + 1)), x]) /; FreeQ[{
a, b, c, d, e}, x] && EqQ[c^2*d + e, 0] && LtQ[q, -1] && NeQ[q, -3/2]
```

Rubi steps

$$\begin{aligned}
\int \frac{\coth^{-1}(x)}{(1-x^2)^3}\,dx &= -\frac{1}{16(1-x^2)^2}+\frac{x\coth^{-1}(x)}{4(1-x^2)^2}+\frac{3}{4}\int \frac{\coth^{-1}(x)}{(1-x^2)^2}\,dx\\
&= -\frac{1}{16(1-x^2)^2}+\frac{x\coth^{-1}(x)}{4(1-x^2)^2}+\frac{3x\coth^{-1}(x)}{8(1-x^2)}+\frac{3}{16}\coth^{-1}(x)^2-\frac{3}{8}\int \frac{x}{(1-x^2)^2}\,dx\\
&= -\frac{1}{16(1-x^2)^2}-\frac{3}{16(1-x^2)}+\frac{x\coth^{-1}(x)}{4(1-x^2)^2}+\frac{3x\coth^{-1}(x)}{8(1-x^2)}+\frac{3}{16}\coth^{-1}(x)^2
\end{aligned}$$

**Mathematica** [A] time = 0.06, size = 43, normalized size = 0.64

$$-\frac{-3x^2+2\left(3x^2-5\right)x\coth^{-1}(x)-3\left(x^2-1\right)^2\coth^{-1}(x)^2+4}{16\left(x^2-1\right)^2}$$

Antiderivative was successfully verified.

```
[In] Integrate[ArcCoth[x]/(1 - x^2)^3,x]
```

```
[Out] -1/16*(4 - 3*x^2 + 2*x*(-5 + 3*x^2)*ArcCoth[x] - 3*(-1 + x^2)^2*ArcCoth[x]^
2)/(-1 + x^2)^2
```

**fricas** [A] time = 0.40, size = 66, normalized size = 0.99

$$\frac{3\left(x^4-2x^2+1\right)\log\left(\frac{x+1}{x-1}\right)^2+12x^2-4\left(3x^3-5x\right)\log\left(\frac{x+1}{x-1}\right)-16}{64\left(x^4-2x^2+1\right)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(x)/(-x^2+1)^3,x, algorithm="fricas")
```

```
[Out] 1/64*(3*(x^4 - 2*x^2 + 1)*log((x + 1)/(x - 1))^2 + 12*x^2 - 4*(3*x^3 - 5*x)
*log((x + 1)/(x - 1)) - 16)/(x^4 - 2*x^2 + 1)
```

**giac** [F] time = 0.00, size = 0, normalized size = 0.00

$$\int -\frac{\operatorname{arcoth}(x)}{\left(x^2-1\right)^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(x)/(-x^2+1)^3,x, algorithm="giac")
```

```
[Out] integrate(-arccoth(x)/(x^2 - 1)^3, x)
```

**maple** [B] time = 0.07, size = 131, normalized size = 1.96

$$\frac{\operatorname{arccoth}(x)}{16\left(-1+x\right)^2}-\frac{3\operatorname{arccoth}(x)}{16\left(-1+x\right)}-\frac{3\operatorname{arccoth}(x)\ln\left(-1+x\right)}{16}-\frac{\operatorname{arccoth}(x)}{16\left(1+x\right)^2}-\frac{3\operatorname{arccoth}(x)}{16\left(1+x\right)}+\frac{3\operatorname{arccoth}(x)\ln\left(1+x\right)}{16}-3\ln$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(arccoth(x)/(-x^2+1)^3,x)
```

```
[Out] 1/16*arccoth(x)/(-1+x)^2-3/16*arccoth(x)/(-1+x)-3/16*arccoth(x)*ln(-1+x)-1/
16*arccoth(x)/(1+x)^2-3/16*arccoth(x)/(1+x)+3/16*arccoth(x)*ln(1+x)-3/64*ln
(-1+x)^2+3/32*ln(-1+x)*ln(1/2+1/2*x)-3/64*ln(1+x)^2+3/32*(ln(1+x)-ln(1/2+1/
2*x))*ln(-1/2*x+1/2)-1/64/(-1+x)^2+7/64/(-1+x)-1/64/(1+x)^2-7/64/(1+x)
```

**maxima** [B] time = 0.31, size = 118, normalized size = 1.76

$$-\frac{1}{16}\left(\frac{2\left(3x^3-5x\right)}{x^4-2x^2+1}-3\log\left(x+1\right)+3\log\left(x-1\right)\right)\operatorname{arcoth}(x)-\frac{3\left(x^4-2x^2+1\right)\log\left(x+1\right)^2-6\left(x^4-2x^2+1\right.}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(x)/(-x^2+1)^3,x, algorithm="maxima")
```

```
[Out] -1/16*(2*(3*x^3 - 5*x)/(x^4 - 2*x^2 + 1) - 3*log(x + 1) + 3*log(x - 1))*arc
coth(x) - 1/64*(3*(x^4 - 2*x^2 + 1)*log(x + 1)^2 - 6*(x^4 - 2*x^2 + 1)*log(
x + 1)*log(x - 1) + 3*(x^4 - 2*x^2 + 1)*log(x - 1)^2 - 12*x^2 + 16)/(x^4 -
2*x^2 + 1)
```

**mupad [B]** time = 1.32, size = 112, normalized size = 1.67

$$\frac{3\ln\left(\frac{1}{x}+1\right)^2}{64}-\ln\left(1-\frac{1}{x}\right)\left(\frac{3\,\ln\left(\frac{1}{x}+1\right)}{32}+\frac{\frac{5\,x}{16}-\frac{3\,x^3}{16}}{x^4-2\,x^2+1}\right)+\frac{3\ln\left(1-\frac{1}{x}\right)^2}{64}+\frac{\frac{3\,x^2}{16}-\frac{1}{4}}{x^4-2\,x^2+1}+\frac{\ln\left(\frac{1}{x}+1\right)\left(\frac{5\,x}{16}-\frac{3\,x^3}{16}\right)}{x^4-2\,x^2+1}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(-acoth(x)/(x^2 - 1)^3,x)
```

```
[Out] (3*log(1/x + 1)^2)/64 - log(1 - 1/x)*((3*log(1/x + 1))/32 + ((5*x)/16 - (3*
x^3)/16)/(x^4 - 2*x^2 + 1)) + (3*log(1 - 1/x)^2)/64 + ((3*x^2)/16 - 1/4)/(x
^4 - 2*x^2 + 1) + (log(1/x + 1)*((5*x)/16 - (3*x^3)/16))/(x^4 - 2*x^2 + 1)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$-\int\frac{\operatorname{acoth}(x)}{x^6-3x^4+3x^2-1}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(x)/(-x**2+1)**3,x)
```

```
[Out] -Integral(acoth(x)/(x**6 - 3*x**4 + 3*x**2 - 1), x)
```

## 3.62 $\int x^3 \coth^{-1}(a+bx)\,dx$

**Optimal**. Leaf size=101

$$\frac{(6a^2+1)\,x}{4b^3}+\frac{(a+bx)^3}{12b^4}-\frac{a(a+bx)^2}{2b^4}+\frac{(1-a)^4\log(-a-bx+1)}{8b^4}-\frac{(a+1)^4\log(a+bx+1)}{8b^4}+\frac{1}{4}x^4\coth^{-1}(a+bx)$$

```
[Out] 1/4*(6*a^2+1)*x/b^3-1/2*a*(b*x+a)^2/b^4+1/12*(b*x+a)^3/b^4+1/4*x^4*arccoth(
b*x+a)+1/8*(1-a)^4*ln(-b*x-a+1)/b^4-1/8*(1+a)^4*ln(b*x+a+1)/b^4
```

**Rubi** [A] time = 0.13, antiderivative size = 101, normalized size of antiderivative = 1.00, number of steps used = 7, number of rules used = 5, integrand size = 10, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.500, Rules used = {6112, 5927, 702, 633, 31}

$$\frac{(6a^2+1)\,x}{4b^3}+\frac{(a+bx)^3}{12b^4}-\frac{a(a+bx)^2}{2b^4}+\frac{(1-a)^4\log(-a-bx+1)}{8b^4}-\frac{(a+1)^4\log(a+bx+1)}{8b^4}+\frac{1}{4}x^4\coth^{-1}(a+bx)$$

Antiderivative was successfully verified.

```
[In] Int[x^3*ArcCoth[a + b*x],x]
```

```
[Out] ((1 + 6*a^2)*x)/(4*b^3) - (a*(a + b*x)^2)/(2*b^4) + (a + b*x)^3/(12*b^4) +
(x^4*ArcCoth[a + b*x])/4 + ((1 - a)^4*Log[1 - a - b*x])/(8*b^4) - ((1 + a)^
4*Log[1 + a + b*x])/(8*b^4)
```

Rule 31

```
Int[((a_) + (b_.)*(x_))^(-1), x_Symbol] :> Simp[Log[RemoveContent[a + b*x,
x]]/b, x] /; FreeQ[{a, b}, x]
```

Rule 633

```
Int[((d_) + (e_.)*(x_))/((a_) + (c_.)*(x_)^2), x_Symbol] :> With[{q = Rt[-(
a*c), 2]}, Dist[e/2 + (c*d)/(2*q), Int[1/(-q + c*x), x], x] + Dist[e/2 - (c
*d)/(2*q), Int[1/(q + c*x), x], x]] /; FreeQ[{a, c, d, e}, x] && NiceSqrtQ[
-(a*c)]
```

Rule 702

```
Int[((d_) + (e_.)*(x_))^(m_)/((a_) + (c_.)*(x_)^2), x_Symbol] :> Int[Polyno
mialDivide[(d + e*x)^m, a + c*x^2, x], x] /; FreeQ[{a, c, d, e}, x] && NeQ[
c*d^2 + a*e^2, 0] && IGtQ[m, 1] && (NeQ[d, 0] || GtQ[m, 2])
```

Rule 5927

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))*((d_) + (e_.)*(x_))^(q_.), x_Symbol
] :> Simp[((d + e*x)^(q + 1)*(a + b*ArcCoth[c*x]))/(e*(q + 1)), x] - Dist[(
b*c)/(e*(q + 1)), Int[(d + e*x)^(q + 1)/(1 - c^2*x^2), x], x] /; FreeQ[{a,
b, c, d, e, q}, x] && NeQ[q, -1]
```

Rule 6112

```
Int[((a_.) + ArcCoth[(c_) + (d_.)*(x_)]*(b_.))^(p_.)*((e_.) + (f_.)*(x_))^(
m_.), x_Symbol] :> Dist[1/d, Subst[Int[((d*e - c*f)/d + (f*x)/d)^m*(a + b*A
rcCoth[x])^p, x], x, c + d*x], x] /; FreeQ[{a, b, c, d, e, f, m}, x] && IGt
Q[p, 0]
```

Rubi steps

$$\int x^3\coth^{-1}(a+bx)\,dx = \frac{\text{Subst}\left(\int\left(-\frac{a}{b}+\frac{x}{b}\right)^3\coth^{-1}(x)\,dx, x, a+bx\right)}{b}$$
$$= \frac{1}{4}x^4\coth^{-1}(a+bx) - \frac{1}{4}\text{Subst}\left(\int\frac{\left(-\frac{a}{b}+\frac{x}{b}\right)^4}{1-x^2}\,dx, x, a+bx\right)$$
$$= \frac{1}{4}x^4\coth^{-1}(a+bx) - \frac{1}{4}\text{Subst}\left(\int\left(-\frac{1+6a^2}{b^4}+\frac{4ax}{b^4}-\frac{x^2}{b^4}+\frac{1+6a^2+a^4-4a\left(1+a^2\right)}{b^4\left(1-x^2\right)}\right.\right.$$
$$= \frac{\left(1+6a^2\right)x}{4b^3} - \frac{a(a+bx)^2}{2b^4} + \frac{(a+bx)^3}{12b^4} + \frac{1}{4}x^4\coth^{-1}(a+bx) - \frac{\text{Subst}\left(\int\frac{1+6a^2+a^4-4a\left(1+a\right.}{1-x^2}\right.}{4b^4}$$
$$= \frac{\left(1+6a^2\right)x}{4b^3} - \frac{a(a+bx)^2}{2b^4} + \frac{(a+bx)^3}{12b^4} + \frac{1}{4}x^4\coth^{-1}(a+bx) - \frac{(1-a)^4\,\text{Subst}\left(\int\frac{1}{1-x}\,dx\right.}{8b^4}$$
$$= \frac{\left(1+6a^2\right)x}{4b^3} - \frac{a(a+bx)^2}{2b^4} + \frac{(a+bx)^3}{12b^4} + \frac{1}{4}x^4\coth^{-1}(a+bx) + \frac{(1-a)^4\log(1-a-bx)}{8b^4}$$

**Mathematica [A]** time = 0.04, size = 81, normalized size = 0.80

$$\frac{6\left(3a^2+1\right)bx+6b^4x^4\coth^{-1}(a+bx)-6ab^2x^2+3(a-1)^4\log(-a-bx+1)-3(a+1)^4\log(a+bx+1)+2b^3x^3}{24b^4}$$

Antiderivative was successfully verified.

```
[In] Integrate[x^3*ArcCoth[a + b*x],x]
```

```
[Out] (6*(1 + 3*a^2)*b*x - 6*a*b^2*x^2 + 2*b^3*x^3 + 6*b^4*x^4*ArcCoth[a + b*x] +
 3*(-1 + a)^4*Log[1 - a - b*x] - 3*(1 + a)^4*Log[1 + a + b*x])/(24*b^4)
```

**fricas [A]** time = 0.50, size = 112, normalized size = 1.11

$$\frac{3\,b^4x^4\log\left(\frac{bx+a+1}{bx+a-1}\right)+2\,b^3x^3-6\,ab^2x^2+6\left(3\,a^2+1\right)bx-3\left(a^4+4\,a^3+6\,a^2+4\,a+1\right)\log\left(bx+a+1\right)+3\left(a^4-\right.}{24\,b^4}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^3*arccoth(b*x+a),x, algorithm="fricas")
```

```
[Out] 1/24*(3*b^4*x^4*log((b*x + a + 1)/(b*x + a - 1)) + 2*b^3*x^3 - 6*a*b^2*x^2
+ 6*(3*a^2 + 1)*b*x - 3*(a^4 + 4*a^3 + 6*a^2 + 4*a + 1)*log(b*x + a + 1) +
3*(a^4 - 4*a^3 + 6*a^2 - 4*a + 1)*log(b*x + a - 1))/b^4
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int x^3\,\text{arcoth}\left(bx+a\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^3*arccoth(b*x+a),x, algorithm="giac")
```

```
[Out] integrate(x^3*arccoth(b*x + a), x)
```

**maple [B]** time = 0.04, size = 199, normalized size = 1.97

$$\frac{a}{4b^4}+\frac{x}{4b^3}+\frac{x^4\text{arccoth}\left(bx+a\right)}{4}+\frac{\ln\left(bx+a-1\right)}{8b^4}-\frac{\ln\left(bx+a+1\right)}{8b^4}-\frac{\ln\left(bx+a+1\right)a^4}{8b^4}-\frac{\ln\left(bx+a+1\right)a^3}{2b^4}-\frac{3\ln\left(bx+\right.}{4b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^3*arccoth(b*x+a),x)
```

```
[Out] 1/4/b^4*a+1/4*x/b^3+1/4*x^4*arccoth(b*x+a)+1/8/b^4*ln(b*x+a-1)-1/8/b^4*ln(b
*x+a+1)-1/8/b^4*ln(b*x+a+1)*a^4-1/2/b^4*ln(b*x+a+1)*a^3-3/4/b^4*ln(b*x+a+1)
*a^2-1/2/b^4*ln(b*x+a+1)*a+1/12*x^3/b-1/4/b^2*x^2*a+3/4/b^3*x*a^2+13/12/b^4
*a^3+1/8/b^4*ln(b*x+a-1)*a^4-1/2/b^4*ln(b*x+a-1)*a^3+3/4/b^4*ln(b*x+a-1)*a^
2-1/2/b^4*ln(b*x+a-1)*a
```

**maxima** [A] time = 0.31, size = 106, normalized size = 1.05

$$\frac{1}{4}\,x^4\,\mathrm{arcoth}\,(bx+a)+\frac{1}{24}\,b\left(\frac{2\left(b^2x^3-3\,abx^2+3\left(3\,a^2+1\right)x\right)}{b^4}-\frac{3\left(a^4+4\,a^3+6\,a^2+4\,a+1\right)\log\,(bx+a+1)}{b^5}+\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^3*arccoth(b*x+a),x, algorithm="maxima")
```

```
[Out] 1/4*x^4*arccoth(b*x + a) + 1/24*b*(2*(b^2*x^3 - 3*a*b*x^2 + 3*(3*a^2 + 1)*x
)/b^4 - 3*(a^4 + 4*a^3 + 6*a^2 + 4*a + 1)*log(b*x + a + 1)/b^5 + 3*(a^4 - 4
*a^3 + 6*a^2 - 4*a + 1)*log(b*x + a - 1)/b^5)
```

**mupad** [B] time = 1.47, size = 134, normalized size = 1.33

$$\frac{x^4\,\ln\left(\frac{1}{a+b\,x}+1\right)}{8}-x\left(\frac{4\,a^2-4}{16\,b^3}-\frac{a^2}{b^3}\right)-\frac{x^4\,\ln\left(1-\frac{1}{a+b\,x}\right)}{8}+\frac{x^3}{12\,b}-\frac{a\,x^2}{4\,b^2}+\frac{\ln\left(a+b\,x-1\right)\,\left(a^4-4\,a^3+6\,a^2-4\,a+1\right)}{8\,b^4}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^3*acoth(a + b*x),x)
```

```
[Out] (x^4*log(1/(a + b*x) + 1))/8 - x*((4*a^2 - 4)/(16*b^3) - a^2/b^3) - (x^4*lo
g(1 - 1/(a + b*x)))/8 + x^3/(12*b) - (a*x^2)/(4*b^2) + (log(a + b*x - 1)*(6
*a^2 - 4*a - 4*a^3 + a^4 + 1))/(8*b^4) - (log(a + b*x + 1)*(4*a + 6*a^2 + 4
*a^3 + a^4 + 1))/(8*b^4)
```

**sympy** [A] time = 1.84, size = 153, normalized size = 1.51

$$\begin{cases} -\frac{a^4\,\mathrm{acoth}\,(a+bx)}{4b^4}-\frac{a^3\log\,(a+bx+1)}{b^4}+\frac{a^3\,\mathrm{acoth}\,(a+bx)}{b^4}+\frac{3a^2x}{4b^3}-\frac{3a^2\,\mathrm{acoth}\,(a+bx)}{2b^4}-\frac{ax^2}{4b^2}-\frac{a\log\,(a+bx+1)}{b^4}+\frac{a\,\mathrm{acoth}\,(a+bx)}{b^4}+\frac{x^4\,\mathrm{aco} \\ \frac{x^4\,\mathrm{acoth}\,(a)}{4} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**3*acoth(b*x+a),x)
```

```
[Out] Piecewise((-a**4*acoth(a + b*x)/(4*b**4) - a**3*log(a + b*x + 1)/b**4 + a**
3*acoth(a + b*x)/b**4 + 3*a**2*x/(4*b**3) - 3*a**2*acoth(a + b*x)/(2*b**4)
- a*x**2/(4*b**2) - a*log(a + b*x + 1)/b**4 + a*acoth(a + b*x)/b**4 + x**4*
acoth(a + b*x)/4 + x**3/(12*b) + x/(4*b**3) - acoth(a + b*x)/(4*b**4), Ne(b
, 0)), (x**4*acoth(a)/4, True))
```

## 3.63 $\int x^2 \coth^{-1}(a+bx)\,dx$

**Optimal**. Leaf size=78

$$\frac{(a+bx)^2}{6b^3}+\frac{(1-a)^3\log(-a-bx+1)}{6b^3}+\frac{(a+1)^3\log(a+bx+1)}{6b^3}-\frac{ax}{b^2}+\frac{1}{3}x^3\coth^{-1}(a+bx)$$

```
[Out] -a*x/b^2+1/6*(b*x+a)^2/b^3+1/3*x^3*arccoth(b*x+a)+1/6*(1-a)^3*ln(-b*x-a+1)/
b^3+1/6*(1+a)^3*ln(b*x+a+1)/b^3
```

**Rubi [A]** time = 0.10, antiderivative size = 78, normalized size of antiderivative = 1.00, number of steps used = 7, number of rules used = 5, integrand size = 10, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.500, Rules used = {6112, 5927, 702, 633, 31}

$$\frac{(a+bx)^2}{6b^3}-\frac{ax}{b^2}+\frac{(1-a)^3\log(-a-bx+1)}{6b^3}+\frac{(a+1)^3\log(a+bx+1)}{6b^3}+\frac{1}{3}x^3\coth^{-1}(a+bx)$$

Antiderivative was successfully verified.

```
[In] Int[x^2*ArcCoth[a + b*x],x]
```

```
[Out] -((a*x)/b^2) + (a + b*x)^2/(6*b^3) + (x^3*ArcCoth[a + b*x])/3 + ((1 - a)^3*
Log[1 - a - b*x])/(6*b^3) + ((1 + a)^3*Log[1 + a + b*x])/(6*b^3)
```

Rule 31

```
Int[((a_) + (b_.)*(x_))^(-1), x_Symbol] :> Simp[Log[RemoveContent[a + b*x,
x]]/b, x] /; FreeQ[{a, b}, x]
```

Rule 633

```
Int[((d_) + (e_.)*(x_))/((a_) + (c_.)*(x_)^2), x_Symbol] :> With[{q = Rt[-(
a*c), 2]}, Dist[e/2 + (c*d)/(2*q), Int[1/(-q + c*x), x], x] + Dist[e/2 - (c
*d)/(2*q), Int[1/(q + c*x), x], x]] /; FreeQ[{a, c, d, e}, x] && NiceSqrtQ[
-(a*c)]
```

Rule 702

```
Int[((d_) + (e_.)*(x_))^(m_)/((a_) + (c_.)*(x_)^2), x_Symbol] :> Int[Polyno
mialDivide[(d + e*x)^m, a + c*x^2, x], x] /; FreeQ[{a, c, d, e}, x] && NeQ[
c*d^2 + a*e^2, 0] && IGtQ[m, 1] && (NeQ[d, 0] || GtQ[m, 2])
```

Rule 5927

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))*((d_) + (e_.)*(x_))^(q_.), x_Symbol
] :> Simp[((d + e*x)^(q + 1)*(a + b*ArcCoth[c*x]))/(e*(q + 1)), x] - Dist[(
b*c)/(e*(q + 1)), Int[(d + e*x)^(q + 1)/(1 - c^2*x^2), x], x] /; FreeQ[{a,
b, c, d, e, q}, x] && NeQ[q, -1]
```

Rule 6112

```
Int[((a_.) + ArcCoth[(c_) + (d_.)*(x_)]*(b_.))^(p_.)*((e_.) + (f_.)*(x_))^(
m_.), x_Symbol] :> Dist[1/d, Subst[Int[((d*e - c*f)/d + (f*x)/d)^m*(a + b*A
rcCoth[x])^p, x], x, c + d*x], x] /; FreeQ[{a, b, c, d, e, f, m}, x] && IGt
Q[p, 0]
```

Rubi steps

$$\int x^2 \coth^{-1}(a+bx)\,dx = \frac{\text{Subst}\left(\int \left(-\frac{a}{b}+\frac{x}{b}\right)^2 \coth^{-1}(x)\,dx, x, a+bx\right)}{b}$$
$$= \frac{1}{3}x^3\coth^{-1}(a+bx) - \frac{1}{3}\text{Subst}\left(\int \frac{\left(-\frac{a}{b}+\frac{x}{b}\right)^3}{1-x^2}\,dx, x, a+bx\right)$$
$$= \frac{1}{3}x^3\coth^{-1}(a+bx) - \frac{1}{3}\text{Subst}\left(\int \left(\frac{3a}{b^3}-\frac{x}{b^3}-\frac{a\left(3+a^2\right)-\left(1+3a^2\right)x}{b^3\left(1-x^2\right)}\right)dx, x, a+b\right.$$
$$= -\frac{ax}{b^2}+\frac{(a+bx)^2}{6b^3}+\frac{1}{3}x^3\coth^{-1}(a+bx)+\frac{\text{Subst}\left(\int \frac{a\left(3+a^2\right)-\left(1+3a^2\right)x}{1-x^2}\,dx, x, a+bx\right)}{3b^3}$$
$$= -\frac{ax}{b^2}+\frac{(a+bx)^2}{6b^3}+\frac{1}{3}x^3\coth^{-1}(a+bx)-\frac{(1-a)^3\,\text{Subst}\left(\int \frac{1}{1-x}\,dx, x, a+bx\right)}{6b^3}-\frac{(1+}{}$$
$$= -\frac{ax}{b^2}+\frac{(a+bx)^2}{6b^3}+\frac{1}{3}x^3\coth^{-1}(a+bx)+\frac{(1-a)^3\log(1-a-bx)}{6b^3}+\frac{(1+a)^3\log(1+}{6b^3}$$

**Mathematica** [A] time = 0.02, size = 92, normalized size = 1.18

$$\frac{\left(-a^3+3a^2-3a+1\right)\log(-a-bx+1)}{6b^3}+\frac{\left(a^3+3a^2+3a+1\right)\log(a+bx+1)}{6b^3}-\frac{2ax}{3b^2}+\frac{1}{3}x^3\coth^{-1}(a+bx)+\frac{x^2}{6b}$$

Antiderivative was successfully verified.

```
[In] Integrate[x^2*ArcCoth[a + b*x],x]
```

```
[Out] (-2*a*x)/(3*b^2) + x^2/(6*b) + (x^3*ArcCoth[a + b*x])/3 + ((1 - 3*a + 3*a^2
 - a^3)*Log[1 - a - b*x])/(6*b^3) + ((1 + 3*a + 3*a^2 + a^3)*Log[1 + a + b*
x])/(6*b^3)
```

**fricas** [A] time = 0.56, size = 84, normalized size = 1.08

$$\frac{b^3x^3\log\left(\frac{bx+a+1}{bx+a-1}\right)+b^2x^2-4\,abx+\left(a^3+3\,a^2+3\,a+1\right)\log\left(bx+a+1\right)-\left(a^3-3\,a^2+3\,a-1\right)\log\left(bx+a-1\right.}{6\,b^3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*arccoth(b*x+a),x, algorithm="fricas")
```

```
[Out] 1/6*(b^3*x^3*log((b*x + a + 1)/(b*x + a - 1)) + b^2*x^2 - 4*a*b*x + (a^3 +
3*a^2 + 3*a + 1)*log(b*x + a + 1) - (a^3 - 3*a^2 + 3*a - 1)*log(b*x + a - 1
))/b^3
```

**giac** [F] time = 0.00, size = 0, normalized size = 0.00

$$\int x^2\,\mathrm{arcoth}\left(bx+a\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*arccoth(b*x+a),x, algorithm="giac")
```

```
[Out] integrate(x^2*arccoth(b*x + a), x)
```

**maple** [B] time = 0.04, size = 146, normalized size = 1.87

$$\frac{x^3\,\mathrm{arccoth}\left(bx+a\right)}{3}+\frac{x^2}{6b}-\frac{2ax}{3b^2}-\frac{5a^2}{6b^3}-\frac{\ln\left(bx+a-1\right)a^3}{6b^3}+\frac{\ln\left(bx+a-1\right)a^2}{2b^3}-\frac{\ln\left(bx+a-1\right)a}{2b^3}+\frac{\ln\left(bx+a-1\right)}{6b^3}+$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^2*arccoth(b*x+a),x)
```

```
[Out] 1/3*x^3*arccoth(b*x+a)+1/6*x^2/b-2/3*a*x/b^2-5/6/b^3*a^2-1/6/b^3*ln(b*x+a-1
)*a^3+1/2/b^3*ln(b*x+a-1)*a^2-1/2/b^3*ln(b*x+a-1)*a+1/6/b^3*ln(b*x+a-1)+1/6
/b^3*ln(b*x+a+1)*a^3+1/2/b^3*ln(b*x+a+1)*a^2+1/2/b^3*ln(b*x+a+1)*a+1/6/b^3*
ln(b*x+a+1)
```

**maxima** [A] time = 0.31, size = 79, normalized size = 1.01

$$\frac{1}{3}x^3\operatorname{arcoth}(bx+a)+\frac{1}{6}b\left(\frac{bx^2-4ax}{b^3}+\frac{(a^3+3a^2+3a+1)\log(bx+a+1)}{b^4}-\frac{(a^3-3a^2+3a-1)\log(bx+a-$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*arccoth(b*x+a),x, algorithm="maxima")
```

```
[Out] 1/3*x^3*arccoth(b*x + a) + 1/6*b*((b*x^2 - 4*a*x)/b^3 + (a^3 + 3*a^2 + 3*a
+ 1)*log(b*x + a + 1)/b^4 - (a^3 - 3*a^2 + 3*a - 1)*log(b*x + a - 1)/b^4)
```

**mupad** [B] time = 1.36, size = 98, normalized size = 1.26

$$\frac{x^3\ln\left(\frac{1}{a+bx}+1\right)}{6}-\frac{x^3\ln\left(1-\frac{1}{a+bx}\right)}{6}+\frac{x^2}{6b}-\frac{\ln(a+bx-1)\left(a^3-3a^2+3a-1\right)}{6b^3}+\frac{\ln(a+bx+1)\left(a^3+3a^2+3a+\right.}{6b^3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^2*acoth(a + b*x),x)
```

```
[Out] (x^3*log(1/(a + b*x) + 1))/6 - (x^3*log(1 - 1/(a + b*x)))/6 + x^2/(6*b) - (
log(a + b*x - 1)*(3*a - 3*a^2 + a^3 - 1))/(6*b^3) + (log(a + b*x + 1)*(3*a
+ 3*a^2 + a^3 + 1))/(6*b^3) - (2*a*x)/(3*b^2)
```

**sympy** [A] time = 1.27, size = 117, normalized size = 1.50

$$\begin{cases}\frac{a^3\operatorname{acoth}(a+bx)}{3b^3}+\frac{a^2\log(a+bx+1)}{b^3}-\frac{a^2\operatorname{acoth}(a+bx)}{b^3}-\frac{2ax}{3b^2}+\frac{a\operatorname{acoth}(a+bx)}{b^3}+\frac{x^3\operatorname{acoth}(a+bx)}{3}+\frac{x^2}{6b}+\frac{\log(a+bx+1)}{3b^3}-\frac{\operatorname{acoth}(a+bx)}{3b^3} & \\ \frac{x^3\operatorname{acoth}(a)}{3} & \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**2*acoth(b*x+a),x)
```

```
[Out] Piecewise((a**3*acoth(a + b*x)/(3*b**3) + a**2*log(a + b*x + 1)/b**3 - a**2
*acoth(a + b*x)/b**3 - 2*a*x/(3*b**2) + a*acoth(a + b*x)/b**3 + x**3*acoth(
a + b*x)/3 + x**2/(6*b) + log(a + b*x + 1)/(3*b**3) - acoth(a + b*x)/(3*b**
3), Ne(b, 0)), (x**3*acoth(a)/3, True))
```

## 3.64 $\int x \coth^{-1}(a+bx)\,dx$

**Optimal**. Leaf size=65

$$\frac{(1-a)^2\log(-a-bx+1)}{4b^2}-\frac{(a+1)^2\log(a+bx+1)}{4b^2}+\frac{1}{2}x^2\coth^{-1}(a+bx)+\frac{x}{2b}$$

```
[Out] 1/2*x/b+1/2*x^2*arccoth(b*x+a)+1/4*(1-a)^2*ln(-b*x-a+1)/b^2-1/4*(1+a)^2*ln(
b*x+a+1)/b^2
```

**Rubi** [A] time = 0.07, antiderivative size = 65, normalized size of antiderivative = 1.00, number of steps used = 7, number of rules used = 5, integrand size = 8, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.625, Rules used = {6112, 5927, 702, 633, 31}

$$\frac{(1-a)^2\log(-a-bx+1)}{4b^2}-\frac{(a+1)^2\log(a+bx+1)}{4b^2}+\frac{1}{2}x^2\coth^{-1}(a+bx)+\frac{x}{2b}$$

Antiderivative was successfully verified.

```
[In] Int[x*ArcCoth[a + b*x],x]
```

```
[Out] x/(2*b) + (x^2*ArcCoth[a + b*x])/2 + ((1 - a)^2*Log[1 - a - b*x])/(4*b^2) -
 ((1 + a)^2*Log[1 + a + b*x])/(4*b^2)
```

Rule 31

```
Int[((a_) + (b_.)*(x_))^(-1), x_Symbol] :> Simp[Log[RemoveContent[a + b*x,
x]]/b, x] /; FreeQ[{a, b}, x]
```

Rule 633

```
Int[((d_) + (e_.)*(x_))/((a_) + (c_.)*(x_)^2), x_Symbol] :> With[{q = Rt[-(
a*c), 2]}, Dist[e/2 + (c*d)/(2*q), Int[1/(-q + c*x), x], x] + Dist[e/2 - (c
*d)/(2*q), Int[1/(q + c*x), x], x]] /; FreeQ[{a, c, d, e}, x] && NiceSqrtQ[
-(a*c)]
```

Rule 702

```
Int[((d_) + (e_.)*(x_))^(m_)/((a_) + (c_.)*(x_)^2), x_Symbol] :> Int[Polyno
mialDivide[(d + e*x)^m, a + c*x^2, x], x] /; FreeQ[{a, c, d, e}, x] && NeQ[
c*d^2 + a*e^2, 0] && IGtQ[m, 1] && (NeQ[d, 0] || GtQ[m, 2])
```

Rule 5927

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))*((d_) + (e_.)*(x_))^(q_.), x_Symbol
] :> Simp[((d + e*x)^(q + 1)*(a + b*ArcCoth[c*x]))/(e*(q + 1)), x] - Dist[(
b*c)/(e*(q + 1)), Int[(d + e*x)^(q + 1)/(1 - c^2*x^2), x], x] /; FreeQ[{a,
b, c, d, e, q}, x] && NeQ[q, -1]
```

Rule 6112

```
Int[((a_.) + ArcCoth[(c_) + (d_.)*(x_)]*(b_.))^(p_.)*((e_.) + (f_.)*(x_))^(
m_.), x_Symbol] :> Dist[1/d, Subst[Int[((d*e - c*f)/d + (f*x)/d)^m*(a + b*A
rcCoth[x])^p, x], x, c + d*x], x] /; FreeQ[{a, b, c, d, e, f, m}, x] && IGt
Q[p, 0]
```

Rubi steps

$$\int x\coth^{-1}(a+bx)\,dx=\frac{\text{Subst}\left(\int\left(-\frac{a}{b}+\frac{x}{b}\right)\coth^{-1}(x)\,dx,x,a+bx\right)}{b}$$
$$=\frac{1}{2}x^2\coth^{-1}(a+bx)-\frac{1}{2}\text{Subst}\left(\int\frac{\left(-\frac{a}{b}+\frac{x}{b}\right)^2}{1-x^2}\,dx,x,a+bx\right)$$
$$=\frac{1}{2}x^2\coth^{-1}(a+bx)-\frac{1}{2}\text{Subst}\left(\int\left(-\frac{1}{b^2}+\frac{1+a^2-2ax}{b^2\left(1-x^2\right)}\right)dx,x,a+bx\right)$$
$$=\frac{x}{2b}+\frac{1}{2}x^2\coth^{-1}(a+bx)-\frac{\text{Subst}\left(\int\frac{1+a^2-2ax}{1-x^2}\,dx,x,a+bx\right)}{2b^2}$$
$$=\frac{x}{2b}+\frac{1}{2}x^2\coth^{-1}(a+bx)-\frac{(1-a)^2\,\text{Subst}\left(\int\frac{1}{1-x}\,dx,x,a+bx\right)}{4b^2}+\frac{(1+a)^2\,\text{Subst}\left(\int\frac{1}{-1-x}\,dx,x,a+bx\right)}{4b^2}$$
$$=\frac{x}{2b}+\frac{1}{2}x^2\coth^{-1}(a+bx)+\frac{(1-a)^2\log(1-a-bx)}{4b^2}-\frac{(1+a)^2\log(1+a+bx)}{4b^2}$$

**Mathematica** [A] time = 0.02, size = 56, normalized size = 0.86

$$\frac{2b^2x^2\coth^{-1}(a+bx)+(a-1)^2\log(-a-bx+1)-(a+1)^2\log(a+bx+1)+2bx}{4b^2}$$

Antiderivative was successfully verified.

```
[In] Integrate[x*ArcCoth[a + b*x],x]
```

```
[Out] (2*b*x + 2*b^2*x^2*ArcCoth[a + b*x] + (-1 + a)^2*Log[1 - a - b*x] - (1 + a)
^2*Log[1 + a + b*x])/(4*b^2)
```

**fricas** [A] time = 0.84, size = 66, normalized size = 1.02

$$\frac{b^2x^2\log\left(\frac{bx+a+1}{bx+a-1}\right)+2\,bx-\left(a^2+2\,a+1\right)\log\left(bx+a+1\right)+\left(a^2-2\,a+1\right)\log\left(bx+a-1\right)}{4\,b^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*arccoth(b*x+a),x, algorithm="fricas")
```

```
[Out] 1/4*(b^2*x^2*log((b*x + a + 1)/(b*x + a - 1)) + 2*b*x - (a^2 + 2*a + 1)*log
(b*x + a + 1) + (a^2 - 2*a + 1)*log(b*x + a - 1))/b^2
```

**giac** [F] time = 0.00, size = 0, normalized size = 0.00

$$\int x\,\text{arcoth}\left(bx+a\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*arccoth(b*x+a),x, algorithm="giac")
```

```
[Out] integrate(x*arccoth(b*x + a), x)
```

**maple** [A] time = 0.03, size = 89, normalized size = 1.37

$$\frac{x^2\text{arccoth}\left(bx+a\right)}{2}-\frac{\text{arccoth}\left(bx+a\right)a^2}{2b^2}+\frac{x}{2b}+\frac{a}{2b^2}+\frac{\ln\left(bx+a-1\right)}{4b^2}-\frac{\ln\left(bx+a-1\right)a}{2b^2}-\frac{\ln\left(bx+a+1\right)}{4b^2}-\frac{\ln\left(bx+a\right.}{2b^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x*arccoth(b*x+a),x)
```

```
[Out] 1/2*x^2*arccoth(b*x+a)-1/2/b^2*arccoth(b*x+a)*a^2+1/2*x/b+1/2/b^2*a+1/4/b^2
*ln(b*x+a-1)-1/2/b^2*ln(b*x+a-1)*a-1/4/b^2*ln(b*x+a+1)-1/2/b^2*ln(b*x+a+1)*
a
```

**maxima** [A] time = 0.30, size = 61, normalized size = 0.94

$$\frac{1}{2}x^2 \operatorname{arcoth}(bx+a) + \frac{1}{4}b\left(\frac{2x}{b^2} - \frac{\left(a^2+2a+1\right)\log(bx+a+1)}{b^3} + \frac{\left(a^2-2a+1\right)\log(bx+a-1)}{b^3}\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*arccoth(b*x+a),x, algorithm="maxima")
```

```
[Out] 1/2*x^2*arccoth(b*x + a) + 1/4*b*(2*x/b^2 - (a^2 + 2*a + 1)*log(b*x + a + 1
)/b^3 + (a^2 - 2*a + 1)*log(b*x + a - 1)/b^3)
```

**mupad** [B] time = 2.00, size = 62, normalized size = 0.95

$$\frac{x^2 \operatorname{acoth}(a+bx)}{2} - \frac{\frac{\operatorname{acoth}(a+bx)}{2} - \frac{bx}{2} + \frac{a^2 \operatorname{acoth}(a+bx)}{2} + \frac{a \ln\left(a^2+2abx+b^2x^2-1\right)}{2}}{b^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x*acoth(a + b*x),x)
```

```
[Out] (x^2*acoth(a + b*x))/2 - (acoth(a + b*x)/2 - (b*x)/2 + (a^2*acoth(a + b*x))
/2 + (a*log(a^2 + b^2*x^2 + 2*a*b*x - 1))/2)/b^2
```

**sympy** [A] time = 0.81, size = 76, normalized size = 1.17

$$\begin{cases} -\frac{a^2 \operatorname{acoth}(a+bx)}{2b^2} - \frac{a \log(a+bx+1)}{b^2} + \frac{a \operatorname{acoth}(a+bx)}{b^2} + \frac{x^2 \operatorname{acoth}(a+bx)}{2} + \frac{x}{2b} - \frac{\operatorname{acoth}(a+bx)}{2b^2} & \text{for } b \neq 0 \\ \frac{x^2 \operatorname{acoth}(a)}{2} & \text{otherwise} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*acoth(b*x+a),x)
```

```
[Out] Piecewise((-a**2*acoth(a + b*x)/(2*b**2) - a*log(a + b*x + 1)/b**2 + a*acot
h(a + b*x)/b**2 + x**2*acoth(a + b*x)/2 + x/(2*b) - acoth(a + b*x)/(2*b**2)
, Ne(b, 0)), (x**2*acoth(a)/2, True))
```

# 3.65 $\int \coth^{-1}(a+bx)\,dx$

**Optimal**. Leaf size=35

$$\frac{\log\left(1-(a+bx)^2\right)}{2b}+\frac{(a+bx)\coth^{-1}(a+bx)}{b}$$

```
[Out] (b*x+a)*arccoth(b*x+a)/b+1/2*ln(1-(b*x+a)^2)/b
```

**Rubi [A]** time = 0.02, antiderivative size = 35, normalized size of antiderivative = 1.00, number of steps used = 3, number of rules used = 3, integrand size = 6, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.500, Rules used = {6104, 5911, 260}

$$\frac{\log\left(1-(a+bx)^2\right)}{2b}+\frac{(a+bx)\coth^{-1}(a+bx)}{b}$$

Antiderivative was successfully verified.

```
[In] Int[ArcCoth[a + b*x],x]
```

```
[Out] ((a + b*x)*ArcCoth[a + b*x])/b + Log[1 - (a + b*x)^2]/(2*b)
```

Rule 260

```
Int[(x_)^(m_.)/((a_) + (b_.)*(x_)^(n_)), x_Symbol] :> Simp[Log[RemoveConten
t[a + b*x^n, x]]/(b*n), x] /; FreeQ[{a, b, m, n}, x] && EqQ[m, n - 1]
```

Rule 5911

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.), x_Symbol] :> Simp[x*(a + b*A
rcCoth[c*x])^p, x] - Dist[b*c*p, Int[(x*(a + b*ArcCoth[c*x])^(p - 1))/(1 -
c^2*x^2), x], x] /; FreeQ[{a, b, c}, x] && IGtQ[p, 0]
```

Rule 6104

```
Int[((a_.) + ArcCoth[(c_) + (d_.)*(x_)]*(b_.))^(p_.), x_Symbol] :> Dist[1/d
, Subst[Int[(a + b*ArcCoth[x])^p, x], x, c + d*x], x] /; FreeQ[{a, b, c, d}
, x] && IGtQ[p, 0]
```

Rubi steps

$$\begin{aligned}\int \coth^{-1}(a+bx)\,dx &= \frac{\text{Subst}\left(\int \coth^{-1}(x)\,dx,x,a+bx\right)}{b}\\ &= \frac{(a+bx)\coth^{-1}(a+bx)}{b}-\frac{\text{Subst}\left(\int \frac{x}{1-x^2}\,dx,x,a+bx\right)}{b}\\ &= \frac{(a+bx)\coth^{-1}(a+bx)}{b}+\frac{\log\left(1-(a+bx)^2\right)}{2b}\end{aligned}$$

**Mathematica [A]** time = 0.01, size = 43, normalized size = 1.23

$$\frac{(a+1)\log(a+bx+1)-(a-1)\log(-a-bx+1)}{2b}+x\coth^{-1}(a+bx)$$

Antiderivative was successfully verified.

```
[In] Integrate[ArcCoth[a + b*x],x]
```

```
[Out] x*ArcCoth[a + b*x] + (-((-1 + a)*Log[1 - a - b*x]) + (1 + a)*Log[1 + a + b*
x])/(2*b)
```

**fricas [A]** time = 0.67, size = 48, normalized size = 1.37

$$\frac{bx\log\left(\frac{bx+a+1}{bx+a-1}\right)+(a+1)\log(bx+a+1)-(a-1)\log(bx+a-1)}{2\,b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(b*x+a),x, algorithm="fricas")
```

```
[Out] 1/2*(b*x*log((b*x + a + 1)/(b*x + a - 1)) + (a + 1)*log(b*x + a + 1) - (a -
 1)*log(b*x + a - 1))/b
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \operatorname{arcoth}(bx+a)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(b*x+a),x, algorithm="giac")
```

```
[Out] integrate(arccoth(b*x + a), x)
```

**maple [A]** time = 0.03, size = 36, normalized size = 1.03

$$x\operatorname{arccoth}(bx+a)+\frac{\operatorname{arccoth}(bx+a)\,a}{b}+\frac{\ln\left((bx+a)^2-1\right)}{2b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(arccoth(b*x+a),x)
```

```
[Out] x*arccoth(b*x+a)+1/b*arccoth(b*x+a)*a+1/2/b*ln((b*x+a)^2-1)
```

**maxima [A]** time = 0.31, size = 31, normalized size = 0.89

$$\frac{2\,(bx+a)\operatorname{arcoth}(bx+a)+\log\left(-(bx+a)^2+1\right)}{2\,b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(b*x+a),x, algorithm="maxima")
```

```
[Out] 1/2*(2*(b*x + a)*arccoth(b*x + a) + log(-(b*x + a)^2 + 1))/b
```

**mupad [B]** time = 1.71, size = 42, normalized size = 1.20

$$\frac{\frac{\ln\left(a^2+2\,a\,b\,x+b^2\,x^2-1\right)}{2}+a\operatorname{acoth}(a+b\,x)}{b}+x\operatorname{acoth}(a+b\,x)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(a + b*x),x)
```

```
[Out] (log(a^2 + b^2*x^2 + 2*a*b*x - 1)/2 + a*acoth(a + b*x))/b + x*acoth(a + b*x
)
```

**sympy [A]** time = 0.51, size = 41, normalized size = 1.17

$$\begin{cases} \frac{a\operatorname{acoth}(a+bx)}{b}+x\operatorname{acoth}(a+bx)+\frac{\log(a+bx+1)}{b}-\frac{\operatorname{acoth}(a+bx)}{b} & \text{for}\ b\neq 0 \\ x\operatorname{acoth}(a) & \text{otherwise} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(b*x+a),x)
```

```
[Out] Piecewise((a*acoth(a + b*x)/b + x*acoth(a + b*x) + log(a + b*x + 1)/b - aco
th(a + b*x)/b, Ne(b, 0)), (x*acoth(a), True))
```

# 3.66 $\int \frac{\coth^{-1}(a+bx)}{x}\,dx$

**Optimal**. Leaf size=92

$$\frac{1}{2}\text{Li}_2\left(1-\frac{2}{a+bx+1}\right)-\frac{1}{2}\text{Li}_2\left(1-\frac{2bx}{(1-a)(a+bx+1)}\right)+\log\left(\frac{2}{a+bx+1}\right)\left(-\coth^{-1}(a+bx)\right)+\log\left(\frac{2bx}{(1-a)(a+ \right.$$

```
[Out] -arccoth(b*x+a)*ln(2/(b*x+a+1))+arccoth(b*x+a)*ln(2*b*x/(1-a)/(b*x+a+1))+1/
2*polylog(2,1-2/(b*x+a+1))-1/2*polylog(2,1-2*b*x/(1-a)/(b*x+a+1))
```

**Rubi [A]** time = 0.10, antiderivative size = 92, normalized size of antiderivative = 1.00, number of steps used = 5, number of rules used = 5, integrand size = 10, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.500, Rules used = {6112, 5921, 2402, 2315, 2447}

$$\frac{1}{2}\text{PolyLog}\left(2,1-\frac{2}{a+bx+1}\right)-\frac{1}{2}\text{PolyLog}\left(2,1-\frac{2bx}{(1-a)(a+bx+1)}\right)+\log\left(\frac{2}{a+bx+1}\right)\left(-\coth^{-1}(a+bx)\right)+$$

Antiderivative was successfully verified.

```
[In] Int[ArcCoth[a + b*x]/x,x]
```

```
[Out] -(ArcCoth[a + b*x]*Log[2/(1 + a + b*x)]) + ArcCoth[a + b*x]*Log[(2*b*x)/((1
 - a)*(1 + a + b*x))] + PolyLog[2, 1 - 2/(1 + a + b*x)]/2 - PolyLog[2, 1 -
(2*b*x)/((1 - a)*(1 + a + b*x))]/2
```

Rule 2315

```
Int[Log[(c_.)*(x_)]/((d_) + (e_.)*(x_)), x_Symbol] :> -Simp[PolyLog[2, 1 -
c*x]/e, x] /; FreeQ[{c, d, e}, x] && EqQ[e + c*d, 0]
```

Rule 2402

```
Int[Log[(c_.)/((d_) + (e_.)*(x_))]/((f_) + (g_.)*(x_)^2), x_Symbol] :> -Dis
t[e/g, Subst[Int[Log[2*d*x]/(1 - 2*d*x), x], x, 1/(d + e*x)], x] /; FreeQ[{
c, d, e, f, g}, x] && EqQ[c, 2*d] && EqQ[e^2*f + d^2*g, 0]
```

Rule 2447

```
Int[Log[u_]*(Pq_)^(m_.), x_Symbol] :> With[{C = FullSimplify[(Pq^m*(1 - u))
/D[u, x]]}, Simp[C*PolyLog[2, 1 - u], x] /; FreeQ[C, x]] /; IntegerQ[m] &&
PolyQ[Pq, x] && RationalFunctionQ[u, x] && LeQ[RationalFunctionExponents[u,
 x][[2]], Expon[Pq, x]]
```

Rule 5921

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))/((d_) + (e_.)*(x_)), x_Symbol] :> -
Simp[((a + b*ArcCoth[c*x])*Log[2/(1 + c*x)])/e, x] + (Dist[(b*c)/e, Int[Log
[2/(1 + c*x)]/(1 - c^2*x^2), x], x] - Dist[(b*c)/e, Int[Log[(2*c*(d + e*x))
/((c*d + e)*(1 + c*x))]/(1 - c^2*x^2), x], x] + Simp[((a + b*ArcCoth[c*x])*
Log[(2*c*(d + e*x))/((c*d + e)*(1 + c*x))])/e, x]) /; FreeQ[{a, b, c, d, e}
, x] && NeQ[c^2*d^2 - e^2, 0]
```

Rule 6112

```
Int[((a_.) + ArcCoth[(c_) + (d_.)*(x_)]*(b_.))^(p_.)*((e_.) + (f_.)*(x_))^(
m_.), x_Symbol] :> Dist[1/d, Subst[Int[((d*e - c*f)/d + (f*x)/d)^m*(a + b*A
rcCoth[x])^p, x], x, c + d*x], x] /; FreeQ[{a, b, c, d, e, f, m}, x] && IGt
Q[p, 0]
```

Rubi steps

$$\int \frac{\coth^{-1}(a+bx)}{x}\,dx = \frac{\text{Subst}\left(\int \frac{\coth^{-1}(x)}{-\frac{a}{b}+\frac{x}{b}}\,dx, x, a+bx\right)}{b}$$

$$= -\coth^{-1}(a+bx)\log\left(\frac{2}{1+a+bx}\right) + \coth^{-1}(a+bx)\log\left(\frac{2bx}{(1-a)(1+a+bx)}\right) + \text{Subst}\Bigg($$

$$= -\coth^{-1}(a+bx)\log\left(\frac{2}{1+a+bx}\right) + \coth^{-1}(a+bx)\log\left(\frac{2bx}{(1-a)(1+a+bx)}\right) - \frac{1}{2}\text{Li}_2\Big(1$$

$$= -\coth^{-1}(a+bx)\log\left(\frac{2}{1+a+bx}\right) + \coth^{-1}(a+bx)\log\left(\frac{2bx}{(1-a)(1+a+bx)}\right) + \frac{1}{2}\text{Li}_2\Big(1$$

**Mathematica [C]** time = 0.17, size = 259, normalized size = 2.82

$$\frac{1}{8}\Big(-4\text{Li}_2\left(e^{2\tanh^{-1}(a)-2\tanh^{-1}(a+bx)}\right) - 4\text{Li}_2\left(-e^{2\tanh^{-1}(a+bx)}\right) + 4\left(\tanh^{-1}(a)-\tanh^{-1}(a+bx)\right)^2 - \Big(\pi - 2i\tanh^{-1}(a$$

Warning: Unable to verify antiderivative.

```
[In] Integrate[ArcCoth[a + b*x]/x,x]
```

```
[Out] (ArcCoth[a + b*x] - ArcTanh[a + b*x])*Log[x] + ArcTanh[a + b*x]*(-Log[1/Sqr
t[1 - (a + b*x)^2]] + Log[(-I)*Sinh[ArcTanh[a] - ArcTanh[a + b*x]]]) + (4*(
ArcTanh[a] - ArcTanh[a + b*x])^2 - (Pi - (2*I)*ArcTanh[a + b*x])^2 - 8*(Arc
Tanh[a] - ArcTanh[a + b*x])*Log[1 - E^(2*ArcTanh[a] - 2*ArcTanh[a + b*x])]
- (4*I)*(Pi - (2*I)*ArcTanh[a + b*x])*Log[1 + E^(2*ArcTanh[a + b*x])] + 4*(
I*Pi + 2*ArcTanh[a + b*x])*Log[2/Sqrt[1 - (a + b*x)^2]] + 8*(ArcTanh[a] - A
rcTanh[a + b*x])*Log[(-2*I)*Sinh[ArcTanh[a] - ArcTanh[a + b*x]]] - 4*PolyLo
g[2, E^(2*ArcTanh[a] - 2*ArcTanh[a + b*x])] - 4*PolyLog[2, -E^(2*ArcTanh[a
+ b*x])])/8
```

**fricas [F]** time = 0.70, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{\text{arcoth}(bx+a)}{x}, x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(b*x+a)/x,x, algorithm="fricas")
```

```
[Out] integral(arccoth(b*x + a)/x, x)
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\text{arcoth}(bx+a)}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(b*x+a)/x,x, algorithm="giac")
```

```
[Out] integrate(arccoth(b*x + a)/x, x)
```

**maple [A]** time = 0.06, size = 81, normalized size = 0.88

$$\ln(bx)\,\text{arccoth}(bx+a) - \frac{\text{dilog}\left(\frac{bx+a+1}{1+a}\right)}{2} - \frac{\ln(bx)\ln\left(\frac{bx+a+1}{1+a}\right)}{2} + \frac{\text{dilog}\left(\frac{bx+a-1}{a-1}\right)}{2} + \frac{\ln(bx)\ln\left(\frac{bx+a-1}{a-1}\right)}{2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(arccoth(b*x+a)/x,x)
```

```
[Out] ln(b*x)*arccoth(b*x+a)-1/2*dilog((b*x+a+1)/(1+a))-1/2*ln(b*x)*ln((b*x+a+1)/
(1+a))+1/2*dilog((b*x+a-1)/(a-1))+1/2*ln(b*x)*ln((b*x+a-1)/(a-1))
```

**maxima [A]** time = 0.31, size = 128, normalized size = 1.39

$$-\frac{1}{2}\,b\left(\frac{\log\left(bx+a+1\right)}{b}-\frac{\log\left(bx+a-1\right)}{b}\right)\log(x)+\frac{1}{2}\,b\left(\frac{\log\left(bx+a+1\right)\log\left(-\frac{bx+a+1}{a+1}+1\right)+\mathrm{Li}_2\left(\frac{bx+a+1}{a+1}\right)}{b}-\frac{\log}{}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(b*x+a)/x,x, algorithm="maxima")
```

```
[Out] -1/2*b*(log(b*x + a + 1)/b - log(b*x + a - 1)/b)*log(x) + 1/2*b*((log(b*x +
 a + 1)*log(-(b*x + a + 1)/(a + 1) + 1) + dilog((b*x + a + 1)/(a + 1)))/b -
 (log(b*x + a - 1)*log(-(b*x + a - 1)/(a - 1) + 1) + dilog((b*x + a - 1)/(a
 - 1)))/b) + arccoth(b*x + a)*log(x)
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.01

$$\int \frac{\mathrm{acoth}\left(a+b\,x\right)}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(a + b*x)/x,x)
```

```
[Out] int(acoth(a + b*x)/x, x)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\mathrm{acoth}\left(a+bx\right)}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(b*x+a)/x,x)
```

```
[Out] Integral(acoth(a + b*x)/x, x)
```

## 3.67 $\int \frac{\coth^{-1}(a+bx)}{x^2}\,dx$

**Optimal**. Leaf size=64

$$\frac{b\log(x)}{1-a^2}-\frac{b\log(-a-bx+1)}{2(1-a)}-\frac{b\log(a+bx+1)}{2(a+1)}-\frac{\coth^{-1}(a+bx)}{x}$$

```
[Out] -arccoth(b*x+a)/x+b*ln(x)/(-a^2+1)-1/2*b*ln(-b*x-a+1)/(1-a)-1/2*b*ln(b*x+a+
1)/(1+a)
```

**Rubi [A]** time = 0.05, antiderivative size = 64, normalized size of antiderivative = 1.00, number of steps used = 7, number of rules used = 5, integrand size = 10, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.500, Rules used = {6110, 371, 706, 31, 633}

$$\frac{b\log(x)}{1-a^2}-\frac{b\log(-a-bx+1)}{2(1-a)}-\frac{b\log(a+bx+1)}{2(a+1)}-\frac{\coth^{-1}(a+bx)}{x}$$

Antiderivative was successfully verified.

```
[In] Int[ArcCoth[a + b*x]/x^2,x]
```

```
[Out] -(ArcCoth[a + b*x]/x) + (b*Log[x])/(1 - a^2) - (b*Log[1 - a - b*x])/(2*(1 -
 a)) - (b*Log[1 + a + b*x])/(2*(1 + a))
```

Rule 31

```
Int[((a_) + (b_.)*(x_))^(-1), x_Symbol] :> Simp[Log[RemoveContent[a + b*x,
x]]/b, x] /; FreeQ[{a, b}, x]
```

Rule 371

```
Int[((a_) + (b_.)*(v_)^(n_))^(p_.)*(x_)^(m_.), x_Symbol] :> With[{c = Coeff
icient[v, x, 0], d = Coefficient[v, x, 1]}, Dist[1/d^(m + 1), Subst[Int[Sim
plifyIntegrand[(x - c)^m*(a + b*x^n)^p, x], x], x, v], x] /; NeQ[c, 0]] /;
FreeQ[{a, b, n, p}, x] && LinearQ[v, x] && IntegerQ[m]
```

Rule 633

```
Int[((d_) + (e_.)*(x_))/((a_) + (c_.)*(x_)^2), x_Symbol] :> With[{q = Rt[-(
a*c), 2]}, Dist[e/2 + (c*d)/(2*q), Int[1/(-q + c*x), x], x] + Dist[e/2 - (c
*d)/(2*q), Int[1/(q + c*x), x], x]] /; FreeQ[{a, c, d, e}, x] && NiceSqrtQ[
-(a*c)]
```

Rule 706

```
Int[1/(((d_) + (e_.)*(x_))*((a_) + (c_.)*(x_)^2)), x_Symbol] :> Dist[e^2/(c
*d^2 + a*e^2), Int[1/(d + e*x), x], x] + Dist[1/(c*d^2 + a*e^2), Int[(c*d -
 c*e*x)/(a + c*x^2), x], x] /; FreeQ[{a, c, d, e}, x] && NeQ[c*d^2 + a*e^2,
 0]
```

Rule 6110

```
Int[((a_.) + ArcCoth[(c_) + (d_.)*(x_)]*(b_.))^(p_.)*((e_.) + (f_.)*(x_))^(
m_), x_Symbol] :> Simp[((e + f*x)^(m + 1)*(a + b*ArcCoth[c + d*x])^p)/(f*(m
 + 1)), x] - Dist[(b*d*p)/(f*(m + 1)), Int[((e + f*x)^(m + 1)*(a + b*ArcCot
h[c + d*x])^(p - 1))/(1 - (c + d*x)^2), x], x] /; FreeQ[{a, b, c, d, e, f},
 x] && IGtQ[p, 0] && ILtQ[m, -1]
```

Rubi steps

$$
\begin{aligned}
\int \frac{\coth^{-1}(a+bx)}{x^2}\,dx &= -\frac{\coth^{-1}(a+bx)}{x}+b\int \frac{1}{x\left(1-(a+bx)^2\right)}\,dx \\
&= -\frac{\coth^{-1}(a+bx)}{x}+b\,\text{Subst}\left(\int \frac{1}{(-a+x)\left(1-x^2\right)}\,dx,x,a+bx\right) \\
&= -\frac{\coth^{-1}(a+bx)}{x}+\frac{b\,\text{Subst}\left(\int \frac{1}{-a+x}\,dx,x,a+bx\right)}{1-a^2}+\frac{b\,\text{Subst}\left(\int \frac{a+x}{1-x^2}\,dx,x,a+bx\right)}{1-a^2} \\
&= -\frac{\coth^{-1}(a+bx)}{x}+\frac{b\log(x)}{1-a^2}+\frac{b\,\text{Subst}\left(\int \frac{1}{1-x}\,dx,x,a+bx\right)}{2(1-a)}+\frac{b\,\text{Subst}\left(\int \frac{1}{-1-x}\,dx,x,a\right.}{2(1+a)} \\
&= -\frac{\coth^{-1}(a+bx)}{x}+\frac{b\log(x)}{1-a^2}-\frac{b\log(1-a-bx)}{2(1-a)}-\frac{b\log(1+a+bx)}{2(1+a)}
\end{aligned}
$$

**Mathematica [A]** time = 0.06, size = 55, normalized size = 0.86

$$
\frac{b((a+1)\log(-a-bx+1)-(a-1)\log(a+bx+1)-2\log(x))}{2\left(a^2-1\right)}-\frac{\coth^{-1}(a+bx)}{x}
$$

Antiderivative was successfully verified.

```
[In] Integrate[ArcCoth[a + b*x]/x^2,x]
```

```
[Out] -(ArcCoth[a + b*x]/x) + (b*(-2*Log[x] + (1 + a)*Log[1 - a - b*x] - (-1 + a)
*Log[1 + a + b*x]))/(2*(-1 + a^2))
```

**fricas [A]** time = 0.68, size = 68, normalized size = 1.06

$$
-\frac{(a-1)bx\log\left(bx+a+1\right)-(a+1)bx\log\left(bx+a-1\right)+2\,bx\log(x)+\left(a^2-1\right)\log\left(\frac{bx+a+1}{bx+a-1}\right)}{2\left(a^2-1\right)x}
$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(b*x+a)/x^2,x, algorithm="fricas")
```

```
[Out] -1/2*((a - 1)*b*x*log(b*x + a + 1) - (a + 1)*b*x*log(b*x + a - 1) + 2*b*x*l
og(x) + (a^2 - 1)*log((b*x + a + 1)/(b*x + a - 1)))/((a^2 - 1)*x)
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$
\int \frac{\operatorname{arcoth}\left(bx+a\right)}{x^2}\,dx
$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(b*x+a)/x^2,x, algorithm="giac")
```

```
[Out] integrate(arccoth(b*x + a)/x^2, x)
```

**maple [A]** time = 0.04, size = 63, normalized size = 0.98

$$
-\frac{\operatorname{arccoth}\left(bx+a\right)}{x}+\frac{b\ln\left(bx+a-1\right)}{2a-2}-\frac{b\ln\left(bx+a+1\right)}{2+2a}-\frac{b\ln\left(bx\right)}{\left(a-1\right)\left(1+a\right)}
$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(arccoth(b*x+a)/x^2,x)
```

```
[Out] -arccoth(b*x+a)/x+b/(2*a-2)*ln(b*x+a-1)-b/(2+2*a)*ln(b*x+a+1)-b/(a-1)/(1+a)
*ln(b*x)
```

**maxima [A]** time = 0.31, size = 54, normalized size = 0.84

$$-\frac{1}{2}b\left(\frac{\log\left(bx+a+1\right)}{a+1}-\frac{\log\left(bx+a-1\right)}{a-1}+\frac{2\log(x)}{a^2-1}\right)-\frac{\operatorname{arcoth}\left(bx+a\right)}{x}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(b*x+a)/x^2,x, algorithm="maxima")
```

```
[Out] -1/2*b*(log(b*x + a + 1)/(a + 1) - log(b*x + a - 1)/(a - 1) + 2*log(x)/(a^2
 - 1)) - arccoth(b*x + a)/x
```

**mupad [B]** time = 1.73, size = 62, normalized size = 0.97

$$-\frac{\operatorname{acoth}\left(a+b\,x\right)}{x}-\frac{b\,x\,\ln(x)-\frac{b\,x\,\ln\left(a^2+2\,a\,b\,x+b^2\,x^2-1\right)}{2}+a\,b\,x\operatorname{acoth}\left(a+b\,x\right)}{x\,\left(a^2-1\right)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(a + b*x)/x^2,x)
```

```
[Out] - acoth(a + b*x)/x - (b*x*log(x) - (b*x*log(a^2 + b^2*x^2 + 2*a*b*x - 1))/2
 + a*b*x*acoth(a + b*x))/(x*(a^2 - 1))
```

**sympy [A]** time = 1.48, size = 144, normalized size = 2.25

$$\begin{cases} \frac{b\operatorname{acoth}\left(bx-1\right)}{2}-\frac{\operatorname{acoth}\left(bx-1\right)}{x}-\frac{1}{2x} & \text{for}\: a=-1 \\ -\frac{b\operatorname{acoth}\left(bx+1\right)}{2}-\frac{\operatorname{acoth}\left(bx+1\right)}{x}+\frac{1}{2x} & \text{for}\: a=1 \\ -\frac{a^2\operatorname{acoth}\left(a+bx\right)}{a^2x-x}-\frac{abx\operatorname{acoth}\left(a+bx\right)}{a^2x-x}-\frac{bx\log\left(x\right)}{a^2x-x}+\frac{bx\log\left(a+bx+1\right)}{a^2x-x}-\frac{bx\operatorname{acoth}\left(a+bx\right)}{a^2x-x}+\frac{\operatorname{acoth}\left(a+bx\right)}{a^2x-x} & \text{otherwise} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(b*x+a)/x**2,x)
```

```
[Out] Piecewise((b*acoth(b*x - 1)/2 - acoth(b*x - 1)/x - 1/(2*x), Eq(a, -1)), (-b
*acoth(b*x + 1)/2 - acoth(b*x + 1)/x + 1/(2*x), Eq(a, 1)), (-a**2*acoth(a +
 b*x)/(a**2*x - x) - a*b*x*acoth(a + b*x)/(a**2*x - x) - b*x*log(x)/(a**2*x
 - x) + b*x*log(a + b*x + 1)/(a**2*x - x) - b*x*acoth(a + b*x)/(a**2*x - x)
 + acoth(a + b*x)/(a**2*x - x), True))
```

# 3.68 $\int \frac{\coth^{-1}(a+bx)}{x^3} dx$

**Optimal**. Leaf size=90

$$\frac{ab^2\log(x)}{\left(1-a^2\right)^2}-\frac{b}{2\left(1-a^2\right)x}-\frac{b^2\log(-a-bx+1)}{4(1-a)^2}+\frac{b^2\log(a+bx+1)}{4(a+1)^2}-\frac{\coth^{-1}(a+bx)}{2x^2}$$

```
[Out] -1/2*b/(-a^2+1)/x-1/2*arccoth(b*x+a)/x^2+a*b^2*ln(x)/(-a^2+1)^2-1/4*b^2*ln(
-b*x-a+1)/(1-a)^2+1/4*b^2*ln(b*x+a+1)/(1+a)^2
```

**Rubi** [A] time = 0.10, antiderivative size = 90, normalized size of antiderivative = 1.00, number of steps used = 5, number of rules used = 4, integrand size = 10, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.400, Rules used = {6110, 371, 710, 801}

$$\frac{ab^2\log(x)}{\left(1-a^2\right)^2}-\frac{b}{2\left(1-a^2\right)x}-\frac{b^2\log(-a-bx+1)}{4(1-a)^2}+\frac{b^2\log(a+bx+1)}{4(a+1)^2}-\frac{\coth^{-1}(a+bx)}{2x^2}$$

Antiderivative was successfully verified.

```
[In] Int[ArcCoth[a + b*x]/x^3,x]
```

```
[Out] -b/(2*(1 - a^2)*x) - ArcCoth[a + b*x]/(2*x^2) + (a*b^2*Log[x])/(1 - a^2)^2
- (b^2*Log[1 - a - b*x])/(4*(1 - a)^2) + (b^2*Log[1 + a + b*x])/(4*(1 + a)^
2)
```

Rule 371

```
Int[((a_) + (b_.)*(v_)^(n_))^(p_.)*(x_)^(m_.), x_Symbol] :> With[{c = Coeff
icient[v, x, 0], d = Coefficient[v, x, 1]}, Dist[1/d^(m + 1), Subst[Int[Sim
plifyIntegrand[(x - c)^m*(a + b*x^n)^p, x], x], x, v], x] /; NeQ[c, 0]] /;
FreeQ[{a, b, n, p}, x] && LinearQ[v, x] && IntegerQ[m]
```

Rule 710

```
Int[((d_) + (e_.)*(x_))^(m_)/((a_) + (c_.)*(x_)^2), x_Symbol] :> Simp[(e*(d
 + e*x)^(m + 1))/((m + 1)*(c*d^2 + a*e^2)), x] + Dist[c/(c*d^2 + a*e^2), In
t[((d + e*x)^(m + 1)*(d - e*x))/(a + c*x^2), x], x] /; FreeQ[{a, c, d, e, m
}, x] && NeQ[c*d^2 + a*e^2, 0] && LtQ[m, -1]
```

Rule 801

```
Int[(((d_.) + (e_.)*(x_))^(m_)*((f_.) + (g_.)*(x_)))/((a_) + (c_.)*(x_)^2),
 x_Symbol] :> Int[ExpandIntegrand[((d + e*x)^m*(f + g*x))/(a + c*x^2), x],
x] /; FreeQ[{a, c, d, e, f, g}, x] && NeQ[c*d^2 + a*e^2, 0] && IntegerQ[m]
```

Rule 6110

```
Int[((a_.) + ArcCoth[(c_) + (d_.)*(x_)]*(b_.))^(p_.)*((e_.) + (f_.)*(x_))^(
m_), x_Symbol] :> Simp[((e + f*x)^(m + 1)*(a + b*ArcCoth[c + d*x])^p)/(f*(m
 + 1)), x] - Dist[(b*d*p)/(f*(m + 1)), Int[((e + f*x)^(m + 1)*(a + b*ArcCot
h[c + d*x])^(p - 1))/(1 - (c + d*x)^2), x], x] /; FreeQ[{a, b, c, d, e, f},
 x] && IGtQ[p, 0] && ILtQ[m, -1]
```

Rubi steps

$$
\begin{aligned}
\int \frac{\coth^{-1}(a+bx)}{x^3}\,dx &= -\frac{\coth^{-1}(a+bx)}{2x^2} + \frac{1}{2}b\int \frac{1}{x^2\left(1-(a+bx)^2\right)}\,dx \\
&= -\frac{\coth^{-1}(a+bx)}{2x^2} + \frac{1}{2}b^2\,\mathrm{Subst}\left(\int \frac{1}{(-a+x)^2\left(1-x^2\right)}\,dx, x, a+bx\right) \\
&= -\frac{b}{2\left(1-a^2\right)x} - \frac{\coth^{-1}(a+bx)}{2x^2} - \frac{b^2\,\mathrm{Subst}\left(\int \frac{-a-x}{(-a+x)\left(1-x^2\right)}\,dx, x, a+bx\right)}{2\left(1-a^2\right)} \\
&= -\frac{b}{2\left(1-a^2\right)x} - \frac{\coth^{-1}(a+bx)}{2x^2} - \frac{b^2\,\mathrm{Subst}\left(\int \left(-\frac{2a}{\left(-1+a^2\right)(a-x)} + \frac{-1-a}{2(-1+a)(-1+x)} + \frac{-1+a}{2(1+a)(1+x)}\right)\right.}{2\left(1-a^2\right)} \\
&= -\frac{b}{2\left(1-a^2\right)x} - \frac{\coth^{-1}(a+bx)}{2x^2} + \frac{ab^2\log(x)}{\left(1-a^2\right)^2} - \frac{b^2\log(1-a-bx)}{4(1-a)^2} + \frac{b^2\log(1+a+bx)}{4(1+a)^2}
\end{aligned}
$$

**Mathematica [A]** time = 0.12, size = 76, normalized size = 0.84

$$
\frac{1}{4}\left(b\left(\frac{4ab\log(x)}{\left(a^2-1\right)^2} + \frac{2}{\left(a^2-1\right)x} - \frac{b\log(-a-bx+1)}{(a-1)^2} + \frac{b\log(a+bx+1)}{(a+1)^2}\right) - \frac{2\coth^{-1}(a+bx)}{x^2}\right)
$$

Antiderivative was successfully verified.

```
[In] Integrate[ArcCoth[a + b*x]/x^3,x]
```

```
[Out] ((-2*ArcCoth[a + b*x])/x^2 + b*(2/((-1 + a^2)*x) + (4*a*b*Log[x])/(-1 + a^2
)^2 - (b*Log[1 - a - b*x])/(-1 + a)^2 + (b*Log[1 + a + b*x])/(1 + a)^2))/4
```

**fricas [A]** time = 0.72, size = 111, normalized size = 1.23

$$
\frac{\left(a^2-2a+1\right)b^2x^2\log(bx+a+1) - \left(a^2+2a+1\right)b^2x^2\log(bx+a-1) + 4ab^2x^2\log(x) + 2\left(a^2-1\right)bx - \left(a^4-2\right.}{4\left(a^4-2a^2+1\right)x^2}
$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(b*x+a)/x^3,x, algorithm="fricas")
```

```
[Out] 1/4*((a^2 - 2*a + 1)*b^2*x^2*log(b*x + a + 1) - (a^2 + 2*a + 1)*b^2*x^2*log
(b*x + a - 1) + 4*a*b^2*x^2*log(x) + 2*(a^2 - 1)*b*x - (a^4 - 2*a^2 + 1)*lo
g((b*x + a + 1)/(b*x + a - 1)))/((a^4 - 2*a^2 + 1)*x^2)
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$
\int \frac{\operatorname{arcoth}(bx+a)}{x^3}\,dx
$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(b*x+a)/x^3,x, algorithm="giac")
```

```
[Out] integrate(arccoth(b*x + a)/x^3, x)
```

**maple [A]** time = 0.04, size = 82, normalized size = 0.91

$$
-\frac{\operatorname{arccoth}(bx+a)}{2x^2} - \frac{b^2\ln(bx+a-1)}{4(a-1)^2} + \frac{b^2\ln(bx+a+1)}{4(1+a)^2} + \frac{b}{2(a-1)(1+a)x} + \frac{b^2a\ln(bx)}{(a-1)^2(1+a)^2}
$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(arccoth(b*x+a)/x^3,x)
```

```
[Out] -1/2*arccoth(b*x+a)/x^2-1/4*b^2/(a-1)^2*ln(b*x+a-1)+1/4*b^2*ln(b*x+a+1)/(1+
a)^2+1/2*b/(a-1)/(1+a)/x+b^2*a/(a-1)^2/(1+a)^2*ln(b*x)
```

**maxima [A]** time = 0.30, size = 85, normalized size = 0.94

$$\frac{1}{4}\left(\frac{4\,ab\log(x)}{a^4-2\,a^2+1}+\frac{b\log(bx+a+1)}{a^2+2\,a+1}-\frac{b\log(bx+a-1)}{a^2-2\,a+1}+\frac{2}{\left(a^2-1\right)x}\right)b-\frac{\operatorname{arcoth}(bx+a)}{2\,x^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(b*x+a)/x^3,x, algorithm="maxima")
```

```
[Out] 1/4*(4*a*b*log(x)/(a^4 - 2*a^2 + 1) + b*log(b*x + a + 1)/(a^2 + 2*a + 1) -
b*log(b*x + a - 1)/(a^2 - 2*a + 1) + 2/((a^2 - 1)*x))*b - 1/2*arccoth(b*x +
 a)/x^2
```

**mupad [B]** time = 1.95, size = 247, normalized size = 2.74

$$\ln(x)\left(\frac{b^2}{4\,(a-1)^2}-\frac{b^2}{4\,(a+1)^2}\right)-\ln\left(a^2+2\,a\,b\,x+b^2\,x^2-1\right)\left(\frac{b^2}{8\,(a-1)^2}-\frac{b^2}{8\,(a+1)^2}\right)-\frac{\operatorname{acoth}(a+b\,x)\left(\frac{a^2}{2}-\frac{1}{2}\right)}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(a + b*x)/x^3,x)
```

```
[Out] log(x)*(b^2/(4*(a - 1)^2) - b^2/(4*(a + 1)^2)) - log(a^2 + b^2*x^2 + 2*a*b*
x - 1)*(b^2/(8*(a - 1)^2) - b^2/(8*(a + 1)^2)) - (acoth(a + b*x)*(a^2/2 - 1
/2) - (b*x)/2 + (b^2*x^2*acoth(a + b*x))/2 + (x^3*(b^3 + 3*a^2*b^3))/(2*(a^
2 - 1)^2) + (a*b^4*x^4)/(a^2 - 1)^2 + a*b*x*acoth(a + b*x))/(a^2*x^2 - x^2
+ b^2*x^4 + 2*a*b*x^3) - (atan((2*a*b + 2*b^2*x)/(2*(b^2*(a^2 - 1) - a^2*b^
2)^(1/2)))*(b^3 + a^2*b^3))/((-b^2)^(1/2)*(2*a^4 - 4*a^2 + 2))
```

**sympy [A]** time = 2.43, size = 410, normalized size = 4.56

$$\begin{cases} \frac{b^2\operatorname{acoth}(bx-1)}{8}-\frac{b}{8x}-\frac{\operatorname{acoth}(bx-1)}{2x^2}-\frac{1}{8x^2} \\ \frac{b^2\operatorname{acoth}(bx+1)}{8}-\frac{b}{8x}-\frac{\operatorname{acoth}(bx+1)}{2x^2}+\frac{1}{8x^2} \\ -\frac{a^4\operatorname{acoth}(a+bx)}{2a^4x^2-4a^2x^2+2x^2}+\frac{a^2b^2x^2\operatorname{acoth}(a+bx)}{2a^4x^2-4a^2x^2+2x^2}+\frac{a^2bx}{2a^4x^2-4a^2x^2+2x^2}+\frac{2a^2\operatorname{acoth}(a+bx)}{2a^4x^2-4a^2x^2+2x^2}+\frac{2ab^2x^2\log(x)}{2a^4x^2-4a^2x^2+2x^2}-\frac{2ab^2x^2\log(a+bx+1)}{2a^4x^2-4a^2x^2+2x^2}+ \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(b*x+a)/x**3,x)
```

```
[Out] Piecewise((b**2*acoth(b*x - 1)/8 - b/(8*x) - acoth(b*x - 1)/(2*x**2) - 1/(8
*x**2), Eq(a, -1)), (b**2*acoth(b*x + 1)/8 - b/(8*x) - acoth(b*x + 1)/(2*x*
*2) + 1/(8*x**2), Eq(a, 1)), (-a**4*acoth(a + b*x)/(2*a**4*x**2 - 4*a**2*x*
*2 + 2*x**2) + a**2*b**2*x**2*acoth(a + b*x)/(2*a**4*x**2 - 4*a**2*x**2 + 2
*x**2) + a**2*b*x/(2*a**4*x**2 - 4*a**2*x**2 + 2*x**2) + 2*a**2*acoth(a + b
*x)/(2*a**4*x**2 - 4*a**2*x**2 + 2*x**2) + 2*a*b**2*x**2*log(x)/(2*a**4*x**
2 - 4*a**2*x**2 + 2*x**2) - 2*a*b**2*x**2*log(a + b*x + 1)/(2*a**4*x**2 - 4
*a**2*x**2 + 2*x**2) + 2*a*b**2*x**2*acoth(a + b*x)/(2*a**4*x**2 - 4*a**2*x
**2 + 2*x**2) + b**2*x**2*acoth(a + b*x)/(2*a**4*x**2 - 4*a**2*x**2 + 2*x**
2) - b*x/(2*a**4*x**2 - 4*a**2*x**2 + 2*x**2) - acoth(a + b*x)/(2*a**4*x**2
 - 4*a**2*x**2 + 2*x**2), True))
```

## 3.69 $\int x^3 \coth^{-1}(a+bx)^2 \, dx$

**Optimal**. Leaf size=263

$$\frac{a\left(a^2+1\right)\text{Li}_2\left(-\frac{a+bx+1}{-a-bx+1}\right)}{b^4}+\frac{\left(6a^2+1\right)\log\left(1-(a+bx)^2\right)}{4b^4}-\frac{a\left(a^2+1\right)\coth^{-1}(a+bx)^2}{b^4}+\frac{\left(6a^2+1\right)(a+bx)\coth^{-1}(a}{2b^4}$$

```
[Out] -a*x/b^3+1/12*(b*x+a)^2/b^4+1/2*(6*a^2+1)*(b*x+a)*arccoth(b*x+a)/b^4-a*(b*x
+a)^2*arccoth(b*x+a)/b^4+1/6*(b*x+a)^3*arccoth(b*x+a)/b^4-a*(a^2+1)*arccoth
(b*x+a)^2/b^4-1/4*(a^4+6*a^2+1)*arccoth(b*x+a)^2/b^4+1/4*x^4*arccoth(b*x+a)
^2+a*arctanh(b*x+a)/b^4+2*a*(a^2+1)*arccoth(b*x+a)*ln(2/(-b*x-a+1))/b^4+1/1
2*ln(1-(b*x+a)^2)/b^4+1/4*(6*a^2+1)*ln(1-(b*x+a)^2)/b^4+a*(a^2+1)*polylog(2
,(-b*x-a-1)/(-b*x-a+1))/b^4
```

**Rubi [A]** time = 0.35, antiderivative size = 263, normalized size of antiderivative = 1.00, number of steps used = 19, number of rules used = 15, integrand size = 12, $\frac{\text{number of rules}}{\text{integrand size}}$ = 1.250, Rules used = {6112, 5929, 5911, 260, 5917, 321, 206, 266, 43, 6049, 5949, 5985, 5919, 2402, 2315}

$$\frac{a\left(a^2+1\right)\text{PolyLog}\left(2,-\frac{a+bx+1}{-a-bx+1}\right)}{b^4}+\frac{\left(6a^2+1\right)\log\left(1-(a+bx)^2\right)}{4b^4}-\frac{a\left(a^2+1\right)\coth^{-1}(a+bx)^2}{b^4}-\frac{\left(a^4+6a^2+1\right)\text{coth}}{4b^4}$$

Antiderivative was successfully verified.

```
[In] Int[x^3*ArcCoth[a + b*x]^2,x]
```

```
[Out] -((a*x)/b^3) + (a + b*x)^2/(12*b^4) + ((1 + 6*a^2)*(a + b*x)*ArcCoth[a + b*
x])/(2*b^4) - (a*(a + b*x)^2*ArcCoth[a + b*x])/b^4 + ((a + b*x)^3*ArcCoth[a
 + b*x])/(6*b^4) - (a*(1 + a^2)*ArcCoth[a + b*x]^2)/b^4 - ((1 + 6*a^2 + a^4
)*ArcCoth[a + b*x]^2)/(4*b^4) + (x^4*ArcCoth[a + b*x]^2)/4 + (a*ArcTanh[a +
 b*x])/b^4 + (2*a*(1 + a^2)*ArcCoth[a + b*x]*Log[2/(1 - a - b*x)])/b^4 + Lo
g[1 - (a + b*x)^2]/(12*b^4) + ((1 + 6*a^2)*Log[1 - (a + b*x)^2])/(4*b^4) +
(a*(1 + a^2)*PolyLog[2, -((1 + a + b*x)/(1 - a - b*x))])/b^4
```

Rule 43

```
Int[((a_.) + (b_.)*(x_))^(m_.)*((c_.) + (d_.)*(x_))^(n_.), x_Symbol] :> Int
[ExpandIntegrand[(a + b*x)^m*(c + d*x)^n, x], x] /; FreeQ[{a, b, c, d, n},
x] && NeQ[b*c - a*d, 0] && IGtQ[m, 0] && ( !IntegerQ[n] || (EqQ[c, 0] && Le
Q[7*m + 4*n + 4, 0]) || LtQ[9*m + 5*(n + 1), 0] || GtQ[m + n + 2, 0])
```

Rule 206

```
Int[((a_) + (b_.)*(x_)^2)^(-1), x_Symbol] :> Simp[(1*ArcTanh[(Rt[-b, 2]*x)/
Rt[a, 2]])/(Rt[a, 2]*Rt[-b, 2]), x] /; FreeQ[{a, b}, x] && NegQ[a/b] && (Gt
Q[a, 0] || LtQ[b, 0])
```

Rule 260

```
Int[(x_)^(m_.)/((a_) + (b_.)*(x_)^(n_)), x_Symbol] :> Simp[Log[RemoveConten
t[a + b*x^n, x]]/(b*n), x] /; FreeQ[{a, b, m, n}, x] && EqQ[m, n - 1]
```

Rule 266

```
Int[(x_)^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Dist[1/n, Subst[
Int[x^(Simplify[(m + 1)/n] - 1)*(a + b*x)^p, x], x, x^n], x] /; FreeQ[{a, b
, m, n, p}, x] && IntegerQ[Simplify[(m + 1)/n]]
```

Rule 321

```
Int[((c_.)*(x_))^(m_)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Simp[(c^(
n - 1)*(c*x)^(m - n + 1)*(a + b*x^n)^(p + 1))/(b*(m + n*p + 1)), x] - Dist[
(a*c^n*(m - n + 1))/(b*(m + n*p + 1)), Int[(c*x)^(m - n)*(a + b*x^n)^p, x],
 x] /; FreeQ[{a, b, c, p}, x] && IGtQ[n, 0] && GtQ[m, n - 1] && NeQ[m + n*p
 + 1, 0] && IntBinomialQ[a, b, c, n, m, p, x]
```

Rule 2315

```
Int[Log[(c_.)*(x_)]/((d_) + (e_.)*(x_)), x_Symbol] :> -Simp[PolyLog[2, 1 -
c*x]/e, x] /; FreeQ[{c, d, e}, x] && EqQ[e + c*d, 0]
```

Rule 2402

```
Int[Log[(c_.)/((d_) + (e_.)*(x_))]/((f_) + (g_.)*(x_)^2), x_Symbol] :> -Dis
t[e/g, Subst[Int[Log[2*d*x]/(1 - 2*d*x), x], x, 1/(d + e*x)], x] /; FreeQ[{
c, d, e, f, g}, x] && EqQ[c, 2*d] && EqQ[e^2*f + d^2*g, 0]
```

Rule 5911

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.), x_Symbol] :> Simp[x*(a + b*A
rcCoth[c*x])^p, x] - Dist[b*c*p, Int[(x*(a + b*ArcCoth[c*x])^(p - 1))/(1 -
c^2*x^2), x], x] /; FreeQ[{a, b, c}, x] && IGtQ[p, 0]
```

Rule 5917

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)*((d_.)*(x_))^(m_.), x_Symbol]
 :> Simp[((d*x)^(m + 1)*(a + b*ArcCoth[c*x])^p)/(d*(m + 1)), x] - Dist[(b*c
*p)/(d*(m + 1)), Int[((d*x)^(m + 1)*(a + b*ArcCoth[c*x])^(p - 1))/(1 - c^2*
x^2), x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[p, 0] && (EqQ[p, 1] || In
tegerQ[m]) && NeQ[m, -1]
```

Rule 5919

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)/((d_) + (e_.)*(x_)), x_Symbol
] :> -Simp[((a + b*ArcCoth[c*x])^p*Log[2/(1 + (e*x)/d)])/e, x] + Dist[(b*c*
p)/e, Int[((a + b*ArcCoth[c*x])^(p - 1)*Log[2/(1 + (e*x)/d)])/(1 - c^2*x^2)
, x], x] /; FreeQ[{a, b, c, d, e}, x] && IGtQ[p, 0] && EqQ[c^2*d^2 - e^2, 0
]
```

Rule 5929

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_)*((d_) + (e_.)*(x_))^(q_.), x_S
ymbol] :> Simp[((d + e*x)^(q + 1)*(a + b*ArcCoth[c*x])^p)/(e*(q + 1)), x] -
 Dist[(b*c*p)/(e*(q + 1)), Int[ExpandIntegrand[(a + b*ArcCoth[c*x])^(p - 1)
, (d + e*x)^(q + 1)/(1 - c^2*x^2), x], x], x] /; FreeQ[{a, b, c, d, e}, x]
&& IGtQ[p, 1] && IntegerQ[q] && NeQ[q, -1]
```

Rule 5949

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)/((d_) + (e_.)*(x_)^2), x_Symb
ol] :> Simp[(a + b*ArcCoth[c*x])^(p + 1)/(b*c*d*(p + 1)), x] /; FreeQ[{a, b
, c, d, e, p}, x] && EqQ[c^2*d + e, 0] && NeQ[p, -1]
```

Rule 5985

```
Int[(((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)*(x_))/((d_) + (e_.)*(x_)^2),
 x_Symbol] :> Simp[(a + b*ArcCoth[c*x])^(p + 1)/(b*e*(p + 1)), x] + Dist[1/
(c*d), Int[(a + b*ArcCoth[c*x])^p/(1 - c*x), x], x] /; FreeQ[{a, b, c, d, e
```

```
}, x] && EqQ[c^2*d + e, 0] && IGtQ[p, 0]
```

Rule 6049

```
Int[(((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)*((f_) + (g_.)*(x_))^(m_.))/(
(d_) + (e_.)*(x_)^2), x_Symbol] :> Int[ExpandIntegrand[(a + b*ArcCoth[c*x])
^p/(d + e*x^2), (f + g*x)^m, x], x] /; FreeQ[{a, b, c, d, e, f, g}, x] && I
GtQ[p, 0] && EqQ[c^2*d + e, 0] && IGtQ[m, 0]
```

Rule 6112

```
Int[((a_.) + ArcCoth[(c_) + (d_.)*(x_)]*(b_.))^(p_.)*((e_.) + (f_.)*(x_))^(
m_.), x_Symbol] :> Dist[1/d, Subst[Int[((d*e - c*f)/d + (f*x)/d)^m*(a + b*A
rcCoth[x])^p, x], x, c + d*x], x] /; FreeQ[{a, b, c, d, e, f, m}, x] && IGt
Q[p, 0]
```

Rubi steps

$$\int x^3 \coth^{-1}(a+bx)^2\,dx = \frac{\text{Subst}\left(\int\left(-\frac{a}{b}+\frac{x}{b}\right)^3 \coth^{-1}(x)^2\,dx, x, a+bx\right)}{b}$$

$$= \frac{1}{4}x^4\coth^{-1}(a+bx)^2 - \frac{1}{2}\text{Subst}\left(\int\left(-\frac{\left(1+6a^2\right)\coth^{-1}(x)}{b^4} + \frac{4ax\coth^{-1}(x)}{b^4} - \frac{x^2\coth}{b^4}\right.\right.$$

$$= \frac{1}{4}x^4\coth^{-1}(a+bx)^2 + \frac{\text{Subst}\left(\int x^2\coth^{-1}(x)\,dx, x, a+bx\right)}{2b^4} - \frac{\text{Subst}\left(\int \frac{(1+6a^2+a^4-4a(1-}{1-}\right.}{}$$

$$= \frac{\left(1+6a^2\right)(a+bx)\coth^{-1}(a+bx)}{2b^4} - \frac{a(a+bx)^2\coth^{-1}(a+bx)}{b^4} + \frac{(a+bx)^3\coth^{-1}(a+}{6b^4}$$

$$= -\frac{ax}{b^3} + \frac{\left(1+6a^2\right)(a+bx)\coth^{-1}(a+bx)}{2b^4} - \frac{a(a+bx)^2\coth^{-1}(a+bx)}{b^4} + \frac{(a+bx)^3\text{cot}}{6b}$$

$$= -\frac{ax}{b^3} + \frac{\left(1+6a^2\right)(a+bx)\coth^{-1}(a+bx)}{2b^4} - \frac{a(a+bx)^2\coth^{-1}(a+bx)}{b^4} + \frac{(a+bx)^3\text{cot}}{6b}$$

$$= -\frac{ax}{b^3} + \frac{(a+bx)^2}{12b^4} + \frac{\left(1+6a^2\right)(a+bx)\coth^{-1}(a+bx)}{2b^4} - \frac{a(a+bx)^2\coth^{-1}(a+bx)}{b^4} + $$

$$= -\frac{ax}{b^3} + \frac{(a+bx)^2}{12b^4} + \frac{\left(1+6a^2\right)(a+bx)\coth^{-1}(a+bx)}{2b^4} - \frac{a(a+bx)^2\coth^{-1}(a+bx)}{b^4} + $$

$$= -\frac{ax}{b^3} + \frac{(a+bx)^2}{12b^4} + \frac{\left(1+6a^2\right)(a+bx)\coth^{-1}(a+bx)}{2b^4} - \frac{a(a+bx)^2\coth^{-1}(a+bx)}{b^4} + $$

**Mathematica** [A] time = 1.70, size = 203, normalized size = 0.77

$$-\frac{12\left(a^3+a\right)\text{Li}_2\left(e^{-2\coth^{-1}(a+bx)}\right) + 36a^2\log\left(\frac{1}{(a+bx)\sqrt{1-\frac{1}{(a+bx)^2}}}\right) + 11a^2 - 2\coth^{-1}(a+bx)\left(12\left(a^3+a\right)\log\left(1-e^{-2}\right.\right.}{}$$

Warning: Unable to verify antiderivative.

```
[In] Integrate[x^3*ArcCoth[a + b*x]^2,x]
```

```
[Out] -1/12*(1 + 11*a^2 + 10*a*b*x - b^2*x^2 + 3*(1 - 4*a + 6*a^2 - 4*a^3 + a^4 -
 b^4*x^4)*ArcCoth[a + b*x]^2 - 2*ArcCoth[a + b*x]*(9*a + 13*a^3 + 3*b*x + 9
*a^2*b*x - 3*a*b^2*x^2 + b^3*x^3 + 12*(a + a^3)*Log[1 - E^(-2*ArcCoth[a + b
*x])]) + 8*Log[1/((a + b*x)*Sqrt[1 - (a + b*x)^(-2)])] + 36*a^2*Log[1/((a +
 b*x)*Sqrt[1 - (a + b*x)^(-2)])] + 12*(a + a^3)*PolyLog[2, E^(-2*ArcCoth[a
+ b*x])]])/b^4
```

**fricas [F]** time = 0.77, size = 0, normalized size = 0.00

$$\text{integral}\left(x^3 \operatorname{arcoth}(bx+a)^2, x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^3*arccoth(b*x+a)^2,x, algorithm="fricas")
```

```
[Out] integral(x^3*arccoth(b*x + a)^2, x)
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int x^3 \operatorname{arcoth}(bx+a)^2\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^3*arccoth(b*x+a)^2,x, algorithm="giac")
```

```
[Out] integrate(x^3*arccoth(b*x + a)^2, x)
```

**maple [B]** time = 0.07, size = 967, normalized size = 3.68

result too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^3*arccoth(b*x+a)^2,x)
```

```
[Out] 3/2/b^4*ln(b*x+a+1)*a^2+1/2/b^4*ln(b*x+a+1)*a+3/2/b^4*ln(b*x+a-1)*a^2-1/2/b
^4*ln(b*x+a-1)*a+1/4*x^4*arccoth(b*x+a)^2-3/4/b^4*ln(b*x+a-1)*ln(1/2+1/2*b*
x+1/2*a)*a^2+1/2/b^4*ln(b*x+a-1)*ln(1/2+1/2*b*x+1/2*a)*a-1/b^4*arccoth(b*x+
a)*ln(b*x+a-1)*a^3-1/8/b^4*ln(b*x+a-1)*ln(1/2+1/2*b*x+1/2*a)*a^4-1/2/b^4*ln
(b*x+a+1)*ln(-1/2*b*x-1/2*a+1/2)*a^3+3/2/b^4*arccoth(b*x+a)*ln(b*x+a-1)*a^2
-1/4/b^4*arccoth(b*x+a)*ln(b*x+a+1)*a^4-1/b^4*arccoth(b*x+a)*ln(b*x+a+1)*a+
1/3/b^4*ln(b*x+a-1)+1/3/b^4*ln(b*x+a+1)+1/4/b^4*arccoth(b*x+a)*ln(b*x+a-1)*
a^4+1/8/b^4*ln(-1/2*b*x-1/2*a+1/2)*ln(1/2+1/2*b*x+1/2*a)*a^4-1/2/b^4*ln(b*x
+a+1)*ln(-1/2*b*x-1/2*a+1/2)*a+1/2/b^4*ln(-1/2*b*x-1/2*a+1/2)*ln(1/2+1/2*b*
x+1/2*a)*a^3+1/2/b^4*ln(b*x+a-1)*ln(1/2+1/2*b*x+1/2*a)*a^3-5/6*a*x/b^3+1/8/
b^4*ln(-1/2*b*x-1/2*a+1/2)*ln(1/2+1/2*b*x+1/2*a)+1/4/b^4*arccoth(b*x+a)*ln(
b*x+a-1)-1/8/b^4*ln(b*x+a-1)*ln(1/2+1/2*b*x+1/2*a)-1/4/b^4*ln(b*x+a-1)^2*a+
1/b^4*dilog(1/2+1/2*b*x+1/2*a)*a^3+1/16/b^4*ln(b*x+a+1)^2*a^4+1/4/b^4*ln(b*
x+a+1)^2*a^3+3/8/b^4*ln(b*x+a+1)^2*a^2+1/4/b^4*ln(b*x+a+1)^2*a+1/b^4*dilog(
1/2+1/2*b*x+1/2*a)*a+1/16/b^4*ln(b*x+a-1)^2*a^4+1/2/b^3*arccoth(b*x+a)*x-1/
8/b^4*ln(-1/2*b*x-1/2*a+1/2)*ln(b*x+a+1)-1/4/b^4*arccoth(b*x+a)*ln(b*x+a+1)
+1/6/b*arccoth(b*x+a)*x^3+1/2/b^4*arccoth(b*x+a)*a-1/4/b^4*ln(b*x+a-1)^2*a^
3+3/8/b^4*ln(b*x+a-1)^2*a^2+13/6/b^4*arccoth(b*x+a)*a^3-1/b^4*arccoth(b*x+a
)*ln(b*x+a-1)*a+1/12*x^2/b^2-3/2/b^4*arccoth(b*x+a)*ln(b*x+a+1)*a^2-1/b^4*a
rccoth(b*x+a)*ln(b*x+a+1)*a^3-1/2/b^2*arccoth(b*x+a)*x^2*a+3/2/b^3*arccoth(
b*x+a)*x*a^2+3/4/b^4*ln(-1/2*b*x-1/2*a+1/2)*ln(1/2+1/2*b*x+1/2*a)*a^2-3/4/b
^4*ln(b*x+a+1)*ln(-1/2*b*x-1/2*a+1/2)*a^2-1/8/b^4*ln(b*x+a+1)*ln(-1/2*b*x-1
/2*a+1/2)*a^4+1/2/b^4*ln(-1/2*b*x-1/2*a+1/2)*ln(1/2+1/2*b*x+1/2*a)*a-11/12/
b^4*a^2+1/16/b^4*ln(b*x+a-1)^2+1/16/b^4*ln(b*x+a+1)^2
```

**maxima** [A] time = 0.34, size = 320, normalized size = 1.22

$$\frac{1}{4}x^4\operatorname{arcoth}(bx+a)^2+\frac{1}{48}b^2\left(\frac{48\left(a^3+a\right)\left(\log(bx+a-1)\log\left(\frac{1}{2}bx+\frac{1}{2}a+\frac{1}{2}\right)+\operatorname{Li}_2\left(-\frac{1}{2}bx-\frac{1}{2}a+\frac{1}{2}\right)\right)}{b^6}+\frac{4(13}{}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^3*arccoth(b*x+a)^2,x, algorithm="maxima")
```

```
[Out] 1/4*x^4*arccoth(b*x + a)^2 + 1/48*b^2*(48*(a^3 + a)*(log(b*x + a - 1)*log(1
/2*b*x + 1/2*a + 1/2) + dilog(-1/2*b*x - 1/2*a + 1/2))/b^6 + 4*(13*a^3 + 18
*a^2 + 9*a + 4)*log(b*x + a + 1)/b^6 + (4*b^2*x^2 - 40*a*b*x + 3*(a^4 + 4*a
^3 + 6*a^2 + 4*a + 1)*log(b*x + a + 1)^2 - 6*(a^4 + 4*a^3 + 6*a^2 + 4*a + 1
)*log(b*x + a + 1)*log(b*x + a - 1) + 3*(a^4 - 4*a^3 + 6*a^2 - 4*a + 1)*log
(b*x + a - 1)^2 - 4*(13*a^3 - 18*a^2 + 9*a - 4)*log(b*x + a - 1))/b^6) + 1/
12*b*(2*(b^2*x^3 - 3*a*b*x^2 + 3*(3*a^2 + 1)*x)/b^4 - 3*(a^4 + 4*a^3 + 6*a^
2 + 4*a + 1)*log(b*x + a + 1)/b^5 + 3*(a^4 - 4*a^3 + 6*a^2 - 4*a + 1)*log(b
*x + a - 1)/b^5)*arccoth(b*x + a)
```

**mupad** [F] time = 0.00, size = -1, normalized size = -0.00

$$\int x^3 \operatorname{acoth}(a+b\,x)^2\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^3*acoth(a + b*x)^2,x)
```

```
[Out] int(x^3*acoth(a + b*x)^2, x)
```

**sympy** [F] time = 0.00, size = 0, normalized size = 0.00

$$\int x^3 \operatorname{acoth}^2(a+bx)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**3*acoth(b*x+a)**2,x)
```

```
[Out] Integral(x**3*acoth(a + b*x)**2, x)
```

## 3.70 $\int x^2 \coth^{-1}(a+bx)^2\,dx$

**Optimal**. Leaf size=204

$$-\frac{(3a^2+1)\,\mathrm{Li}_2\left(-\frac{a+bx+1}{-a-bx+1}\right)}{3b^3}+\frac{a\,(a^2+3)\coth^{-1}(a+bx)^2}{3b^3}+\frac{(3a^2+1)\coth^{-1}(a+bx)^2}{3b^3}-\frac{2\,(3a^2+1)\log\left(\frac{2}{-a-bx+1}\right)}{3b^3}$$

```
[Out] 1/3*x/b^2-2*a*(b*x+a)*arccoth(b*x+a)/b^3+1/3*(b*x+a)^2*arccoth(b*x+a)/b^3+1
/3*a*(a^2+3)*arccoth(b*x+a)^2/b^3+1/3*(3*a^2+1)*arccoth(b*x+a)^2/b^3+1/3*x^
3*arccoth(b*x+a)^2-1/3*arctanh(b*x+a)/b^3-2/3*(3*a^2+1)*arccoth(b*x+a)*ln(2
/(-b*x-a+1))/b^3-a*ln(1-(b*x+a)^2)/b^3-1/3*(3*a^2+1)*polylog(2,(-b*x-a-1)/(
-b*x-a+1))/b^3
```

**Rubi [A]** time = 0.28, antiderivative size = 204, normalized size of antiderivative = 1.00, number of steps used = 15, number of rules used = 13, integrand size = 12, $\frac{\text{number of rules}}{\text{integrand size}}$ = 1.083, Rules used = {6112, 5929, 5911, 260, 5917, 321, 206, 6049, 5949, 5985, 5919, 2402, 2315}

$$-\frac{(3a^2+1)\,\mathrm{PolyLog}\left(2,-\frac{a+bx+1}{-a-bx+1}\right)}{3b^3}+\frac{a\,(a^2+3)\coth^{-1}(a+bx)^2}{3b^3}+\frac{(3a^2+1)\coth^{-1}(a+bx)^2}{3b^3}-\frac{2\,(3a^2+1)\log\left(\frac{2}{-a-bx+1}\right)}{}$$

Antiderivative was successfully verified.

```
[In] Int[x^2*ArcCoth[a + b*x]^2,x]
```

```
[Out] x/(3*b^2) - (2*a*(a + b*x)*ArcCoth[a + b*x])/b^3 + ((a + b*x)^2*ArcCoth[a +
 b*x])/(3*b^3) + (a*(3 + a^2)*ArcCoth[a + b*x]^2)/(3*b^3) + ((1 + 3*a^2)*Ar
cCoth[a + b*x]^2)/(3*b^3) + (x^3*ArcCoth[a + b*x]^2)/3 - ArcTanh[a + b*x]/(
3*b^3) - (2*(1 + 3*a^2)*ArcCoth[a + b*x]*Log[2/(1 - a - b*x)])/(3*b^3) - (a
*Log[1 - (a + b*x)^2])/b^3 - ((1 + 3*a^2)*PolyLog[2, -((1 + a + b*x)/(1 - a
 - b*x))])/(3*b^3)
```

Rule 206

```
Int[((a_) + (b_.)*(x_)^2)^(-1), x_Symbol] :> Simp[(1*ArcTanh[(Rt[-b, 2]*x)/
Rt[a, 2]])/(Rt[a, 2]*Rt[-b, 2]), x] /; FreeQ[{a, b}, x] && NegQ[a/b] && (Gt
Q[a, 0] || LtQ[b, 0])
```

Rule 260

```
Int[(x_)^(m_.)/((a_) + (b_.)*(x_)^(n_)), x_Symbol] :> Simp[Log[RemoveConten
t[a + b*x^n, x]]/(b*n), x] /; FreeQ[{a, b, m, n}, x] && EqQ[m, n - 1]
```

Rule 321

```
Int[((c_.)*(x_))^(m_)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Simp[(c^(
n - 1)*(c*x)^(m - n + 1)*(a + b*x^n)^(p + 1))/(b*(m + n*p + 1)), x] - Dist[
(a*c^n*(m - n + 1))/(b*(m + n*p + 1)), Int[(c*x)^(m - n)*(a + b*x^n)^p, x],
 x] /; FreeQ[{a, b, c, p}, x] && IGtQ[n, 0] && GtQ[m, n - 1] && NeQ[m + n*p
 + 1, 0] && IntBinomialQ[a, b, c, n, m, p, x]
```

Rule 2315

```
Int[Log[(c_.)*(x_)]/((d_) + (e_.)*(x_)), x_Symbol] :> -Simp[PolyLog[2, 1 -
c*x]/e, x] /; FreeQ[{c, d, e}, x] && EqQ[e + c*d, 0]
```

Rule 2402

```
Int[Log[(c_.)/((d_) + (e_.)*(x_))]/((f_) + (g_.)*(x_)^2), x_Symbol] :> -Dis
t[e/g, Subst[Int[Log[2*d*x]/(1 - 2*d*x), x], x, 1/(d + e*x)], x] /; FreeQ[{
```

```
c, d, e, f, g}, x] && EqQ[c, 2*d] && EqQ[e^2*f + d^2*g, 0]
```

Rule 5911

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.), x_Symbol] :> Simp[x*(a + b*A
rcCoth[c*x])^p, x] - Dist[b*c*p, Int[(x*(a + b*ArcCoth[c*x])^(p - 1))/(1 -
c^2*x^2), x], x] /; FreeQ[{a, b, c}, x] && IGtQ[p, 0]
```

Rule 5917

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)*((d_.)*(x_))^(m_.), x_Symbol]
 :> Simp[((d*x)^(m + 1)*(a + b*ArcCoth[c*x])^p)/(d*(m + 1)), x] - Dist[(b*c
*p)/(d*(m + 1)), Int[((d*x)^(m + 1)*(a + b*ArcCoth[c*x])^(p - 1))/(1 - c^2*
x^2), x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[p, 0] && (EqQ[p, 1] || In
tegerQ[m]) && NeQ[m, -1]
```

Rule 5919

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)/((d_) + (e_.)*(x_)), x_Symbol
] :> -Simp[((a + b*ArcCoth[c*x])^p*Log[2/(1 + (e*x)/d)])/e, x] + Dist[(b*c*
p)/e, Int[((a + b*ArcCoth[c*x])^(p - 1)*Log[2/(1 + (e*x)/d)])/(1 - c^2*x^2)
, x], x] /; FreeQ[{a, b, c, d, e}, x] && IGtQ[p, 0] && EqQ[c^2*d^2 - e^2, 0
]
```

Rule 5929

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_)*((d_) + (e_.)*(x_))^(q_.), x_S
ymbol] :> Simp[((d + e*x)^(q + 1)*(a + b*ArcCoth[c*x])^p)/(e*(q + 1)), x] -
 Dist[(b*c*p)/(e*(q + 1)), Int[ExpandIntegrand[(a + b*ArcCoth[c*x])^(p - 1)
, (d + e*x)^(q + 1)/(1 - c^2*x^2), x], x], x] /; FreeQ[{a, b, c, d, e}, x]
&& IGtQ[p, 1] && IntegerQ[q] && NeQ[q, -1]
```

Rule 5949

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)/((d_) + (e_.)*(x_)^2), x_Symb
ol] :> Simp[(a + b*ArcCoth[c*x])^(p + 1)/(b*c*d*(p + 1)), x] /; FreeQ[{a, b
, c, d, e, p}, x] && EqQ[c^2*d + e, 0] && NeQ[p, -1]
```

Rule 5985

```
Int[(((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)*(x_))/((d_) + (e_.)*(x_)^2),
 x_Symbol] :> Simp[(a + b*ArcCoth[c*x])^(p + 1)/(b*e*(p + 1)), x] + Dist[1/
(c*d), Int[(a + b*ArcCoth[c*x])^p/(1 - c*x), x], x] /; FreeQ[{a, b, c, d, e
}, x] && EqQ[c^2*d + e, 0] && IGtQ[p, 0]
```

Rule 6049

```
Int[(((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)*((f_) + (g_.)*(x_))^(m_.))/(
(d_) + (e_.)*(x_)^2), x_Symbol] :> Int[ExpandIntegrand[(a + b*ArcCoth[c*x])
^p/(d + e*x^2), (f + g*x)^m, x], x] /; FreeQ[{a, b, c, d, e, f, g}, x] && I
GtQ[p, 0] && EqQ[c^2*d + e, 0] && IGtQ[m, 0]
```

Rule 6112

```
Int[((a_.) + ArcCoth[(c_) + (d_.)*(x_)]*(b_.))^(p_.)*((e_.) + (f_.)*(x_))^(
m_.), x_Symbol] :> Dist[1/d, Subst[Int[((d*e - c*f)/d + (f*x)/d)^m*(a + b*A
rcCoth[x])^p, x], x, c + d*x], x] /; FreeQ[{a, b, c, d, e, f, m}, x] && IGt
Q[p, 0]
```

Rubi steps

$$\int x^2 \coth^{-1}(a+bx)^2\,dx = \frac{\text{Subst}\left(\int \left(-\frac{a}{b}+\frac{x}{b}\right)^2 \coth^{-1}(x)^2\,dx, x, a+bx\right)}{b}$$

$$= \frac{1}{3}x^3 \coth^{-1}(a+bx)^2 - \frac{2}{3}\text{Subst}\left(\int \left(\frac{3a\coth^{-1}(x)}{b^3} - \frac{x\coth^{-1}(x)}{b^3} - \frac{\left(a\left(3+a^2\right)-(1\right.}{b^3}\right.\right.$$

$$= \frac{1}{3}x^3 \coth^{-1}(a+bx)^2 + \frac{2\,\text{Subst}\left(\int x\coth^{-1}(x)\,dx, x, a+bx\right)}{3b^3} + \frac{2\,\text{Subst}\left(\int \frac{\left(a\left(3+a^2\right)-\right.}{}\right.}{}$$

$$= -\frac{2a(a+bx)\coth^{-1}(a+bx)}{b^3} + \frac{(a+bx)^2\coth^{-1}(a+bx)}{3b^3} + \frac{1}{3}x^3\coth^{-1}(a+bx)^2 - $$

$$= \frac{x}{3b^2} - \frac{2a(a+bx)\coth^{-1}(a+bx)}{b^3} + \frac{(a+bx)^2\coth^{-1}(a+bx)}{3b^3} + \frac{1}{3}x^3\coth^{-1}(a+bx)$$

$$= \frac{x}{3b^2} - \frac{2a(a+bx)\coth^{-1}(a+bx)}{b^3} + \frac{(a+bx)^2\coth^{-1}(a+bx)}{3b^3} + \frac{a\left(3+a^2\right)\coth^{-1}(a}{3b^3}$$

$$= \frac{x}{3b^2} - \frac{2a(a+bx)\coth^{-1}(a+bx)}{b^3} + \frac{(a+bx)^2\coth^{-1}(a+bx)}{3b^3} + \frac{a\left(3+a^2\right)\coth^{-1}(a}{3b^3}$$

$$= \frac{x}{3b^2} - \frac{2a(a+bx)\coth^{-1}(a+bx)}{b^3} + \frac{(a+bx)^2\coth^{-1}(a+bx)}{3b^3} + \frac{a\left(3+a^2\right)\coth^{-1}(a}{3b^3}$$

$$= \frac{x}{3b^2} - \frac{2a(a+bx)\coth^{-1}(a+bx)}{b^3} + \frac{(a+bx)^2\coth^{-1}(a+bx)}{3b^3} + \frac{a\left(3+a^2\right)\coth^{-1}(a}{3b^3}$$

**Mathematica [B]** time = 4.54, size = 607, normalized size = 2.98

$$-\frac{(a+bx)\sqrt{1-\frac{1}{(a+bx)^2}}\left(1-(a+bx)^2\right)\left(\frac{4\left(3a^2+1\right)\text{Li}_2\left(e^{-2\coth^{-1}(a+bx)}\right)}{(a+bx)^3\left(1-\frac{1}{(a+bx)^2}\right)^{3/2}} + \frac{9a^2\coth^{-1}(a+bx)^2}{(a+bx)\sqrt{1-\frac{1}{(a+bx)^2}}} + \frac{-3\left(a^2-1\right)\coth^{-1}(a+bx)^2+6a\coth^{-1}}{\sqrt{1-\frac{1}{(a+bx)^2}}}\right.}{}$$

Warning: Unable to verify antiderivative.

```
[In] Integrate[x^2*ArcCoth[a + b*x]^2,x]
```

```
[Out] -1/12*((a + b*x)*Sqrt[1 - (a + b*x)^(-2)]*(1 - (a + b*x)^2)*((4*ArcCoth[a +
 b*x])/((a + b*x)*Sqrt[1 - (a + b*x)^(-2)]) + (3*ArcCoth[a + b*x]^2)/((a +
b*x)*Sqrt[1 - (a + b*x)^(-2)]) - (12*a*ArcCoth[a + b*x]^2)/((a + b*x)*Sqrt[
1 - (a + b*x)^(-2)]) + (9*a^2*ArcCoth[a + b*x]^2)/((a + b*x)*Sqrt[1 - (a +
b*x)^(-2)]) + (-1 + 6*a*ArcCoth[a + b*x] - 3*(-1 + a^2)*ArcCoth[a + b*x]^2)
/Sqrt[1 - (a + b*x)^(-2)] + Cosh[3*ArcCoth[a + b*x]] - 6*a*ArcCoth[a + b*x]
*Cosh[3*ArcCoth[a + b*x]] + ArcCoth[a + b*x]^2*Cosh[3*ArcCoth[a + b*x]] + 3
*a^2*ArcCoth[a + b*x]^2*Cosh[3*ArcCoth[a + b*x]] + (6*ArcCoth[a + b*x]*Log[
1 - E^(-2*ArcCoth[a + b*x])])/((a + b*x)*Sqrt[1 - (a + b*x)^(-2)]) + (18*a^
2*ArcCoth[a + b*x]*Log[1 - E^(-2*ArcCoth[a + b*x])])/((a + b*x)*Sqrt[1 - (a
 + b*x)^(-2)]) - (18*a*Log[1/((a + b*x)*Sqrt[1 - (a + b*x)^(-2)])])/((a + b
*x)*Sqrt[1 - (a + b*x)^(-2)]) + (4*(1 + 3*a^2)*PolyLog[2, E^(-2*ArcCoth[a +
 b*x])])/((a + b*x)^3*(1 - (a + b*x)^(-2))^(3/2)) - ArcCoth[a + b*x]^2*Sinh
```

```
[3*ArcCoth[a + b*x]] - 3*a^2*ArcCoth[a + b*x]^2*Sinh[3*ArcCoth[a + b*x]] -
2*ArcCoth[a + b*x]*Log[1 - E^(-2*ArcCoth[a + b*x])]*Sinh[3*ArcCoth[a + b*x]
] - 6*a^2*ArcCoth[a + b*x]*Log[1 - E^(-2*ArcCoth[a + b*x])]*Sinh[3*ArcCoth[
a + b*x]] + 6*a*Log[1/((a + b*x)*Sqrt[1 - (a + b*x)^(-2)])]*Sinh[3*ArcCoth[
a + b*x]]))/b^3
```

**fricas [F]** time = 0.48, size = 0, normalized size = 0.00

$$\text{integral}\left(x^2 \operatorname{arcoth}(bx+a)^2, x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*arccoth(b*x+a)^2,x, algorithm="fricas")
```

```
[Out] integral(x^2*arccoth(b*x + a)^2, x)
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int x^2 \operatorname{arcoth}(bx+a)^2\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*arccoth(b*x+a)^2,x, algorithm="giac")
```

```
[Out] integrate(x^2*arccoth(b*x + a)^2, x)
```

**maple [B]** time = 0.06, size = 729, normalized size = 3.57

result too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^2*arccoth(b*x+a)^2,x)
```

```
[Out] 1/b^3*arccoth(b*x+a)*ln(b*x+a-1)*a^2-1/b^3*arccoth(b*x+a)*ln(b*x+a-1)*a+1/3
/b^3*arccoth(b*x+a)*ln(b*x+a+1)*a^3-4/3/b^2*arccoth(b*x+a)*x*a-1/2/b^3*ln(b
*x+a-1)*ln(1/2+1/2*b*x+1/2*a)*a^2+1/2/b^3*ln(b*x+a-1)*ln(1/2+1/2*b*x+1/2*a)
*a-1/2/b^3*ln(-1/2*b*x-1/2*a+1/2)*ln(1/2+1/2*b*x+1/2*a)*a^2-1/2/b^3*ln(-1/2
*b*x-1/2*a+1/2)*ln(1/2+1/2*b*x+1/2*a)*a+1/6/b^3*ln(b*x+a-1)*ln(1/2+1/2*b*x+
1/2*a)*a^3-1/3/b^3*arccoth(b*x+a)*ln(b*x+a-1)*a^3+1/6/b^3*ln(b*x+a+1)*ln(-1
/2*b*x-1/2*a+1/2)*a^3+1/2/b^3*ln(b*x+a+1)*ln(-1/2*b*x-1/2*a+1/2)*a^2+1/2/b^
3*ln(b*x+a+1)*ln(-1/2*b*x-1/2*a+1/2)*a-1/b^3*ln(b*x+a+1)*a-1/b^3*ln(b*x+a-1
)*a+1/b^3*arccoth(b*x+a)*ln(b*x+a+1)*a+1/b^3*arccoth(b*x+a)*ln(b*x+a+1)*a^2
-1/6/b^3*ln(-1/2*b*x-1/2*a+1/2)*ln(1/2+1/2*b*x+1/2*a)*a^3+1/3*x^3*arccoth(b
*x+a)^2+1/3*x/b^2-1/6/b^3*ln(b*x+a-1)*ln(1/2+1/2*b*x+1/2*a)-1/b^3*dilog(1/2
+1/2*b*x+1/2*a)*a^2+1/4/b^3*ln(b*x+a-1)^2*a^2+1/3/b*arccoth(b*x+a)*x^2-5/3/
b^3*arccoth(b*x+a)*a^2+1/3/b^3*arccoth(b*x+a)*ln(b*x+a+1)+1/6/b^3*ln(-1/2*b
*x-1/2*a+1/2)*ln(b*x+a+1)-1/12/b^3*ln(b*x+a+1)^2*a^3-1/4/b^3*ln(b*x+a+1)^2*
a^2-1/4/b^3*ln(b*x+a+1)^2*a-1/12/b^3*ln(b*x+a-1)^2*a^3-1/4/b^3*ln(b*x+a-1)^
2*a-1/6/b^3*ln(-1/2*b*x-1/2*a+1/2)*ln(1/2+1/2*b*x+1/2*a)+1/3/b^3*arccoth(b*
x+a)*ln(b*x+a-1)+1/3/b^3*a-1/3/b^3*dilog(1/2+1/2*b*x+1/2*a)+1/12/b^3*ln(b*x
+a-1)^2-1/12/b^3*ln(b*x+a+1)^2+1/6/b^3*ln(b*x+a-1)-1/6/b^3*ln(b*x+a+1)
```

**maxima [A]** time = 0.33, size = 259, normalized size = 1.27

$$\frac{1}{3}x^3 \operatorname{arcoth}(bx+a)^2 - \frac{1}{12}b^2\left(\frac{4\left(3a^2+1\right)\left(\log(bx+a-1)\log\left(\frac{1}{2}bx+\frac{1}{2}a+\frac{1}{2}\right)+\mathrm{Li}_2\left(-\frac{1}{2}bx-\frac{1}{2}a+\frac{1}{2}\right)\right)}{b^5} + \frac{2\left(5a^2\right.}{}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*arccoth(b*x+a)^2,x, algorithm="maxima")
```

```
[Out] 1/3*x^3*arccoth(b*x + a)^2 - 1/12*b^2*(4*(3*a^2 + 1)*(log(b*x + a - 1)*log(
1/2*b*x + 1/2*a + 1/2) + dilog(-1/2*b*x - 1/2*a + 1/2))/b^5 + 2*(5*a^2 + 6*
a + 1)*log(b*x + a + 1)/b^5 + ((a^3 + 3*a^2 + 3*a + 1)*log(b*x + a + 1)^2 -
 2*(a^3 + 3*a^2 + 3*a + 1)*log(b*x + a + 1)*log(b*x + a - 1) + (a^3 - 3*a^2
 + 3*a - 1)*log(b*x + a - 1)^2 - 4*b*x - 2*(5*a^2 - 6*a + 1)*log(b*x + a -
1))/b^5) + 1/3*b*((b*x^2 - 4*a*x)/b^3 + (a^3 + 3*a^2 + 3*a + 1)*log(b*x + a
 + 1)/b^4 - (a^3 - 3*a^2 + 3*a - 1)*log(b*x + a - 1)/b^4)*arccoth(b*x + a)
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.00

$$\int x^2\,\mathrm{acoth}\left(a+b\,x\right)^2\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^2*acoth(a + b*x)^2,x)
```

```
[Out] int(x^2*acoth(a + b*x)^2, x)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int x^{2}\operatorname{acoth}^{2}{\left(a+bx\right)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**2*acoth(b*x+a)**2,x)
```

```
[Out] Integral(x**2*acoth(a + b*x)**2, x)
```

# 3.71 $\int x \coth^{-1}(a+bx)^2\,dx$

**Optimal**. Leaf size=136

$$-\frac{(a^2+1)\coth^{-1}(a+bx)^2}{2b^2}+\frac{a\text{Li}_2\left(-\frac{a+bx+1}{-a-bx+1}\right)}{b^2}+\frac{\log\left(1-(a+bx)^2\right)}{2b^2}-\frac{a\coth^{-1}(a+bx)^2}{b^2}+\frac{(a+bx)\coth^{-1}(a+bx)}{b^2}+$$

```
[Out] (b*x+a)*arccoth(b*x+a)/b^2-a*arccoth(b*x+a)^2/b^2-1/2*(a^2+1)*arccoth(b*x+a
)^2/b^2+1/2*x^2*arccoth(b*x+a)^2+2*a*arccoth(b*x+a)*ln(2/(-b*x-a+1))/b^2+1/
2*ln(1-(b*x+a)^2)/b^2+a*polylog(2,(-b*x-a-1)/(-b*x-a+1))/b^2
```

**Rubi** [A] time = 0.21, antiderivative size = 136, normalized size of antiderivative = 1.00, number of steps used = 12, number of rules used = 10, integrand size = 10, $\frac{\text{number of rules}}{\text{integrand size}}$ = 1.000, Rules used = {6112, 5929, 5911, 260, 6049, 5949, 5985, 5919, 2402, 2315}

$$\frac{a\text{PolyLog}\left(2,-\frac{a+bx+1}{-a-bx+1}\right)}{b^2}-\frac{(a^2+1)\coth^{-1}(a+bx)^2}{2b^2}+\frac{\log\left(1-(a+bx)^2\right)}{2b^2}-\frac{a\coth^{-1}(a+bx)^2}{b^2}+\frac{(a+bx)\coth^{-1}(a+}{b^2}$$

Antiderivative was successfully verified.

```
[In] Int[x*ArcCoth[a + b*x]^2,x]
```

```
[Out] ((a + b*x)*ArcCoth[a + b*x])/b^2 - (a*ArcCoth[a + b*x]^2)/b^2 - ((1 + a^2)*
ArcCoth[a + b*x]^2)/(2*b^2) + (x^2*ArcCoth[a + b*x]^2)/2 + (2*a*ArcCoth[a +
 b*x]*Log[2/(1 - a - b*x)])/b^2 + Log[1 - (a + b*x)^2]/(2*b^2) + (a*PolyLog
[2, -((1 + a + b*x)/(1 - a - b*x))])/b^2
```

Rule 260

```
Int[(x_)^(m_.)/((a_) + (b_.)*(x_)^(n_)), x_Symbol] :> Simp[Log[RemoveConten
t[a + b*x^n, x]]/(b*n), x] /; FreeQ[{a, b, m, n}, x] && EqQ[m, n - 1]
```

Rule 2315

```
Int[Log[(c_.)*(x_)]/((d_) + (e_.)*(x_)), x_Symbol] :> -Simp[PolyLog[2, 1 -
c*x]/e, x] /; FreeQ[{c, d, e}, x] && EqQ[e + c*d, 0]
```

Rule 2402

```
Int[Log[(c_.)/((d_) + (e_.)*(x_))]/((f_) + (g_.)*(x_)^2), x_Symbol] :> -Dis
t[e/g, Subst[Int[Log[2*d*x]/(1 - 2*d*x), x], x, 1/(d + e*x)], x] /; FreeQ[{
c, d, e, f, g}, x] && EqQ[c, 2*d] && EqQ[e^2*f + d^2*g, 0]
```

Rule 5911

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.), x_Symbol] :> Simp[x*(a + b*A
rcCoth[c*x])^p, x] - Dist[b*c*p, Int[(x*(a + b*ArcCoth[c*x])^(p - 1))/(1 -
c^2*x^2), x], x] /; FreeQ[{a, b, c}, x] && IGtQ[p, 0]
```

Rule 5919

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)/((d_) + (e_.)*(x_)), x_Symbol
] :> -Simp[((a + b*ArcCoth[c*x])^p*Log[2/(1 + (e*x)/d)])/e, x] + Dist[(b*c*
p)/e, Int[((a + b*ArcCoth[c*x])^(p - 1)*Log[2/(1 + (e*x)/d)])/(1 - c^2*x^2)
, x], x] /; FreeQ[{a, b, c, d, e}, x] && IGtQ[p, 0] && EqQ[c^2*d^2 - e^2, 0
]
```

Rule 5929

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_)*((d_) + (e_.)*(x_))^(q_.), x_S
ymbol] :> Simp[((d + e*x)^(q + 1)*(a + b*ArcCoth[c*x])^p)/(e*(q + 1)), x] -
 Dist[(b*c*p)/(e*(q + 1)), Int[ExpandIntegrand[(a + b*ArcCoth[c*x])^(p - 1)
, (d + e*x)^(q + 1)/(1 - c^2*x^2), x], x], x] /; FreeQ[{a, b, c, d, e}, x]
&& IGtQ[p, 1] && IntegerQ[q] && NeQ[q, -1]
```

Rule 5949

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)/((d_) + (e_.)*(x_)^2), x_Symb
ol] :> Simp[(a + b*ArcCoth[c*x])^(p + 1)/(b*c*d*(p + 1)), x] /; FreeQ[{a, b
, c, d, e, p}, x] && EqQ[c^2*d + e, 0] && NeQ[p, -1]
```

Rule 5985

```
Int[(((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)*(x_))/((d_) + (e_.)*(x_)^2),
 x_Symbol] :> Simp[(a + b*ArcCoth[c*x])^(p + 1)/(b*e*(p + 1)), x] + Dist[1/
(c*d), Int[(a + b*ArcCoth[c*x])^p/(1 - c*x), x], x] /; FreeQ[{a, b, c, d, e
}, x] && EqQ[c^2*d + e, 0] && IGtQ[p, 0]
```

Rule 6049

```
Int[(((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)*((f_) + (g_.)*(x_))^(m_.))/(
(d_) + (e_.)*(x_)^2), x_Symbol] :> Int[ExpandIntegrand[(a + b*ArcCoth[c*x])
^p/(d + e*x^2), (f + g*x)^m, x], x] /; FreeQ[{a, b, c, d, e, f, g}, x] && I
GtQ[p, 0] && EqQ[c^2*d + e, 0] && IGtQ[m, 0]
```

Rule 6112

```
Int[((a_.) + ArcCoth[(c_) + (d_.)*(x_)]*(b_.))^(p_.)*((e_.) + (f_.)*(x_))^(
m_.), x_Symbol] :> Dist[1/d, Subst[Int[((d*e - c*f)/d + (f*x)/d)^m*(a + b*A
rcCoth[x])^p, x], x, c + d*x], x] /; FreeQ[{a, b, c, d, e, f, m}, x] && IGt
Q[p, 0]
```

Rubi steps

$$\int x\coth^{-1}(a+bx)^2\,dx = \frac{\text{Subst}\left(\int\left(-\frac{a}{b}+\frac{x}{b}\right)\coth^{-1}(x)^2\,dx, x, a+bx\right)}{b}$$

$$= \frac{1}{2}x^2\coth^{-1}(a+bx)^2 - \text{Subst}\left(\int\left(-\frac{\coth^{-1}(x)}{b^2}+\frac{\left(1+a^2-2ax\right)\coth^{-1}(x)}{b^2\left(1-x^2\right)}\right)dx, x, a+b$$

$$= \frac{1}{2}x^2\coth^{-1}(a+bx)^2 + \frac{\text{Subst}\left(\int\coth^{-1}(x)\,dx, x, a+bx\right)}{b^2} - \frac{\text{Subst}\left(\int\frac{\left(1+a^2-2ax\right)\coth^{-1}(x)}{1-x^2}\right.}{b^2}$$

$$= \frac{(a+bx)\coth^{-1}(a+bx)}{b^2} + \frac{1}{2}x^2\coth^{-1}(a+bx)^2 - \frac{\text{Subst}\left(\int\frac{x}{1-x^2}\,dx, x, a+bx\right)}{b^2} - \frac{\text{Subst}}{}$$

$$= \frac{(a+bx)\coth^{-1}(a+bx)}{b^2} + \frac{1}{2}x^2\coth^{-1}(a+bx)^2 + \frac{\log\left(1-(a+bx)^2\right)}{2b^2} + \frac{(2a)\,\text{Subst}\left(\int\right.}{}$$

$$= \frac{(a+bx)\coth^{-1}(a+bx)}{b^2} - \frac{a\coth^{-1}(a+bx)^2}{b^2} - \frac{\left(1+a^2\right)\coth^{-1}(a+bx)^2}{2b^2} + \frac{1}{2}x^2\coth^{-1}($$

$$= \frac{(a+bx)\coth^{-1}(a+bx)}{b^2} - \frac{a\coth^{-1}(a+bx)^2}{b^2} - \frac{\left(1+a^2\right)\coth^{-1}(a+bx)^2}{2b^2} + \frac{1}{2}x^2\coth^{-1}($$

$$= \frac{(a+bx)\coth^{-1}(a+bx)}{b^2} - \frac{a\coth^{-1}(a+bx)^2}{b^2} - \frac{\left(1+a^2\right)\coth^{-1}(a+bx)^2}{2b^2} + \frac{1}{2}x^2\coth^{-1}($$

$$= \frac{(a+bx)\coth^{-1}(a+bx)}{b^2} - \frac{a\coth^{-1}(a+bx)^2}{b^2} - \frac{\left(1+a^2\right)\coth^{-1}(a+bx)^2}{2b^2} + \frac{1}{2}x^2\coth^{-1}($$

**Mathematica [A]** time = 0.26, size = 106, normalized size = 0.78

$$\frac{\left(-a^2+2a+b^2x^2-1\right)\coth^{-1}(a+bx)^2 - 2a\text{Li}_2\left(e^{-2\coth^{-1}(a+bx)}\right) - 2\log\left(\frac{1}{(a+bx)\sqrt{1-\frac{1}{(a+bx)^2}}}\right) + 2\coth^{-1}(a+bx)\left(2a\,1\right.}{2b^2}$$

Warning: Unable to verify antiderivative.

```
[In] Integrate[x*ArcCoth[a + b*x]^2,x]
```

```
[Out] ((-1 + 2*a - a^2 + b^2*x^2)*ArcCoth[a + b*x]^2 + 2*ArcCoth[a + b*x]*(a + b*
x + 2*a*Log[1 - E^(-2*ArcCoth[a + b*x])]) - 2*Log[1/((a + b*x)*Sqrt[1 - (a
+ b*x)^(-2)])] - 2*a*PolyLog[2, E^(-2*ArcCoth[a + b*x])])/(2*b^2)
```

**fricas [F]** time = 0.68, size = 0, normalized size = 0.00

$$\text{integral}\left(x\,\text{arcoth}\left(bx+a\right)^2, x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*arccoth(b*x+a)^2,x, algorithm="fricas")
```

```
[Out] integral(x*arccoth(b*x + a)^2, x)
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int x\,\text{arcoth}\left(bx+a\right)^2\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*arccoth(b*x+a)^2,x, algorithm="giac")
```

```
[Out] integrate(x*arccoth(b*x + a)^2, x)
```

**maple [B]** time = 0.06, size = 365, normalized size = 2.68

$$\frac{x^2 \operatorname{arccoth}(bx+a)^2}{2}-\frac{\operatorname{arccoth}(bx+a)^2 a^2}{2b^2}+\frac{\operatorname{arccoth}(bx+a)\,x}{b}+\frac{\operatorname{arccoth}(bx+a)\,a}{b^2}-\frac{\operatorname{arccoth}(bx+a)\ln(bx+}{b^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x*arccoth(b*x+a)^2,x)
```

```
[Out] 1/2*x^2*arccoth(b*x+a)^2-1/2/b^2*arccoth(b*x+a)^2*a^2+1/b*arccoth(b*x+a)*x+
1/b^2*arccoth(b*x+a)*a-1/b^2*arccoth(b*x+a)*ln(b*x+a-1)*a+1/2/b^2*arccoth(b
*x+a)*ln(b*x+a-1)-1/b^2*arccoth(b*x+a)*ln(b*x+a+1)*a-1/2/b^2*arccoth(b*x+a)
*ln(b*x+a+1)+1/2/b^2*ln(b*x+a-1)+1/2/b^2*ln(b*x+a+1)+1/8/b^2*ln(b*x+a-1)^2-
1/4/b^2*ln(b*x+a-1)*ln(1/2+1/2*b*x+1/2*a)-1/4/b^2*ln(b*x+a-1)^2*a+1/b^2*dil
og(1/2+1/2*b*x+1/2*a)*a+1/2/b^2*ln(b*x+a-1)*ln(1/2+1/2*b*x+1/2*a)*a+1/4/b^2
*ln(b*x+a+1)^2*a-1/2/b^2*ln(b*x+a+1)*ln(-1/2*b*x-1/2*a+1/2)*a+1/2/b^2*ln(-1
/2*b*x-1/2*a+1/2)*ln(1/2+1/2*b*x+1/2*a)*a+1/8/b^2*ln(b*x+a+1)^2-1/4/b^2*ln(
-1/2*b*x-1/2*a+1/2)*ln(b*x+a+1)+1/4/b^2*ln(-1/2*b*x-1/2*a+1/2)*ln(1/2+1/2*b
*x+1/2*a)
```

**maxima [A]** time = 0.34, size = 202, normalized size = 1.49

$$\frac{1}{2}\,x^2 \operatorname{arcoth}(bx+a)^2+\frac{1}{8}\,b^2\left(\frac{8\left(\log(bx+a-1)\log\left(\frac{1}{2}\,bx+\frac{1}{2}\,a+\frac{1}{2}\right)+\mathrm{Li}_2\left(-\frac{1}{2}\,bx-\frac{1}{2}\,a+\frac{1}{2}\right)\right)a}{b^4}+\frac{4\,(a+1)\log}{b}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*arccoth(b*x+a)^2,x, algorithm="maxima")
```

```
[Out] 1/2*x^2*arccoth(b*x + a)^2 + 1/8*b^2*(8*(log(b*x + a - 1)*log(1/2*b*x + 1/2
*a + 1/2) + dilog(-1/2*b*x - 1/2*a + 1/2))*a/b^4 + 4*(a + 1)*log(b*x + a +
1)/b^4 + ((a^2 + 2*a + 1)*log(b*x + a + 1)^2 - 2*(a^2 + 2*a + 1)*log(b*x +
a + 1)*log(b*x + a - 1) + (a^2 - 2*a + 1)*log(b*x + a - 1)^2 - 4*(a - 1)*lo
g(b*x + a - 1))/b^4) + 1/2*b*(2*x/b^2 - (a^2 + 2*a + 1)*log(b*x + a + 1)/b^
3 + (a^2 - 2*a + 1)*log(b*x + a - 1)/b^3)*arccoth(b*x + a)
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.01

$$\int x\,\mathrm{acoth}\left(a+b\,x\right)^2\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x*acoth(a + b*x)^2,x)
```

```
[Out] int(x*acoth(a + b*x)^2, x)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int x\,\mathrm{acoth}^2(a+bx)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*acoth(b*x+a)**2,x)
```

```
[Out] Integral(x*acoth(a + b*x)**2, x)
```

# 3.72 $\int \coth^{-1}(a+bx)^2\,dx$

**Optimal**. Leaf size=81

$$-\frac{\mathrm{Li}_2\left(-\frac{a+bx+1}{-a-bx+1}\right)}{b}+\frac{(a+bx)\coth^{-1}(a+bx)^2}{b}+\frac{\coth^{-1}(a+bx)^2}{b}-\frac{2\log\left(\frac{2}{-a-bx+1}\right)\coth^{-1}(a+bx)}{b}$$

```
[Out] arccoth(b*x+a)^2/b+(b*x+a)*arccoth(b*x+a)^2/b-2*arccoth(b*x+a)*ln(2/(-b*x-a
+1))/b-polylog(2,(-b*x-a-1)/(-b*x-a+1))/b
```

**Rubi [A]** time = 0.09, antiderivative size = 81, normalized size of antiderivative = 1.00, number of steps used = 6, number of rules used = 6, integrand size = 8, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.750, Rules used = {6104, 5911, 5985, 5919, 2402, 2315}

$$-\frac{\mathrm{PolyLog}\left(2,-\frac{a+bx+1}{-a-bx+1}\right)}{b}+\frac{(a+bx)\coth^{-1}(a+bx)^2}{b}+\frac{\coth^{-1}(a+bx)^2}{b}-\frac{2\log\left(\frac{2}{-a-bx+1}\right)\coth^{-1}(a+bx)}{b}$$

Antiderivative was successfully verified.

```
[In] Int[ArcCoth[a + b*x]^2,x]
```

```
[Out] ArcCoth[a + b*x]^2/b + ((a + b*x)*ArcCoth[a + b*x]^2)/b - (2*ArcCoth[a + b*
x]*Log[2/(1 - a - b*x)])/b - PolyLog[2, -((1 + a + b*x)/(1 - a - b*x))]/b
```

Rule 2315

```
Int[Log[(c_.)*(x_)]/((d_) + (e_.)*(x_)), x_Symbol] :> -Simp[PolyLog[2, 1 -
c*x]/e, x] /; FreeQ[{c, d, e}, x] && EqQ[e + c*d, 0]
```

Rule 2402

```
Int[Log[(c_.)/((d_) + (e_.)*(x_))]/((f_) + (g_.)*(x_)^2), x_Symbol] :> -Dis
t[e/g, Subst[Int[Log[2*d*x]/(1 - 2*d*x), x], x, 1/(d + e*x)], x] /; FreeQ[{
c, d, e, f, g}, x] && EqQ[c, 2*d] && EqQ[e^2*f + d^2*g, 0]
```

Rule 5911

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.), x_Symbol] :> Simp[x*(a + b*A
rcCoth[c*x])^p, x] - Dist[b*c*p, Int[(x*(a + b*ArcCoth[c*x])^(p - 1))/(1 -
c^2*x^2), x], x] /; FreeQ[{a, b, c}, x] && IGtQ[p, 0]
```

Rule 5919

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)/((d_) + (e_.)*(x_)), x_Symbol
] :> -Simp[((a + b*ArcCoth[c*x])^p*Log[2/(1 + (e*x)/d)])/e, x] + Dist[(b*c*
p)/e, Int[((a + b*ArcCoth[c*x])^(p - 1)*Log[2/(1 + (e*x)/d)])/(1 - c^2*x^2)
, x], x] /; FreeQ[{a, b, c, d, e}, x] && IGtQ[p, 0] && EqQ[c^2*d^2 - e^2, 0
]
```

Rule 5985

```
Int[(((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)*(x_))/((d_) + (e_.)*(x_)^2),
 x_Symbol] :> Simp[(a + b*ArcCoth[c*x])^(p + 1)/(b*e*(p + 1)), x] + Dist[1/
(c*d), Int[(a + b*ArcCoth[c*x])^p/(1 - c*x), x], x] /; FreeQ[{a, b, c, d, e
}, x] && EqQ[c^2*d + e, 0] && IGtQ[p, 0]
```

Rule 6104

```
Int[((a_.) + ArcCoth[(c_) + (d_.)*(x_)]*(b_.))^(p_.), x_Symbol] :> Dist[1/d
, Subst[Int[(a + b*ArcCoth[x])^p, x], x, c + d*x], x] /; FreeQ[{a, b, c, d}
```

```
, x] && IGtQ[p, 0]
```

Rubi steps

$$\int \coth^{-1}(a+bx)^2\,dx = \frac{\text{Subst}\left(\int \coth^{-1}(x)^2\,dx, x, a+bx\right)}{b}$$

$$= \frac{(a+bx)\coth^{-1}(a+bx)^2}{b} - \frac{2\,\text{Subst}\left(\int \frac{x\coth^{-1}(x)}{1-x^2}\,dx, x, a+bx\right)}{b}$$

$$= \frac{\coth^{-1}(a+bx)^2}{b} + \frac{(a+bx)\coth^{-1}(a+bx)^2}{b} - \frac{2\,\text{Subst}\left(\int \frac{\coth^{-1}(x)}{1-x}\,dx, x, a+bx\right)}{b}$$

$$= \frac{\coth^{-1}(a+bx)^2}{b} + \frac{(a+bx)\coth^{-1}(a+bx)^2}{b} - \frac{2\coth^{-1}(a+bx)\log\left(\frac{2}{1-a-bx}\right)}{b} + \frac{2\,\text{Sub}}{}$$

$$= \frac{\coth^{-1}(a+bx)^2}{b} + \frac{(a+bx)\coth^{-1}(a+bx)^2}{b} - \frac{2\coth^{-1}(a+bx)\log\left(\frac{2}{1-a-bx}\right)}{b} - \frac{2\,\text{Sub}}{}$$

$$= \frac{\coth^{-1}(a+bx)^2}{b} + \frac{(a+bx)\coth^{-1}(a+bx)^2}{b} - \frac{2\coth^{-1}(a+bx)\log\left(\frac{2}{1-a-bx}\right)}{b} - \frac{\text{Li}_2\left(1\right.}{}$$

**Mathematica [A]** time = 0.08, size = 55, normalized size = 0.68

$$\frac{\text{Li}_2\left(e^{-2\coth^{-1}(a+bx)}\right) + \coth^{-1}(a+bx)\left((a+bx-1)\coth^{-1}(a+bx) - 2\log\left(1-e^{-2\coth^{-1}(a+bx)}\right)\right)}{b}$$

Warning: Unable to verify antiderivative.

```
[In] Integrate[ArcCoth[a + b*x]^2,x]
[Out] (ArcCoth[a + b*x]*((-1 + a + b*x)*ArcCoth[a + b*x] - 2*Log[1 - E^(-2*ArcCot
h[a + b*x])]) + PolyLog[2, E^(-2*ArcCoth[a + b*x])])/b
```

**fricas [F]** time = 0.44, size = 0, normalized size = 0.00

$$\text{integral}\left(\text{arcoth}\,(bx+a)^2\,, x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(b*x+a)^2,x, algorithm="fricas")
[Out] integral(arccoth(b*x + a)^2, x)
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \text{arcoth}\,(bx+a)^2\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(b*x+a)^2,x, algorithm="giac")
[Out] integrate(arccoth(b*x + a)^2, x)
```

**maple [A]** time = 0.30, size = 151, normalized size = 1.86

$$x\text{arccoth}\,(bx+a)^2 + \frac{\text{arccoth}\,(bx+a)^2\,a}{b} + \frac{\text{arccoth}\,(bx+a)^2}{b} - \frac{2\,\text{arccoth}\,(bx+a)\ln\left(1-\frac{1}{\sqrt{\frac{bx+a-1}{bx+a+1}}}\right)}{b} - \frac{2\,\text{arccoth}\,(}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(arccoth(b*x+a)^2,x)
```

```
[Out] x*arccoth(b*x+a)^2+1/b*arccoth(b*x+a)^2*a+arccoth(b*x+a)^2/b-2/b*arccoth(b*
x+a)*ln(1-1/((b*x+a-1)/(b*x+a+1))^(1/2))-2/b*arccoth(b*x+a)*ln(1+1/((b*x+a-
1)/(b*x+a+1))^(1/2))-2/b*polylog(2,-1/((b*x+a-1)/(b*x+a+1))^(1/2))-2/b*poly
log(2,1/((b*x+a-1)/(b*x+a+1))^(1/2))
```

**maxima [A]** time = 0.33, size = 139, normalized size = 1.72

$$-\frac{1}{4}b^2\left(\frac{(a+1)\log(bx+a+1)^2-2(a+1)\log(bx+a+1)\log(bx+a-1)+(a-1)\log(bx+a-1)^2}{b^3}+\frac{4\left(\log(b\right.}{}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(b*x+a)^2,x, algorithm="maxima")
```

```
[Out] -1/4*b^2*(((a + 1)*log(b*x + a + 1)^2 - 2*(a + 1)*log(b*x + a + 1)*log(b*x
+ a - 1) + (a - 1)*log(b*x + a - 1)^2)/b^3 + 4*(log(b*x + a - 1)*log(1/2*b*
x + 1/2*a + 1/2) + dilog(-1/2*b*x - 1/2*a + 1/2))/b^3) + b*((a + 1)*log(b*x
 + a + 1)/b^2 - (a - 1)*log(b*x + a - 1)/b^2)*arccoth(b*x + a) + x*arccoth(
b*x + a)^2
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.01

$$\int \operatorname{acoth}(a+b\,x)^2\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(a + b*x)^2,x)
```

```
[Out] int(acoth(a + b*x)^2, x)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \operatorname{acoth}^2(a+bx)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(b*x+a)**2,x)
```

```
[Out] Integral(acoth(a + b*x)**2, x)
```

# 3.73 $\int \frac{\coth^{-1}(a+bx)^2}{x} \, dx$

**Optimal**. Leaf size=148

$$\frac{1}{2}\mathrm{Li}_3\left(1-\frac{2}{a+bx+1}\right)-\frac{1}{2}\mathrm{Li}_3\left(1-\frac{2bx}{(1-a)(a+bx+1)}\right)+\mathrm{Li}_2\left(1-\frac{2}{a+bx+1}\right)\coth^{-1}(a+bx)-\mathrm{Li}_2\left(1-\frac{2b}{(1-a)(a}\right.$$

```
[Out] -arccoth(b*x+a)^2*ln(2/(b*x+a+1))+arccoth(b*x+a)^2*ln(2*b*x/(1-a)/(b*x+a+1)
)+arccoth(b*x+a)*polylog(2,1-2/(b*x+a+1))-arccoth(b*x+a)*polylog(2,1-2*b*x/
(1-a)/(b*x+a+1))+1/2*polylog(3,1-2/(b*x+a+1))-1/2*polylog(3,1-2*b*x/(1-a)/(
b*x+a+1))
```

**Rubi [A]** time = 0.09, antiderivative size = 148, normalized size of antiderivative = 1.00, number of steps used = 2, number of rules used = 2, integrand size = 12, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.167, Rules used = {6112, 5923}

$$\frac{1}{2}\mathrm{PolyLog}\left(3,1-\frac{2}{a+bx+1}\right)-\frac{1}{2}\mathrm{PolyLog}\left(3,1-\frac{2bx}{(1-a)(a+bx+1)}\right)+\coth^{-1}(a+bx)\mathrm{PolyLog}\left(2,1-\frac{2}{a+bx}\right.$$

Antiderivative was successfully verified.

```
[In] Int[ArcCoth[a + b*x]^2/x,x]
```

```
[Out] -(ArcCoth[a + b*x]^2*Log[2/(1 + a + b*x)]) + ArcCoth[a + b*x]^2*Log[(2*b*x)
/((1 - a)*(1 + a + b*x))] + ArcCoth[a + b*x]*PolyLog[2, 1 - 2/(1 + a + b*x)
] - ArcCoth[a + b*x]*PolyLog[2, 1 - (2*b*x)/((1 - a)*(1 + a + b*x))] + Poly
Log[3, 1 - 2/(1 + a + b*x)]/2 - PolyLog[3, 1 - (2*b*x)/((1 - a)*(1 + a + b*
x))]/2
```

Rule 5923

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^2/((d_) + (e_.)*(x_)), x_Symbol] :>
 -Simp[((a + b*ArcCoth[c*x])^2*Log[2/(1 + c*x)])/e, x] + (Simp[((a + b*ArcC
oth[c*x])^2*Log[(2*c*(d + e*x))/((c*d + e)*(1 + c*x))])/e, x] + Simp[(b*(a
+ b*ArcCoth[c*x])*PolyLog[2, 1 - 2/(1 + c*x)])/e, x] - Simp[(b*(a + b*ArcCo
th[c*x])*PolyLog[2, 1 - (2*c*(d + e*x))/((c*d + e)*(1 + c*x))])/e, x] + Sim
p[(b^2*PolyLog[3, 1 - 2/(1 + c*x)])/(2*e), x] - Simp[(b^2*PolyLog[3, 1 - (2
*c*(d + e*x))/((c*d + e)*(1 + c*x))])/(2*e), x]) /; FreeQ[{a, b, c, d, e},
x] && NeQ[c^2*d^2 - e^2, 0]
```

Rule 6112

```
Int[((a_.) + ArcCoth[(c_) + (d_.)*(x_)]*(b_.))^(p_.)*((e_.) + (f_.)*(x_))^(
m_.), x_Symbol] :> Dist[1/d, Subst[Int[((d*e - c*f)/d + (f*x)/d)^m*(a + b*A
rcCoth[x])^p, x], x, c + d*x], x] /; FreeQ[{a, b, c, d, e, f, m}, x] && IGt
Q[p, 0]
```

Rubi steps

$$\begin{aligned}\int \frac{\coth^{-1}(a+bx)^2}{x} \, dx &= \frac{\mathrm{Subst}\left(\int \frac{\coth^{-1}(x)^2}{-\frac{a}{b}+\frac{x}{b}} \, dx, x, a+bx\right)}{b}\\ &= -\coth^{-1}(a+bx)^2 \log\left(\frac{2}{1+a+bx}\right)+\coth^{-1}(a+bx)^2 \log\left(\frac{2bx}{(1-a)(1+a+bx)}\right)+\mathrm{co}\end{aligned}$$

**Mathematica** [C] time = 2.87, size = 547, normalized size = 3.70

$$\frac{2}{3}\sqrt{1-\frac{1}{a^2}}\,ae^{\tanh^{-1}\left(\frac{1}{a}\right)}\coth^{-1}(a+bx)^3+2\coth^{-1}(a+bx)\text{Li}_2\left(-\sqrt{\frac{a-1}{a+1}}e^{\coth^{-1}(a+bx)}\right)+2\coth^{-1}(a+bx)\text{Li}_2\left(\sqrt{\frac{a-1}{a+1}}e^{c}\right.$$

Warning: Unable to verify antiderivative.

```
[In] Integrate[ArcCoth[a + b*x]^2/x,x]
```

```
[Out] (-1/24*I)*Pi^3 - (2*ArcCoth[a + b*x]^3)/3 - (2*a*ArcCoth[a + b*x]^3)/3 + (2
*Sqrt[1 - a^(-2)]*a*E^ArcTanh[a^(-1)]*ArcCoth[a + b*x]^3)/3 - I*Pi*ArcCoth[
a + b*x]*Log[(E^(-ArcCoth[a + b*x]) + E^ArcCoth[a + b*x])/2] + ArcCoth[a +
b*x]^2*Log[1 - Sqrt[(-1 + a)/(1 + a)]*E^ArcCoth[a + b*x]] + ArcCoth[a + b*x
]^2*Log[1 + Sqrt[(-1 + a)/(1 + a)]*E^ArcCoth[a + b*x]] - ArcCoth[a + b*x]^2
*Log[1 - E^(2*ArcCoth[a + b*x])] - 2*ArcCoth[a + b*x]*ArcTanh[a^(-1)]*Log[(
I/2)*(E^(ArcCoth[a + b*x] - ArcTanh[a^(-1)]) - E^(-ArcCoth[a + b*x] + ArcTa
nh[a^(-1)]))] + ArcCoth[a + b*x]^2*Log[(-1 - E^(2*ArcCoth[a + b*x]) + a*(-1
 + E^(2*ArcCoth[a + b*x])))/(2*E^ArcCoth[a + b*x])] + I*Pi*ArcCoth[a + b*x]
*Log[1/Sqrt[1 - (a + b*x)^(-2)]] - ArcCoth[a + b*x]^2*Log[-((b*x)/((a + b*x
)*Sqrt[1 - (a + b*x)^(-2)]))] + 2*ArcCoth[a + b*x]*ArcTanh[a^(-1)]*Log[I*Si
nh[ArcCoth[a + b*x] - ArcTanh[a^(-1)]]] + 2*ArcCoth[a + b*x]*PolyLog[2, -(S
qrt[(-1 + a)/(1 + a)]*E^ArcCoth[a + b*x])] + 2*ArcCoth[a + b*x]*PolyLog[2,
Sqrt[(-1 + a)/(1 + a)]*E^ArcCoth[a + b*x]] - ArcCoth[a + b*x]*PolyLog[2, E^
(2*ArcCoth[a + b*x])] - 2*PolyLog[3, -(Sqrt[(-1 + a)/(1 + a)]*E^ArcCoth[a +
 b*x])] - 2*PolyLog[3, Sqrt[(-1 + a)/(1 + a)]*E^ArcCoth[a + b*x]] + PolyLog
[3, E^(2*ArcCoth[a + b*x])]/2
```

**fricas** [F] time = 0.47, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{\text{arcoth}\,(bx+a)^2}{x},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(b*x+a)^2/x,x, algorithm="fricas")
```

```
[Out] integral(arccoth(b*x + a)^2/x, x)
```

**giac** [F] time = 0.00, size = 0, normalized size = 0.00

$$\int\frac{\text{arcoth}\,(bx+a)^2}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(b*x+a)^2/x,x, algorithm="giac")
```

```
[Out] integrate(arccoth(b*x + a)^2/x, x)
```

**maple** [C] time = 1.15, size = 985, normalized size = 6.66

result too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(arccoth(b*x+a)^2/x,x)
```

```
[Out] ln(b*x)*arccoth(b*x+a)^2-arccoth(b*x+a)^2*ln(a*((b*x+a+1)/(b*x+a-1)-1)-(b*x
+a+1)/(b*x+a-1)-1)+arccoth(b*x+a)^2*ln((b*x+a+1)/(b*x+a-1)-1)-arccoth(b*x+a
)^2*ln(1-1/((b*x+a-1)/(b*x+a+1))^(1/2))-2*arccoth(b*x+a)*polylog(2,1/((b*x+
a-1)/(b*x+a+1))^(1/2))+2*polylog(3,1/((b*x+a-1)/(b*x+a+1))^(1/2))-arccoth(b
```

```
*x+a)^2*ln(1+1/((b*x+a-1)/(b*x+a+1))^(1/2))-2*arccoth(b*x+a)*polylog(2,-1/(
(b*x+a-1)/(b*x+a+1))^(1/2))+2*polylog(3,-1/((b*x+a-1)/(b*x+a+1))^(1/2))-I*P
i*arccoth(b*x+a)^2+I*Pi*arccoth(b*x+a)^2*csgn(I*(a*((b*x+a+1)/(b*x+a-1)-1)-
(b*x+a+1)/(b*x+a-1)-1)/((b*x+a+1)/(b*x+a-1)-1))^2-1/2*I*Pi*arccoth(b*x+a)^2
*csgn(I*(a*((b*x+a+1)/(b*x+a-1)-1)-(b*x+a+1)/(b*x+a-1)-1)/((b*x+a+1)/(b*x+a
-1)-1))^3-1/2*I*Pi*arccoth(b*x+a)^2*csgn(I/((b*x+a+1)/(b*x+a-1)-1))*csgn(I*
(a*((b*x+a+1)/(b*x+a-1)-1)-(b*x+a+1)/(b*x+a-1)-1)/((b*x+a+1)/(b*x+a-1)-1))^
2+1/2*I*Pi*arccoth(b*x+a)^2*csgn(I/((b*x+a+1)/(b*x+a-1)-1))*csgn(I*(a*((b*x
+a+1)/(b*x+a-1)-1)-(b*x+a+1)/(b*x+a-1)-1))*csgn(I*(a*((b*x+a+1)/(b*x+a-1)-1
)-(b*x+a+1)/(b*x+a-1)-1)/((b*x+a+1)/(b*x+a-1)-1))-1/2*I*Pi*arccoth(b*x+a)^2
*csgn(I*(a*((b*x+a+1)/(b*x+a-1)-1)-(b*x+a+1)/(b*x+a-1)-1))*csgn(I*(a*((b*x+
a+1)/(b*x+a-1)-1)-(b*x+a+1)/(b*x+a-1)-1)/((b*x+a+1)/(b*x+a-1)-1))^2+a/(a-1)
*arccoth(b*x+a)^2*ln(1-(a-1)*(b*x+a+1)/(b*x+a-1)/(1+a))+a/(a-1)*arccoth(b*x
+a)*polylog(2,(a-1)*(b*x+a+1)/(b*x+a-1)/(1+a))-1/2*a/(a-1)*polylog(3,(a-1)*
(b*x+a+1)/(b*x+a-1)/(1+a))-1/(a-1)*arccoth(b*x+a)^2*ln(1-(a-1)*(b*x+a+1)/(b
*x+a-1)/(1+a))-1/(a-1)*arccoth(b*x+a)*polylog(2,(a-1)*(b*x+a+1)/(b*x+a-1)/(
1+a))+1/2/(a-1)*polylog(3,(a-1)*(b*x+a+1)/(b*x+a-1)/(1+a))
```

**maxima [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{arcoth}(bx+a)^2}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(b*x+a)^2/x,x, algorithm="maxima")
```

```
[Out] integrate(arccoth(b*x + a)^2/x, x)
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.01

$$\int \frac{\operatorname{acoth}(a+b\,x)^2}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(a + b*x)^2/x,x)
```

```
[Out] int(acoth(a + b*x)^2/x, x)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{acoth}^2(a+bx)}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(b*x+a)**2/x,x)
```

```
[Out] Integral(acoth(a + b*x)**2/x, x)
```

## 3.74 $\int \frac{\coth^{-1}(a+bx)^2}{x^2}\,dx$

**Optimal**. Leaf size=251

$$\frac{b\text{Li}_2\left(1-\frac{2}{a+bx+1}\right)}{1-a^2}-\frac{b\text{Li}_2\left(1-\frac{2bx}{(1-a)(a+bx+1)}\right)}{1-a^2}-\frac{2b\log\left(\frac{2}{a+bx+1}\right)\coth^{-1}(a+bx)}{1-a^2}+\frac{2b\log\left(\frac{2bx}{(1-a)(a+bx+1)}\right)\coth^{-1}(a+bx)}{1-a^2}$$

```
[Out] -arccoth(b*x+a)^2/x+b*arccoth(b*x+a)*ln(2/(-b*x-a+1))/(1-a)+b*arccoth(b*x+a
)*ln(2/(b*x+a+1))/(1+a)-2*b*arccoth(b*x+a)*ln(2/(b*x+a+1))/(-a^2+1)+2*b*arc
coth(b*x+a)*ln(2*b*x/(1-a)/(b*x+a+1))/(-a^2+1)+1/2*b*polylog(2,(-b*x-a-1)/(
-b*x-a+1))/(1-a)-1/2*b*polylog(2,1-2/(b*x+a+1))/(1+a)+b*polylog(2,1-2/(b*x+
a+1))/(-a^2+1)-b*polylog(2,1-2*b*x/(1-a)/(b*x+a+1))/(-a^2+1)
```

**Rubi [A]** time = 0.72, antiderivative size = 251, normalized size of antiderivative = 1.00, number of steps used = 17, number of rules used = 15, integrand size = 12, $\frac{\text{number of rules}}{\text{integrand size}}$ = 1.250, Rules used = {6110, 371, 706, 31, 633, 6741, 6122, 6688, 12, 6725, 5921, 2402, 2315, 2447, 5919}

$$\frac{b\text{PolyLog}\left(2,1-\frac{2}{a+bx+1}\right)}{1-a^2}-\frac{b\text{PolyLog}\left(2,1-\frac{2bx}{(1-a)(a+bx+1)}\right)}{1-a^2}+\frac{b\text{PolyLog}\left(2,-\frac{a+bx+1}{-a-bx+1}\right)}{2(1-a)}-\frac{b\text{PolyLog}\left(2,1-\frac{2}{a+bx+1}\right)}{2(a+1)}-$$

Antiderivative was successfully verified.

```
[In] Int[ArcCoth[a + b*x]^2/x^2,x]
```

```
[Out] -(ArcCoth[a + b*x]^2/x) + (b*ArcCoth[a + b*x]*Log[2/(1 - a - b*x)])/(1 - a)
 + (b*ArcCoth[a + b*x]*Log[2/(1 + a + b*x)])/(1 + a) - (2*b*ArcCoth[a + b*x
]*Log[2/(1 + a + b*x)])/(1 - a^2) + (2*b*ArcCoth[a + b*x]*Log[(2*b*x)/((1 -
 a)*(1 + a + b*x))])/(1 - a^2) + (b*PolyLog[2, -((1 + a + b*x)/(1 - a - b*x
))])/(2*(1 - a)) - (b*PolyLog[2, 1 - 2/(1 + a + b*x)])/(2*(1 + a)) + (b*Pol
yLog[2, 1 - 2/(1 + a + b*x)])/(1 - a^2) - (b*PolyLog[2, 1 - (2*b*x)/((1 - a
)*(1 + a + b*x))])/(1 - a^2)
```

Rule 12

```
Int[(a_)*(u_), x_Symbol] :> Dist[a, Int[u, x], x] /; FreeQ[a, x] &&  !Match
Q[u, (b_)*(v_) /; FreeQ[b, x]]
```

Rule 31

```
Int[((a_) + (b_.)*(x_))^(-1), x_Symbol] :> Simp[Log[RemoveContent[a + b*x,
x]]/b, x] /; FreeQ[{a, b}, x]
```

Rule 371

```
Int[((a_) + (b_.)*(v_)^(n_))^(p_.)*(x_)^(m_.), x_Symbol] :> With[{c = Coeff
icient[v, x, 0], d = Coefficient[v, x, 1]}, Dist[1/d^(m + 1), Subst[Int[Sim
plifyIntegrand[(x - c)^m*(a + b*x^n)^p, x], x], x, v], x] /; NeQ[c, 0]] /;
FreeQ[{a, b, n, p}, x] && LinearQ[v, x] && IntegerQ[m]
```

Rule 633

```
Int[((d_) + (e_.)*(x_))/((a_) + (c_.)*(x_)^2), x_Symbol] :> With[{q = Rt[-(
a*c), 2]}, Dist[e/2 + (c*d)/(2*q), Int[1/(-q + c*x), x], x] + Dist[e/2 - (c
*d)/(2*q), Int[1/(q + c*x), x], x]] /; FreeQ[{a, c, d, e}, x] && NiceSqrtQ[
-(a*c)]
```

Rule 706

```
Int[1/(((d_) + (e_.)*(x_))*((a_) + (c_.)*(x_)^2)), x_Symbol] :> Dist[e^2/(c
*d^2 + a*e^2), Int[1/(d + e*x), x], x] + Dist[1/(c*d^2 + a*e^2), Int[(c*d -
 c*e*x)/(a + c*x^2), x], x] /; FreeQ[{a, c, d, e}, x] && NeQ[c*d^2 + a*e^2,
 0]
```

Rule 2315

```
Int[Log[(c_.)*(x_)]/((d_) + (e_.)*(x_)), x_Symbol] :> -Simp[PolyLog[2, 1 -
c*x]/e, x] /; FreeQ[{c, d, e}, x] && EqQ[e + c*d, 0]
```

Rule 2402

```
Int[Log[(c_.)/((d_) + (e_.)*(x_))]/((f_) + (g_.)*(x_)^2), x_Symbol] :> -Dis
t[e/g, Subst[Int[Log[2*d*x]/(1 - 2*d*x), x], x, 1/(d + e*x)], x] /; FreeQ[{
c, d, e, f, g}, x] && EqQ[c, 2*d] && EqQ[e^2*f + d^2*g, 0]
```

Rule 2447

```
Int[Log[u_]*(Pq_)^(m_.), x_Symbol] :> With[{C = FullSimplify[(Pq^m*(1 - u))
/D[u, x]]}, Simp[C*PolyLog[2, 1 - u], x] /; FreeQ[C, x]] /; IntegerQ[m] &&
PolyQ[Pq, x] && RationalFunctionQ[u, x] && LeQ[RationalFunctionExponents[u,
 x][[2]], Expon[Pq, x]]
```

Rule 5919

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)/((d_) + (e_.)*(x_)), x_Symbol
] :> -Simp[((a + b*ArcCoth[c*x])^p*Log[2/(1 + (e*x)/d)])/e, x] + Dist[(b*c*
p)/e, Int[((a + b*ArcCoth[c*x])^(p - 1)*Log[2/(1 + (e*x)/d)])/(1 - c^2*x^2)
, x], x] /; FreeQ[{a, b, c, d, e}, x] && IGtQ[p, 0] && EqQ[c^2*d^2 - e^2, 0
]
```

Rule 5921

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))/((d_) + (e_.)*(x_)), x_Symbol] :> -
Simp[((a + b*ArcCoth[c*x])*Log[2/(1 + c*x)])/e, x] + (Dist[(b*c)/e, Int[Log
[2/(1 + c*x)]/(1 - c^2*x^2), x], x] - Dist[(b*c)/e, Int[Log[(2*c*(d + e*x))
/((c*d + e)*(1 + c*x))]/(1 - c^2*x^2), x], x] + Simp[((a + b*ArcCoth[c*x])*
Log[(2*c*(d + e*x))/((c*d + e)*(1 + c*x))])/e, x]) /; FreeQ[{a, b, c, d, e}
, x] && NeQ[c^2*d^2 - e^2, 0]
```

Rule 6110

```
Int[((a_.) + ArcCoth[(c_) + (d_.)*(x_)]*(b_.))^(p_.)*((e_.) + (f_.)*(x_))^(
m_), x_Symbol] :> Simp[((e + f*x)^(m + 1)*(a + b*ArcCoth[c + d*x])^p)/(f*(m
 + 1)), x] - Dist[(b*d*p)/(f*(m + 1)), Int[((e + f*x)^(m + 1)*(a + b*ArcCot
h[c + d*x])^(p - 1))/(1 - (c + d*x)^2), x], x] /; FreeQ[{a, b, c, d, e, f},
 x] && IGtQ[p, 0] && ILtQ[m, -1]
```

Rule 6122

```
Int[((a_.) + ArcCoth[(c_) + (d_.)*(x_)]*(b_.))^(p_.)*((e_.) + (f_.)*(x_))^(
m_.)*((A_.) + (B_.)*(x_) + (C_.)*(x_)^2)^(q_.), x_Symbol] :> Dist[1/d, Subs
t[Int[(((d*e - c*f)/d + (f*x)/d)^m*(-(C/d^2) + (C*x^2)/d^2)^q*(a + b*ArcCoth
[x])^p, x], x, c + d*x], x] /; FreeQ[{a, b, c, d, e, f, A, B, C, m, p, q},
x] && EqQ[B*(1 - c^2) + 2*A*c*d, 0] && EqQ[2*c*C - B*d, 0]
```

Rule 6688

```
Int[u_, x_Symbol] :> With[{v = SimplifyIntegrand[u, x]}, Int[v, x] /; Simpl
```

```
erIntegrandQ[v, u, x]]
```

Rule 6725

```
Int[(u_)/((a_) + (b_.)*(x_)^(n_)), x_Symbol] :> With[{v = RationalFunctionE
xpand[u/(a + b*x^n), x]}, Int[v, x] /; SumQ[v]] /; FreeQ[{a, b}, x] && IGtQ
[n, 0]
```

Rule 6741

```
Int[u_, x_Symbol] :> With[{v = NormalizeIntegrand[u, x]}, Int[v, x] /; v =!
= u]
```

Rubi steps

$$\int \frac{\coth^{-1}(a+bx)^2}{x^2}\,dx = -\frac{\coth^{-1}(a+bx)^2}{x} + (2b)\int \frac{\coth^{-1}(a+bx)}{x\left(1-(a+bx)^2\right)}\,dx$$

$$= -\frac{\coth^{-1}(a+bx)^2}{x} + (2b)\int \frac{\coth^{-1}(a+bx)}{x\left(1-a^2-2abx-b^2x^2\right)}\,dx$$

$$= -\frac{\coth^{-1}(a+bx)^2}{x} + 2\,\text{Subst}\left(\int \frac{\coth^{-1}(x)}{\left(-\frac{a}{b}+\frac{x}{b}\right)\left(1-x^2\right)}\,dx, x, a+bx\right)$$

$$= -\frac{\coth^{-1}(a+bx)^2}{x} + 2\,\text{Subst}\left(\int \frac{b\coth^{-1}(x)}{(-a+x)\left(1-x^2\right)}\,dx, x, a+bx\right)$$

$$= -\frac{\coth^{-1}(a+bx)^2}{x} + (2b)\,\text{Subst}\left(\int \frac{\coth^{-1}(x)}{(-a+x)\left(1-x^2\right)}\,dx, x, a+bx\right)$$

$$= -\frac{\coth^{-1}(a+bx)^2}{x} + (2b)\,\text{Subst}\left(\int\left(\frac{\coth^{-1}(x)}{\left(-1+a^2\right)(a-x)} + \frac{\coth^{-1}(x)}{2(-1+a)(-1+x)} - \frac{\coth^{-1}(}{2(1+a)(1}\right.\right.$$

$$= -\frac{\coth^{-1}(a+bx)^2}{x} - \frac{b\,\text{Subst}\left(\int \frac{\coth^{-1}(x)}{-1+x}\,dx, x, a+bx\right)}{1-a} - \frac{b\,\text{Subst}\left(\int \frac{\coth^{-1}(x)}{1+x}\,dx, x, a+b\right.}{1+a}$$

$$= -\frac{\coth^{-1}(a+bx)^2}{x} + \frac{b\coth^{-1}(a+bx)\log\left(\frac{2}{1-a-bx}\right)}{1-a} + \frac{b\coth^{-1}(a+bx)\log\left(\frac{2}{1+a+bx}\right)}{1+a} - \frac{2b}{}$$

$$= -\frac{\coth^{-1}(a+bx)^2}{x} + \frac{b\coth^{-1}(a+bx)\log\left(\frac{2}{1-a-bx}\right)}{1-a} + \frac{b\coth^{-1}(a+bx)\log\left(\frac{2}{1+a+bx}\right)}{1+a} - \frac{2b}{}$$

$$= -\frac{\coth^{-1}(a+bx)^2}{x} + \frac{b\coth^{-1}(a+bx)\log\left(\frac{2}{1-a-bx}\right)}{1-a} + \frac{b\coth^{-1}(a+bx)\log\left(\frac{2}{1+a+bx}\right)}{1+a} - \frac{2b}{}$$

**Mathematica [C]** time = 1.12, size = 206, normalized size = 0.82

$$-\left(\left(\sqrt{1-\frac{1}{a^2}}\,abxe^{\tanh^{-1}\left(\frac{1}{a}\right)} + a^2 - 1\right)\coth^{-1}(a+bx)^2\right) + bx\text{Li}_2\left(e^{2\tanh^{-1}\left(\frac{1}{a}\right)-2\coth^{-1}(a+bx)}\right) + bx\coth^{-1}(a+bx)\left(-2\right.$$

Warning: Unable to verify antiderivative.

```
[In] Integrate[ArcCoth[a + b*x]^2/x^2,x]
```

```
[Out] (-((-1 + a^2 + Sqrt[1 - a^(-2)]*a*b*E^ArcTanh[a^(-1)]*x)*ArcCoth[a + b*x]^2
) + b*x*ArcCoth[a + b*x]*((-I)*Pi + 2*ArcTanh[a^(-1)] - 2*Log[1 - E^(-2*Arc
Coth[a + b*x] + 2*ArcTanh[a^(-1)])]) + b*x*(I*Pi*(Log[1 + E^(2*ArcCoth[a +
b*x])] - Log[1/Sqrt[1 - (a + b*x)^(-2)]]) + 2*ArcTanh[a^(-1)]*(Log[1 - E^(-
2*ArcCoth[a + b*x] + 2*ArcTanh[a^(-1)])] - Log[I*Sinh[ArcCoth[a + b*x] - Ar
cTanh[a^(-1)]]])) + b*x*PolyLog[2, E^(-2*ArcCoth[a + b*x] + 2*ArcTanh[a^(-1
)])])/((-1 + a^2)*x)
```

**fricas [F]** time = 0.47, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{\text{arccoth}\,(bx+a)^2}{x^2},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(b*x+a)^2/x^2,x, algorithm="fricas")
```

```
[Out] integral(arccoth(b*x + a)^2/x^2, x)
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\text{arccoth}\,(bx+a)^2}{x^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(b*x+a)^2/x^2,x, algorithm="giac")
```

```
[Out] integrate(arccoth(b*x + a)^2/x^2, x)
```

**maple [A]** time = 0.07, size = 342, normalized size = 1.36

$$-\frac{\text{arccoth}\,(bx+a)^2}{x}+\frac{2b\,\text{arccoth}\,(bx+a)\ln(bx+a-1)}{2a-2}-\frac{2b\,\text{arccoth}\,(bx+a)\ln(bx+a+1)}{2+2a}-\frac{2b\,\text{arccoth}\,(bx+}{(a-1)\,(1}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(arccoth(b*x+a)^2/x^2,x)
```

```
[Out] -arccoth(b*x+a)^2/x+2*b*arccoth(b*x+a)/(2*a-2)*ln(b*x+a-1)-2*b*arccoth(b*x+
a)/(2+2*a)*ln(b*x+a+1)-2*b*arccoth(b*x+a)/(a-1)/(1+a)*ln(b*x)+b/(a-1)/(1+a)
*dilog((b*x+a+1)/(1+a))+b/(a-1)/(1+a)*ln(b*x)*ln((b*x+a+1)/(1+a))-b/(a-1)/(
1+a)*dilog((b*x+a-1)/(a-1))-b/(a-1)/(1+a)*ln(b*x)*ln((b*x+a-1)/(a-1))+1/4*b
/(1+a)*ln(b*x+a+1)^2+1/2*b/(1+a)*ln(-1/2*b*x-1/2*a+1/2)*ln(1/2+1/2*b*x+1/2*
a)-1/2*b/(1+a)*ln(-1/2*b*x-1/2*a+1/2)*ln(b*x+a+1)+1/2*b/(1+a)*dilog(1/2+1/2
*b*x+1/2*a)+1/4*b/(a-1)*ln(b*x+a-1)^2-1/2*b/(a-1)*dilog(1/2+1/2*b*x+1/2*a)-
1/2*b/(a-1)*ln(b*x+a-1)*ln(1/2+1/2*b*x+1/2*a)
```

**maxima [A]** time = 0.32, size = 244, normalized size = 0.97

$$\frac{1}{4}b^2\left(\frac{(a-1)\log(bx+a+1)^2-2\,(a-1)\log(bx+a+1)\log(bx+a-1)+(a+1)\log(bx+a-1)^2}{a^2b-b}-\frac{4\left(\log(\right.}{}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(b*x+a)^2/x^2,x, algorithm="maxima")
```

```
[Out] 1/4*b^2*(((a - 1)*log(b*x + a + 1)^2 - 2*(a - 1)*log(b*x + a + 1)*log(b*x +
 a - 1) + (a + 1)*log(b*x + a - 1)^2)/(a^2*b - b) - 4*(log(b*x + a - 1)*log
(1/2*b*x + 1/2*a + 1/2) + dilog(-1/2*b*x - 1/2*a + 1/2))/(a^2*b - b) + 4*(l
```

```
og(b*x/(a + 1) + 1)*log(x) + dilog(-b*x/(a + 1)))/(a^2*b - b) - 4*(log(b*x/
(a - 1) + 1)*log(x) + dilog(-b*x/(a - 1)))/(a^2*b - b)) - b*(log(b*x + a +
1)/(a + 1) - log(b*x + a - 1)/(a - 1) + 2*log(x)/(a^2 - 1))*arccoth(b*x + a
) - arccoth(b*x + a)^2/x
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.00

$$\int \frac{\operatorname{acoth}(a+b\,x)^2}{x^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(a + b*x)^2/x^2,x)
```

```
[Out] int(acoth(a + b*x)^2/x^2, x)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{acoth}^2(a+bx)}{x^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(b*x+a)**2/x**2,x)
```

```
[Out] Integral(acoth(a + b*x)**2/x**2, x)
```

# 3.75 $\int \frac{\coth^{-1}(a+bx)^2}{x^3}\,dx$

**Optimal**. Leaf size=370

$$\frac{ab^2\text{Li}_2\left(1-\frac{2}{a+bx+1}\right)}{\left(1-a^2\right)^2}-\frac{ab^2\text{Li}_2\left(1-\frac{2bx}{(1-a)(a+bx+1)}\right)}{\left(1-a^2\right)^2}+\frac{b^2\log(x)}{\left(1-a^2\right)^2}-\frac{2ab^2\log\left(\frac{2}{a+bx+1}\right)\coth^{-1}(a+bx)}{\left(1-a^2\right)^2}+\frac{2ab^2\log\left(\frac{2}{(1-a)(}\right.}{(}$$

```
[Out] -b*arccoth(b*x+a)/(-a^2+1)/x-1/2*arccoth(b*x+a)^2/x^2+b^2*ln(x)/(-a^2+1)^2+
1/2*b^2*arccoth(b*x+a)*ln(2/(-b*x-a+1))/(1-a)^2-1/2*b^2*ln(-b*x-a+1)/(1-a)^
2/(1+a)-1/2*b^2*arccoth(b*x+a)*ln(2/(b*x+a+1))/(1+a)^2-2*a*b^2*arccoth(b*x+
a)*ln(2/(b*x+a+1))/(-a^2+1)^2+2*a*b^2*arccoth(b*x+a)*ln(2*b*x/(1-a)/(b*x+a+
1))/(-a^2+1)^2-1/2*b^2*ln(b*x+a+1)/(1-a)/(1+a)^2+1/4*b^2*polylog(2,(-b*x-a-
1)/(-b*x-a+1))/(1-a)^2+1/4*b^2*polylog(2,1-2/(b*x+a+1))/(1+a)^2+a*b^2*polyl
og(2,1-2/(b*x+a+1))/(-a^2+1)^2-a*b^2*polylog(2,1-2*b*x/(1-a)/(b*x+a+1))/(-a
^2+1)^2
```

**Rubi [A]** time = 0.83, antiderivative size = 370, normalized size of antiderivative = 1.00, number of steps used = 21, number of rules used = 16, integrand size = 12, $\frac{\text{number of rules}}{\text{integrand size}}$ = 1.333, Rules used = {6110, 371, 710, 801, 6741, 6122, 6725, 5927, 706, 31, 633, 5921, 2402, 2315, 2447, 5919}

$$\frac{ab^2\text{PolyLog}\left(2,1-\frac{2}{a+bx+1}\right)}{\left(1-a^2\right)^2}-\frac{ab^2\text{PolyLog}\left(2,1-\frac{2bx}{(1-a)(a+bx+1)}\right)}{\left(1-a^2\right)^2}+\frac{b^2\text{PolyLog}\left(2,-\frac{a+bx+1}{-a-bx+1}\right)}{4(1-a)^2}+\frac{b^2\text{PolyLog}\left(2,1-\right.}{4(a+1)^2}$$

Antiderivative was successfully verified.

```
[In] Int[ArcCoth[a + b*x]^2/x^3,x]
```

```
[Out] -((b*ArcCoth[a + b*x])/((1 - a^2)*x)) - ArcCoth[a + b*x]^2/(2*x^2) + (b^2*L
og[x])/(1 - a^2)^2 + (b^2*ArcCoth[a + b*x]*Log[2/(1 - a - b*x)])/(2*(1 - a)
^2) - (b^2*Log[1 - a - b*x])/(2*(1 - a)^2*(1 + a)) - (b^2*ArcCoth[a + b*x]*
Log[2/(1 + a + b*x)])/(2*(1 + a)^2) - (2*a*b^2*ArcCoth[a + b*x]*Log[2/(1 +
a + b*x)])/(1 - a^2)^2 + (2*a*b^2*ArcCoth[a + b*x]*Log[(2*b*x)/((1 - a)*(1
+ a + b*x))])/(1 - a^2)^2 - (b^2*Log[1 + a + b*x])/(2*(1 - a)*(1 + a)^2) +
(b^2*PolyLog[2, -((1 + a + b*x)/(1 - a - b*x))])/(4*(1 - a)^2) + (b^2*PolyL
og[2, 1 - 2/(1 + a + b*x)])/(4*(1 + a)^2) + (a*b^2*PolyLog[2, 1 - 2/(1 + a
+ b*x)])/(1 - a^2)^2 - (a*b^2*PolyLog[2, 1 - (2*b*x)/((1 - a)*(1 + a + b*x)
)])/(1 - a^2)^2
```

Rule 31

```
Int[((a_) + (b_.)*(x_))^(-1), x_Symbol] :> Simp[Log[RemoveContent[a + b*x,
x]]/b, x] /; FreeQ[{a, b}, x]
```

Rule 371

```
Int[((a_) + (b_.)*(v_)^(n_))^(p_.)*(x_)^(m_.), x_Symbol] :> With[{c = Coeff
icient[v, x, 0], d = Coefficient[v, x, 1]}, Dist[1/d^(m + 1), Subst[Int[Sim
plifyIntegrand[(x - c)^m*(a + b*x^n)^p, x], x], x, v], x] /; NeQ[c, 0]] /;
FreeQ[{a, b, n, p}, x] && LinearQ[v, x] && IntegerQ[m]
```

Rule 633

```
Int[((d_) + (e_.)*(x_))/((a_) + (c_.)*(x_)^2), x_Symbol] :> With[{q = Rt[-(
a*c), 2]}, Dist[e/2 + (c*d)/(2*q), Int[1/(-q + c*x), x], x] + Dist[e/2 - (c
*d)/(2*q), Int[1/(q + c*x), x], x]] /; FreeQ[{a, c, d, e}, x] && NiceSqrtQ[
-(a*c)]
```

Rule 706

```
Int[1/(((d_) + (e_.)*(x_))*((a_) + (c_.)*(x_)^2)), x_Symbol] :> Dist[e^2/(c
*d^2 + a*e^2), Int[1/(d + e*x), x], x] + Dist[1/(c*d^2 + a*e^2), Int[(c*d -
 c*e*x)/(a + c*x^2), x], x] /; FreeQ[{a, c, d, e}, x] && NeQ[c*d^2 + a*e^2,
 0]
```

Rule 710

```
Int[((d_) + (e_.)*(x_))^(m_)/((a_) + (c_.)*(x_)^2), x_Symbol] :> Simp[(e*(d
 + e*x)^(m + 1))/((m + 1)*(c*d^2 + a*e^2)), x] + Dist[c/(c*d^2 + a*e^2), In
t[((d + e*x)^(m + 1)*(d - e*x))/(a + c*x^2), x], x] /; FreeQ[{a, c, d, e, m
}, x] && NeQ[c*d^2 + a*e^2, 0] && LtQ[m, -1]
```

Rule 801

```
Int[(((d_.) + (e_.)*(x_))^(m_)*((f_.) + (g_.)*(x_)))/((a_) + (c_.)*(x_)^2),
 x_Symbol] :> Int[ExpandIntegrand[((d + e*x)^m*(f + g*x))/(a + c*x^2), x],
x] /; FreeQ[{a, c, d, e, f, g}, x] && NeQ[c*d^2 + a*e^2, 0] && IntegerQ[m]
```

Rule 2315

```
Int[Log[(c_.)*(x_)]/((d_) + (e_.)*(x_)), x_Symbol] :> -Simp[PolyLog[2, 1 -
c*x]/e, x] /; FreeQ[{c, d, e}, x] && EqQ[e + c*d, 0]
```

Rule 2402

```
Int[Log[(c_.)/((d_) + (e_.)*(x_))]/((f_) + (g_.)*(x_)^2), x_Symbol] :> -Dis
t[e/g, Subst[Int[Log[2*d*x]/(1 - 2*d*x), x], x, 1/(d + e*x)], x] /; FreeQ[{
c, d, e, f, g}, x] && EqQ[c, 2*d] && EqQ[e^2*f + d^2*g, 0]
```

Rule 2447

```
Int[Log[u_]*(Pq_)^(m_.), x_Symbol] :> With[{C = FullSimplify[(Pq^m*(1 - u))
/D[u, x]]}, Simp[C*PolyLog[2, 1 - u], x] /; FreeQ[C, x]] /; IntegerQ[m] &&
PolyQ[Pq, x] && RationalFunctionQ[u, x] && LeQ[RationalFunctionExponents[u,
 x][[2]], Expon[Pq, x]]
```

Rule 5919

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)/((d_) + (e_.)*(x_)), x_Symbol
] :> -Simp[((a + b*ArcCoth[c*x])^p*Log[2/(1 + (e*x)/d)])/e, x] + Dist[(b*c*
p)/e, Int[((a + b*ArcCoth[c*x])^(p - 1)*Log[2/(1 + (e*x)/d)])/(1 - c^2*x^2)
, x], x] /; FreeQ[{a, b, c, d, e}, x] && IGtQ[p, 0] && EqQ[c^2*d^2 - e^2, 0
]
```

Rule 5921

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))/((d_) + (e_.)*(x_)), x_Symbol] :> -
Simp[((a + b*ArcCoth[c*x])*Log[2/(1 + c*x)])/e, x] + (Dist[(b*c)/e, Int[Log
[2/(1 + c*x)]/(1 - c^2*x^2), x], x] - Dist[(b*c)/e, Int[Log[(2*c*(d + e*x))
/((c*d + e)*(1 + c*x))]/(1 - c^2*x^2), x], x] + Simp[((a + b*ArcCoth[c*x])*
Log[(2*c*(d + e*x))/((c*d + e)*(1 + c*x))])/e, x]) /; FreeQ[{a, b, c, d, e}
, x] && NeQ[c^2*d^2 - e^2, 0]
```

Rule 5927

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))*((d_) + (e_.)*(x_))^(q_.), x_Symbol
] :> Simp[((d + e*x)^(q + 1)*(a + b*ArcCoth[c*x]))/(e*(q + 1)), x] - Dist[(
b*c)/(e*(q + 1)), Int[(d + e*x)^(q + 1)/(1 - c^2*x^2), x], x] /; FreeQ[{a,
```

```
b, c, d, e, q}, x] && NeQ[q, -1]
```

Rule 6110

```
Int[((a_.) + ArcCoth[(c_) + (d_.)*(x_)]*(b_.))^(p_.)*((e_.) + (f_.)*(x_))^(
m_), x_Symbol] :> Simp[((e + f*x)^(m + 1)*(a + b*ArcCoth[c + d*x])^p)/(f*(m
 + 1)), x] - Dist[(b*d*p)/(f*(m + 1)), Int[((e + f*x)^(m + 1)*(a + b*ArcCot
h[c + d*x])^(p - 1))/(1 - (c + d*x)^2), x], x] /; FreeQ[{a, b, c, d, e, f},
 x] && IGtQ[p, 0] && ILtQ[m, -1]
```

Rule 6122

```
Int[((a_.) + ArcCoth[(c_) + (d_.)*(x_)]*(b_.))^(p_.)*((e_.) + (f_.)*(x_))^(
m_.)*((A_.) + (B_.)*(x_) + (C_.)*(x_)^2)^(q_.), x_Symbol] :> Dist[1/d, Subs
t[Int[((d*e - c*f)/d + (f*x)/d)^m*(-(C/d^2) + (C*x^2)/d^2)^q*(a + b*ArcCoth
[x])^p, x], x, c + d*x], x] /; FreeQ[{a, b, c, d, e, f, A, B, C, m, p, q},
x] && EqQ[B*(1 - c^2) + 2*A*c*d, 0] && EqQ[2*c*C - B*d, 0]
```

Rule 6725

```
Int[(u_)/((a_) + (b_.)*(x_)^(n_)), x_Symbol] :> With[{v = RationalFunctionE
xpand[u/(a + b*x^n), x]}, Int[v, x] /; SumQ[v]] /; FreeQ[{a, b}, x] && IGtQ
[n, 0]
```

Rule 6741

```
Int[u_, x_Symbol] :> With[{v = NormalizeIntegrand[u, x]}, Int[v, x] /; v =!
= u]
```

Rubi steps

$$\int \frac{\coth^{-1}(a+bx)^2}{x^3}\,dx = -\frac{\coth^{-1}(a+bx)^2}{2x^2} + b\int \frac{\coth^{-1}(a+bx)}{x^2\left(1-(a+bx)^2\right)}\,dx$$

$$= -\frac{\coth^{-1}(a+bx)^2}{2x^2} + b\int \frac{\coth^{-1}(a+bx)}{x^2\left(1-a^2-2abx-b^2x^2\right)}\,dx$$

$$= -\frac{\coth^{-1}(a+bx)^2}{2x^2} + \text{Subst}\left(\int \frac{\coth^{-1}(x)}{\left(-\frac{a}{b}+\frac{x}{b}\right)^2\left(1-x^2\right)}\,dx, x, a+bx\right)$$

$$= -\frac{\coth^{-1}(a+bx)^2}{2x^2} + \text{Subst}\left(\int \left(-\frac{b^2\coth^{-1}(x)}{\left(-1+a^2\right)(a-x)^2} - \frac{2ab^2\coth^{-1}(x)}{\left(-1+a^2\right)^2(a-x)} - \frac{b^2\coth^{-1}}{2(-1+a)^2(-}\right.\right.$$

$$= -\frac{\coth^{-1}(a+bx)^2}{2x^2} - \frac{b^2\,\text{Subst}\left(\int \frac{\coth^{-1}(x)}{-1+x}\,dx, x, a+bx\right)}{2(1-a)^2} + \frac{b^2\,\text{Subst}\left(\int \frac{\coth^{-1}(x)}{1+x}\,dx, x, a+\right.}{2(1+a)^2}$$

$$= -\frac{b\coth^{-1}(a+bx)}{\left(1-a^2\right)x} - \frac{\coth^{-1}(a+bx)^2}{2x^2} + \frac{b^2\coth^{-1}(a+bx)\log\left(\frac{2}{1-a-bx}\right)}{2(1-a)^2} - \frac{b^2\coth^{-1}(a+}{2(1}$$

$$= -\frac{b\coth^{-1}(a+bx)}{\left(1-a^2\right)x} - \frac{\coth^{-1}(a+bx)^2}{2x^2} + \frac{b^2\coth^{-1}(a+bx)\log\left(\frac{2}{1-a-bx}\right)}{2(1-a)^2} - \frac{b^2\coth^{-1}(a+}{2(1}$$

$$= -\frac{b\coth^{-1}(a+bx)}{\left(1-a^2\right)x} - \frac{\coth^{-1}(a+bx)^2}{2x^2} + \frac{b^2\log(x)}{\left(1-a^2\right)^2} + \frac{b^2\coth^{-1}(a+bx)\log\left(\frac{2}{1-a-bx}\right)}{2(1-a)^2} - \frac{b^2}{}$$

$$= -\frac{b\coth^{-1}(a+bx)}{\left(1-a^2\right)x} - \frac{\coth^{-1}(a+bx)^2}{2x^2} + \frac{b^2\log(x)}{\left(1-a^2\right)^2} + \frac{b^2\coth^{-1}(a+bx)\log\left(\frac{2}{1-a-bx}\right)}{2(1-a)^2} - \frac{b^2}{2}$$

**Mathematica [C]** time = 2.35, size = 291, normalized size = 0.79

$$\frac{2bx\coth^{-1}(a+bx)\left(a^2+abx+i\pi abx-2abx\tanh^{-1}\left(\frac{1}{a}\right)+2abx\log\left(1-e^{2\tanh^{-1}\left(\frac{1}{a}\right)-2\coth^{-1}(a+bx)}\right)-1\right)+\left(-a^4+\right.}{}$$

Warning: Unable to verify antiderivative.

```
[In] Integrate[ArcCoth[a + b*x]^2/x^3,x]
```

```
[Out] ((-1 - a^4 + b^2*x^2 + a^2*(2 + b^2*(-1 + 2*Sqrt[1 - a^(-2)]*E^ArcTanh[a^(-
1)])*x^2))*ArcCoth[a + b*x]^2 + 2*b*x*ArcCoth[a + b*x]*(-1 + a^2 + a*b*x +
I*a*b*Pi*x - 2*a*b*x*ArcTanh[a^(-1)] + 2*a*b*x*Log[1 - E^(-2*ArcCoth[a + b*
x] + 2*ArcTanh[a^(-1)])]) + 2*b^2*x^2*((-I)*a*Pi*Log[1 + E^(2*ArcCoth[a + b
*x])] + I*a*Pi*Log[1/Sqrt[1 - (a + b*x)^(-2)]] + Log[-((b*x)/((a + b*x)*Sqr
t[1 - (a + b*x)^(-2)]))] - 2*a*ArcTanh[a^(-1)]*(Log[1 - E^(-2*ArcCoth[a + b
*x] + 2*ArcTanh[a^(-1)])] - Log[I*Sinh[ArcCoth[a + b*x] - ArcTanh[a^(-1)]]]
)) - 2*a*b^2*x^2*PolyLog[2, E^(-2*ArcCoth[a + b*x] + 2*ArcTanh[a^(-1)])])/(
2*(-1 + a^2)^2*x^2)
```

**fricas [F]** time = 0.41, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{\operatorname{arcoth}(bx+a)^2}{x^3}, x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

[In] integrate(arccoth(b*x+a)^2/x^3,x, algorithm="fricas")

[Out] integral(arccoth(b*x + a)^2/x^3, x)

**giac** [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{arcoth}(bx+a)^2}{x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

[In] integrate(arccoth(b*x+a)^2/x^3,x, algorithm="giac")

[Out] integrate(arccoth(b*x + a)^2/x^3, x)

**maple** [A] time = 0.08, size = 467, normalized size = 1.26

$$-\frac{\operatorname{arccoth}(bx+a)^2}{2x^2}-\frac{b^2\operatorname{arccoth}(bx+a)\ln(bx+a-1)}{2(a-1)^2}+\frac{b^2\operatorname{arccoth}(bx+a)\ln(bx+a+1)}{2(1+a)^2}+\frac{b\operatorname{arccoth}(bx+a}{(a-1)(1+a)x}$$

Verification of antiderivative is not currently implemented for this CAS.

[In] int(arccoth(b*x+a)^2/x^3,x)

[Out] -1/2*arccoth(b*x+a)^2/x^2-1/2*b^2*arccoth(b*x+a)/(a-1)^2*ln(b*x+a-1)+1/2*b^
2*arccoth(b*x+a)/(1+a)^2*ln(b*x+a+1)+b*arccoth(b*x+a)/(a-1)/(1+a)/x+2*b^2*a
rccoth(b*x+a)*a/(a-1)^2/(1+a)^2*ln(b*x)-1/8*b^2/(a-1)^2*ln(b*x+a-1)^2+1/4*b
^2/(a-1)^2*dilog(1/2+1/2*b*x+1/2*a)+1/4*b^2/(a-1)^2*ln(b*x+a-1)*ln(1/2+1/2*
b*x+1/2*a)-1/8*b^2/(1+a)^2*ln(b*x+a+1)^2-1/4*b^2/(1+a)^2*ln(-1/2*b*x-1/2*a+
1/2)*ln(1/2+1/2*b*x+1/2*a)+1/4*b^2/(1+a)^2*ln(-1/2*b*x-1/2*a+1/2)*ln(b*x+a+
1)-1/4*b^2/(1+a)^2*dilog(1/2+1/2*b*x+1/2*a)-b^2/(a-1)/(1+a)/(2*a-2)*ln(b*x+
a-1)+b^2/(a-1)/(1+a)/(2+2*a)*ln(b*x+a+1)+b^2/(a-1)^2/(1+a)^2*ln(b*x)-b^2*a/
(a-1)^2/(1+a)^2*dilog((b*x+a+1)/(1+a))-b^2*a/(a-1)^2/(1+a)^2*ln(b*x)*ln((b*
x+a+1)/(1+a))+b^2*a/(a-1)^2/(1+a)^2*dilog((b*x+a-1)/(a-1))+b^2*a/(a-1)^2/(1
+a)^2*ln(b*x)*ln((b*x+a-1)/(a-1))

**maxima** [A] time = 0.34, size = 360, normalized size = 0.97

$$\frac{1}{8}\left(\frac{8\left(\log(bx+a-1)\log\left(\frac{1}{2}\,bx+\frac{1}{2}\,a+\frac{1}{2}\right)+\operatorname{Li}_2\left(-\frac{1}{2}\,bx-\frac{1}{2}\,a+\frac{1}{2}\right)\right)a}{a^4-2\,a^2+1}-\frac{8\left(\log\left(\frac{bx}{a+1}+1\right)\log(x)+\operatorname{Li}_2\left(-\frac{bx}{a+1}\right)\right)}{a^4-2\,a^2+1}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

[In] integrate(arccoth(b*x+a)^2/x^3,x, algorithm="maxima")

[Out] 1/8*(8*(log(b*x + a - 1)*log(1/2*b*x + 1/2*a + 1/2) + dilog(-1/2*b*x - 1/2*
a + 1/2))*a/(a^4 - 2*a^2 + 1) - 8*(log(b*x/(a + 1) + 1)*log(x) + dilog(-b*x
/(a + 1)))*a/(a^4 - 2*a^2 + 1) + 8*(log(b*x/(a - 1) + 1)*log(x) + dilog(-b*
x/(a - 1)))*a/(a^4 - 2*a^2 + 1) - ((a^2 - 2*a + 1)*log(b*x + a + 1)^2 - 2*(
a^2 - 2*a + 1)*log(b*x + a + 1)*log(b*x + a - 1) + (a^2 + 2*a + 1)*log(b*x
+ a - 1)^2)/(a^4 - 2*a^2 + 1) + 4*log(b*x + a + 1)/(a^3 + a^2 - a - 1) - 4*
log(b*x + a - 1)/(a^3 - a^2 - a + 1) + 8*log(x)/(a^4 - 2*a^2 + 1))*b^2 + 1/
2*(4*a*b*log(x)/(a^4 - 2*a^2 + 1) + b*log(b*x + a + 1)/(a^2 + 2*a + 1) - b*
log(b*x + a - 1)/(a^2 - 2*a + 1) + 2/((a^2 - 1)*x))*b*arccoth(b*x + a) - 1/
2*arccoth(b*x + a)^2/x^2

**mupad** [F] time = 0.00, size = -1, normalized size = -0.00

$$\int \frac{\operatorname{acoth}(a+b\,x)^2}{x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(a + b*x)^2/x^3,x)
```

```
[Out] int(acoth(a + b*x)^2/x^3, x)
```

**sympy [F]**     time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{acoth}^2(a+bx)}{x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(b*x+a)**2/x**3,x)
```

```
[Out] Integral(acoth(a + b*x)**2/x**3, x)
```

# 3.76 $\int \frac{\coth^{-1}(a+bx)}{c+dx^2}\,dx$

**Optimal**. Leaf size=673

$$\frac{\text{Li}_2\left(-\frac{(da^2+b^2c)(-a-bx+1)}{(cb^2-\sqrt{-c}\sqrt{d}b-(1-a)ad)(a+bx)}\right)}{4\sqrt{-c}\sqrt{d}}-\frac{\text{Li}_2\left(-\frac{(da^2+b^2c)(-a-bx+1)}{(cb^2+\sqrt{-c}\sqrt{d}b-(1-a)ad)(a+bx)}\right)}{4\sqrt{-c}\sqrt{d}}+\frac{\text{Li}_2\left(\frac{(da^2+b^2c)(a+bx+1)}{(cb^2-\sqrt{-c}\sqrt{d}b+a(a+1)d)(a+bx)}\right)}{4\sqrt{-c}\sqrt{d}}-\frac{\text{Li}_2\left(\frac{}{(cb^2}\right.}{}$$

```
[Out] 1/4*ln((b*x+a-1)/(b*x+a))*ln(1+(a^2*d+b^2*c)*(-b*x-a+1)/(b*x+a)/(b^2*c-(1-a
)*a*d-b*(-c)^(1/2)*d^(1/2)))/(-c)^(1/2)/d^(1/2)+1/4*ln((b*x+a+1)/(b*x+a))*l
n(1-(a^2*d+b^2*c)*(b*x+a+1)/(b*x+a)/(b^2*c+a*(1+a)*d-b*(-c)^(1/2)*d^(1/2)))
/(-c)^(1/2)/d^(1/2)-1/4*ln((b*x+a-1)/(b*x+a))*ln(1+(a^2*d+b^2*c)*(-b*x-a+1)
/(b*x+a)/(b^2*c-(1-a)*a*d+b*(-c)^(1/2)*d^(1/2)))/(-c)^(1/2)/d^(1/2)-1/4*ln(
(b*x+a+1)/(b*x+a))*ln(1-(a^2*d+b^2*c)*(b*x+a+1)/(b*x+a)/(b^2*c+a*(1+a)*d+b*
(-c)^(1/2)*d^(1/2)))/(-c)^(1/2)/d^(1/2)+1/4*polylog(2,-(a^2*d+b^2*c)*(-b*x-
a+1)/(b*x+a)/(b^2*c-(1-a)*a*d-b*(-c)^(1/2)*d^(1/2)))/(-c)^(1/2)/d^(1/2)+1/4
*polylog(2,(a^2*d+b^2*c)*(b*x+a+1)/(b*x+a)/(b^2*c+a*(1+a)*d-b*(-c)^(1/2)*d^
(1/2)))/(-c)^(1/2)/d^(1/2)-1/4*polylog(2,-(a^2*d+b^2*c)*(-b*x-a+1)/(b*x+a)/
(b^2*c-(1-a)*a*d+b*(-c)^(1/2)*d^(1/2)))/(-c)^(1/2)/d^(1/2)-1/4*polylog(2,(a
^2*d+b^2*c)*(b*x+a+1)/(b*x+a)/(b^2*c+a*(1+a)*d+b*(-c)^(1/2)*d^(1/2)))/(-c)^
(1/2)/d^(1/2)
```

**Rubi [A]** time = 1.10, antiderivative size = 597, normalized size of antiderivative = 0.89, number of steps used = 37, number of rules used = 7, integrand size = 16, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.438, Rules used = {6116, 2513, 2409, 2394, 2393, 2391, 205}

$$-\frac{\text{PolyLog}\left(2,-\frac{\sqrt{d}(-a-bx+1)}{b\sqrt{-c}-(1-a)\sqrt{d}}\right)}{4\sqrt{-c}\sqrt{d}}+\frac{\text{PolyLog}\left(2,\frac{\sqrt{d}(-a-bx+1)}{(1-a)\sqrt{d}+b\sqrt{-c}}\right)}{4\sqrt{-c}\sqrt{d}}-\frac{\text{PolyLog}\left(2,-\frac{\sqrt{d}(a+bx+1)}{b\sqrt{-c}-(a+1)\sqrt{d}}\right)}{4\sqrt{-c}\sqrt{d}}+\frac{\text{PolyLog}\left(2,\frac{\sqrt{d}(}{(a+1)}\right.}{4\sqrt{-c}\sqrt{d}}$$

Warning: Unable to verify antiderivative.

```
[In] Int[ArcCoth[a + b*x]/(c + d*x^2),x]
```

```
[Out] (ArcTan[(Sqrt[d]*x)/Sqrt[c]]*(Log[-1 + a + b*x] - Log[-((1 - a - b*x)/(a +
b*x))] - Log[a + b*x]))/(2*Sqrt[c]*Sqrt[d]) + (ArcTan[(Sqrt[d]*x)/Sqrt[c]]*
(Log[a + b*x] - Log[1 + a + b*x] + Log[(1 + a + b*x)/(a + b*x)]))/(2*Sqrt[c
]*Sqrt[d]) - (Log[-1 + a + b*x]*Log[(b*(Sqrt[-c] - Sqrt[d]*x))/(b*Sqrt[-c]
- (1 - a)*Sqrt[d])])/(4*Sqrt[-c]*Sqrt[d]) + (Log[1 + a + b*x]*Log[(b*(Sqrt[
-c] - Sqrt[d]*x))/(b*Sqrt[-c] + (1 + a)*Sqrt[d])])/(4*Sqrt[-c]*Sqrt[d]) + (
Log[-1 + a + b*x]*Log[(b*(Sqrt[-c] + Sqrt[d]*x))/(b*Sqrt[-c] + (1 - a)*Sqrt
[d])])/(4*Sqrt[-c]*Sqrt[d]) - (Log[1 + a + b*x]*Log[(b*(Sqrt[-c] + Sqrt[d]*
x))/(b*Sqrt[-c] - (1 + a)*Sqrt[d])])/(4*Sqrt[-c]*Sqrt[d]) - PolyLog[2, -((S
qrt[d]*(1 - a - b*x))/(b*Sqrt[-c] - (1 - a)*Sqrt[d]))]/(4*Sqrt[-c]*Sqrt[d])
 + PolyLog[2, (Sqrt[d]*(1 - a - b*x))/(b*Sqrt[-c] + (1 - a)*Sqrt[d])]/(4*Sq
rt[-c]*Sqrt[d]) - PolyLog[2, -((Sqrt[d]*(1 + a + b*x))/(b*Sqrt[-c] - (1 + a
)*Sqrt[d]))]/(4*Sqrt[-c]*Sqrt[d]) + PolyLog[2, (Sqrt[d]*(1 + a + b*x))/(b*S
qrt[-c] + (1 + a)*Sqrt[d])]/(4*Sqrt[-c]*Sqrt[d])
```

Rule 205

```
Int[((a_) + (b_.)*(x_)^2)^(-1), x_Symbol] :> Simp[(Rt[a/b, 2]*ArcTan[x/Rt[a
/b, 2]])/a, x] /; FreeQ[{a, b}, x] && PosQ[a/b]
```

Rule 2391

```
Int[Log[(c_.)*((d_) + (e_.)*(x_)^(n_.))]/(x_), x_Symbol] :> -Simp[PolyLog[2
, -(c*e*x^n)]/n, x] /; FreeQ[{c, d, e, n}, x] && EqQ[c*d, 1]
```

Rule 2393

```
Int[((a_.) + Log[(c_.)*((d_) + (e_.)*(x_))]*(b_.))/((f_.) + (g_.)*(x_)), x_
Symbol] :> Dist[1/g, Subst[Int[(a + b*Log[1 + (c*e*x)/g])/x, x], x, f + g*x
], x] /; FreeQ[{a, b, c, d, e, f, g}, x] && NeQ[e*f - d*g, 0] && EqQ[g + c*
(e*f - d*g), 0]
```

Rule 2394

```
Int[((a_.) + Log[(c_.)*((d_) + (e_.)*(x_))^(n_.)]*(b_.))/((f_.) + (g_.)*(x_
)), x_Symbol] :> Simp[(Log[(e*(f + g*x))/(e*f - d*g)]*(a + b*Log[c*(d + e*x
)^n]))/g, x] - Dist[(b*e*n)/g, Int[Log[(e*(f + g*x))/(e*f - d*g)]/(d + e*x)
, x], x] /; FreeQ[{a, b, c, d, e, f, g, n}, x] && NeQ[e*f - d*g, 0]
```

Rule 2409

```
Int[((a_.) + Log[(c_.)*((d_) + (e_.)*(x_))^(n_.)]*(b_.))^(p_.)*((f_) + (g_.
)*(x_)^(r_))^(q_.), x_Symbol] :> Int[ExpandIntegrand[(a + b*Log[c*(d + e*x)
^n])^p, (f + g*x^r)^q, x], x] /; FreeQ[{a, b, c, d, e, f, g, n, r}, x] && I
GtQ[p, 0] && IntegerQ[q] && (GtQ[q, 0] || (IntegerQ[r] && NeQ[r, 1]))
```

Rule 2513

```
Int[Log[(e_.)*((f_.)*((a_.) + (b_.)*(x_))^(p_.)*((c_.) + (d_.)*(x_))^(q_.))
^(r_.)]*(RFx_.), x_Symbol] :> Dist[p*r, Int[RFx*Log[a + b*x], x], x] + (Dis
t[q*r, Int[RFx*Log[c + d*x], x], x] - Dist[p*r*Log[a + b*x] + q*r*Log[c + d
*x] - Log[e*(f*(a + b*x)^p*(c + d*x)^q)^r], Int[RFx, x], x]) /; FreeQ[{a, b
, c, d, e, f, p, q, r}, x] && RationalFunctionQ[RFx, x] && NeQ[b*c - a*d, 0
] &&  !MatchQ[RFx, (u_.)*(a + b*x)^(m_.)*(c + d*x)^(n_.) /; IntegersQ[m, n]
]
```

Rule 6116

```
Int[ArcCoth[(c_) + (d_.)*(x_)]/((e_) + (f_.)*(x_)^(n_.)), x_Symbol] :> Dist
[1/2, Int[Log[(1 + c + d*x)/(c + d*x)]/(e + f*x^n), x], x] - Dist[1/2, Int[
Log[(-1 + c + d*x)/(c + d*x)]/(e + f*x^n), x], x] /; FreeQ[{c, d, e, f}, x]
 && RationalQ[n]
```

Rubi steps

$$\int \frac{\coth^{-1}(a+bx)}{c+dx^2}\,dx = -\left(\frac{1}{2}\int \frac{\log\left(\frac{-1+a+bx}{a+bx}\right)}{c+dx^2}\,dx\right) + \frac{1}{2}\int \frac{\log\left(\frac{1+a+bx}{a+bx}\right)}{c+dx^2}\,dx$$
$$= -\left(\frac{1}{2}\int \frac{\log(-1+a+bx)}{c+dx^2}\,dx\right) + \frac{1}{2}\int \frac{\log(1+a+bx)}{c+dx^2}\,dx - \frac{1}{2}\left(-\log(-1+a+bx)+\mathrm{lo}\right.$$
$$= \frac{\tan^{-1}\left(\frac{\sqrt{d}\,x}{\sqrt{c}}\right)\left(\log(-1+a+bx)-\log\left(-\frac{1-a-bx}{a+bx}\right)-\log(a+bx)\right)}{2\sqrt{c}\,\sqrt{d}} + \frac{\tan^{-1}\left(\frac{\sqrt{d}\,x}{\sqrt{c}}\right)\left(\log(a\right.}{}$$
$$= \frac{\tan^{-1}\left(\frac{\sqrt{d}\,x}{\sqrt{c}}\right)\left(\log(-1+a+bx)-\log\left(-\frac{1-a-bx}{a+bx}\right)-\log(a+bx)\right)}{2\sqrt{c}\,\sqrt{d}} + \frac{\tan^{-1}\left(\frac{\sqrt{d}\,x}{\sqrt{c}}\right)\left(\log(a\right.}{}$$
$$= \frac{\tan^{-1}\left(\frac{\sqrt{d}\,x}{\sqrt{c}}\right)\left(\log(-1+a+bx)-\log\left(-\frac{1-a-bx}{a+bx}\right)-\log(a+bx)\right)}{2\sqrt{c}\,\sqrt{d}} + \frac{\tan^{-1}\left(\frac{\sqrt{d}\,x}{\sqrt{c}}\right)\left(\log(a\right.}{}$$
$$= \frac{\tan^{-1}\left(\frac{\sqrt{d}\,x}{\sqrt{c}}\right)\left(\log(-1+a+bx)-\log\left(-\frac{1-a-bx}{a+bx}\right)-\log(a+bx)\right)}{2\sqrt{c}\,\sqrt{d}} + \frac{\tan^{-1}\left(\frac{\sqrt{d}\,x}{\sqrt{c}}\right)\left(\log(a\right.}{}$$
$$= \frac{\tan^{-1}\left(\frac{\sqrt{d}\,x}{\sqrt{c}}\right)\left(\log(-1+a+bx)-\log\left(-\frac{1-a-bx}{a+bx}\right)-\log(a+bx)\right)}{2\sqrt{c}\,\sqrt{d}} + \frac{\tan^{-1}\left(\frac{\sqrt{d}\,x}{\sqrt{c}}\right)\left(\log(a\right.}{}$$

**Mathematica [A]** time = 0.62, size = 529, normalized size = 0.79

$$\frac{\mathrm{Li}_2\left(\frac{b\left(\sqrt{-c}-\sqrt{d}\,x\right)}{\sqrt{d}\,(a-1)+b\sqrt{-c}}\right)-\mathrm{Li}_2\left(\frac{b\left(\sqrt{-c}-\sqrt{d}\,x\right)}{\sqrt{d}\,(a+1)+b\sqrt{-c}}\right)-\mathrm{Li}_2\left(\frac{b\left(\sqrt{d}\,x+\sqrt{-c}\right)}{b\sqrt{-c}-(a-1)\sqrt{d}}\right)+\mathrm{Li}_2\left(\frac{b\left(\sqrt{d}\,x+\sqrt{-c}\right)}{b\sqrt{-c}-(a+1)\sqrt{d}}\right)+\log\left(\sqrt{-c}-\sqrt{d}\,x\right)\log\left(\right.}{}$$

Warning: Unable to verify antiderivative.

```
[In] Integrate[ArcCoth[a + b*x]/(c + d*x^2),x]
```

```
[Out] (Log[(Sqrt[d]*(-1 + a + b*x))/(b*Sqrt[-c] + (-1 + a)*Sqrt[d])]*Log[Sqrt[-c]
 - Sqrt[d]*x] - Log[(-1 + a + b*x)/(a + b*x)]*Log[Sqrt[-c] - Sqrt[d]*x] - L
og[(Sqrt[d]*(1 + a + b*x))/(b*Sqrt[-c] + (1 + a)*Sqrt[d])]*Log[Sqrt[-c] - S
qrt[d]*x] + Log[(1 + a + b*x)/(a + b*x)]*Log[Sqrt[-c] - Sqrt[d]*x] - Log[-(
(Sqrt[d]*(-1 + a + b*x))/(b*Sqrt[-c] - (-1 + a)*Sqrt[d]))]*Log[Sqrt[-c] + S
qrt[d]*x] + Log[(-1 + a + b*x)/(a + b*x)]*Log[Sqrt[-c] + Sqrt[d]*x] + Log[-
((Sqrt[d]*(1 + a + b*x))/(b*Sqrt[-c] - (1 + a)*Sqrt[d]))]*Log[Sqrt[-c] + Sq
rt[d]*x] - Log[(1 + a + b*x)/(a + b*x)]*Log[Sqrt[-c] + Sqrt[d]*x] + PolyLog
[2, (b*(Sqrt[-c] - Sqrt[d]*x))/(b*Sqrt[-c] + (-1 + a)*Sqrt[d])] - PolyLog[2
, (b*(Sqrt[-c] - Sqrt[d]*x))/(b*Sqrt[-c] + (1 + a)*Sqrt[d])] - PolyLog[2, (
b*(Sqrt[-c] + Sqrt[d]*x))/(b*Sqrt[-c] - (-1 + a)*Sqrt[d])] + PolyLog[2, (b*
(Sqrt[-c] + Sqrt[d]*x))/(b*Sqrt[-c] - (1 + a)*Sqrt[d])])/(4*Sqrt[-c]*Sqrt[d
])
```

**fricas [F]** time = 0.41, size = 0, normalized size = 0.00

$$\mathrm{integral}\left(\frac{\mathrm{arcoth}\,(bx+a)}{dx^2+c}, x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(b*x+a)/(d*x^2+c),x, algorithm="fricas")
```

```
[Out] integral(arccoth(b*x + a)/(d*x^2 + c), x)
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{arcoth}(bx+a)}{dx^2+c}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(b*x+a)/(d*x^2+c),x, algorithm="giac")
```

```
[Out] integrate(arccoth(b*x + a)/(d*x^2 + c), x)
```

**maple [B]** time = 0.75, size = 1230, normalized size = 1.83

result too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(arccoth(b*x+a)/(d*x^2+c),x)
```

```
[Out] -1/2/b*(-b^2*c*d)^(1/2)/c*ln(1-(a^2*d+b^2*c-2*a*d+d)*(b*x+a+1)/(b*x+a-1)/(a
^2*d+b^2*c-2*(-b^2*c*d)^(1/2)-d))*arccoth(b*x+a)*a^2/(a^2*d+b^2*c-2*(-b^2*c
*d)^(1/2)-d)-1/2*b*(-b^2*c*d)^(1/2)/d*ln(1-(a^2*d+b^2*c-2*a*d+d)*(b*x+a+1)/
(b*x+a-1)/(a^2*d+b^2*c-2*(-b^2*c*d)^(1/2)-d))*arccoth(b*x+a)/(a^2*d+b^2*c-2
*(-b^2*c*d)^(1/2)-d)+1/2/b*(-b^2*c*d)^(1/2)/c*arccoth(b*x+a)^2*a^2/(a^2*d+b
^2*c-2*(-b^2*c*d)^(1/2)-d)+1/2*b*(-b^2*c*d)^(1/2)/d*arccoth(b*x+a)^2/(a^2*d
+b^2*c-2*(-b^2*c*d)^(1/2)-d)-1/4/b*(-b^2*c*d)^(1/2)/c*polylog(2,(a^2*d+b^2*
c-2*a*d+d)*(b*x+a+1)/(b*x+a-1)/(a^2*d+b^2*c-2*(-b^2*c*d)^(1/2)-d))*a^2/(a^2
*d+b^2*c-2*(-b^2*c*d)^(1/2)-d)-1/4*b*(-b^2*c*d)^(1/2)/d*polylog(2,(a^2*d+b^
2*c-2*a*d+d)*(b*x+a+1)/(b*x+a-1)/(a^2*d+b^2*c-2*(-b^2*c*d)^(1/2)-d))/(a^2*d
+b^2*c-2*(-b^2*c*d)^(1/2)-d)-b/(a^2*d+b^2*c-2*(-b^2*c*d)^(1/2)-d)*ln(1-(a^2
*d+b^2*c-2*a*d+d)*(b*x+a+1)/(b*x+a-1)/(a^2*d+b^2*c-2*(-b^2*c*d)^(1/2)-d))*a
rccoth(b*x+a)+b/(a^2*d+b^2*c-2*(-b^2*c*d)^(1/2)-d)*arccoth(b*x+a)^2+1/2/b*(
-b^2*c*d)^(1/2)/c*ln(1-(a^2*d+b^2*c-2*a*d+d)*(b*x+a+1)/(b*x+a-1)/(a^2*d+b^2
*c-2*(-b^2*c*d)^(1/2)-d))*arccoth(b*x+a)/(a^2*d+b^2*c-2*(-b^2*c*d)^(1/2)-d)
-1/2/b*(-b^2*c*d)^(1/2)/c*arccoth(b*x+a)^2/(a^2*d+b^2*c-2*(-b^2*c*d)^(1/2)-
d)-1/2*b/(a^2*d+b^2*c-2*(-b^2*c*d)^(1/2)-d)*polylog(2,(a^2*d+b^2*c-2*a*d+d)
*(b*x+a+1)/(b*x+a-1)/(a^2*d+b^2*c-2*(-b^2*c*d)^(1/2)-d))+1/4/b*(-b^2*c*d)^(
1/2)/c*polylog(2,(a^2*d+b^2*c-2*a*d+d)*(b*x+a+1)/(b*x+a-1)/(a^2*d+b^2*c-2*(
-b^2*c*d)^(1/2)-d))/(a^2*d+b^2*c-2*(-b^2*c*d)^(1/2)-d)+1/2/b*(-b^2*c*d)^(1/
2)/c/d*arccoth(b*x+a)*ln(1-(a^2*d+b^2*c-2*a*d+d)*(b*x+a+1)/(b*x+a-1)/(a^2*d
+b^2*c+2*(-b^2*c*d)^(1/2)-d))-1/2/b*(-b^2*c*d)^(1/2)/c/d*arccoth(b*x+a)^2+1
/4/b*(-b^2*c*d)^(1/2)/c/d*polylog(2,(a^2*d+b^2*c-2*a*d+d)*(b*x+a+1)/(b*x+a-
1)/(a^2*d+b^2*c+2*(-b^2*c*d)^(1/2)-d))
```

**maxima [C]** time = 0.59, size = 589, normalized size = 0.88

$$\frac{\operatorname{arcoth}(bx+a)\arctan\left(\frac{dx}{\sqrt{cd}}\right)}{\sqrt{cd}} + \frac{\left(\arctan\left(\frac{(b^2x+(a+1)b)\sqrt{c}\sqrt{d}}{b^2c+(a^2+2a+1)d}, \frac{(a+1)bdx+(a^2+2a+1)d}{b^2c+(a^2+2a+1)d}\right) - \arctan\left(\frac{(b^2x+(a-1)b)\sqrt{c}\sqrt{d}}{b^2c+(a^2-2a+1)d}, \frac{(a-1)bdx\cdots}{b^2c+(a\cdots}\right.\right.\cdots}{\cdots}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(b*x+a)/(d*x^2+c),x, algorithm="maxima")
```

```
[Out] arccoth(b*x + a)*arctan(d*x/sqrt(c*d))/sqrt(c*d) + 1/4*((arctan2((b^2*x + (
a + 1)*b)*sqrt(c)*sqrt(d)/(b^2*c + (a^2 + 2*a + 1)*d), ((a + 1)*b*d*x + (a^
2 + 2*a + 1)*d)/(b^2*c + (a^2 + 2*a + 1)*d)) - arctan2((b^2*x + (a - 1)*b)*
sqrt(c)*sqrt(d)/(b^2*c + (a^2 - 2*a + 1)*d), ((a - 1)*b*d*x + (a^2 - 2*a +
```

```
1)*d)/(b^2*c + (a^2 - 2*a + 1)*d)))*log(d*x^2 + c) - arctan(sqrt(d)*x/sqrt(
c))*log((b^2*d*x^2 + 2*(a + 1)*b*d*x + (a^2 + 2*a + 1)*d)/(b^2*c + (a^2 + 2
*a + 1)*d)) + arctan(sqrt(d)*x/sqrt(c))*log((b^2*d*x^2 + 2*(a - 1)*b*d*x +
(a^2 - 2*a + 1)*d)/(b^2*c + (a^2 - 2*a + 1)*d)) - I*dilog(((a + 1)*b*d*x +
b^2*c - (I*b^2*x + (-I*a - I)*b)*sqrt(c)*sqrt(d))/(b^2*c + (2*I*a + 2*I)*b*
sqrt(c)*sqrt(d) - (a^2 + 2*a + 1)*d)) + I*dilog(((a + 1)*b*d*x + b^2*c + (I
*b^2*x + (-I*a - I)*b)*sqrt(c)*sqrt(d))/(b^2*c - (2*I*a + 2*I)*b*sqrt(c)*sq
rt(d) - (a^2 + 2*a + 1)*d)) + I*dilog(((a - 1)*b*d*x + b^2*c - (I*b^2*x + (
-I*a + I)*b)*sqrt(c)*sqrt(d))/(b^2*c + (2*I*a - 2*I)*b*sqrt(c)*sqrt(d) - (a
^2 - 2*a + 1)*d)) - I*dilog(((a - 1)*b*d*x + b^2*c + (I*b^2*x + (-I*a + I)*
b)*sqrt(c)*sqrt(d))/(b^2*c - (2*I*a - 2*I)*b*sqrt(c)*sqrt(d) - (a^2 - 2*a +
 1)*d)))/sqrt(c*d)
```

**mupad** **[F]** time = 0.00, size = -1, normalized size = -0.00

$$\int \frac{\operatorname{acoth}(a+bx)}{dx^2+c}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(a + b*x)/(c + d*x^2),x)
```

```
[Out] int(acoth(a + b*x)/(c + d*x^2), x)
```

**sympy** **[F(-1)]** time = 0.00, size = 0, normalized size = 0.00

Timed out

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(b*x+a)/(d*x**2+c),x)
```

```
[Out] Timed out
```

# 3.77 $\int \frac{\coth^{-1}(a+bx)}{c+dx}\,dx$

**Optimal**. Leaf size=120

$$-\frac{\text{Li}_2\left(1-\frac{2b(c+dx)}{(bc-ad+d)(a+bx+1)}\right)}{2d}+\frac{\coth^{-1}(a+bx)\log\left(\frac{2b(c+dx)}{(a+bx+1)(-ad+bc+d)}\right)}{d}+\frac{\text{Li}_2\left(1-\frac{2}{a+bx+1}\right)}{2d}-\frac{\log\left(\frac{2}{a+bx+1}\right)\coth^{-1}(a+b}{d}$$

```
[Out] -arccoth(b*x+a)*ln(2/(b*x+a+1))/d+arccoth(b*x+a)*ln(2*b*(d*x+c)/(-a*d+b*c+d
)/(b*x+a+1))/d+1/2*polylog(2,1-2/(b*x+a+1))/d-1/2*polylog(2,1-2*b*(d*x+c)/(
-a*d+b*c+d)/(b*x+a+1))/d
```

**Rubi [A]** time = 0.13, antiderivative size = 120, normalized size of antiderivative = 1.00, number of steps used = 5, number of rules used = 5, integrand size = 14, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.357, Rules used = {6112, 5921, 2402, 2315, 2447}

$$-\frac{\text{PolyLog}\left(2,1-\frac{2b(c+dx)}{(a+bx+1)(-ad+bc+d)}\right)}{2d}+\frac{\text{PolyLog}\left(2,1-\frac{2}{a+bx+1}\right)}{2d}+\frac{\coth^{-1}(a+bx)\log\left(\frac{2b(c+dx)}{(a+bx+1)(-ad+bc+d)}\right)}{d}-\frac{\log\left(\frac{2}{a+b}\right.}{}$$

Antiderivative was successfully verified.

```
[In] Int[ArcCoth[a + b*x]/(c + d*x),x]
```

```
[Out] -((ArcCoth[a + b*x]*Log[2/(1 + a + b*x)])/d) + (ArcCoth[a + b*x]*Log[(2*b*(
c + d*x))/((b*c + d - a*d)*(1 + a + b*x))])/d + PolyLog[2, 1 - 2/(1 + a + b
*x)]/(2*d) - PolyLog[2, 1 - (2*b*(c + d*x))/((b*c + d - a*d)*(1 + a + b*x))
]/(2*d)
```

Rule 2315

```
Int[Log[(c_.)*(x_)]/((d_) + (e_.)*(x_)), x_Symbol] :> -Simp[PolyLog[2, 1 -
c*x]/e, x] /; FreeQ[{c, d, e}, x] && EqQ[e + c*d, 0]
```

Rule 2402

```
Int[Log[(c_.)/((d_) + (e_.)*(x_))]/((f_) + (g_.)*(x_)^2), x_Symbol] :> -Dis
t[e/g, Subst[Int[Log[2*d*x]/(1 - 2*d*x), x], x, 1/(d + e*x)], x] /; FreeQ[{
c, d, e, f, g}, x] && EqQ[c, 2*d] && EqQ[e^2*f + d^2*g, 0]
```

Rule 2447

```
Int[Log[u_]*(Pq_)^(m_.), x_Symbol] :> With[{C = FullSimplify[(Pq^m*(1 - u))
/D[u, x]]}, Simp[C*PolyLog[2, 1 - u], x] /; FreeQ[C, x]] /; IntegerQ[m] &&
PolyQ[Pq, x] && RationalFunctionQ[u, x] && LeQ[RationalFunctionExponents[u,
 x][[2]], Expon[Pq, x]]
```

Rule 5921

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))/((d_) + (e_.)*(x_)), x_Symbol] :> -
Simp[((a + b*ArcCoth[c*x])*Log[2/(1 + c*x)])/e, x] + (Dist[(b*c)/e, Int[Log
[2/(1 + c*x)]/(1 - c^2*x^2), x], x] - Dist[(b*c)/e, Int[Log[(2*c*(d + e*x))
/((c*d + e)*(1 + c*x))]/(1 - c^2*x^2), x], x] + Simp[((a + b*ArcCoth[c*x])*
Log[(2*c*(d + e*x))/((c*d + e)*(1 + c*x))])/e, x]) /; FreeQ[{a, b, c, d, e}
, x] && NeQ[c^2*d^2 - e^2, 0]
```

Rule 6112

```
Int[((a_.) + ArcCoth[(c_) + (d_.)*(x_)]*(b_.))^(p_.)*((e_.) + (f_.)*(x_))^(
m_.), x_Symbol] :> Dist[1/d, Subst[Int[(((d*e - c*f)/d + (f*x)/d)^m*(a + b*A
rcCoth[x])^p, x], x, c + d*x], x] /; FreeQ[{a, b, c, d, e, f, m}, x] && IGt
```

```
Q[p, 0]
```

Rubi steps

$$\int \frac{\coth^{-1}(a+bx)}{c+dx}\,dx = \frac{\text{Subst}\left(\int \frac{\coth^{-1}(x)}{\frac{bc-ad}{b}+\frac{dx}{b}}\,dx, x, a+bx\right)}{b}$$

$$= -\frac{\coth^{-1}(a+bx)\log\left(\frac{2}{1+a+bx}\right)}{d} + \frac{\coth^{-1}(a+bx)\log\left(\frac{2b(c+dx)}{(bc+d-ad)(1+a+bx)}\right)}{d} + \frac{\text{Subst}\left(\int \frac{\log}{1}\right.}{}$$

$$= -\frac{\coth^{-1}(a+bx)\log\left(\frac{2}{1+a+bx}\right)}{d} + \frac{\coth^{-1}(a+bx)\log\left(\frac{2b(c+dx)}{(bc+d-ad)(1+a+bx)}\right)}{d} - \frac{\text{Li}_2\left(1-\frac{}{(bc+a}\right.}{2}$$

$$= -\frac{\coth^{-1}(a+bx)\log\left(\frac{2}{1+a+bx}\right)}{d} + \frac{\coth^{-1}(a+bx)\log\left(\frac{2b(c+dx)}{(bc+d-ad)(1+a+bx)}\right)}{d} + \frac{\text{Li}_2\left(1-\frac{2}{1+a+}\right.}{2d}$$

**Mathematica [A]** time = 0.07, size = 185, normalized size = 1.54

$$-\frac{\text{Li}_2\left(\frac{b(c+dx)}{bc-ad-d}\right)}{2d}+\frac{\text{Li}_2\left(\frac{b(c+dx)}{bc-ad+d}\right)}{2d}+\frac{\log(c+dx)\log\left(\frac{d(-a-bx+1)}{-ad+bc+d}\right)}{2d}-\frac{\log\left(\frac{a+bx-1}{a+bx}\right)\log(c+dx)}{2d}-\frac{\log(c+dx)\log\left(-\frac{d(a+}{-ad+}\right.}{2d}$$

Warning: Unable to verify antiderivative.

```
[In] Integrate[ArcCoth[a + b*x]/(c + d*x),x]
```

```
[Out] (Log[(d*(1 - a - b*x))/(b*c + d - a*d)]*Log[c + d*x])/(2*d) - (Log[(-1 + a
+ b*x)/(a + b*x)]*Log[c + d*x])/(2*d) - (Log[-((d*(1 + a + b*x))/(b*c - d -
 a*d))]*Log[c + d*x])/(2*d) + (Log[(1 + a + b*x)/(a + b*x)]*Log[c + d*x])/(
2*d) - PolyLog[2, (b*(c + d*x))/(b*c - d - a*d)]/(2*d) + PolyLog[2, (b*(c +
 d*x))/(b*c + d - a*d)]/(2*d)
```

**fricas [F]** time = 0.71, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{\text{arcoth}\,(bx+a)}{dx+c}, x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(b*x+a)/(d*x+c),x, algorithm="fricas")
```

```
[Out] integral(arccoth(b*x + a)/(d*x + c), x)
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\text{arcoth}\,(bx+a)}{dx+c}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(b*x+a)/(d*x+c),x, algorithm="giac")
```

```
[Out] integrate(arccoth(b*x + a)/(d*x + c), x)
```

**maple** [A] time = 0.08, size = 176, normalized size = 1.47

$$\frac{\ln\left(d\left(bx+a\right)-ad+bc\right)\operatorname{arccoth}\left(bx+a\right)}{d}+\frac{\ln\left(d\left(bx+a\right)-ad+bc\right)\ln\left(\frac{d(bx+a)-d}{ad-bc-d}\right)}{2d}+\frac{\operatorname{dilog}\left(\frac{d(bx+a)-d}{ad-bc-d}\right)}{2d}-\frac{\ln\left(\frac{d(bx+a)+}{ad-bc+a}\right.}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(arccoth(b*x+a)/(d*x+c),x)
```

```
[Out] ln(d*(b*x+a)-a*d+b*c)/d*arccoth(b*x+a)+1/2/d*ln(d*(b*x+a)-a*d+b*c)*ln((d*(b
*x+a)-d)/(a*d-b*c-d))+1/2/d*dilog((d*(b*x+a)-d)/(a*d-b*c-d))-1/2/d*ln((d*(b
*x+a)+d)/(a*d-b*c+d))*ln(d*(b*x+a)-a*d+b*c)-1/2/d*dilog((d*(b*x+a)+d)/(a*d-
b*c+d))
```

**maxima** [A] time = 0.33, size = 192, normalized size = 1.60

$$-\frac{1}{2}b\left(\frac{\log\left(bx+a-1\right)\log\left(\frac{bdx+ad-d}{bc-ad+d}+1\right)+\mathrm{Li}_2\left(-\frac{bdx+ad-d}{bc-ad+d}\right)}{bd}-\frac{\log\left(bx+a+1\right)\log\left(\frac{bdx+ad+d}{bc-ad-d}+1\right)+\mathrm{Li}_2\left(-\frac{bdx+ad+a}{bc-ad-d}\right.}{bd}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(b*x+a)/(d*x+c),x, algorithm="maxima")
```

```
[Out] -1/2*b*((log(b*x + a - 1)*log((b*d*x + a*d - d)/(b*c - a*d + d) + 1) + dilo
g(-(b*d*x + a*d - d)/(b*c - a*d + d)))/(b*d) - (log(b*x + a + 1)*log((b*d*x
 + a*d + d)/(b*c - a*d - d) + 1) + dilog(-(b*d*x + a*d + d)/(b*c - a*d - d)
))/(b*d)) - 1/2*b*(log(b*x + a + 1)/b - log(b*x + a - 1)/b)*log(d*x + c)/d
+ arccoth(b*x + a)*log(d*x + c)/d
```

**mupad** [F] time = 0.00, size = -1, normalized size = -0.01

$$\int \frac{\operatorname{acoth}\left(a+b\,x\right)}{c+d\,x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(a + b*x)/(c + d*x),x)
```

```
[Out] int(acoth(a + b*x)/(c + d*x), x)
```

**sympy** [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{acoth}\left(a+bx\right)}{c+dx}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(b*x+a)/(d*x+c),x)
```

```
[Out] Integral(acoth(a + b*x)/(c + d*x), x)
```

## 3.78 $\int \frac{\coth^{-1}(a+bx)}{c+\frac{d}{x}}\,dx$

**Optimal**. Leaf size=292

$$\frac{d\text{Li}_2\left(-\frac{b(d+cx)}{ac+c-bd}\right)}{2c^2}-\frac{d\text{Li}_2\left(\frac{b(d+cx)}{-ac+c+bd}\right)}{2c^2}+\frac{d\log\left(-\frac{-a-bx+1}{a+bx}\right)\log(cx+d)}{2c^2}-\frac{d\log(cx+d)\log\left(\frac{c(-a-bx+1)}{-ac+bd+c}\right)}{2c^2}+\frac{d\log(cx+d)}{2}$$

```
[Out] 1/2*(-b*x-a+1)*ln((b*x+a-1)/(b*x+a))/b/c+1/2*ln(b*x+a)/b/c+1/2*ln(b*x+a+1)/
b/c+1/2*(b*x+a)*ln((b*x+a+1)/(b*x+a))/b/c-1/2*d*ln(c*(-b*x-a+1)/(-a*c+b*d+c
))*ln(c*x+d)/c^2+1/2*d*ln((b*x+a-1)/(b*x+a))*ln(c*x+d)/c^2+1/2*d*ln(c*(b*x+
a+1)/(a*c-b*d+c))*ln(c*x+d)/c^2-1/2*d*ln((b*x+a+1)/(b*x+a))*ln(c*x+d)/c^2+1
/2*d*polylog(2,-b*(c*x+d)/(a*c-b*d+c))/c^2-1/2*d*polylog(2,b*(c*x+d)/(-a*c+
b*d+c))/c^2
```

**Rubi** [A] time = 0.50, antiderivative size = 360, normalized size of antiderivative = 1.23, number of steps used = 37, number of rules used = 10, integrand size = 16, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.625, Rules used = {6116, 2513, 2409, 2389, 2295, 2394, 2393, 2391, 193, 43}

$$\frac{d\text{PolyLog}\left(2,\frac{c(-a-bx+1)}{-ac+bd+c}\right)}{2c^2}-\frac{d\text{PolyLog}\left(2,\frac{c(a+bx+1)}{ac-bd+c}\right)}{2c^2}+\frac{d\log(a+bx-1)\log\left(\frac{b(cx+d)}{-ac+bd+c}\right)}{2c^2}-\frac{d\left(\log(a+bx-1)-\log\right.}{}$$

Warning: Unable to verify antiderivative.

```
[In] Int[ArcCoth[a + b*x]/(c + d/x),x]
```

```
[Out] ((1 - a - b*x)*Log[-1 + a + b*x])/(2*b*c) + (x*(Log[-1 + a + b*x] - Log[-((
1 - a - b*x)/(a + b*x))] - Log[a + b*x]))/(2*c) + ((1 + a + b*x)*Log[1 + a
+ b*x])/(2*b*c) + (x*(Log[a + b*x] - Log[1 + a + b*x] + Log[(1 + a + b*x)/(
a + b*x)]))/(2*c) - (d*(Log[-1 + a + b*x] - Log[-((1 - a - b*x)/(a + b*x))]
 - Log[a + b*x])*Log[d + c*x])/(2*c^2) - (d*(Log[a + b*x] - Log[1 + a + b*x
] + Log[(1 + a + b*x)/(a + b*x)])*Log[d + c*x])/(2*c^2) - (d*Log[1 + a + b*
x]*Log[-((b*(d + c*x))/(c + a*c - b*d))])/(2*c^2) + (d*Log[-1 + a + b*x]*Lo
g[(b*(d + c*x))/(c - a*c + b*d)])/(2*c^2) + (d*PolyLog[2, (c*(1 - a - b*x))
/(c - a*c + b*d)])/(2*c^2) - (d*PolyLog[2, (c*(1 + a + b*x))/(c + a*c - b*d
)])/(2*c^2)
```

Rule 43

```
Int[((a_.) + (b_.)*(x_))^(m_.)*((c_.) + (d_.)*(x_))^(n_.), x_Symbol] :> Int
[ExpandIntegrand[(a + b*x)^m*(c + d*x)^n, x], x] /; FreeQ[{a, b, c, d, n},
x] && NeQ[b*c - a*d, 0] && IGtQ[m, 0] && ( !IntegerQ[n] || (EqQ[c, 0] && Le
Q[7*m + 4*n + 4, 0]) || LtQ[9*m + 5*(n + 1), 0] || GtQ[m + n + 2, 0])
```

Rule 193

```
Int[((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Int[x^(n*p)*(b + a/x^n)^p,
x] /; FreeQ[{a, b}, x] && LtQ[n, 0] && IntegerQ[p]
```

Rule 2295

```
Int[Log[(c_.)*(x_)^(n_.)], x_Symbol] :> Simp[x*Log[c*x^n], x] - Simp[n*x, x
] /; FreeQ[{c, n}, x]
```

Rule 2389

```
Int[((a_.) + Log[(c_.)*((d_) + (e_.)*(x_))^(n_.)]*(b_.))^(p_.), x_Symbol] :
> Dist[1/e, Subst[Int[(a + b*Log[c*x^n])^p, x], x, d + e*x], x] /; FreeQ[{a
```

```
, b, c, d, e, n, p}, x]
```

Rule 2391

```
Int[Log[(c_.)*((d_) + (e_.)*(x_)^(n_.))]/(x_), x_Symbol] :> -Simp[PolyLog[2
, -(c*e*x^n)]/n, x] /; FreeQ[{c, d, e, n}, x] && EqQ[c*d, 1]
```

Rule 2393

```
Int[((a_.) + Log[(c_.)*((d_) + (e_.)*(x_))]*(b_.))/((f_.) + (g_.)*(x_)), x_
Symbol] :> Dist[1/g, Subst[Int[(a + b*Log[1 + (c*e*x)/g])/x, x], x, f + g*x
], x] /; FreeQ[{a, b, c, d, e, f, g}, x] && NeQ[e*f - d*g, 0] && EqQ[g + c*
(e*f - d*g), 0]
```

Rule 2394

```
Int[((a_.) + Log[(c_.)*((d_) + (e_.)*(x_))^(n_.)]*(b_.))/((f_.) + (g_.)*(x_
)), x_Symbol] :> Simp[(Log[(e*(f + g*x))/(e*f - d*g)]*(a + b*Log[c*(d + e*x
)^n]))/g, x] - Dist[(b*e*n)/g, Int[Log[(e*(f + g*x))/(e*f - d*g)]/(d + e*x)
, x], x] /; FreeQ[{a, b, c, d, e, f, g, n}, x] && NeQ[e*f - d*g, 0]
```

Rule 2409

```
Int[((a_.) + Log[(c_.)*((d_) + (e_.)*(x_))^(n_.)]*(b_.))^(p_.)*((f_) + (g_.
)*(x_)^(r_))^(q_.), x_Symbol] :> Int[ExpandIntegrand[(a + b*Log[c*(d + e*x)
^n])^p, (f + g*x^r)^q, x], x] /; FreeQ[{a, b, c, d, e, f, g, n, r}, x] && I
GtQ[p, 0] && IntegerQ[q] && (GtQ[q, 0] || (IntegerQ[r] && NeQ[r, 1]))
```

Rule 2513

```
Int[Log[(e_.)*((f_.)*((a_.) + (b_.)*(x_))^(p_.)*((c_.) + (d_.)*(x_))^(q_.))
^(r_.)]*(RFx_.), x_Symbol] :> Dist[p*r, Int[RFx*Log[a + b*x], x], x] + (Dis
t[q*r, Int[RFx*Log[c + d*x], x], x] - Dist[p*r*Log[a + b*x] + q*r*Log[c + d
*x] - Log[e*(f*(a + b*x)^p*(c + d*x)^q)^r], Int[RFx, x], x]) /; FreeQ[{a, b
, c, d, e, f, p, q, r}, x] && RationalFunctionQ[RFx, x] && NeQ[b*c - a*d, 0
] &&  !MatchQ[RFx, (u_.)*(a + b*x)^(m_.)*(c + d*x)^(n_.) /; IntegersQ[m, n]
]
```

Rule 6116

```
Int[ArcCoth[(c_) + (d_.)*(x_)]/((e_) + (f_.)*(x_)^(n_.)), x_Symbol] :> Dist
[1/2, Int[Log[(1 + c + d*x)/(c + d*x)]/(e + f*x^n), x], x] - Dist[1/2, Int[
Log[(-1 + c + d*x)/(c + d*x)]/(e + f*x^n), x], x] /; FreeQ[{c, d, e, f}, x]
 && RationalQ[n]
```

Rubi steps

$$\int \frac{\coth^{-1}(a+bx)}{c+\frac{d}{x}}dx = -\left(\frac{1}{2}\int \frac{\log\left(\frac{-1+a+bx}{a+bx}\right)}{c+\frac{d}{x}}dx\right)+\frac{1}{2}\int \frac{\log\left(\frac{1+a+bx}{a+bx}\right)}{c+\frac{d}{x}}dx$$

$$= -\left(\frac{1}{2}\int \frac{\log(-1+a+bx)}{c+\frac{d}{x}}dx\right)+\frac{1}{2}\int \frac{\log(1+a+bx)}{c+\frac{d}{x}}dx-\frac{1}{2}\left(-\log(-1+a+bx)+\text{lo}\right.$$

$$= -\left(\frac{1}{2}\int \left(\frac{\log(-1+a+bx)}{c}-\frac{d\log(-1+a+bx)}{c(d+cx)}\right)dx\right)+\frac{1}{2}\int \left(\frac{\log(1+a+bx)}{c}-\frac{d\log}{}\right.$$

$$= -\frac{\int \log(-1+a+bx)\,dx}{2c}+\frac{\int \log(1+a+bx)\,dx}{2c}+\frac{d\int \frac{\log(-1+a+bx)}{d+cx}dx}{2c}-\frac{d\int \frac{\log(1+a+bx)}{d+cx}}{2c}$$

$$= \frac{x\left(\log(-1+a+bx)-\log\left(-\frac{1-a-bx}{a+bx}\right)-\log(a+bx)\right)}{2c}+\frac{x\left(\log(a+bx)-\log(1+a+bx\right.}{2c}$$

$$= \frac{(1-a-bx)\log(-1+a+bx)}{2bc}+\frac{x\left(\log(-1+a+bx)-\log\left(-\frac{1-a-bx}{a+bx}\right)-\log(a+bx)\right)}{2c}+$$

$$= \frac{(1-a-bx)\log(-1+a+bx)}{2bc}+\frac{x\left(\log(-1+a+bx)-\log\left(-\frac{1-a-bx}{a+bx}\right)-\log(a+bx)\right)}{2c}+$$

**Mathematica [C]** time = 4.49, size = 502, normalized size = 1.72

$$b^2d^2\sqrt{1-\frac{c^2}{(ac-bd)^2}}\coth^{-1}(a+bx)^2e^{\tanh^{-1}\left(\frac{c}{ac-bd}\right)}-b^2d^2\coth^{-1}(a+bx)^2-abcd\sqrt{1-\frac{c^2}{(ac-bd)^2}}\coth^{-1}(a+bx)^2e^{\text{ta}}$$

Warning: Unable to verify antiderivative.

```
[In] Integrate[ArcCoth[a + b*x]/(c + d/x),x]
```

```
[Out] (2*a*c^2*ArcCoth[a + b*x] - I*b*c*d*Pi*ArcCoth[a + b*x] + 2*b*c^2*x*ArcCoth
[a + b*x] + b*c*d*ArcCoth[a + b*x]^2 + a*b*c*d*ArcCoth[a + b*x]^2 - b^2*d^2
*ArcCoth[a + b*x]^2 - a*b*c*d*Sqrt[1 - c^2/(a*c - b*d)^2]*E^ArcTanh[c/(a*c
- b*d)]*ArcCoth[a + b*x]^2 + b^2*d^2*Sqrt[1 - c^2/(a*c - b*d)^2]*E^ArcTanh[
c/(a*c - b*d)]*ArcCoth[a + b*x]^2 + 2*b*c*d*ArcCoth[a + b*x]*ArcTanh[c/(a*c
 - b*d)] + 2*b*c*d*ArcCoth[a + b*x]*Log[1 - E^(-2*ArcCoth[a + b*x])] + I*b*
c*d*Pi*Log[1 + E^(2*ArcCoth[a + b*x])] - 2*b*c*d*ArcCoth[a + b*x]*Log[1 - E
^(-2*ArcCoth[a + b*x] + 2*ArcTanh[c/(a*c - b*d)])] + 2*b*c*d*ArcTanh[c/(a*c
 - b*d)]*Log[1 - E^(-2*ArcCoth[a + b*x] + 2*ArcTanh[c/(a*c - b*d)])] - I*b*
c*d*Pi*Log[1/Sqrt[1 - (a + b*x)^(-2)]] - 2*c^2*Log[1/((a + b*x)*Sqrt[1 - (a
 + b*x)^(-2)])] - 2*b*c*d*ArcTanh[c/(a*c - b*d)]*Log[I*Sinh[ArcCoth[a + b*x
] - ArcTanh[c/(a*c - b*d)]]] - b*c*d*PolyLog[2, E^(-2*ArcCoth[a + b*x])] +
b*c*d*PolyLog[2, E^(-2*ArcCoth[a + b*x] + 2*ArcTanh[c/(a*c - b*d)])])/(2*b*
c^3)
```

**fricas [F]** time = 0.58, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{x\,\text{arcoth}\,(bx+a)}{cx+d},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(b*x+a)/(c+d/x),x, algorithm="fricas")
```

```
[Out] integral(x*arccoth(b*x + a)/(c*x + d), x)
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{arcoth}(bx+a)}{c+\frac{d}{x}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(b*x+a)/(c+d/x),x, algorithm="giac")
[Out] integrate(arccoth(b*x + a)/(c + d/x), x)
```

**maple [A]** time = 0.09, size = 297, normalized size = 1.02

$$\frac{\operatorname{arccoth}(bx+a)\,x}{c}+\frac{\operatorname{arccoth}(bx+a)\,a}{bc}-\frac{\operatorname{arccoth}(bx+a)\,d\ln(c(bx+a)-ac+bd)}{c^2}+\frac{\ln\left(a^2c^2-2abcd+b^2d^2+2\right.}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(arccoth(b*x+a)/(c+d/x),x)
[Out] arccoth(b*x+a)/c*x+1/b*arccoth(b*x+a)/c*a-arccoth(b*x+a)*d/c^2*ln(c*(b*x+a)
-a*c+b*d)+1/2/b/c*ln(a^2*c^2-2*a*b*c*d+b^2*d^2+2*(c*(b*x+a)-a*c+b*d)*a*c-2*
(c*(b*x+a)-a*c+b*d)*b*d+(c*(b*x+a)-a*c+b*d)^2-c^2)-1/2/c^2*d*ln(c*(b*x+a)-a
*c+b*d)*ln((c*(b*x+a)-c)/(a*c-b*d-c))-1/2/c^2*d*dilog((c*(b*x+a)-c)/(a*c-b*
d-c))+1/2/c^2*d*ln(c*(b*x+a)-a*c+b*d)*ln((c*(b*x+a)+c)/(a*c-b*d+c))+1/2/c^2
*d*dilog((c*(b*x+a)+c)/(a*c-b*d+c))
```

**maxima [A]** time = 0.34, size = 192, normalized size = 0.66

$$\frac{1}{2}b\left(\frac{\left(\log(cx+d)\log\left(\frac{bcx+bd}{ac-bd+c}+1\right)+\operatorname{Li}_2\left(-\frac{bcx+bd}{ac-bd+c}\right)\right)d}{bc^2}-\frac{\left(\log(cx+d)\log\left(\frac{bcx+bd}{ac-bd-c}+1\right)+\operatorname{Li}_2\left(-\frac{bcx+bd}{ac-bd-c}\right)\right)d}{bc^2}+\frac{(a\ }{}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(b*x+a)/(c+d/x),x, algorithm="maxima")
[Out] 1/2*b*((log(c*x + d)*log((b*c*x + b*d)/(a*c - b*d + c) + 1) + dilog(-(b*c*x
 + b*d)/(a*c - b*d + c)))*d/(b*c^2) - (log(c*x + d)*log((b*c*x + b*d)/(a*c
- b*d - c) + 1) + dilog(-(b*c*x + b*d)/(a*c - b*d - c)))*d/(b*c^2) + (a + 1
)*log(b*x + a + 1)/(b^2*c) - (a - 1)*log(b*x + a - 1)/(b^2*c)) + (x/c - d*l
og(c*x + d)/c^2)*arccoth(b*x + a)
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.00

$$\int \frac{\operatorname{acoth}(a+b\,x)}{c+\frac{d}{x}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(a + b*x)/(c + d/x),x)
[Out] int(acoth(a + b*x)/(c + d/x), x)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{x\operatorname{acoth}(a+bx)}{cx+d}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(b*x+a)/(c+d/x),x)
[Out] Integral(x*acoth(a + b*x)/(c*x + d), x)
```

## 3.79 $\int \frac{\coth^{-1}(a+bx)}{c+\frac{d}{x^2}}\,dx$

**Optimal**. Leaf size=738

$$-\frac{\sqrt{d}\left(\log(a+bx-1)-\log\left(-\frac{-a-bx+1}{a+bx}\right)-\log(a+bx)\right)\tan^{-1}\left(\frac{\sqrt{c}\,x}{\sqrt{d}}\right)}{2c^{3/2}}-\frac{\sqrt{d}\left(\log(a+bx)-\log(a+bx+1)+\log\right.}{2c^{3/2}}$$

```
[Out] 1/2*(-b*x-a+1)*ln(b*x+a-1)/b/c+1/2*x*(ln(b*x+a-1)-ln((b*x+a-1)/(b*x+a))-ln(
b*x+a))/c+1/2*(b*x+a+1)*ln(b*x+a+1)/b/c+1/2*x*(ln(b*x+a)-ln(b*x+a+1)+ln((b*
x+a+1)/(b*x+a)))/c-1/2*arctan(x*c^(1/2)/d^(1/2))*(ln(b*x+a-1)-ln((b*x+a-1)/
(b*x+a))-ln(b*x+a))*d^(1/2)/c^(3/2)-1/2*arctan(x*c^(1/2)/d^(1/2))*(ln(b*x+a
)-ln(b*x+a+1)+ln((b*x+a+1)/(b*x+a)))*d^(1/2)/c^(3/2)+1/4*ln(b*x+a-1)*ln(-b*
(-x*(-c)^(1/2)+d^(1/2))/((1-a)*(-c)^(1/2)-b*d^(1/2)))*d^(1/2)/(-c)^(3/2)+1/
4*ln(b*x+a+1)*ln(-b*(x*(-c)^(1/2)+d^(1/2))/((1+a)*(-c)^(1/2)-b*d^(1/2)))*d^
(1/2)/(-c)^(3/2)-1/4*ln(b*x+a-1)*ln(b*(x*(-c)^(1/2)+d^(1/2))/((1-a)*(-c)^(1
/2)+b*d^(1/2)))*d^(1/2)/(-c)^(3/2)-1/4*ln(b*x+a+1)*ln(b*(-x*(-c)^(1/2)+d^(1
/2))/((1+a)*(-c)^(1/2)+b*d^(1/2)))*d^(1/2)/(-c)^(3/2)+1/4*polylog(2,(-b*x-a
+1)*(-c)^(1/2)/((1-a)*(-c)^(1/2)-b*d^(1/2)))*d^(1/2)/(-c)^(3/2)+1/4*polylog
(2,(b*x+a+1)*(-c)^(1/2)/((1+a)*(-c)^(1/2)-b*d^(1/2)))*d^(1/2)/(-c)^(3/2)-1/
4*polylog(2,(-b*x-a+1)*(-c)^(1/2)/((1-a)*(-c)^(1/2)+b*d^(1/2)))*d^(1/2)/(-c
)^(3/2)-1/4*polylog(2,(b*x+a+1)*(-c)^(1/2)/((1+a)*(-c)^(1/2)+b*d^(1/2)))*d^
(1/2)/(-c)^(3/2)
```

**Rubi [A]** time = 1.53, antiderivative size = 738, normalized size of antiderivative = 1.00, number of steps used = 57, number of rules used = 11, integrand size = 16, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.688, Rules used = {6116, 2513, 2409, 2389, 2295, 2394, 2393, 2391, 193, 321, 205}

$$\frac{\sqrt{d}\,\text{PolyLog}\left(2,\frac{\sqrt{-c}(-a-bx+1)}{(1-a)\sqrt{-c}-b\sqrt{d}}\right)}{4(-c)^{3/2}}-\frac{\sqrt{d}\,\text{PolyLog}\left(2,\frac{\sqrt{-c}(-a-bx+1)}{(1-a)\sqrt{-c}+b\sqrt{d}}\right)}{4(-c)^{3/2}}+\frac{\sqrt{d}\,\text{PolyLog}\left(2,\frac{\sqrt{-c}(a+bx+1)}{(a+1)\sqrt{-c}-b\sqrt{d}}\right)}{4(-c)^{3/2}}-\frac{\sqrt{d}\,\text{PolyLog}}{4}$$

Antiderivative was successfully verified.

```
[In] Int[ArcCoth[a + b*x]/(c + d/x^2),x]
```

```
[Out] ((1 - a - b*x)*Log[-1 + a + b*x])/(2*b*c) + (x*(Log[-1 + a + b*x] - Log[-((
1 - a - b*x)/(a + b*x))] - Log[a + b*x]))/(2*c) - (Sqrt[d]*ArcTan[(Sqrt[c]*
x)/Sqrt[d]]*(Log[-1 + a + b*x] - Log[-((1 - a - b*x)/(a + b*x))] - Log[a +
b*x]))/(2*c^(3/2)) + ((1 + a + b*x)*Log[1 + a + b*x])/(2*b*c) + (x*(Log[a +
 b*x] - Log[1 + a + b*x] + Log[(1 + a + b*x)/(a + b*x)]))/(2*c) - (Sqrt[d]*
ArcTan[(Sqrt[c]*x)/Sqrt[d]]*(Log[a + b*x] - Log[1 + a + b*x] + Log[(1 + a +
 b*x)/(a + b*x)]))/(2*c^(3/2)) + (Sqrt[d]*Log[-1 + a + b*x]*Log[-((b*(Sqrt[
d] - Sqrt[-c]*x))/((1 - a)*Sqrt[-c] - b*Sqrt[d]))])/(4*(-c)^(3/2)) - (Sqrt[
d]*Log[1 + a + b*x]*Log[(b*(Sqrt[d] - Sqrt[-c]*x))/((1 + a)*Sqrt[-c] + b*Sq
rt[d])])/(4*(-c)^(3/2)) + (Sqrt[d]*Log[1 + a + b*x]*Log[-((b*(Sqrt[d] + Sqr
t[-c]*x))/((1 + a)*Sqrt[-c] - b*Sqrt[d]))])/(4*(-c)^(3/2)) - (Sqrt[d]*Log[-
1 + a + b*x]*Log[(b*(Sqrt[d] + Sqrt[-c]*x))/((1 - a)*Sqrt[-c] + b*Sqrt[d])]
)/(4*(-c)^(3/2)) + (Sqrt[d]*PolyLog[2, (Sqrt[-c]*(1 - a - b*x))/((1 - a)*Sq
rt[-c] - b*Sqrt[d])])/(4*(-c)^(3/2)) - (Sqrt[d]*PolyLog[2, (Sqrt[-c]*(1 - a
 - b*x))/((1 - a)*Sqrt[-c] + b*Sqrt[d])])/(4*(-c)^(3/2)) + (Sqrt[d]*PolyLog
[2, (Sqrt[-c]*(1 + a + b*x))/((1 + a)*Sqrt[-c] - b*Sqrt[d])])/(4*(-c)^(3/2)
) - (Sqrt[d]*PolyLog[2, (Sqrt[-c]*(1 + a + b*x))/((1 + a)*Sqrt[-c] + b*Sqrt
[d])])/(4*(-c)^(3/2))
```

Rule 193

```
Int[((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Int[x^(n*p)*(b + a/x^n)^p,
x] /; FreeQ[{a, b}, x] && LtQ[n, 0] && IntegerQ[p]
```

Rule 205

```
Int[((a_) + (b_.)*(x_)^2)^(-1), x_Symbol] :> Simp[(Rt[a/b, 2]*ArcTan[x/Rt[a
/b, 2]])/a, x] /; FreeQ[{a, b}, x] && PosQ[a/b]
```

Rule 321

```
Int[((c_.)*(x_))^(m_)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Simp[(c^(
n - 1)*(c*x)^(m - n + 1)*(a + b*x^n)^(p + 1))/(b*(m + n*p + 1)), x] - Dist[
(a*c^n*(m - n + 1))/(b*(m + n*p + 1)), Int[(c*x)^(m - n)*(a + b*x^n)^p, x],
 x] /; FreeQ[{a, b, c, p}, x] && IGtQ[n, 0] && GtQ[m, n - 1] && NeQ[m + n*p
 + 1, 0] && IntBinomialQ[a, b, c, n, m, p, x]
```

Rule 2295

```
Int[Log[(c_.)*(x_)^(n_.)], x_Symbol] :> Simp[x*Log[c*x^n], x] - Simp[n*x, x
] /; FreeQ[{c, n}, x]
```

Rule 2389

```
Int[((a_.) + Log[(c_.)*((d_) + (e_.)*(x_))^(n_.)]*(b_.))^(p_.), x_Symbol] :
> Dist[1/e, Subst[Int[(a + b*Log[c*x^n])^p, x], x, d + e*x], x] /; FreeQ[{a
, b, c, d, e, n, p}, x]
```

Rule 2391

```
Int[Log[(c_.)*((d_) + (e_.)*(x_)^(n_.))]/(x_), x_Symbol] :> -Simp[PolyLog[2
, -(c*e*x^n)]/n, x] /; FreeQ[{c, d, e, n}, x] && EqQ[c*d, 1]
```

Rule 2393

```
Int[((a_.) + Log[(c_.)*((d_) + (e_.)*(x_))]*(b_.))/((f_.) + (g_.)*(x_)), x_
Symbol] :> Dist[1/g, Subst[Int[(a + b*Log[1 + (c*e*x)/g])/x, x], x, f + g*x
], x] /; FreeQ[{a, b, c, d, e, f, g}, x] && NeQ[e*f - d*g, 0] && EqQ[g + c*
(e*f - d*g), 0]
```

Rule 2394

```
Int[((a_.) + Log[(c_.)*((d_) + (e_.)*(x_))^(n_.)]*(b_.))/((f_.) + (g_.)*(x_
)), x_Symbol] :> Simp[(Log[(e*(f + g*x))/(e*f - d*g)]*(a + b*Log[c*(d + e*x
)^n]))/g, x] - Dist[(b*e*n)/g, Int[Log[(e*(f + g*x))/(e*f - d*g)]/(d + e*x)
, x], x] /; FreeQ[{a, b, c, d, e, f, g, n}, x] && NeQ[e*f - d*g, 0]
```

Rule 2409

```
Int[((a_.) + Log[(c_.)*((d_) + (e_.)*(x_))^(n_.)]*(b_.))^(p_.)*((f_) + (g_.
)*(x_)^(r_))^(q_.), x_Symbol] :> Int[ExpandIntegrand[(a + b*Log[c*(d + e*x)
^n])^p, (f + g*x^r)^q, x], x] /; FreeQ[{a, b, c, d, e, f, g, n, r}, x] && I
GtQ[p, 0] && IntegerQ[q] && (GtQ[q, 0] || (IntegerQ[r] && NeQ[r, 1]))
```

Rule 2513

```
Int[Log[(e_.)*((f_.)*((a_.) + (b_.)*(x_))^(p_.)*((c_.) + (d_.)*(x_))^(q_.))
^(r_.)]*(RFx_.), x_Symbol] :> Dist[p*r, Int[RFx*Log[a + b*x], x], x] + (Dis
t[q*r, Int[RFx*Log[c + d*x], x], x] - Dist[p*r*Log[a + b*x] + q*r*Log[c + d
*x] - Log[e*(f*(a + b*x)^p*(c + d*x)^q)^r], Int[RFx, x], x]) /; FreeQ[{a, b
```

```
, c, d, e, f, p, q, r}, x] && RationalFunctionQ[RFx, x] && NeQ[b*c - a*d, 0
] &&  !MatchQ[RFx, (u_.)*(a + b*x)^(m_.)*(c + d*x)^(n_.) /; IntegersQ[m, n]
]
```

Rule 6116

```
Int[ArcCoth[(c_) + (d_.)*(x_)]/((e_) + (f_.)*(x_)^(n_.)), x_Symbol] :> Dist
[1/2, Int[Log[(1 + c + d*x)/(c + d*x)]/(e + f*x^n), x], x] - Dist[1/2, Int[
Log[(-1 + c + d*x)/(c + d*x)]/(e + f*x^n), x], x] /; FreeQ[{c, d, e, f}, x]
 && RationalQ[n]
```

Rubi steps

$$\int \frac{\coth^{-1}(a+bx)}{c+\frac{d}{x^2}}\,dx = -\left(\frac{1}{2}\int \frac{\log\left(\frac{-1+a+bx}{a+bx}\right)}{c+\frac{d}{x^2}}\,dx\right)+\frac{1}{2}\int \frac{\log\left(\frac{1+a+bx}{a+bx}\right)}{c+\frac{d}{x^2}}\,dx$$

$$= -\left(\frac{1}{2}\int \frac{\log(-1+a+bx)}{c+\frac{d}{x^2}}\,dx\right)+\frac{1}{2}\int \frac{\log(1+a+bx)}{c+\frac{d}{x^2}}\,dx-\frac{1}{2}\left(-\log(-1+a+bx)+\text{lo}\right.$$

$$= -\left(\frac{1}{2}\int \left(\frac{\log(-1+a+bx)}{c}-\frac{d\log(-1+a+bx)}{c\left(d+cx^2\right)}\right)dx\right)+\frac{1}{2}\int \left(\frac{\log(1+a+bx)}{c}-\frac{d\log}{c}\right.$$

$$= \frac{x\left(\log(-1+a+bx)-\log\left(-\frac{1-a-bx}{a+bx}\right)-\log(a+bx)\right)}{2c}+\frac{x\left(\log(a+bx)-\log(1+a+b\right.}{2c}$$

$$= \frac{x\left(\log(-1+a+bx)-\log\left(-\frac{1-a-bx}{a+bx}\right)-\log(a+bx)\right)}{2c}-\frac{\sqrt{d}\tan^{-1}\left(\frac{\sqrt{c}\,x}{\sqrt{d}}\right)\left(\log(-1+a+\right.}{}$$

$$= \frac{(1-a-bx)\log(-1+a+bx)}{2bc}+\frac{x\left(\log(-1+a+bx)-\log\left(-\frac{1-a-bx}{a+bx}\right)-\log(a+bx)\right)}{2c}-$$

$$= \frac{(1-a-bx)\log(-1+a+bx)}{2bc}+\frac{x\left(\log(-1+a+bx)-\log\left(-\frac{1-a-bx}{a+bx}\right)-\log(a+bx)\right)}{2c}-$$

$$= \frac{(1-a-bx)\log(-1+a+bx)}{2bc}+\frac{x\left(\log(-1+a+bx)-\log\left(-\frac{1-a-bx}{a+bx}\right)-\log(a+bx)\right)}{2c}-$$

$$= \frac{(1-a-bx)\log(-1+a+bx)}{2bc}+\frac{x\left(\log(-1+a+bx)-\log\left(-\frac{1-a-bx}{a+bx}\right)-\log(a+bx)\right)}{2c}-$$

**Mathematica [C]** time = 36.35, size = 5552, normalized size = 7.52

Result too large to show

Warning: Unable to verify antiderivative.

```
[In] Integrate[ArcCoth[a + b*x]/(c + d/x^2),x]
[Out] Result too large to show
```

**fricas [F]** time = 0.50, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{x^2\,\text{arcoth}\,(bx+a)}{cx^2+d},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(b*x+a)/(c+d/x^2),x, algorithm="fricas")
```

```
[Out] integral(x^2*arccoth(b*x + a)/(c*x^2 + d), x)
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{arcoth}(bx + a)}{c + \frac{d}{x^2}}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(b*x+a)/(c+d/x^2),x, algorithm="giac")
```

```
[Out] integrate(arccoth(b*x + a)/(c + d/x^2), x)
```

**maple [C]** time = 1.88, size = 19686, normalized size = 26.67

output too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(arccoth(b*x+a)/(c+d/x^2),x)
```

```
[Out] result too large to display
```

**maxima [C]** time = 0.55, size = 647, normalized size = 0.88

$$-\left(\frac{d \arctan\left(\frac{cx}{\sqrt{cd}}\right)}{\sqrt{cd}\, c} - \frac{x}{c}\right)\operatorname{arcoth}(bx + a) + \frac{2\,(a+1)c \log(bx + a + 1) - 2\,(a-1)c\log(bx + a - 1) + \left(b \arctan\left(\frac{\sqrt{c}\, x}{\sqrt{d}}\right.\right.}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(b*x+a)/(c+d/x^2),x, algorithm="maxima")
```

```
[Out] -(d*arctan(c*x/sqrt(c*d))/(sqrt(c*d)*c) - x/c)*arccoth(b*x + a) + 1/4*(2*(a
 + 1)*c*log(b*x + a + 1) - 2*(a - 1)*c*log(b*x + a - 1) + (b*arctan(sqrt(c)
*x/sqrt(d))*log((b^2*c*x^2 + 2*(a + 1)*b*c*x + (a^2 + 2*a + 1)*c)/(b^2*d +
(a^2 + 2*a + 1)*c)) - b*arctan(sqrt(c)*x/sqrt(d))*log((b^2*c*x^2 + 2*(a - 1
)*b*c*x + (a^2 - 2*a + 1)*c)/(b^2*d + (a^2 - 2*a + 1)*c)) + I*b*dilog(((a +
 1)*b*c*x + b^2*d - (I*b^2*x + (-I*a - I)*b)*sqrt(c)*sqrt(d))/((2*I*a + 2*I
)*b*sqrt(c)*sqrt(d) + b^2*d - (a^2 + 2*a + 1)*c)) - I*b*dilog(-((a + 1)*b*c
*x + b^2*d + (I*b^2*x + (-I*a - I)*b)*sqrt(c)*sqrt(d))/((2*I*a + 2*I)*b*sqr
t(c)*sqrt(d) - b^2*d + (a^2 + 2*a + 1)*c)) - I*b*dilog(((a - 1)*b*c*x + b^2
*d - (I*b^2*x + (-I*a + I)*b)*sqrt(c)*sqrt(d))/((2*I*a - 2*I)*b*sqrt(c)*sqr
t(d) + b^2*d - (a^2 - 2*a + 1)*c)) + I*b*dilog(-((a - 1)*b*c*x + b^2*d + (I
*b^2*x + (-I*a + I)*b)*sqrt(c)*sqrt(d))/((2*I*a - 2*I)*b*sqrt(c)*sqrt(d) -
b^2*d + (a^2 - 2*a + 1)*c)) - (b*arctan2((b^2*x + (a + 1)*b)*sqrt(c)*sqrt(d
)/(b^2*d + (a^2 + 2*a + 1)*c), ((a + 1)*b*c*x + (a^2 + 2*a + 1)*c)/(b^2*d +
 (a^2 + 2*a + 1)*c)) - b*arctan2((b^2*x + (a - 1)*b)*sqrt(c)*sqrt(d)/(b^2*d
 + (a^2 - 2*a + 1)*c), ((a - 1)*b*c*x + (a^2 - 2*a + 1)*c)/(b^2*d + (a^2 -
2*a + 1)*c)))*log(c*x^2 + d))*sqrt(c)*sqrt(d))/(b*c^2)
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.00

$$\int \frac{\operatorname{acoth}(a + b\,x)}{c + \frac{d}{x^2}}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(a + b*x)/(c + d/x^2),x)
```

```
[Out] int(acoth(a + b*x)/(c + d/x^2), x)
```

**sympy [F(-1)]** time = 0.00, size = 0, normalized size = 0.00

Timed out

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(b*x+a)/(c+d/x**2),x)
```

```
[Out] Timed out
```

# 3.80 $\int \frac{\coth^{-1}(a+bx)}{c+d\sqrt{x}}\,dx$

**Optimal**. Leaf size=619

$$\frac{c\text{Li}_2\left(\frac{\sqrt{b}\left(c+d\sqrt{x}\right)}{\sqrt{b}c-\sqrt{-a-1}d}\right)}{d^2}+\frac{c\text{Li}_2\left(\frac{\sqrt{b}\left(c+d\sqrt{x}\right)}{\sqrt{b}c+\sqrt{-a-1}d}\right)}{d^2}-\frac{c\text{Li}_2\left(\frac{\sqrt{b}\left(c+d\sqrt{x}\right)}{\sqrt{b}c-\sqrt{1-a}d}\right)}{d^2}-\frac{c\text{Li}_2\left(\frac{\sqrt{b}\left(c+d\sqrt{x}\right)}{\sqrt{b}c+\sqrt{1-a}d}\right)}{d^2}+\frac{c\log\left(c+d\sqrt{x}\right)\log\left(\frac{d\left(\sqrt{-a-1}-\sqrt{\right.}}{\sqrt{-a-1}d+}\right.}{d^2}$$

```
[Out] c*ln((b*x+a-1)/(b*x+a))*ln(c+d*x^(1/2))/d^2-c*ln((b*x+a+1)/(b*x+a))*ln(c+d*
x^(1/2))/d^2+c*ln(c+d*x^(1/2))*ln(d*((-1-a)^(1/2)-b^(1/2)*x^(1/2))/(d*(-1-a
)^(1/2)+c*b^(1/2)))/d^2-c*ln(c+d*x^(1/2))*ln(d*((1-a)^(1/2)-b^(1/2)*x^(1/2)
)/(d*(1-a)^(1/2)+c*b^(1/2)))/d^2+c*ln(c+d*x^(1/2))*ln(-d*((-1-a)^(1/2)+b^(1
/2)*x^(1/2))/(-d*(-1-a)^(1/2)+c*b^(1/2)))/d^2-c*ln(c+d*x^(1/2))*ln(-d*((1-a
)^(1/2)+b^(1/2)*x^(1/2))/(-d*(1-a)^(1/2)+c*b^(1/2)))/d^2+c*polylog(2,b^(1/2
)*(c+d*x^(1/2))/(-d*(-1-a)^(1/2)+c*b^(1/2)))/d^2+c*polylog(2,b^(1/2)*(c+d*x
^(1/2))/(d*(-1-a)^(1/2)+c*b^(1/2)))/d^2-c*polylog(2,b^(1/2)*(c+d*x^(1/2))/(
-d*(1-a)^(1/2)+c*b^(1/2)))/d^2-c*polylog(2,b^(1/2)*(c+d*x^(1/2))/(d*(1-a)^(
1/2)+c*b^(1/2)))/d^2-2*arctanh(b^(1/2)*x^(1/2)/(1-a)^(1/2))*(1-a)^(1/2)/d/b
^(1/2)+2*arctan(b^(1/2)*x^(1/2)/(1+a)^(1/2))*(1+a)^(1/2)/d/b^(1/2)-ln((b*x+
a-1)/(b*x+a))*x^(1/2)/d+ln((b*x+a+1)/(b*x+a))*x^(1/2)/d
```

**Rubi [A]** time = 2.20, antiderivative size = 619, normalized size of antiderivative = 1.00, number of steps used = 55, number of rules used = 16, integrand size = 18, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.889, Rules used = {6116, 190, 43, 2528, 2523, 12, 481, 205, 2524, 2418, 260, 2416, 2394, 2393, 2391, 208}

$$\frac{c\text{PolyLog}\left(2,\frac{\sqrt{b}\left(c+d\sqrt{x}\right)}{\sqrt{b}c-\sqrt{-a-1}d}\right)}{d^2}+\frac{c\text{PolyLog}\left(2,\frac{\sqrt{b}\left(c+d\sqrt{x}\right)}{\sqrt{-a-1}d+\sqrt{b}c}\right)}{d^2}-\frac{c\text{PolyLog}\left(2,\frac{\sqrt{b}\left(c+d\sqrt{x}\right)}{\sqrt{b}c-\sqrt{1-a}d}\right)}{d^2}-\frac{c\text{PolyLog}\left(2,\frac{\sqrt{b}\left(c+d\sqrt{x}\right)}{\sqrt{1-a}d+\sqrt{b}c}\right)}{d^2}+$$

Antiderivative was successfully verified.

```
[In] Int[ArcCoth[a + b*x]/(c + d*Sqrt[x]),x]
```

```
[Out] (2*Sqrt[1 + a]*ArcTan[(Sqrt[b]*Sqrt[x])/Sqrt[1 + a]])/(Sqrt[b]*d) - (2*Sqrt
[1 - a]*ArcTanh[(Sqrt[b]*Sqrt[x])/Sqrt[1 - a]])/(Sqrt[b]*d) + (c*Log[(d*(Sq
rt[-1 - a] - Sqrt[b]*Sqrt[x]))/(Sqrt[b]*c + Sqrt[-1 - a]*d)]*Log[c + d*Sqrt
[x]])/d^2 - (c*Log[(d*(Sqrt[1 - a] - Sqrt[b]*Sqrt[x]))/(Sqrt[b]*c + Sqrt[1
- a]*d)]*Log[c + d*Sqrt[x]])/d^2 + (c*Log[-((d*(Sqrt[-1 - a] + Sqrt[b]*Sqrt
[x]))/(Sqrt[b]*c - Sqrt[-1 - a]*d))]*Log[c + d*Sqrt[x]])/d^2 - (c*Log[-((d*
(Sqrt[1 - a] + Sqrt[b]*Sqrt[x]))/(Sqrt[b]*c - Sqrt[1 - a]*d))]*Log[c + d*Sq
rt[x]])/d^2 - (Sqrt[x]*Log[-((1 - a - b*x)/(a + b*x))])/d + (c*Log[c + d*Sq
rt[x]]*Log[-((1 - a - b*x)/(a + b*x))])/d^2 + (Sqrt[x]*Log[(1 + a + b*x)/(a
 + b*x)])/d - (c*Log[c + d*Sqrt[x]]*Log[(1 + a + b*x)/(a + b*x)])/d^2 + (c*
PolyLog[2, (Sqrt[b]*(c + d*Sqrt[x]))/(Sqrt[b]*c - Sqrt[-1 - a]*d)])/d^2 + (
c*PolyLog[2, (Sqrt[b]*(c + d*Sqrt[x]))/(Sqrt[b]*c + Sqrt[-1 - a]*d)])/d^2 -
 (c*PolyLog[2, (Sqrt[b]*(c + d*Sqrt[x]))/(Sqrt[b]*c - Sqrt[1 - a]*d)])/d^2
- (c*PolyLog[2, (Sqrt[b]*(c + d*Sqrt[x]))/(Sqrt[b]*c + Sqrt[1 - a]*d)])/d^2
```

Rule 12

```
Int[(a_)*(u_), x_Symbol] :> Dist[a, Int[u, x], x] /; FreeQ[a, x] &&  !Match
Q[u, (b_)*(v_) /; FreeQ[b, x]]
```

Rule 43

```
Int[((a_.) + (b_.)*(x_))^(m_.)*((c_.) + (d_.)*(x_))^(n_.), x_Symbol] :> Int
[ExpandIntegrand[(a + b*x)^m*(c + d*x)^n, x], x] /; FreeQ[{a, b, c, d, n},
x] && NeQ[b*c - a*d, 0] && IGtQ[m, 0] && ( !IntegerQ[n] || (EqQ[c, 0] && Le
```

```
Q[7*m + 4*n + 4, 0]) || LtQ[9*m + 5*(n + 1), 0] || GtQ[m + n + 2, 0])
```

Rule 190

```
Int[((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Dist[1/n, Subst[Int[x^(1/n
- 1)*(a + b*x)^p, x], x, x^n], x] /; FreeQ[{a, b, p}, x] && FractionQ[n] &&
 IntegerQ[1/n]
```

Rule 205

```
Int[((a_) + (b_.)*(x_)^2)^(-1), x_Symbol] :> Simp[(Rt[a/b, 2]*ArcTan[x/Rt[a
/b, 2]])/a, x] /; FreeQ[{a, b}, x] && PosQ[a/b]
```

Rule 208

```
Int[((a_) + (b_.)*(x_)^2)^(-1), x_Symbol] :> Simp[(Rt[-(a/b), 2]*ArcTanh[x/
Rt[-(a/b), 2]])/a, x] /; FreeQ[{a, b}, x] && NegQ[a/b]
```

Rule 260

```
Int[(x_)^(m_.)/((a_) + (b_.)*(x_)^(n_)), x_Symbol] :> Simp[Log[RemoveConten
t[a + b*x^n, x]]/(b*n), x] /; FreeQ[{a, b, m, n}, x] && EqQ[m, n - 1]
```

Rule 481

```
Int[((e_.)*(x_))^(m_.)/(((a_) + (b_.)*(x_)^(n_))*((c_) + (d_.)*(x_)^(n_))),
 x_Symbol] :> -Dist[(a*e^n)/(b*c - a*d), Int[(e*x)^(m - n)/(a + b*x^n), x],
 x] + Dist[(c*e^n)/(b*c - a*d), Int[(e*x)^(m - n)/(c + d*x^n), x], x] /; Fr
eeQ[{a, b, c, d, e, m}, x] && NeQ[b*c - a*d, 0] && IGtQ[n, 0] && LeQ[n, m,
2*n - 1]
```

Rule 2391

```
Int[Log[(c_.)*((d_) + (e_.)*(x_)^(n_.))]/(x_), x_Symbol] :> -Simp[PolyLog[2
, -(c*e*x^n)]/n, x] /; FreeQ[{c, d, e, n}, x] && EqQ[c*d, 1]
```

Rule 2393

```
Int[((a_.) + Log[(c_.)*((d_) + (e_.)*(x_))]*(b_.))/((f_.) + (g_.)*(x_)), x_
Symbol] :> Dist[1/g, Subst[Int[(a + b*Log[1 + (c*e*x)/g])/x, x], x, f + g*x
], x] /; FreeQ[{a, b, c, d, e, f, g}, x] && NeQ[e*f - d*g, 0] && EqQ[g + c*
(e*f - d*g), 0]
```

Rule 2394

```
Int[((a_.) + Log[(c_.)*((d_) + (e_.)*(x_))^(n_.)]*(b_.))/((f_.) + (g_.)*(x_
)), x_Symbol] :> Simp[(Log[(e*(f + g*x))/(e*f - d*g)]*(a + b*Log[c*(d + e*x
)^n]))/g, x] - Dist[(b*e*n)/g, Int[Log[(e*(f + g*x))/(e*f - d*g)]/(d + e*x)
, x], x] /; FreeQ[{a, b, c, d, e, f, g, n}, x] && NeQ[e*f - d*g, 0]
```

Rule 2416

```
Int[((a_.) + Log[(c_.)*((d_) + (e_.)*(x_))^(n_.)]*(b_.))^(p_.)*((h_.)*(x_))
^(m_.)*((f_) + (g_.)*(x_)^(r_.))^(q_.), x_Symbol] :> Int[ExpandIntegrand[(a
 + b*Log[c*(d + e*x)^n])^p, (h*x)^m*(f + g*x^r)^q, x], x] /; FreeQ[{a, b, c
, d, e, f, g, h, m, n, p, q, r}, x] && IntegerQ[m] && IntegerQ[q]
```

Rule 2418

```
Int[((a_.) + Log[(c_.)*((d_) + (e_.)*(x_))^(n_.)]*(b_.))^(p_.)*(RFx_), x_Sy
mbol] :> With[{u = ExpandIntegrand[(a + b*Log[c*(d + e*x)^n])^p, RFx, x]},
Int[u, x] /; SumQ[u]] /; FreeQ[{a, b, c, d, e, n}, x] && RationalFunctionQ[
RFx, x] && IntegerQ[p]
```

Rule 2523

```
Int[((a_.) + Log[(c_.)*(RFx_)^(p_.)]*(b_.))^(n_.), x_Symbol] :> Simp[x*(a +
 b*Log[c*RFx^p])^n, x] - Dist[b*n*p, Int[SimplifyIntegrand[(x*(a + b*Log[c*
RFx^p])^(n - 1)*D[RFx, x])/RFx, x], x], x] /; FreeQ[{a, b, c, p}, x] && Rat
ionalFunctionQ[RFx, x] && IGtQ[n, 0]
```

Rule 2524

```
Int[((a_.) + Log[(c_.)*(RFx_)^(p_.)]*(b_.))^(n_.)/((d_.) + (e_.)*(x_)), x_S
ymbol] :> Simp[(Log[d + e*x]*(a + b*Log[c*RFx^p])^n)/e, x] - Dist[(b*n*p)/e
, Int[(Log[d + e*x]*(a + b*Log[c*RFx^p])^(n - 1)*D[RFx, x])/RFx, x], x] /;
FreeQ[{a, b, c, d, e, p}, x] && RationalFunctionQ[RFx, x] && IGtQ[n, 0]
```

Rule 2528

```
Int[((a_.) + Log[(c_.)*(RFx_)^(p_.)]*(b_.))^(n_.)*(RGx_), x_Symbol] :> With
[{u = ExpandIntegrand[(a + b*Log[c*RFx^p])^n, RGx, x]}, Int[u, x] /; SumQ[u
]] /; FreeQ[{a, b, c, p}, x] && RationalFunctionQ[RFx, x] && RationalFuncti
onQ[RGx, x] && IGtQ[n, 0]
```

Rule 6116

```
Int[ArcCoth[(c_) + (d_.)*(x_)]/((e_) + (f_.)*(x_)^(n_.)), x_Symbol] :> Dist
[1/2, Int[Log[(1 + c + d*x)/(c + d*x)]/(e + f*x^n), x], x] - Dist[1/2, Int[
Log[(-1 + c + d*x)/(c + d*x)]/(e + f*x^n), x], x] /; FreeQ[{c, d, e, f}, x]
 && RationalQ[n]
```

Rubi steps

$$\int \frac{\coth^{-1}(a+bx)}{c+d\sqrt{x}}\,dx = -\left(\frac{1}{2}\int \frac{\log\left(\frac{-1+a+bx}{a+bx}\right)}{c+d\sqrt{x}}\,dx\right)+\frac{1}{2}\int \frac{\log\left(\frac{1+a+bx}{a+bx}\right)}{c+d\sqrt{x}}\,dx$$

$$= -\text{Subst}\left(\int \frac{x\log\left(\frac{-1+a+bx^2}{a+bx^2}\right)}{c+dx}\,dx, x, \sqrt{x}\right)+\text{Subst}\left(\int \frac{x\log\left(\frac{1+a+bx^2}{a+bx^2}\right)}{c+dx}\,dx, x, \sqrt{x}\right)$$

$$= -\text{Subst}\left(\int\left(\frac{\log\left(\frac{-1+a+bx^2}{a+bx^2}\right)}{d}-\frac{c\log\left(\frac{-1+a+bx^2}{a+bx^2}\right)}{d(c+dx)}\right)dx, x, \sqrt{x}\right)+\text{Subst}\left(\int\left(\frac{\log\left(\frac{1+a+bx^2}{a+bx^2}\right)}{d}\right.\right.$$

$$= -\frac{\text{Subst}\left(\int\log\left(\frac{-1+a+bx^2}{a+bx^2}\right)dx, x, \sqrt{x}\right)}{d}+\frac{\text{Subst}\left(\int\log\left(\frac{1+a+bx^2}{a+bx^2}\right)dx, x, \sqrt{x}\right)}{d}+\frac{c\,\text{Subst}}{}$$

$$= -\frac{\sqrt{x}\log\left(-\frac{1-a-bx}{a+bx}\right)}{d}+\frac{c\log\left(c+d\sqrt{x}\right)\log\left(-\frac{1-a-bx}{a+bx}\right)}{d^2}+\frac{\sqrt{x}\log\left(\frac{1+a+bx}{a+bx}\right)}{d}-\frac{c\log(c+}{}$$

$$= -\frac{\sqrt{x}\log\left(-\frac{1-a-bx}{a+bx}\right)}{d}+\frac{c\log\left(c+d\sqrt{x}\right)\log\left(-\frac{1-a-bx}{a+bx}\right)}{d^2}+\frac{\sqrt{x}\log\left(\frac{1+a+bx}{a+bx}\right)}{d}-\frac{c\log(c+}{}$$

$$= -\frac{\sqrt{x}\log\left(-\frac{1-a-bx}{a+bx}\right)}{d}+\frac{c\log\left(c+d\sqrt{x}\right)\log\left(-\frac{1-a-bx}{a+bx}\right)}{d^2}+\frac{\sqrt{x}\log\left(\frac{1+a+bx}{a+bx}\right)}{d}-\frac{c\log(c+}{}$$

$$= \frac{2\sqrt{1+a}\tan^{-1}\left(\frac{\sqrt{b}\sqrt{x}}{\sqrt{1+a}}\right)}{\sqrt{b}d}-\frac{2\sqrt{1-a}\tanh^{-1}\left(\frac{\sqrt{b}\sqrt{x}}{\sqrt{1-a}}\right)}{\sqrt{b}d}-\frac{\sqrt{x}\log\left(-\frac{1-a-bx}{a+bx}\right)}{d}+\frac{c\log(c+}{}$$

$$= \frac{2\sqrt{1+a}\tan^{-1}\left(\frac{\sqrt{b}\sqrt{x}}{\sqrt{1+a}}\right)}{\sqrt{b}d}-\frac{2\sqrt{1-a}\tanh^{-1}\left(\frac{\sqrt{b}\sqrt{x}}{\sqrt{1-a}}\right)}{\sqrt{b}d}-\frac{\sqrt{x}\log\left(-\frac{1-a-bx}{a+bx}\right)}{d}+\frac{c\log(c+}{}$$

$$= \frac{2\sqrt{1+a}\tan^{-1}\left(\frac{\sqrt{b}\sqrt{x}}{\sqrt{1+a}}\right)}{\sqrt{b}d}-\frac{2\sqrt{1-a}\tanh^{-1}\left(\frac{\sqrt{b}\sqrt{x}}{\sqrt{1-a}}\right)}{\sqrt{b}d}+\frac{c\log\left(\frac{d\left(\sqrt{-1-a}-\sqrt{b}\sqrt{x}\right)}{\sqrt{b}c+\sqrt{-1-a}d}\right)\log(c+}{d^2}$$

$$= \frac{2\sqrt{1+a}\tan^{-1}\left(\frac{\sqrt{b}\sqrt{x}}{\sqrt{1+a}}\right)}{\sqrt{b}d}-\frac{2\sqrt{1-a}\tanh^{-1}\left(\frac{\sqrt{b}\sqrt{x}}{\sqrt{1-a}}\right)}{\sqrt{b}d}+\frac{c\log\left(\frac{d\left(\sqrt{-1-a}-\sqrt{b}\sqrt{x}\right)}{\sqrt{b}c+\sqrt{-1-a}d}\right)\log(c+}{d^2}$$

$$= \frac{2\sqrt{1+a}\tan^{-1}\left(\frac{\sqrt{b}\sqrt{x}}{\sqrt{1+a}}\right)}{\sqrt{b}d}-\frac{2\sqrt{1-a}\tanh^{-1}\left(\frac{\sqrt{b}\sqrt{x}}{\sqrt{1-a}}\right)}{\sqrt{b}d}+\frac{c\log\left(\frac{d\left(\sqrt{-1-a}-\sqrt{b}\sqrt{x}\right)}{\sqrt{b}c+\sqrt{-1-a}d}\right)\log(c+}{d^2}$$

**Mathematica [A]** time = 0.71, size = 575, normalized size = 0.93

$$\frac{c\text{Li}_2\left(\frac{\sqrt{b}\left(c+d\sqrt{x}\right)}{\sqrt{b}c-\sqrt{-a-1}d}\right)+c\text{Li}_2\left(\frac{\sqrt{b}\left(c+d\sqrt{x}\right)}{\sqrt{b}c+\sqrt{-a-1}d}\right)-c\text{Li}_2\left(\frac{\sqrt{b}\left(c+d\sqrt{x}\right)}{\sqrt{b}c-\sqrt{1-a}d}\right)-c\text{Li}_2\left(\frac{\sqrt{b}\left(c+d\sqrt{x}\right)}{\sqrt{b}c+\sqrt{1-a}d}\right)+c\log\left(c+d\sqrt{x}\right)\log\left(\frac{d\left(\sqrt{-a}\right.}{\sqrt{-a}}\right.}{}$$

Antiderivative was successfully verified.

```
[In] Integrate[ArcCoth[a + b*x]/(c + d*Sqrt[x]),x]
```

```
[Out] ((2*Sqrt[1 + a]*d*ArcTan[(Sqrt[b]*Sqrt[x])/Sqrt[1 + a]])/Sqrt[b] - (2*Sqrt[
1 - a]*d*ArcTanh[(Sqrt[b]*Sqrt[x])/Sqrt[1 - a]])/Sqrt[b] + c*Log[(d*(Sqrt[-
1 - a] - Sqrt[b]*Sqrt[x]))/(Sqrt[b]*c + Sqrt[-1 - a]*d)]*Log[c + d*Sqrt[x]]
 - c*Log[(d*(Sqrt[1 - a] - Sqrt[b]*Sqrt[x]))/(Sqrt[b]*c + Sqrt[1 - a]*d)]*L
og[c + d*Sqrt[x]] + c*Log[(d*(Sqrt[-1 - a] + Sqrt[b]*Sqrt[x]))/(-(Sqrt[b]*c
) + Sqrt[-1 - a]*d)]*Log[c + d*Sqrt[x]] - c*Log[(d*(Sqrt[1 - a] + Sqrt[b]*S
qrt[x]))/(-(Sqrt[b]*c) + Sqrt[1 - a]*d)]*Log[c + d*Sqrt[x]] - d*Sqrt[x]*Log
[(-1 + a + b*x)/(a + b*x)] + c*Log[c + d*Sqrt[x]]*Log[(-1 + a + b*x)/(a + b
*x)] + d*Sqrt[x]*Log[(1 + a + b*x)/(a + b*x)] - c*Log[c + d*Sqrt[x]]*Log[(1
 + a + b*x)/(a + b*x)] + c*PolyLog[2, (Sqrt[b]*(c + d*Sqrt[x]))/(Sqrt[b]*c
- Sqrt[-1 - a]*d)] + c*PolyLog[2, (Sqrt[b]*(c + d*Sqrt[x]))/(Sqrt[b]*c + Sq
rt[-1 - a]*d)] - c*PolyLog[2, (Sqrt[b]*(c + d*Sqrt[x]))/(Sqrt[b]*c - Sqrt[1
 - a]*d)] - c*PolyLog[2, (Sqrt[b]*(c + d*Sqrt[x]))/(Sqrt[b]*c + Sqrt[1 - a]
*d)])/d^2
```

**fricas [F]** time = 0.47, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{d\sqrt{x}\,\text{arcoth}\,(bx+a)-c\,\text{arcoth}\,(bx+a)}{d^2x-c^2},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(b*x+a)/(c+d*x^(1/2)),x, algorithm="fricas")
```

```
[Out] integral((d*sqrt(x)*arccoth(b*x + a) - c*arccoth(b*x + a))/(d^2*x - c^2), x
)
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\text{arcoth}\,(bx+a)}{d\sqrt{x}+c}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(b*x+a)/(c+d*x^(1/2)),x, algorithm="giac")
```

```
[Out] integrate(arccoth(b*x + a)/(d*sqrt(x) + c), x)
```

**maple [A]** time = 0.13, size = 738, normalized size = 1.19

$$\frac{2\,\text{arccoth}\,(bx+a)\sqrt{x}}{d}-\frac{2\,\text{arccoth}\,(bx+a)\,c\ln\left(c+d\sqrt{x}\right)}{d^2}+\frac{2\arctan\left(\frac{2b\left(c+d\sqrt{x}\right)-2bc}{2\sqrt{a\,d^2b+b\,d^2}}\right)}{\sqrt{a\,d^2b+b\,d^2}}+\frac{2\arctan\left(\frac{2b\left(c+d\sqrt{x}\right)-2bc}{2\sqrt{a\,d^2b+b\,d^2}}\right)a}{\sqrt{a\,d^2b+b\,d^2}}+$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(arccoth(b*x+a)/(c+d*x^(1/2)),x)
```

```
[Out] 2*arccoth(b*x+a)*x^(1/2)/d-2*arccoth(b*x+a)*c/d^2*ln(c+d*x^(1/2))+2/(a*b*d^
2+b*d^2)^(1/2)*arctan(1/2*(2*b*(c+d*x^(1/2))-2*b*c)/(a*b*d^2+b*d^2)^(1/2))+
2/(a*b*d^2+b*d^2)^(1/2)*arctan(1/2*(2*b*(c+d*x^(1/2))-2*b*c)/(a*b*d^2+b*d^2
)^(1/2))*a+2/(a*b*d^2-b*d^2)^(1/2)*arctan(1/2*(2*b*(c+d*x^(1/2))-2*b*c)/(a*
b*d^2-b*d^2)^(1/2))-2/(a*b*d^2-b*d^2)^(1/2)*arctan(1/2*(2*b*(c+d*x^(1/2))-2
*b*c)/(a*b*d^2-b*d^2)^(1/2))*a+1/d^2*c*ln(c+d*x^(1/2))*ln((-b*(c+d*x^(1/2))
+b*c+(-a*b*d^2-b*d^2)^(1/2))/(b*c+(-a*b*d^2-b*d^2)^(1/2)))+1/d^2*c*ln(c+d*x
^(1/2))*ln((b*(c+d*x^(1/2))-b*c+(-a*b*d^2-b*d^2)^(1/2))/(-b*c+(-a*b*d^2-b*d
^2)^(1/2)))+1/d^2*c*dilog((-b*(c+d*x^(1/2))+b*c+(-a*b*d^2-b*d^2)^(1/2))/(b*
c+(-a*b*d^2-b*d^2)^(1/2)))+1/d^2*c*dilog((b*(c+d*x^(1/2))-b*c+(-a*b*d^2-b*d
^2)^(1/2))/(-b*c+(-a*b*d^2-b*d^2)^(1/2)))-1/d^2*c*ln(c+d*x^(1/2))*ln((-b*(c
+d*x^(1/2))+b*c+(-a*b*d^2+b*d^2)^(1/2))/(b*c+(-a*b*d^2+b*d^2)^(1/2)))-1/d^2
```

```
*c*ln(c+d*x^(1/2))*ln((b*(c+d*x^(1/2))-b*c+(-a*b*d^2+b*d^2)^(1/2))/(-b*c+(-
a*b*d^2+b*d^2)^(1/2)))-1/d^2*c*dilog((-b*(c+d*x^(1/2))+b*c+(-a*b*d^2+b*d^2)
^(1/2))/(b*c+(-a*b*d^2+b*d^2)^(1/2)))-1/d^2*c*dilog((b*(c+d*x^(1/2))-b*c+(-
a*b*d^2+b*d^2)^(1/2))/(-b*c+(-a*b*d^2+b*d^2)^(1/2)))
```

**maxima [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{arcoth}(bx+a)}{d\sqrt{x}+c}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(b*x+a)/(c+d*x^(1/2)),x, algorithm="maxima")
[Out] integrate(arccoth(b*x + a)/(d*sqrt(x) + c), x)
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.00

$$\int \frac{\operatorname{acoth}(a+b\,x)}{c+d\,\sqrt{x}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(a + b*x)/(c + d*x^(1/2)),x)
[Out] int(acoth(a + b*x)/(c + d*x^(1/2)), x)
```

**sympy [F(-1)]** time = 0.00, size = 0, normalized size = 0.00

Timed out

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(b*x+a)/(c+d*x**(1/2)),x)
[Out] Timed out
```

# 3.81 $\int \frac{\coth^{-1}(a+bx)}{c+\frac{d}{\sqrt{x}}}\,dx$

**Optimal**. Leaf size=738

$$-\frac{d^2\text{Li}_2\left(-\frac{\sqrt{b}\left(\sqrt{x}c+d\right)}{\sqrt{-a-1}c-\sqrt{b}d}\right)}{c^3}+\frac{d^2\text{Li}_2\left(-\frac{\sqrt{b}\left(\sqrt{x}c+d\right)}{\sqrt{1-a}c-\sqrt{b}d}\right)}{c^3}-\frac{d^2\text{Li}_2\left(\frac{\sqrt{b}\left(\sqrt{x}c+d\right)}{\sqrt{-a-1}c+\sqrt{b}d}\right)}{c^3}+\frac{d^2\text{Li}_2\left(\frac{\sqrt{b}\left(\sqrt{x}c+d\right)}{\sqrt{1-a}c+\sqrt{b}d}\right)}{c^3}-\frac{d^2\log\left(c\sqrt{x}+d\right)\log\left(\right.}{c^3}$$

```
[Out] 1/2*(1-a)*ln(-b*x-a+1)/b/c-1/2*x*ln((b*x+a-1)/(b*x+a))/c+1/2*(1+a)*ln(b*x+a
+1)/b/c+1/2*x*ln((b*x+a+1)/(b*x+a))/c-d^2*ln((b*x+a-1)/(b*x+a))*ln(d+c*x^(1
/2))/c^3+d^2*ln((b*x+a+1)/(b*x+a))*ln(d+c*x^(1/2))/c^3-d^2*ln(d+c*x^(1/2))*
ln(c*((-1-a)^(1/2)-b^(1/2)*x^(1/2))/(c*(-1-a)^(1/2)+d*b^(1/2)))/c^3+d^2*ln(
d+c*x^(1/2))*ln(c*((1-a)^(1/2)-b^(1/2)*x^(1/2))/(c*(1-a)^(1/2)+d*b^(1/2)))/
c^3-d^2*ln(d+c*x^(1/2))*ln(c*((-1-a)^(1/2)+b^(1/2)*x^(1/2))/(c*(-1-a)^(1/2)
-d*b^(1/2)))/c^3+d^2*ln(d+c*x^(1/2))*ln(c*((1-a)^(1/2)+b^(1/2)*x^(1/2))/(c*
(1-a)^(1/2)-d*b^(1/2)))/c^3-d^2*polylog(2,-b^(1/2)*(d+c*x^(1/2))/(c*(-1-a)^
(1/2)-d*b^(1/2)))/c^3+d^2*polylog(2,-b^(1/2)*(d+c*x^(1/2))/(c*(1-a)^(1/2)-d
*b^(1/2)))/c^3-d^2*polylog(2,b^(1/2)*(d+c*x^(1/2))/(c*(-1-a)^(1/2)+d*b^(1/2
)))/c^3+d^2*polylog(2,b^(1/2)*(d+c*x^(1/2))/(c*(1-a)^(1/2)+d*b^(1/2)))/c^3+
2*d*arctanh(b^(1/2)*x^(1/2)/(1-a)^(1/2))*(1-a)^(1/2)/c^2/b^(1/2)-2*d*arctan
(b^(1/2)*x^(1/2)/(1+a)^(1/2))*(1+a)^(1/2)/c^2/b^(1/2)+d*ln((b*x+a-1)/(b*x+a
))*x^(1/2)/c^2-d*ln((b*x+a+1)/(b*x+a))*x^(1/2)/c^2
```

**Rubi [A]** time = 2.37, antiderivative size = 738, normalized size of antiderivative = 1.00, number of steps used = 65, number of rules used = 19, integrand size = 18, $\frac{\text{number of rules}}{\text{integrand size}}$ = 1.056, Rules used = {6116, 190, 44, 2528, 2523, 12, 481, 205, 2525, 446, 72, 2524, 2418, 260, 2416, 2394, 2393, 2391, 208}

$$-\frac{d^2\text{PolyLog}\left(2,-\frac{\sqrt{b}\left(c\sqrt{x}+d\right)}{\sqrt{-a-1}c-\sqrt{b}d}\right)}{c^3}+\frac{d^2\text{PolyLog}\left(2,-\frac{\sqrt{b}\left(c\sqrt{x}+d\right)}{\sqrt{1-a}c-\sqrt{b}d}\right)}{c^3}-\frac{d^2\text{PolyLog}\left(2,\frac{\sqrt{b}\left(c\sqrt{x}+d\right)}{\sqrt{-a-1}c+\sqrt{b}d}\right)}{c^3}+\frac{d^2\text{PolyLog}\left(2,\frac{\sqrt{b}(}{\sqrt{1-}}\right.}{c^3}$$

Antiderivative was successfully verified.

```
[In] Int[ArcCoth[a + b*x]/(c + d/Sqrt[x]),x]
```

```
[Out] (-2*Sqrt[1 + a]*d*ArcTan[(Sqrt[b]*Sqrt[x])/Sqrt[1 + a]])/(Sqrt[b]*c^2) + (2
*Sqrt[1 - a]*d*ArcTanh[(Sqrt[b]*Sqrt[x])/Sqrt[1 - a]])/(Sqrt[b]*c^2) - (d^2
*Log[(c*(Sqrt[-1 - a] - Sqrt[b]*Sqrt[x]))/(Sqrt[-1 - a]*c + Sqrt[b]*d)]*Log
[d + c*Sqrt[x]])/c^3 + (d^2*Log[(c*(Sqrt[1 - a] - Sqrt[b]*Sqrt[x]))/(Sqrt[1
 - a]*c + Sqrt[b]*d)]*Log[d + c*Sqrt[x]])/c^3 - (d^2*Log[(c*(Sqrt[-1 - a] +
 Sqrt[b]*Sqrt[x]))/(Sqrt[-1 - a]*c - Sqrt[b]*d)]*Log[d + c*Sqrt[x]])/c^3 +
(d^2*Log[(c*(Sqrt[1 - a] + Sqrt[b]*Sqrt[x]))/(Sqrt[1 - a]*c - Sqrt[b]*d)]*L
og[d + c*Sqrt[x]])/c^3 + ((1 - a)*Log[1 - a - b*x])/(2*b*c) + (d*Sqrt[x]*Lo
g[-((1 - a - b*x)/(a + b*x))])/c^2 - (x*Log[-((1 - a - b*x)/(a + b*x))])/(2
*c) - (d^2*Log[d + c*Sqrt[x]]*Log[-((1 - a - b*x)/(a + b*x))])/c^3 + ((1 +
a)*Log[1 + a + b*x])/(2*b*c) - (d*Sqrt[x]*Log[(1 + a + b*x)/(a + b*x)])/c^2
 + (x*Log[(1 + a + b*x)/(a + b*x)])/(2*c) + (d^2*Log[d + c*Sqrt[x]]*Log[(1
+ a + b*x)/(a + b*x)])/c^3 - (d^2*PolyLog[2, -((Sqrt[b]*(d + c*Sqrt[x]))/(S
qrt[-1 - a]*c - Sqrt[b]*d))])/c^3 + (d^2*PolyLog[2, -((Sqrt[b]*(d + c*Sqrt[
x]))/(Sqrt[1 - a]*c - Sqrt[b]*d))])/c^3 - (d^2*PolyLog[2, (Sqrt[b]*(d + c*S
qrt[x]))/(Sqrt[-1 - a]*c + Sqrt[b]*d)])/c^3 + (d^2*PolyLog[2, (Sqrt[b]*(d +
 c*Sqrt[x]))/(Sqrt[1 - a]*c + Sqrt[b]*d)])/c^3
```

Rule 12

```
Int[(a_)*(u_), x_Symbol] :> Dist[a, Int[u, x], x] /; FreeQ[a, x] &&  !Match
Q[u, (b_)*(v_) /; FreeQ[b, x]]
```

Rule 44

```
Int[((a_) + (b_.)*(x_))^(m_.)*((c_.) + (d_.)*(x_))^(n_.), x_Symbol] :> Int[
ExpandIntegrand[(a + b*x)^m*(c + d*x)^n, x], x] /; FreeQ[{a, b, c, d}, x] &
& NeQ[b*c - a*d, 0] && ILtQ[m, 0] && IntegerQ[n] &&  !(IGtQ[n, 0] && LtQ[m
+ n + 2, 0])
```

Rule 72

```
Int[((e_.) + (f_.)*(x_))^(p_.)/(((a_.) + (b_.)*(x_))*((c_.) + (d_.)*(x_))),
 x_Symbol] :> Int[ExpandIntegrand[(e + f*x)^p/((a + b*x)*(c + d*x)), x], x]
 /; FreeQ[{a, b, c, d, e, f}, x] && IntegerQ[p]
```

Rule 190

```
Int[((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Dist[1/n, Subst[Int[x^(1/n
- 1)*(a + b*x)^p, x], x, x^n], x] /; FreeQ[{a, b, p}, x] && FractionQ[n] &&
 IntegerQ[1/n]
```

Rule 205

```
Int[((a_) + (b_.)*(x_)^2)^(-1), x_Symbol] :> Simp[(Rt[a/b, 2]*ArcTan[x/Rt[a
/b, 2]])/a, x] /; FreeQ[{a, b}, x] && PosQ[a/b]
```

Rule 208

```
Int[((a_) + (b_.)*(x_)^2)^(-1), x_Symbol] :> Simp[(Rt[-(a/b), 2]*ArcTanh[x/
Rt[-(a/b), 2]])/a, x] /; FreeQ[{a, b}, x] && NegQ[a/b]
```

Rule 260

```
Int[(x_)^(m_.)/((a_) + (b_.)*(x_)^(n_)), x_Symbol] :> Simp[Log[RemoveConten
t[a + b*x^n, x]]/(b*n), x] /; FreeQ[{a, b, m, n}, x] && EqQ[m, n - 1]
```

Rule 446

```
Int[(x_)^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_.)*((c_) + (d_.)*(x_)^(n_))^(q_.
), x_Symbol] :> Dist[1/n, Subst[Int[x^(Simplify[(m + 1)/n] - 1)*(a + b*x)^p
*(c + d*x)^q, x], x, x^n], x] /; FreeQ[{a, b, c, d, m, n, p, q}, x] && NeQ[
b*c - a*d, 0] && IntegerQ[Simplify[(m + 1)/n]]
```

Rule 481

```
Int[((e_.)*(x_))^(m_.)/(((a_) + (b_.)*(x_)^(n_))*((c_) + (d_.)*(x_)^(n_))),
 x_Symbol] :> -Dist[(a*e^n)/(b*c - a*d), Int[(e*x)^(m - n)/(a + b*x^n), x],
 x] + Dist[(c*e^n)/(b*c - a*d), Int[(e*x)^(m - n)/(c + d*x^n), x], x] /; Fr
eeQ[{a, b, c, d, e, m}, x] && NeQ[b*c - a*d, 0] && IGtQ[n, 0] && LeQ[n, m,
2*n - 1]
```

Rule 2391

```
Int[Log[(c_.)*((d_) + (e_.)*(x_)^(n_.))]/(x_), x_Symbol] :> -Simp[PolyLog[2
, -(c*e*x^n)]/n, x] /; FreeQ[{c, d, e, n}, x] && EqQ[c*d, 1]
```

Rule 2393

```
Int[((a_.) + Log[(c_.)*((d_) + (e_.)*(x_))]*(b_.))/((f_.) + (g_.)*(x_)), x_
Symbol] :> Dist[1/g, Subst[Int[(a + b*Log[1 + (c*e*x)/g])/x, x], x, f + g*x
], x] /; FreeQ[{a, b, c, d, e, f, g}, x] && NeQ[e*f - d*g, 0] && EqQ[g + c*
```

```
(e*f - d*g), 0]
```

Rule 2394

```
Int[((a_.) + Log[(c_.)*((d_) + (e_.)*(x_))^(n_.)]*(b_.))/((f_.) + (g_.)*(x_
)), x_Symbol] :> Simp[(Log[(e*(f + g*x))/(e*f - d*g)]*(a + b*Log[c*(d + e*x
)^n]))/g, x] - Dist[(b*e*n)/g, Int[Log[(e*(f + g*x))/(e*f - d*g)]/(d + e*x)
, x], x] /; FreeQ[{a, b, c, d, e, f, g, n}, x] && NeQ[e*f - d*g, 0]
```

Rule 2416

```
Int[((a_.) + Log[(c_.)*((d_) + (e_.)*(x_))^(n_.)]*(b_.))^(p_.)*((h_.)*(x_))
^(m_.)*((f_) + (g_.)*(x_)^(r_.))^(q_.), x_Symbol] :> Int[ExpandIntegrand[(a
 + b*Log[c*(d + e*x)^n])^p, (h*x)^m*(f + g*x^r)^q, x], x] /; FreeQ[{a, b, c
, d, e, f, g, h, m, n, p, q, r}, x] && IntegerQ[m] && IntegerQ[q]
```

Rule 2418

```
Int[((a_.) + Log[(c_.)*((d_) + (e_.)*(x_))^(n_.)]*(b_.))^(p_.)*(RFx_), x_Sy
mbol] :> With[{u = ExpandIntegrand[(a + b*Log[c*(d + e*x)^n])^p, RFx, x]},
Int[u, x] /; SumQ[u]] /; FreeQ[{a, b, c, d, e, n}, x] && RationalFunctionQ[
RFx, x] && IntegerQ[p]
```

Rule 2523

```
Int[((a_.) + Log[(c_.)*(RFx_)^(p_.)]*(b_.))^(n_.), x_Symbol] :> Simp[x*(a +
 b*Log[c*RFx^p])^n, x] - Dist[b*n*p, Int[SimplifyIntegrand[(x*(a + b*Log[c*
RFx^p])^(n - 1)*D[RFx, x])/RFx, x], x], x] /; FreeQ[{a, b, c, p}, x] && Rat
ionalFunctionQ[RFx, x] && IGtQ[n, 0]
```

Rule 2524

```
Int[((a_.) + Log[(c_.)*(RFx_)^(p_.)]*(b_.))^(n_.)/((d_.) + (e_.)*(x_)), x_S
ymbol] :> Simp[(Log[d + e*x]*(a + b*Log[c*RFx^p])^n)/e, x] - Dist[(b*n*p)/e
, Int[(Log[d + e*x]*(a + b*Log[c*RFx^p])^(n - 1)*D[RFx, x])/RFx, x], x] /;
FreeQ[{a, b, c, d, e, p}, x] && RationalFunctionQ[RFx, x] && IGtQ[n, 0]
```

Rule 2525

```
Int[((a_.) + Log[(c_.)*(RFx_)^(p_.)]*(b_.))^(n_.)*((d_.) + (e_.)*(x_))^(m_.
), x_Symbol] :> Simp[((d + e*x)^(m + 1)*(a + b*Log[c*RFx^p])^n)/(e*(m + 1))
, x] - Dist[(b*n*p)/(e*(m + 1)), Int[SimplifyIntegrand[((d + e*x)^(m + 1)*(
a + b*Log[c*RFx^p])^(n - 1)*D[RFx, x])/RFx, x], x], x] /; FreeQ[{a, b, c, d
, e, m, p}, x] && RationalFunctionQ[RFx, x] && IGtQ[n, 0] && (EqQ[n, 1] ||
IntegerQ[m]) && NeQ[m, -1]
```

Rule 2528

```
Int[((a_.) + Log[(c_.)*(RFx_)^(p_.)]*(b_.))^(n_.)*(RGx_), x_Symbol] :> With
[{u = ExpandIntegrand[(a + b*Log[c*RFx^p])^n, RGx, x]}, Int[u, x] /; SumQ[u
]] /; FreeQ[{a, b, c, p}, x] && RationalFunctionQ[RFx, x] && RationalFuncti
onQ[RGx, x] && IGtQ[n, 0]
```

Rule 6116

```
Int[ArcCoth[(c_) + (d_.)*(x_)]/((e_) + (f_.)*(x_)^(n_.)), x_Symbol] :> Dist
[1/2, Int[Log[(1 + c + d*x)/(c + d*x)]/(e + f*x^n), x], x] - Dist[1/2, Int[
Log[(-1 + c + d*x)/(c + d*x)]/(e + f*x^n), x], x] /; FreeQ[{c, d, e, f}, x]
```

```
&& RationalQ[n]
```

Rubi steps

$$\int \frac{\coth^{-1}(a+bx)}{c+\frac{d}{\sqrt{x}}}\,dx = -\left(\frac{1}{2}\int \frac{\log\left(\frac{-1+a+bx}{a+bx}\right)}{c+\frac{d}{\sqrt{x}}}\,dx\right)+\frac{1}{2}\int \frac{\log\left(\frac{1+a+bx}{a+bx}\right)}{c+\frac{d}{\sqrt{x}}}\,dx$$

$$= -\text{Subst}\left(\int \frac{x^2\log\left(\frac{-1+a+bx^2}{a+bx^2}\right)}{d+cx}\,dx, x, \sqrt{x}\right)+\text{Subst}\left(\int \frac{x^2\log\left(\frac{1+a+bx^2}{a+bx^2}\right)}{d+cx}\,dx, x, \sqrt{x}\right)$$

$$= -\text{Subst}\left(\int \left(-\frac{d\log\left(\frac{-1+a+bx^2}{a+bx^2}\right)}{c^2}+\frac{x\log\left(\frac{-1+a+bx^2}{a+bx^2}\right)}{c}+\frac{d^2\log\left(\frac{-1+a+bx^2}{a+bx^2}\right)}{c^2(d+cx)}\right)dx, x, \sqrt{x}\right)+$$

$$= -\frac{\text{Subst}\left(\int x\log\left(\frac{-1+a+bx^2}{a+bx^2}\right)dx, x, \sqrt{x}\right)}{c}+\frac{\text{Subst}\left(\int x\log\left(\frac{1+a+bx^2}{a+bx^2}\right)dx, x, \sqrt{x}\right)}{c}+\frac{d\,\text{Su}}{}$$

$$= \frac{d\sqrt{x}\,\log\left(-\frac{1-a-bx}{a+bx}\right)}{c^2}-\frac{x\log\left(-\frac{1-a-bx}{a+bx}\right)}{2c}-\frac{d^2\log\left(d+c\sqrt{x}\right)\log\left(-\frac{1-a-bx}{a+bx}\right)}{c^3}-\frac{d\sqrt{x}\,\log\left(\right.}{c^2}$$

$$= \frac{d\sqrt{x}\,\log\left(-\frac{1-a-bx}{a+bx}\right)}{c^2}-\frac{x\log\left(-\frac{1-a-bx}{a+bx}\right)}{2c}-\frac{d^2\log\left(d+c\sqrt{x}\right)\log\left(-\frac{1-a-bx}{a+bx}\right)}{c^3}-\frac{d\sqrt{x}\,\log\left(\right.}{c^2}$$

$$= \frac{d\sqrt{x}\,\log\left(-\frac{1-a-bx}{a+bx}\right)}{c^2}-\frac{x\log\left(-\frac{1-a-bx}{a+bx}\right)}{2c}-\frac{d^2\log\left(d+c\sqrt{x}\right)\log\left(-\frac{1-a-bx}{a+bx}\right)}{c^3}-\frac{d\sqrt{x}\,\log\left(\right.}{c^2}$$

$$= -\frac{2\sqrt{1+a}\,d\tan^{-1}\left(\frac{\sqrt{b}\sqrt{x}}{\sqrt{1+a}}\right)}{\sqrt{b}\,c^2}+\frac{2\sqrt{1-a}\,d\tanh^{-1}\left(\frac{\sqrt{b}\sqrt{x}}{\sqrt{1-a}}\right)}{\sqrt{b}\,c^2}+\frac{d\sqrt{x}\,\log\left(-\frac{1-a-bx}{a+bx}\right)}{c^2}-\frac{x\log}{}$$

$$= -\frac{2\sqrt{1+a}\,d\tan^{-1}\left(\frac{\sqrt{b}\sqrt{x}}{\sqrt{1+a}}\right)}{\sqrt{b}\,c^2}+\frac{2\sqrt{1-a}\,d\tanh^{-1}\left(\frac{\sqrt{b}\sqrt{x}}{\sqrt{1-a}}\right)}{\sqrt{b}\,c^2}+\frac{(1-a)\log(1-a-bx)}{2bc}+\frac{d}{}$$

$$= -\frac{2\sqrt{1+a}\,d\tan^{-1}\left(\frac{\sqrt{b}\sqrt{x}}{\sqrt{1+a}}\right)}{\sqrt{b}\,c^2}+\frac{2\sqrt{1-a}\,d\tanh^{-1}\left(\frac{\sqrt{b}\sqrt{x}}{\sqrt{1-a}}\right)}{\sqrt{b}\,c^2}-\frac{d^2\log\left(\frac{c\left(\sqrt{-1-a}-\sqrt{b}\sqrt{x}\right)}{\sqrt{-1-a}\,c+\sqrt{b}\,d}\right)\log}{c^3}$$

$$= -\frac{2\sqrt{1+a}\,d\tan^{-1}\left(\frac{\sqrt{b}\sqrt{x}}{\sqrt{1+a}}\right)}{\sqrt{b}\,c^2}+\frac{2\sqrt{1-a}\,d\tanh^{-1}\left(\frac{\sqrt{b}\sqrt{x}}{\sqrt{1-a}}\right)}{\sqrt{b}\,c^2}-\frac{d^2\log\left(\frac{c\left(\sqrt{-1-a}-\sqrt{b}\sqrt{x}\right)}{\sqrt{-1-a}\,c+\sqrt{b}\,d}\right)\log}{c^3}$$

$$= -\frac{2\sqrt{1+a}\,d\tan^{-1}\left(\frac{\sqrt{b}\sqrt{x}}{\sqrt{1+a}}\right)}{\sqrt{b}\,c^2}+\frac{2\sqrt{1-a}\,d\tanh^{-1}\left(\frac{\sqrt{b}\sqrt{x}}{\sqrt{1-a}}\right)}{\sqrt{b}\,c^2}-\frac{d^2\log\left(\frac{c\left(\sqrt{-1-a}-\sqrt{b}\sqrt{x}\right)}{\sqrt{-1-a}\,c+\sqrt{b}\,d}\right)\log}{c^3}$$

**Mathematica [A]** time = 0.74, size = 719, normalized size = 0.97

$$-ac^2\log(-a-bx+1)+c^2\log(-a-bx+1)-bc^2x\log\left(\frac{a+bx-1}{a+bx}\right)+ac^2\log(a+bx+1)+c^2\log(a+bx+1)+b$$

Antiderivative was successfully verified.

```
[In] Integrate[ArcCoth[a + b*x]/(c + d/Sqrt[x]),x]
```

```
[Out] (-4*Sqrt[1 + a]*Sqrt[b]*c*d*ArcTan[(Sqrt[b]*Sqrt[x])/Sqrt[1 + a]] + 4*Sqrt[
1 - a]*Sqrt[b]*c*d*ArcTanh[(Sqrt[b]*Sqrt[x])/Sqrt[1 - a]] - 2*b*d^2*Log[(c*
(Sqrt[-1 - a] - Sqrt[b]*Sqrt[x]))/(Sqrt[-1 - a]*c + Sqrt[b]*d)]*Log[d + c*S
qrt[x]] + 2*b*d^2*Log[(c*(Sqrt[1 - a] - Sqrt[b]*Sqrt[x]))/(Sqrt[1 - a]*c +
Sqrt[b]*d)]*Log[d + c*Sqrt[x]] - 2*b*d^2*Log[(c*(Sqrt[-1 - a] + Sqrt[b]*Sqr
t[x]))/(Sqrt[-1 - a]*c - Sqrt[b]*d)]*Log[d + c*Sqrt[x]] + 2*b*d^2*Log[(c*(S
qrt[1 - a] + Sqrt[b]*Sqrt[x]))/(Sqrt[1 - a]*c - Sqrt[b]*d)]*Log[d + c*Sqrt[
x]] + c^2*Log[1 - a - b*x] - a*c^2*Log[1 - a - b*x] + 2*b*c*d*Sqrt[x]*Log[(
-1 + a + b*x)/(a + b*x)] - b*c^2*x*Log[(-1 + a + b*x)/(a + b*x)] - 2*b*d^2*
Log[d + c*Sqrt[x]]*Log[(-1 + a + b*x)/(a + b*x)] + c^2*Log[1 + a + b*x] + a
*c^2*Log[1 + a + b*x] - 2*b*c*d*Sqrt[x]*Log[(1 + a + b*x)/(a + b*x)] + b*c^
2*x*Log[(1 + a + b*x)/(a + b*x)] + 2*b*d^2*Log[d + c*Sqrt[x]]*Log[(1 + a +
b*x)/(a + b*x)] - 2*b*d^2*PolyLog[2, (Sqrt[b]*(d + c*Sqrt[x]))/(-(Sqrt[-1 -
 a]*c) + Sqrt[b]*d)] - 2*b*d^2*PolyLog[2, (Sqrt[b]*(d + c*Sqrt[x]))/(Sqrt[-
1 - a]*c + Sqrt[b]*d)] + 2*b*d^2*PolyLog[2, (Sqrt[b]*(d + c*Sqrt[x]))/(-(Sq
rt[1 - a]*c) + Sqrt[b]*d)] + 2*b*d^2*PolyLog[2, (Sqrt[b]*(d + c*Sqrt[x]))/(
Sqrt[1 - a]*c + Sqrt[b]*d)])/(2*b*c^3)
```

**fricas [F]** time = 0.65, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{cx \operatorname{arcoth}(bx+a) - d\sqrt{x}\operatorname{arcoth}(bx+a)}{c^2x - d^2}, x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(b*x+a)/(c+d/x^(1/2)),x, algorithm="fricas")
```

```
[Out] integral((c*x*arccoth(b*x + a) - d*sqrt(x)*arccoth(b*x + a))/(c^2*x - d^2),
 x)
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{arcoth}(bx+a)}{c + \frac{d}{\sqrt{x}}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(b*x+a)/(c+d/x^(1/2)),x, algorithm="giac")
```

```
[Out] integrate(arccoth(b*x + a)/(c + d/sqrt(x)), x)
```

**maple [A]** time = 0.12, size = 970, normalized size = 1.31

$$\frac{\operatorname{arccoth}(bx+a)\,x}{c} - \frac{2\operatorname{arccoth}(bx+a)\,d\sqrt{x}}{c^2} + \frac{2\operatorname{arccoth}(bx+a)\,d^2\ln\left(d+c\sqrt{x}\right)}{c^3} - \frac{d^2\ln\left(d+c\sqrt{x}\right)\ln\left(\frac{-b\left(d+c\sqrt{x}\right)+}{bd+\sqrt{\cdot}}\right.}{c^3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(arccoth(b*x+a)/(c+d/x^(1/2)),x)
```

```
[Out] arccoth(b*x+a)/c*x-2*arccoth(b*x+a)/c^2*d*x^(1/2)+2*arccoth(b*x+a)*d^2/c^3*
ln(d+c*x^(1/2))-1/c^3*d^2*ln(d+c*x^(1/2))*ln((-b*(d+c*x^(1/2))+b*d+(-a*b*c^
2-b*c^2)^(1/2))/(b*d+(-a*b*c^2-b*c^2)^(1/2)))-1/c^3*d^2*ln(d+c*x^(1/2))*ln(
(b*(d+c*x^(1/2))-b*d+(-a*b*c^2-b*c^2)^(1/2))/(-b*d+(-a*b*c^2-b*c^2)^(1/2)))
-1/c^3*d^2*dilog((-b*(d+c*x^(1/2))+b*d+(-a*b*c^2-b*c^2)^(1/2))/(b*d+(-a*b*c
^2-b*c^2)^(1/2)))-1/c^3*d^2*dilog((b*(d+c*x^(1/2))-b*d+(-a*b*c^2-b*c^2)^(1/
```

```
2))/(-b*d+(-a*b*c^2-b*c^2)^(1/2)))+1/c^3*d^2*ln(d+c*x^(1/2))*ln((-b*(d+c*x^
(1/2))+b*d+(-a*b*c^2+b*c^2)^(1/2))/(b*d+(-a*b*c^2+b*c^2)^(1/2)))+1/c^3*d^2*
ln(d+c*x^(1/2))*ln((b*(d+c*x^(1/2))-b*d+(-a*b*c^2+b*c^2)^(1/2))/(-b*d+(-a*b
*c^2+b*c^2)^(1/2)))+1/c^3*d^2*dilog((-b*(d+c*x^(1/2))+b*d+(-a*b*c^2+b*c^2)^
(1/2))/(b*d+(-a*b*c^2+b*c^2)^(1/2)))+1/c^3*d^2*dilog((b*(d+c*x^(1/2))-b*d+(
-a*b*c^2+b*c^2)^(1/2))/(-b*d+(-a*b*c^2+b*c^2)^(1/2)))+1/2/b/c*ln(b*(d+c*x^(
1/2))^2-2*(d+c*x^(1/2))*b*d+a*c^2+b*d^2+c^2)-2/c*d/(a*b*c^2+b*c^2)^(1/2)*ar
ctan(1/2*(2*b*(d+c*x^(1/2))-2*b*d)/(a*b*c^2+b*c^2)^(1/2))+1/2/b/c*a*ln(b*(d
+c*x^(1/2))^2-2*(d+c*x^(1/2))*b*d+a*c^2+b*d^2+c^2)-2/c*a*d/(a*b*c^2+b*c^2)^
(1/2)*arctan(1/2*(2*b*(d+c*x^(1/2))-2*b*d)/(a*b*c^2+b*c^2)^(1/2))-1/2/b/c*a
*ln(b*(d+c*x^(1/2))^2-2*(d+c*x^(1/2))*b*d+a*c^2+b*d^2-c^2)+2/c*a*d/(a*b*c^2
-b*c^2)^(1/2)*arctan(1/2*(2*b*(d+c*x^(1/2))-2*b*d)/(a*b*c^2-b*c^2)^(1/2))+1
/2/b/c*ln(b*(d+c*x^(1/2))^2-2*(d+c*x^(1/2))*b*d+a*c^2+b*d^2-c^2)-2/c*d/(a*b
*c^2-b*c^2)^(1/2)*arctan(1/2*(2*b*(d+c*x^(1/2))-2*b*d)/(a*b*c^2-b*c^2)^(1/2
))
```

**maxima [F]** time = 0.00, size = 0, normalized size = 0.00

$$\frac{(bx+a+1)\log(bx+a+1)-(bx+a-1)\log(bx+a-1)}{2\,bc}-\frac{1}{2}\int\frac{d\log(bx+a+1)-d\log(bx+a-1)}{c^2\sqrt{x}+cd}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(b*x+a)/(c+d/x^(1/2)),x, algorithm="maxima")
```

```
[Out] 1/2*((b*x + a + 1)*log(b*x + a + 1) - (b*x + a - 1)*log(b*x + a - 1))/(b*c)
 - 1/2*integrate((d*log(b*x + a + 1) - d*log(b*x + a - 1))/(c^2*sqrt(x) + c
*d), x)
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.00

$$\int\frac{\mathrm{acoth}\left(a+b\,x\right)}{c+\frac{d}{\sqrt{x}}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(a + b*x)/(c + d/x^(1/2)),x)
```

```
[Out] int(acoth(a + b*x)/(c + d/x^(1/2)), x)
```

**sympy [F(-1)]** time = 0.00, size = 0, normalized size = 0.00

Timed out

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(b*x+a)/(c+d/x**(1/2)),x)
```

```
[Out] Timed out
```

## 3.82 $\int \frac{\coth^{-1}(d+ex)}{a+bx+cx^2}\,dx$

**Optimal**. Leaf size=335

$$-\frac{\mathrm{Li}_2\left(\frac{2\left(2cd-\left(b-\sqrt{b^2-4ac}\right)e-2c(d+ex)\right)}{\left(-2dc+2c+be-\sqrt{b^2-4ac}\,e\right)(d+ex+1)}+1\right)}{2\sqrt{b^2-4ac}}+\frac{\mathrm{Li}_2\left(\frac{2\left(2cd-\left(b+\sqrt{b^2-4ac}\right)e-2c(d+ex)\right)}{\left(2c(1-d)+\left(b+\sqrt{b^2-4ac}\right)e\right)(d+ex+1)}+1\right)}{2\sqrt{b^2-4ac}}+\frac{\coth^{-1}(d+ex)\log\left(\frac{2e\left(-\sqrt{b^2-\cdots}\right.}{(d+ex+1)\left(e\left(b-\cdots\right.\right.}\right.}{\sqrt{b^2-4ac}}$$

```
[Out] arccoth(e*x+d)*ln(2*e*(b+2*c*x-(-4*a*c+b^2)^(1/2))/(e*x+d+1)/(2*c*(1-d)+e*(
b-(-4*a*c+b^2)^(1/2))))/(-4*a*c+b^2)^(1/2)-arccoth(e*x+d)*ln(2*e*(b+2*c*x+(
-4*a*c+b^2)^(1/2))/(e*x+d+1)/(2*c*(1-d)+e*(b+(-4*a*c+b^2)^(1/2))))/(-4*a*c+
b^2)^(1/2)-1/2*polylog(2,1+2*(2*c*d-2*c*(e*x+d)-e*(b-(-4*a*c+b^2)^(1/2)))/(
e*x+d+1)/(2*c-2*c*d+b*e-e*(-4*a*c+b^2)^(1/2)))/(-4*a*c+b^2)^(1/2)+1/2*polyl
og(2,1+2*(2*c*d-2*c*(e*x+d)-e*(b+(-4*a*c+b^2)^(1/2)))/(e*x+d+1)/(2*c*(1-d)+
e*(b+(-4*a*c+b^2)^(1/2))))/(-4*a*c+b^2)^(1/2)
```

**Rubi [A]** time = 0.75, antiderivative size = 335, normalized size of antiderivative = 1.00, number of steps used = 12, number of rules used = 8, integrand size = 19, $\frac{\text{number of rules}}{\text{integrand size}} = 0.421$, Rules used = {618, 206, 6728, 6112, 5921, 2402, 2315, 2447}

$$-\frac{\mathrm{PolyLog}\left(2,\frac{2\left(-e\left(b-\sqrt{b^2-4ac}\right)-2c(d+ex)+2cd\right)}{(d+ex+1)\left(-e\sqrt{b^2-4ac}+be-2cd+2c\right)}+1\right)}{2\sqrt{b^2-4ac}}+\frac{\mathrm{PolyLog}\left(2,\frac{2\left(-e\left(\sqrt{b^2-4ac}+b\right)-2c(d+ex)+2cd\right)}{(d+ex+1)\left(e\left(\sqrt{b^2-4ac}+b\right)+2c(1-d)\right)}+1\right)}{2\sqrt{b^2-4ac}}+\frac{\coth^{-1}(d+ex)\,\mathrm{lo}\cdots}{\cdots}$$

Antiderivative was successfully verified.

```
[In] Int[ArcCoth[d + e*x]/(a + b*x + c*x^2),x]
```

```
[Out] (ArcCoth[d + e*x]*Log[(2*e*(b - Sqrt[b^2 - 4*a*c] + 2*c*x))/((2*c*(1 - d) +
 (b - Sqrt[b^2 - 4*a*c])*e)*(1 + d + e*x))])/Sqrt[b^2 - 4*a*c] - (ArcCoth[d
 + e*x]*Log[(2*e*(b + Sqrt[b^2 - 4*a*c] + 2*c*x))/((2*c*(1 - d) + (b + Sqrt
[b^2 - 4*a*c])*e)*(1 + d + e*x))])/Sqrt[b^2 - 4*a*c] - PolyLog[2, 1 + (2*(2
*c*d - (b - Sqrt[b^2 - 4*a*c])*e - 2*c*(d + e*x)))/((2*c - 2*c*d + b*e - Sq
rt[b^2 - 4*a*c]*e)*(1 + d + e*x))]/(2*Sqrt[b^2 - 4*a*c]) + PolyLog[2, 1 + (
2*(2*c*d - (b + Sqrt[b^2 - 4*a*c])*e - 2*c*(d + e*x)))/((2*c*(1 - d) + (b +
 Sqrt[b^2 - 4*a*c])*e)*(1 + d + e*x))]/(2*Sqrt[b^2 - 4*a*c])
```

Rule 206

```
Int[((a_) + (b_.)*(x_)^2)^(-1), x_Symbol] :> Simp[(1*ArcTanh[(Rt[-b, 2]*x)/
Rt[a, 2]])/(Rt[a, 2]*Rt[-b, 2]), x] /; FreeQ[{a, b}, x] && NegQ[a/b] && (Gt
Q[a, 0] || LtQ[b, 0])
```

Rule 618

```
Int[((a_.) + (b_.)*(x_) + (c_.)*(x_)^2)^(-1), x_Symbol] :> Dist[-2, Subst[I
nt[1/Simp[b^2 - 4*a*c - x^2, x], x], x, b + 2*c*x], x] /; FreeQ[{a, b, c},
x] && NeQ[b^2 - 4*a*c, 0]
```

Rule 2315

```
Int[Log[(c_.)*(x_)]/((d_) + (e_.)*(x_)), x_Symbol] :> -Simp[PolyLog[2, 1 -
c*x]/e, x] /; FreeQ[{c, d, e}, x] && EqQ[e + c*d, 0]
```

Rule 2402

```
Int[Log[(c_.)/((d_) + (e_.)*(x_))]/((f_) + (g_.)*(x_)^2), x_Symbol] :> -Dis
t[e/g, Subst[Int[Log[2*d*x]/(1 - 2*d*x), x], x, 1/(d + e*x)], x] /; FreeQ[{
```

```
c, d, e, f, g}, x] && EqQ[c, 2*d] && EqQ[e^2*f + d^2*g, 0]
```

Rule 2447

```
Int[Log[u_]*(Pq_)^(m_.), x_Symbol] :> With[{C = FullSimplify[(Pq^m*(1 - u))
/D[u, x]]}, Simp[C*PolyLog[2, 1 - u], x] /; FreeQ[C, x]] /; IntegerQ[m] &&
PolyQ[Pq, x] && RationalFunctionQ[u, x] && LeQ[RationalFunctionExponents[u,
 x][[2]], Expon[Pq, x]]
```

Rule 5921

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))/((d_) + (e_.)*(x_)), x_Symbol] :> -
Simp[((a + b*ArcCoth[c*x])*Log[2/(1 + c*x)])/e, x] + (Dist[(b*c)/e, Int[Log
[2/(1 + c*x)]/(1 - c^2*x^2), x], x] - Dist[(b*c)/e, Int[Log[(2*c*(d + e*x))
/((c*d + e)*(1 + c*x))]/(1 - c^2*x^2), x], x] + Simp[((a + b*ArcCoth[c*x])*
Log[(2*c*(d + e*x))/((c*d + e)*(1 + c*x))])/e, x]) /; FreeQ[{a, b, c, d, e}
, x] && NeQ[c^2*d^2 - e^2, 0]
```

Rule 6112

```
Int[((a_.) + ArcCoth[(c_) + (d_.)*(x_)]*(b_.))^(p_.)*((e_.) + (f_.)*(x_))^(
m_.), x_Symbol] :> Dist[1/d, Subst[Int[((d*e - c*f)/d + (f*x)/d)^m*(a + b*A
rcCoth[x])^p, x], x, c + d*x], x] /; FreeQ[{a, b, c, d, e, f, m}, x] && IGt
Q[p, 0]
```

Rule 6728

```
Int[(u_)/((a_.) + (b_.)*(x_)^(n_.) + (c_.)*(x_)^(n2_.)), x_Symbol] :> With[
{v = RationalFunctionExpand[u/(a + b*x^n + c*x^(2*n)), x]}, Int[v, x] /; Su
mQ[v]] /; FreeQ[{a, b, c}, x] && EqQ[n2, 2*n] && IGtQ[n, 0]
```

Rubi steps

$$\int \frac{\coth^{-1}(d+ex)}{a+bx+cx^2}\,dx = \int \left(\frac{2c\coth^{-1}(d+ex)}{\sqrt{b^2-4ac}\left(b-\sqrt{b^2-4ac}+2cx\right)} - \frac{2c\coth^{-1}(d+ex)}{\sqrt{b^2-4ac}\left(b+\sqrt{b^2-4ac}+2cx\right)}\right)dx$$

$$= \frac{(2c)\int \frac{\coth^{-1}(d+ex)}{b-\sqrt{b^2-4ac}+2cx}\,dx}{\sqrt{b^2-4ac}} - \frac{(2c)\int \frac{\coth^{-1}(d+ex)}{b+\sqrt{b^2-4ac}+2cx}\,dx}{\sqrt{b^2-4ac}}$$

$$= \frac{(2c)\,\text{Subst}\left(\int \frac{\coth^{-1}(x)}{\frac{-2cd+\left(b-\sqrt{b^2-4ac}\right)e}{e}+\frac{2cx}{e}}\,dx, x, d+ex\right)}{\sqrt{b^2-4ac}\,e} - \frac{(2c)\,\text{Subst}\left(\int \frac{\coth^{-1}(x)}{\frac{-2cd+\left(b+\sqrt{b^2-4ac}\right)e}{e}+\frac{2cx}{e}}\,dx, x, d\right.}{\sqrt{b^2-4ac}\,e}$$

$$= \frac{\coth^{-1}(d+ex)\log\left(\frac{2e\left(b-\sqrt{b^2-4ac}+2cx\right)}{\left(2c-2cd+be-\sqrt{b^2-4ac}\,e\right)(1+d+ex)}\right)}{\sqrt{b^2-4ac}} - \frac{\coth^{-1}(d+ex)\log\left(\frac{2e\left(b+\sqrt{b^2-4ac}+\right.}{\left(2c(1-d)+\left(b+\sqrt{b^2-4ac}\right.\right.}\right.}{\sqrt{b^2-4ac}}$$

$$= \frac{\coth^{-1}(d+ex)\log\left(\frac{2e\left(b-\sqrt{b^2-4ac}+2cx\right)}{\left(2c-2cd+be-\sqrt{b^2-4ac}\,e\right)(1+d+ex)}\right)}{\sqrt{b^2-4ac}} - \frac{\coth^{-1}(d+ex)\log\left(\frac{2e\left(b+\sqrt{b^2-4ac}+\right.}{\left(2c(1-d)+\left(b+\sqrt{b^2-4ac}\right.\right.}\right.}{\sqrt{b^2-4ac}}$$

**Mathematica [A]** time = 0.96, size = 596, normalized size = 1.78

$$\frac{-\text{Li}_2\left(\frac{e\left(-b-2cx+\sqrt{b^2-4ac}\right)}{2c(d+1)+\left(\sqrt{b^2-4ac}-b\right)e}\right)+\text{Li}_2\left(\frac{e\left(b+2cx-\sqrt{b^2-4ac}\right)}{-2dc+2c+be-\sqrt{b^2-4ac}\,e}\right)-\text{Li}_2\left(\frac{e\left(b+2cx+\sqrt{b^2-4ac}\right)}{\left(b+\sqrt{b^2-4ac}\right)e-2c(d-1)}\right)+\text{Li}_2\left(\frac{e\left(b+2cx+\sqrt{b^2-4ac}\right)}{\left(b+\sqrt{b^2-4ac}\right)e-2c(d+1)}\right)+\text{lo}}{}$$

Warning: Unable to verify antiderivative.

```
[In] Integrate[ArcCoth[d + e*x]/(a + b*x + c*x^2),x]
```

```
[Out] (Log[b - Sqrt[b^2 - 4*a*c] + 2*c*x]*Log[(2*c*(-1 + d + e*x))/(2*c*(-1 + d)
+ (-b + Sqrt[b^2 - 4*a*c])*e)] - Log[b + Sqrt[b^2 - 4*a*c] + 2*c*x]*Log[(2*
c*(-1 + d + e*x))/(2*c*(-1 + d) - (b + Sqrt[b^2 - 4*a*c])*e)] - Log[b - Sqr
t[b^2 - 4*a*c] + 2*c*x]*Log[(-1 + d + e*x)/(d + e*x)] + Log[b + Sqrt[b^2 -
4*a*c] + 2*c*x]*Log[(-1 + d + e*x)/(d + e*x)] - Log[b - Sqrt[b^2 - 4*a*c] +
 2*c*x]*Log[(2*c*(1 + d + e*x))/(2*c*(1 + d) + (-b + Sqrt[b^2 - 4*a*c])*e)]
 + Log[b + Sqrt[b^2 - 4*a*c] + 2*c*x]*Log[(2*c*(1 + d + e*x))/(2*c*(1 + d)
- (b + Sqrt[b^2 - 4*a*c])*e)] + Log[b - Sqrt[b^2 - 4*a*c] + 2*c*x]*Log[(1 +
 d + e*x)/(d + e*x)] - Log[b + Sqrt[b^2 - 4*a*c] + 2*c*x]*Log[(1 + d + e*x)
/(d + e*x)] - PolyLog[2, (e*(-b + Sqrt[b^2 - 4*a*c] - 2*c*x))/(2*c*(1 + d)
+ (-b + Sqrt[b^2 - 4*a*c])*e)] + PolyLog[2, (e*(b - Sqrt[b^2 - 4*a*c] + 2*c
*x))/(2*c - 2*c*d + b*e - Sqrt[b^2 - 4*a*c]*e)] - PolyLog[2, (e*(b + Sqrt[b
^2 - 4*a*c] + 2*c*x))/(-2*c*(-1 + d) + (b + Sqrt[b^2 - 4*a*c])*e)] + PolyLo
g[2, (e*(b + Sqrt[b^2 - 4*a*c] + 2*c*x))/(-2*c*(1 + d) + (b + Sqrt[b^2 - 4*
a*c])*e)])/(2*Sqrt[b^2 - 4*a*c])
```

**fricas [F]** time = 0.65, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{\text{arcoth}\,(ex+d)}{cx^2+bx+a}, x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(e*x+d)/(c*x^2+b*x+a),x, algorithm="fricas")
```

```
[Out] integral(arccoth(e*x + d)/(c*x^2 + b*x + a), x)
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{arcoth}(ex+d)}{cx^2+bx+a}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(e*x+d)/(c*x^2+b*x+a),x, algorithm="giac")
```

```
[Out] integrate(arccoth(e*x + d)/(c*x^2 + b*x + a), x)
```

**maple [B]** time = 1.11, size = 2098, normalized size = 6.26

result too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(arccoth(e*x+d)/(c*x^2+b*x+a),x)
```

```
[Out] -e*(e^2*(-4*a*c+b^2))^(1/2)/(4*a*c-b^2)*ln(1-(a*e^2-b*d*e+c*d^2+b*e-2*c*d+c
)*(e*x+d+1)/(e*x+d-1)/(a*e^2-b*e*d+c*d^2-(-e^2*(4*a*c-b^2))^(1/2)-c))*arcco
th(e*x+d)*a/(a*e^2-b*e*d+c*d^2-(e^2*(-4*a*c+b^2))^(1/2)-c)+(e^2*(-4*a*c+b^2
))^(1/2)/(4*a*c-b^2)*ln(1-(a*e^2-b*d*e+c*d^2+b*e-2*c*d+c)*(e*x+d+1)/(e*x+d-
1)/(a*e^2-b*e*d+c*d^2-(-e^2*(4*a*c-b^2))^(1/2)-c))*arccoth(e*x+d)*b*d/(a*e^
2-b*e*d+c*d^2-(e^2*(-4*a*c+b^2))^(1/2)-c)-1/e*(e^2*(-4*a*c+b^2))^(1/2)/(4*a
*c-b^2)*ln(1-(a*e^2-b*d*e+c*d^2+b*e-2*c*d+c)*(e*x+d+1)/(e*x+d-1)/(a*e^2-b*e
*d+c*d^2-(-e^2*(4*a*c-b^2))^(1/2)-c))*arccoth(e*x+d)*c*d^2/(a*e^2-b*e*d+c*d
^2-(e^2*(-4*a*c+b^2))^(1/2)-c)+e*(e^2*(-4*a*c+b^2))^(1/2)/(4*a*c-b^2)*arcco
th(e*x+d)^2*a/(a*e^2-b*e*d+c*d^2-(e^2*(-4*a*c+b^2))^(1/2)-c)-(e^2*(-4*a*c+b
^2))^(1/2)/(4*a*c-b^2)*arccoth(e*x+d)^2*b*d/(a*e^2-b*e*d+c*d^2-(e^2*(-4*a*c
+b^2))^(1/2)-c)+1/e*(e^2*(-4*a*c+b^2))^(1/2)/(4*a*c-b^2)*arccoth(e*x+d)^2*c
*d^2/(a*e^2-b*e*d+c*d^2-(e^2*(-4*a*c+b^2))^(1/2)-c)-1/2*e*(e^2*(-4*a*c+b^2)
)^(1/2)/(4*a*c-b^2)*polylog(2,(a*e^2-b*d*e+c*d^2+b*e-2*c*d+c)*(e*x+d+1)/(e*
x+d-1)/(a*e^2-b*e*d+c*d^2-(-e^2*(4*a*c-b^2))^(1/2)-c))*a/(a*e^2-b*e*d+c*d^2
-(e^2*(-4*a*c+b^2))^(1/2)-c)+1/2*(e^2*(-4*a*c+b^2))^(1/2)/(4*a*c-b^2)*polyl
og(2,(a*e^2-b*d*e+c*d^2+b*e-2*c*d+c)*(e*x+d+1)/(e*x+d-1)/(a*e^2-b*e*d+c*d^2
-(-e^2*(4*a*c-b^2))^(1/2)-c))*b*d/(a*e^2-b*e*d+c*d^2-(e^2*(-4*a*c+b^2))^(1/
2)-c)-1/2/e*(e^2*(-4*a*c+b^2))^(1/2)/(4*a*c-b^2)*polylog(2,(a*e^2-b*d*e+c*d
^2+b*e-2*c*d+c)*(e*x+d+1)/(e*x+d-1)/(a*e^2-b*e*d+c*d^2-(-e^2*(4*a*c-b^2))^(
1/2)-c))*c*d^2/(a*e^2-b*e*d+c*d^2-(e^2*(-4*a*c+b^2))^(1/2)-c)-e/(a*e^2-b*e*
d+c*d^2-(e^2*(-4*a*c+b^2))^(1/2)-c)*ln(1-(a*e^2-b*d*e+c*d^2+b*e-2*c*d+c)*(e
*x+d+1)/(e*x+d-1)/(a*e^2-b*e*d+c*d^2-(-e^2*(4*a*c-b^2))^(1/2)-c))*arccoth(e
*x+d)+1/e*(e^2*(-4*a*c+b^2))^(1/2)/(4*a*c-b^2)*ln(1-(a*e^2-b*d*e+c*d^2+b*e-
2*c*d+c)*(e*x+d+1)/(e*x+d-1)/(a*e^2-b*e*d+c*d^2-(-e^2*(4*a*c-b^2))^(1/2)-c)
)*arccoth(e*x+d)*c/(a*e^2-b*e*d+c*d^2-(e^2*(-4*a*c+b^2))^(1/2)-c)+e/(a*e^2-
b*e*d+c*d^2-(e^2*(-4*a*c+b^2))^(1/2)-c)*arccoth(e*x+d)^2-1/e*(e^2*(-4*a*c+b
^2))^(1/2)/(4*a*c-b^2)*arccoth(e*x+d)^2*c/(a*e^2-b*e*d+c*d^2-(e^2*(-4*a*c+b
^2))^(1/2)-c)-1/2*e/(a*e^2-b*e*d+c*d^2-(e^2*(-4*a*c+b^2))^(1/2)-c)*polylog(
2,(a*e^2-b*d*e+c*d^2+b*e-2*c*d+c)*(e*x+d+1)/(e*x+d-1)/(a*e^2-b*e*d+c*d^2-(-
e^2*(4*a*c-b^2))^(1/2)-c))+1/2/e*(e^2*(-4*a*c+b^2))^(1/2)/(4*a*c-b^2)*polyl
og(2,(a*e^2-b*d*e+c*d^2+b*e-2*c*d+c)*(e*x+d+1)/(e*x+d-1)/(a*e^2-b*e*d+c*d^2
-(-e^2*(4*a*c-b^2))^(1/2)-c))*c/(a*e^2-b*e*d+c*d^2-(e^2*(-4*a*c+b^2))^(1/2)
-c)+1/e*(e^2*(-4*a*c+b^2))^(1/2)/(4*a*c-b^2)*arccoth(e*x+d)*ln(1-(a*e^2-b*d
*e+c*d^2+b*e-2*c*d+c)*(e*x+d+1)/(e*x+d-1)/(a*e^2-b*e*d+c*d^2+(-e^2*(4*a*c-b
^2))^(1/2)-c))-1/e*(e^2*(-4*a*c+b^2))^(1/2)/(4*a*c-b^2)*arccoth(e*x+d)^2+1/
```

```
2/e*(e^2*(-4*a*c+b^2))^(1/2)/(4*a*c-b^2)*polylog(2,(a*e^2-b*d*e+c*d^2+b*e-2
*c*d+c)*(e*x+d+1)/(e*x+d-1)/(a*e^2-b*e*d+c*d^2+(-e^2*(4*a*c-b^2))^(1/2)-c))
```

**maxima** [F(-2)] time = 0.00, size = 0, normalized size = 0.00

Exception raised: ValueError

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(e*x+d)/(c*x^2+b*x+a),x, algorithm="maxima")
```

```
[Out] Exception raised: ValueError >> Computation failed since Maxima requested a
dditional constraints; using the 'assume' command before evaluation *may* h
elp (example of legal syntax is 'assume(4*a*c-b^2>0)', see `assume?` for mo
re details)Is 4*a*c-b^2 positive or negative?
```

**mupad** [F] time = 0.00, size = -1, normalized size = -0.00

$$\int \frac{\operatorname{acoth}(d+e\,x)}{c\,x^2+b\,x+a}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(d + e*x)/(a + b*x + c*x^2),x)
```

```
[Out] int(acoth(d + e*x)/(a + b*x + c*x^2), x)
```

**sympy** [F(-1)] time = 0.00, size = 0, normalized size = 0.00

Timed out

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(e*x+d)/(c*x**2+b*x+a),x)
```

```
[Out] Timed out
```

# 3.83 $\int x^2 \coth^{-1}\left(\sqrt{x}\right) dx$

**Optimal**. Leaf size=51

$$\frac{x^{5/2}}{15}+\frac{x^{3/2}}{9}+\frac{1}{3}x^3\coth^{-1}\left(\sqrt{x}\right)+\frac{\sqrt{x}}{3}-\frac{1}{3}\tanh^{-1}\left(\sqrt{x}\right)$$

```
[Out] 1/9*x^(3/2)+1/15*x^(5/2)+1/3*x^3*arccoth(x^(1/2))-1/3*arctanh(x^(1/2))+1/3*
x^(1/2)
```

**Rubi [A]** time = 0.01, antiderivative size = 51, normalized size of antiderivative = 1.00, number of steps used = 6, number of rules used = 4, integrand size = 10, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.400, Rules used = {6098, 50, 63, 206}

$$\frac{x^{5/2}}{15}+\frac{x^{3/2}}{9}+\frac{1}{3}x^3\coth^{-1}\left(\sqrt{x}\right)+\frac{\sqrt{x}}{3}-\frac{1}{3}\tanh^{-1}\left(\sqrt{x}\right)$$

Antiderivative was successfully verified.

```
[In] Int[x^2*ArcCoth[Sqrt[x]],x]
```

```
[Out] Sqrt[x]/3 + x^(3/2)/9 + x^(5/2)/15 + (x^3*ArcCoth[Sqrt[x]])/3 - ArcTanh[Sqr
t[x]]/3
```

Rule 50

```
Int[((a_.) + (b_.)*(x_))^(m_)*((c_.) + (d_.)*(x_))^(n_), x_Symbol] :> Simp[
((a + b*x)^(m + 1)*(c + d*x)^n)/(b*(m + n + 1)), x] + Dist[(n*(b*c - a*d))/
(b*(m + n + 1)), Int[(a + b*x)^m*(c + d*x)^(n - 1), x], x] /; FreeQ[{a, b,
c, d}, x] && NeQ[b*c - a*d, 0] && GtQ[n, 0] && NeQ[m + n + 1, 0] && !(IGtQ
[m, 0] && ( !IntegerQ[n] || (GtQ[m, 0] && LtQ[m - n, 0]))) && !ILtQ[m + n
+ 2, 0] && IntLinearQ[a, b, c, d, m, n, x]
```

Rule 63

```
Int[((a_.) + (b_.)*(x_))^(m_)*((c_.) + (d_.)*(x_))^(n_), x_Symbol] :> With[
{p = Denominator[m]}, Dist[p/b, Subst[Int[x^(p*(m + 1) - 1)*(c - (a*d)/b +
(d*x^p)/b)^n, x], x, (a + b*x)^(1/p)], x]] /; FreeQ[{a, b, c, d}, x] && NeQ
[b*c - a*d, 0] && LtQ[-1, m, 0] && LeQ[-1, n, 0] && LeQ[Denominator[n], Den
ominator[m]] && IntLinearQ[a, b, c, d, m, n, x]
```

Rule 206

```
Int[((a_) + (b_.)*(x_)^2)^(-1), x_Symbol] :> Simp[(1*ArcTanh[(Rt[-b, 2]*x)/
Rt[a, 2]])/(Rt[a, 2]*Rt[-b, 2]), x] /; FreeQ[{a, b}, x] && NegQ[a/b] && (Gt
Q[a, 0] || LtQ[b, 0])
```

Rule 6098

```
Int[((a_.) + ArcCoth[(c_.)*(x_)^(n_)]*(b_.))*((d_.)*(x_))^(m_.), x_Symbol]
:> Simp[((d*x)^(m + 1)*(a + b*ArcCoth[c*x^n]))/(d*(m + 1)), x] - Dist[(b*c*
n)/(d*(m + 1)), Int[(x^(n - 1)*(d*x)^(m + 1))/(1 - c^2*x^(2*n)), x], x] /;
FreeQ[{a, b, c, d, m, n}, x] && NeQ[m, -1]
```

Rubi steps

$$
\begin{aligned}
\int x^2 \coth^{-1}\left(\sqrt{x}\right) dx &= \frac{1}{3}x^3 \coth^{-1}\left(\sqrt{x}\right) - \frac{1}{6}\int \frac{x^{5/2}}{1-x} dx \\
&= \frac{x^{5/2}}{15} + \frac{1}{3}x^3 \coth^{-1}\left(\sqrt{x}\right) - \frac{1}{6}\int \frac{x^{3/2}}{1-x} dx \\
&= \frac{x^{3/2}}{9} + \frac{x^{5/2}}{15} + \frac{1}{3}x^3 \coth^{-1}\left(\sqrt{x}\right) - \frac{1}{6}\int \frac{\sqrt{x}}{1-x} dx \\
&= \frac{\sqrt{x}}{3} + \frac{x^{3/2}}{9} + \frac{x^{5/2}}{15} + \frac{1}{3}x^3 \coth^{-1}\left(\sqrt{x}\right) - \frac{1}{6}\int \frac{1}{(1-x)\sqrt{x}} dx \\
&= \frac{\sqrt{x}}{3} + \frac{x^{3/2}}{9} + \frac{x^{5/2}}{15} + \frac{1}{3}x^3 \coth^{-1}\left(\sqrt{x}\right) - \frac{1}{3}\text{Subst}\left(\int \frac{1}{1-x^2} dx, x, \sqrt{x}\right) \\
&= \frac{\sqrt{x}}{3} + \frac{x^{3/2}}{9} + \frac{x^{5/2}}{15} + \frac{1}{3}x^3 \coth^{-1}\left(\sqrt{x}\right) - \frac{1}{3}\tanh^{-1}\left(\sqrt{x}\right)
\end{aligned}
$$

**Mathematica [A]** time = 0.02, size = 59, normalized size = 1.16

$$
\frac{1}{90}\left(6x^{5/2} + 10x^{3/2} + 30x^3 \coth^{-1}\left(\sqrt{x}\right) + 30\sqrt{x} + 15\log\left(1-\sqrt{x}\right) - 15\log\left(\sqrt{x}+1\right)\right)
$$

Antiderivative was successfully verified.

```
[In] Integrate[x^2*ArcCoth[Sqrt[x]],x]
```

```
[Out] (30*Sqrt[x] + 10*x^(3/2) + 6*x^(5/2) + 30*x^3*ArcCoth[Sqrt[x]] + 15*Log[1 -
 Sqrt[x]] - 15*Log[1 + Sqrt[x]])/90
```

**fricas [A]** time = 0.47, size = 38, normalized size = 0.75

$$
\frac{1}{6}\left(x^3-1\right)\log\left(\frac{x+2\sqrt{x}+1}{x-1}\right) + \frac{1}{45}\left(3x^2+5x+15\right)\sqrt{x}
$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*arccoth(x^(1/2)),x, algorithm="fricas")
```

```
[Out] 1/6*(x^3 - 1)*log((x + 2*sqrt(x) + 1)/(x - 1)) + 1/45*(3*x^2 + 5*x + 15)*sq
rt(x)
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$
\int x^2 \operatorname{arcoth}\left(\sqrt{x}\right) dx
$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*arccoth(x^(1/2)),x, algorithm="giac")
```

```
[Out] integrate(x^2*arccoth(sqrt(x)), x)
```

**maple [A]** time = 0.04, size = 42, normalized size = 0.82

$$
\frac{x^3 \operatorname{arccoth}\left(\sqrt{x}\right)}{3} + \frac{x^{\frac{5}{2}}}{15} + \frac{x^{\frac{3}{2}}}{9} + \frac{\sqrt{x}}{3} + \frac{\ln\left(-1+\sqrt{x}\right)}{6} - \frac{\ln\left(1+\sqrt{x}\right)}{6}
$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^2*arccoth(x^(1/2)),x)
```

```
[Out] 1/3*x^3*arccoth(x^(1/2))+1/15*x^(5/2)+1/9*x^(3/2)+1/3*x^(1/2)+1/6*ln(-1+x^(
1/2))-1/6*ln(1+x^(1/2))
```

**maxima** [A] time = 0.30, size = 41, normalized size = 0.80

$$\frac{1}{3}\,x^{3}\operatorname{arcoth}\left(\sqrt{x}\right)+\frac{1}{15}\,x^{\frac{5}{2}}+\frac{1}{9}\,x^{\frac{3}{2}}+\frac{1}{3}\,\sqrt{x}-\frac{1}{6}\,\log\left(\sqrt{x}+1\right)+\frac{1}{6}\,\log\left(\sqrt{x}-1\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*arccoth(x^(1/2)),x, algorithm="maxima")
```

```
[Out] 1/3*x^3*arccoth(sqrt(x)) + 1/15*x^(5/2) + 1/9*x^(3/2) + 1/3*sqrt(x) - 1/6*l
og(sqrt(x) + 1) + 1/6*log(sqrt(x) - 1)
```

**mupad** [B] time = 1.30, size = 31, normalized size = 0.61

$$\frac{x^{3}\operatorname{acoth}\left(\sqrt{x}\right)}{3}-\frac{\operatorname{acoth}\left(\sqrt{x}\right)}{3}+\frac{\sqrt{x}}{3}+\frac{x^{3/2}}{9}+\frac{x^{5/2}}{15}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^2*acoth(x^(1/2)),x)
```

```
[Out] (x^3*acoth(x^(1/2)))/3 - acoth(x^(1/2))/3 + x^(1/2)/3 + x^(3/2)/9 + x^(5/2)
/15
```

**sympy** [F] time = 0.00, size = 0, normalized size = 0.00

$$\int x^{2}\operatorname{acoth}\left(\sqrt{x}\right)dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**2*acoth(x**(1/2)),x)
```

```
[Out] Integral(x**2*acoth(sqrt(x)), x)
```

## 3.84 $\int x \coth^{-1}\left(\sqrt{x}\right) dx$

**Optimal**. Leaf size=42

$$\frac{x^{3/2}}{6}+\frac{1}{2}x^2\coth^{-1}\left(\sqrt{x}\right)+\frac{\sqrt{x}}{2}-\frac{1}{2}\tanh^{-1}\left(\sqrt{x}\right)$$

```
[Out] 1/6*x^(3/2)+1/2*x^2*arccoth(x^(1/2))-1/2*arctanh(x^(1/2))+1/2*x^(1/2)
```

**Rubi [A]** time = 0.01, antiderivative size = 42, normalized size of antiderivative = 1.00, number of steps used = 5, number of rules used = 4, integrand size = 8, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.500, Rules used = {6098, 50, 63, 206}

$$\frac{x^{3/2}}{6}+\frac{1}{2}x^2\coth^{-1}\left(\sqrt{x}\right)+\frac{\sqrt{x}}{2}-\frac{1}{2}\tanh^{-1}\left(\sqrt{x}\right)$$

Antiderivative was successfully verified.

```
[In] Int[x*ArcCoth[Sqrt[x]],x]
```

```
[Out] Sqrt[x]/2 + x^(3/2)/6 + (x^2*ArcCoth[Sqrt[x]])/2 - ArcTanh[Sqrt[x]]/2
```

Rule 50

```
Int[((a_.) + (b_.)*(x_))^(m_)*((c_.) + (d_.)*(x_))^(n_), x_Symbol] :> Simp[
((a + b*x)^(m + 1)*(c + d*x)^n)/(b*(m + n + 1)), x] + Dist[(n*(b*c - a*d))/
(b*(m + n + 1)), Int[(a + b*x)^m*(c + d*x)^(n - 1), x], x] /; FreeQ[{a, b,
c, d}, x] && NeQ[b*c - a*d, 0] && GtQ[n, 0] && NeQ[m + n + 1, 0] &&  !(IGtQ
[m, 0] && ( !IntegerQ[n] || (GtQ[m, 0] && LtQ[m - n, 0]))) &&  !ILtQ[m + n
+ 2, 0] && IntLinearQ[a, b, c, d, m, n, x]
```

Rule 63

```
Int[((a_.) + (b_.)*(x_))^(m_)*((c_.) + (d_.)*(x_))^(n_), x_Symbol] :> With[
{p = Denominator[m]}, Dist[p/b, Subst[Int[x^(p*(m + 1) - 1)*(c - (a*d)/b +
(d*x^p)/b)^n, x], x, (a + b*x)^(1/p)], x]] /; FreeQ[{a, b, c, d}, x] && NeQ
[b*c - a*d, 0] && LtQ[-1, m, 0] && LeQ[-1, n, 0] && LeQ[Denominator[n], Den
ominator[m]] && IntLinearQ[a, b, c, d, m, n, x]
```

Rule 206

```
Int[((a_) + (b_.)*(x_)^2)^(-1), x_Symbol] :> Simp[(1*ArcTanh[(Rt[-b, 2]*x)/
Rt[a, 2]])/(Rt[a, 2]*Rt[-b, 2]), x] /; FreeQ[{a, b}, x] && NegQ[a/b] && (Gt
Q[a, 0] || LtQ[b, 0])
```

Rule 6098

```
Int[((a_.) + ArcCoth[(c_.)*(x_)^(n_)]*(b_.))*((d_.)*(x_))^(m_.), x_Symbol]
:> Simp[((d*x)^(m + 1)*(a + b*ArcCoth[c*x^n]))/(d*(m + 1)), x] - Dist[(b*c*
n)/(d*(m + 1)), Int[(x^(n - 1)*(d*x)^(m + 1))/(1 - c^2*x^(2*n)), x], x] /;
FreeQ[{a, b, c, d, m, n}, x] && NeQ[m, -1]
```

Rubi steps

$$
\begin{aligned}
\int x\coth^{-1}\left(\sqrt{x}\right)dx &= \frac{1}{2}x^2\coth^{-1}\left(\sqrt{x}\right)-\frac{1}{4}\int\frac{x^{3/2}}{1-x}dx\\
&= \frac{x^{3/2}}{6}+\frac{1}{2}x^2\coth^{-1}\left(\sqrt{x}\right)-\frac{1}{4}\int\frac{\sqrt{x}}{1-x}dx\\
&= \frac{\sqrt{x}}{2}+\frac{x^{3/2}}{6}+\frac{1}{2}x^2\coth^{-1}\left(\sqrt{x}\right)-\frac{1}{4}\int\frac{1}{(1-x)\sqrt{x}}dx\\
&= \frac{\sqrt{x}}{2}+\frac{x^{3/2}}{6}+\frac{1}{2}x^2\coth^{-1}\left(\sqrt{x}\right)-\frac{1}{2}\text{Subst}\left(\int\frac{1}{1-x^2}dx,x,\sqrt{x}\right)\\
&= \frac{\sqrt{x}}{2}+\frac{x^{3/2}}{6}+\frac{1}{2}x^2\coth^{-1}\left(\sqrt{x}\right)-\frac{1}{2}\tanh^{-1}\left(\sqrt{x}\right)
\end{aligned}
$$

**Mathematica** [A] time = 0.01, size = 52, normalized size = 1.24

$$\frac{1}{12}\left(2x^{3/2}+6x^2\coth^{-1}\left(\sqrt{x}\right)+6\sqrt{x}+3\log\left(1-\sqrt{x}\right)-3\log\left(\sqrt{x}+1\right)\right)$$

Antiderivative was successfully verified.

```
[In] Integrate[x*ArcCoth[Sqrt[x]],x]
[Out] (6*Sqrt[x] + 2*x^(3/2) + 6*x^2*ArcCoth[Sqrt[x]] + 3*Log[1 - Sqrt[x]] - 3*Lo
g[1 + Sqrt[x]])/12
```

**fricas** [A] time = 0.57, size = 31, normalized size = 0.74

$$\frac{1}{4}\left(x^2-1\right)\log\left(\frac{x+2\sqrt{x}+1}{x-1}\right)+\frac{1}{6}(x+3)\sqrt{x}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*arccoth(x^(1/2)),x, algorithm="fricas")
[Out] 1/4*(x^2 - 1)*log((x + 2*sqrt(x) + 1)/(x - 1)) + 1/6*(x + 3)*sqrt(x)
```

**giac** [F] time = 0.00, size = 0, normalized size = 0.00

$$\int x\,\text{arcoth}\left(\sqrt{x}\right)dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*arccoth(x^(1/2)),x, algorithm="giac")
[Out] integrate(x*arccoth(sqrt(x)), x)
```

**maple** [A] time = 0.05, size = 37, normalized size = 0.88

$$\frac{x^2\text{arccoth}\left(\sqrt{x}\right)}{2}+\frac{x^{\frac{3}{2}}}{6}+\frac{\sqrt{x}}{2}+\frac{\ln\left(-1+\sqrt{x}\right)}{4}-\frac{\ln\left(1+\sqrt{x}\right)}{4}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x*arccoth(x^(1/2)),x)
[Out] 1/2*x^2*arccoth(x^(1/2))+1/6*x^(3/2)+1/2*x^(1/2)+1/4*ln(-1+x^(1/2))-1/4*ln(
1+x^(1/2))
```

**maxima** [A] time = 0.31, size = 36, normalized size = 0.86

$$\frac{1}{2}x^2\,\text{arcoth}\left(\sqrt{x}\right)+\frac{1}{6}x^{\frac{3}{2}}+\frac{1}{2}\sqrt{x}-\frac{1}{4}\log\left(\sqrt{x}+1\right)+\frac{1}{4}\log\left(\sqrt{x}-1\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*arccoth(x^(1/2)),x, algorithm="maxima")
```

```
[Out] 1/2*x^2*arccoth(sqrt(x)) + 1/6*x^(3/2) + 1/2*sqrt(x) - 1/4*log(sqrt(x) + 1)
 + 1/4*log(sqrt(x) - 1)
```

**mupad [B]** time = 1.26, size = 26, normalized size = 0.62

$$\frac{x^2 \operatorname{acoth}\left(\sqrt{x}\right)}{2} - \frac{\operatorname{acoth}\left(\sqrt{x}\right)}{2} + \frac{\sqrt{x}}{2} + \frac{x^{3/2}}{6}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x*acoth(x^(1/2)),x)
```

```
[Out] (x^2*acoth(x^(1/2)))/2 - acoth(x^(1/2))/2 + x^(1/2)/2 + x^(3/2)/6
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int x \operatorname{acoth}\left(\sqrt{x}\right) dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*acoth(x**(1/2)),x)
```

```
[Out] Integral(x*acoth(sqrt(x)), x)
```

## 3.85 $\int \coth^{-1}\left(\sqrt{x}\right) dx$

**Optimal**. Leaf size=22

$$\sqrt{x} - \tanh^{-1}\left(\sqrt{x}\right) + x\coth^{-1}\left(\sqrt{x}\right)$$

[Out] x*arccoth(x^(1/2))-arctanh(x^(1/2))+x^(1/2)

**Rubi [A]** time = 0.01, antiderivative size = 22, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 4, integrand size = 6, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.667, Rules used = {6092, 50, 63, 206}

$$\sqrt{x} - \tanh^{-1}\left(\sqrt{x}\right) + x\coth^{-1}\left(\sqrt{x}\right)$$

Antiderivative was successfully verified.

[In] Int[ArcCoth[Sqrt[x]],x]

[Out] Sqrt[x] + x*ArcCoth[Sqrt[x]] - ArcTanh[Sqrt[x]]

Rule 50

```
Int[((a_.) + (b_.)*(x_))^(m_)*((c_.) + (d_.)*(x_))^(n_), x_Symbol] :> Simp[
((a + b*x)^(m + 1)*(c + d*x)^n)/(b*(m + n + 1)), x] + Dist[(n*(b*c - a*d))/
(b*(m + n + 1)), Int[(a + b*x)^m*(c + d*x)^(n - 1), x], x] /; FreeQ[{a, b,
c, d}, x] && NeQ[b*c - a*d, 0] && GtQ[n, 0] && NeQ[m + n + 1, 0] &&  !(IGtQ
[m, 0] && ( !IntegerQ[n] || (GtQ[m, 0] && LtQ[m - n, 0]))) &&  !ILtQ[m + n
+ 2, 0] && IntLinearQ[a, b, c, d, m, n, x]
```

Rule 63

```
Int[((a_.) + (b_.)*(x_))^(m_)*((c_.) + (d_.)*(x_))^(n_), x_Symbol] :> With[
{p = Denominator[m]}, Dist[p/b, Subst[Int[x^(p*(m + 1) - 1)*(c - (a*d)/b +
(d*x^p)/b)^n, x], x, (a + b*x)^(1/p)], x]] /; FreeQ[{a, b, c, d}, x] && NeQ
[b*c - a*d, 0] && LtQ[-1, m, 0] && LeQ[-1, n, 0] && LeQ[Denominator[n], Den
ominator[m]] && IntLinearQ[a, b, c, d, m, n, x]
```

Rule 206

```
Int[((a_) + (b_.)*(x_)^2)^(-1), x_Symbol] :> Simp[(1*ArcTanh[(Rt[-b, 2]*x)/
Rt[a, 2]])/(Rt[a, 2]*Rt[-b, 2]), x] /; FreeQ[{a, b}, x] && NegQ[a/b] && (Gt
Q[a, 0] || LtQ[b, 0])
```

Rule 6092

```
Int[ArcCoth[(c_.)*(x_)^(n_)], x_Symbol] :> Simp[x*ArcCoth[c*x^n], x] - Dist
[c*n, Int[x^n/(1 - c^2*x^(2*n)), x], x] /; FreeQ[{c, n}, x]
```

Rubi steps

$$\begin{aligned}
\int \coth^{-1}\left(\sqrt{x}\right) dx &= x\coth^{-1}\left(\sqrt{x}\right) - \frac{1}{2}\int \frac{\sqrt{x}}{1-x}\, dx \\
&= \sqrt{x} + x\coth^{-1}\left(\sqrt{x}\right) - \frac{1}{2}\int \frac{1}{(1-x)\sqrt{x}}\, dx \\
&= \sqrt{x} + x\coth^{-1}\left(\sqrt{x}\right) - \text{Subst}\left(\int \frac{1}{1-x^2}\, dx, x, \sqrt{x}\right) \\
&= \sqrt{x} + x\coth^{-1}\left(\sqrt{x}\right) - \tanh^{-1}\left(\sqrt{x}\right)
\end{aligned}$$

**Mathematica** [A] time = 0.01, size = 22, normalized size = 1.00

$$\sqrt{x} - \tanh^{-1}\left(\sqrt{x}\right) + x\coth^{-1}\left(\sqrt{x}\right)$$

Antiderivative was successfully verified.

```
[In] Integrate[ArcCoth[Sqrt[x]],x]
[Out] Sqrt[x] + x*ArcCoth[Sqrt[x]] - ArcTanh[Sqrt[x]]
```

**fricas** [A] time = 0.62, size = 24, normalized size = 1.09

$$\frac{1}{2}(x-1)\log\left(\frac{x+2\sqrt{x}+1}{x-1}\right) + \sqrt{x}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(x^(1/2)),x, algorithm="fricas")
[Out] 1/2*(x - 1)*log((x + 2*sqrt(x) + 1)/(x - 1)) + sqrt(x)
```

**giac** [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \operatorname{arcoth}\left(\sqrt{x}\right) dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(x^(1/2)),x, algorithm="giac")
[Out] integrate(arccoth(sqrt(x)), x)
```

**maple** [A] time = 0.05, size = 27, normalized size = 1.23

$$x\,\mathrm{arccoth}\left(\sqrt{x}\right) + \sqrt{x} + \frac{\ln\left(-1+\sqrt{x}\right)}{2} - \frac{\ln\left(1+\sqrt{x}\right)}{2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(arccoth(x^(1/2)),x)
[Out] x*arccoth(x^(1/2))+x^(1/2)+1/2*ln(-1+x^(1/2))-1/2*ln(1+x^(1/2))
```

**maxima** [A] time = 0.30, size = 26, normalized size = 1.18

$$x\,\mathrm{arcoth}\left(\sqrt{x}\right) + \sqrt{x} - \frac{1}{2}\log\left(\sqrt{x}+1\right) + \frac{1}{2}\log\left(\sqrt{x}-1\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(x^(1/2)),x, algorithm="maxima")
[Out] x*arccoth(sqrt(x)) + sqrt(x) - 1/2*log(sqrt(x) + 1) + 1/2*log(sqrt(x) - 1)
```

**mupad** [B] time = 1.24, size = 16, normalized size = 0.73

$$x\,\mathrm{acoth}\left(\sqrt{x}\right) - \mathrm{acoth}\left(\sqrt{x}\right) + \sqrt{x}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(x^(1/2)),x)
[Out] x*acoth(x^(1/2)) - acoth(x^(1/2)) + x^(1/2)
```

**sympy** **[F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \operatorname{acoth}\left(\sqrt{x}\right) dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(x**(1/2)),x)
```

```
[Out] Integral(acoth(sqrt(x)), x)
```

# 3.86 $\int \frac{\coth^{-1}\left(\sqrt{x}\right)}{x}\,dx$

**Optimal**. Leaf size=19

$$\mathrm{Li}_2\left(-\frac{1}{\sqrt{x}}\right)-\mathrm{Li}_2\left(\frac{1}{\sqrt{x}}\right)$$

```
[Out] polylog(2,-1/x^(1/2))-polylog(2,1/x^(1/2))
```

**Rubi [A]** time = 0.02, antiderivative size = 19, normalized size of antiderivative = 1.00, number of steps used = 2, number of rules used = 2, integrand size = 10, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.200, Rules used = {6096, 5913}

$$\text{PolyLog}\left(2,-\frac{1}{\sqrt{x}}\right)-\text{PolyLog}\left(2,\frac{1}{\sqrt{x}}\right)$$

Antiderivative was successfully verified.

```
[In] Int[ArcCoth[Sqrt[x]]/x,x]
[Out] PolyLog[2, -(1/Sqrt[x])] - PolyLog[2, 1/Sqrt[x]]
```

Rule 5913

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))/(x_), x_Symbol] :> Simp[a*Log[x], x
] + (Simp[(b*PolyLog[2, -(c*x)^(-1)])/2, x] - Simp[(b*PolyLog[2, 1/(c*x)])/
2, x]) /; FreeQ[{a, b, c}, x]
```

Rule 6096

```
Int[((a_.) + ArcCoth[(c_.)*(x_)^(n_)]*(b_.))^(p_.)/(x_), x_Symbol] :> Dist[
1/n, Subst[Int[(a + b*ArcCoth[c*x])^p/x, x], x, x^n], x] /; FreeQ[{a, b, c,
 n}, x] && IGtQ[p, 0]
```

Rubi steps

$$\begin{aligned}\int \frac{\coth^{-1}\left(\sqrt{x}\right)}{x}\,dx &= 2\,\text{Subst}\left(\int \frac{\coth^{-1}(x)}{x}\,dx,x,\sqrt{x}\right)\\ &= \mathrm{Li}_2\left(-\frac{1}{\sqrt{x}}\right)-\mathrm{Li}_2\left(\frac{1}{\sqrt{x}}\right)\end{aligned}$$

**Mathematica [A]** time = 0.01, size = 19, normalized size = 1.00

$$\mathrm{Li}_2\left(-\frac{1}{\sqrt{x}}\right)-\mathrm{Li}_2\left(\frac{1}{\sqrt{x}}\right)$$

Antiderivative was successfully verified.

```
[In] Integrate[ArcCoth[Sqrt[x]]/x,x]
[Out] PolyLog[2, -(1/Sqrt[x])] - PolyLog[2, 1/Sqrt[x]]
```

**fricas [F]** time = 0.66, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{\text{arcoth}\left(\sqrt{x}\right)}{x},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(x^(1/2))/x,x, algorithm="fricas")
```

```
[Out] integral(arccoth(sqrt(x))/x, x)
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{arcoth}\left(\sqrt{x}\right)}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(x^(1/2))/x,x, algorithm="giac")
```

```
[Out] integrate(arccoth(sqrt(x))/x, x)
```

**maple [B]** time = 0.06, size = 33, normalized size = 1.74

$$\ln(x)\operatorname{arccoth}\left(\sqrt{x}\right) - \operatorname{dilog}\left(\sqrt{x}\right) - \operatorname{dilog}\left(1+\sqrt{x}\right) - \frac{\ln(x)\ln\left(1+\sqrt{x}\right)}{2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(arccoth(x^(1/2))/x,x)
```

```
[Out] ln(x)*arccoth(x^(1/2))-dilog(x^(1/2))-dilog(1+x^(1/2))-1/2*ln(x)*ln(1+x^(1/
2))
```

**maxima [B]** time = 0.31, size = 66, normalized size = 3.47

$$-\frac{1}{2}\left(\log\left(\sqrt{x}+1\right) - \log\left(\sqrt{x}-1\right)\right)\log(x) + \operatorname{arcoth}\left(\sqrt{x}\right)\log(x) + \log\left(-\sqrt{x}\right)\log\left(\sqrt{x}+1\right) - \frac{1}{2}\log(x)\log\left(\sqrt{x}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(x^(1/2))/x,x, algorithm="maxima")
```

```
[Out] -1/2*(log(sqrt(x) + 1) - log(sqrt(x) - 1))*log(x) + arccoth(sqrt(x))*log(x)
 + log(-sqrt(x))*log(sqrt(x) + 1) - 1/2*log(x)*log(sqrt(x) - 1) + dilog(sqr
t(x) + 1) - dilog(-sqrt(x) + 1)
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.05

$$\int \frac{\operatorname{acoth}\left(\sqrt{x}\right)}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(x^(1/2))/x,x)
```

```
[Out] int(acoth(x^(1/2))/x, x)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{acoth}\left(\sqrt{x}\right)}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(x**(1/2))/x,x)
```

```
[Out] Integral(acoth(sqrt(x))/x, x)
```

## 3.87 $\int \frac{\coth^{-1}\left(\sqrt{x}\right)}{x^2} dx$

**Optimal**. Leaf size=25

$$-\frac{1}{\sqrt{x}}+\tanh^{-1}\left(\sqrt{x}\right)-\frac{\coth^{-1}\left(\sqrt{x}\right)}{x}$$

```
[Out] -arccoth(x^(1/2))/x+arctanh(x^(1/2))-1/x^(1/2)
```

**Rubi [A]** time = 0.01, antiderivative size = 25, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 4, integrand size = 10, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.400, Rules used = {6098, 51, 63, 206}

$$-\frac{1}{\sqrt{x}}+\tanh^{-1}\left(\sqrt{x}\right)-\frac{\coth^{-1}\left(\sqrt{x}\right)}{x}$$

Antiderivative was successfully verified.

```
[In] Int[ArcCoth[Sqrt[x]]/x^2,x]
```

```
[Out] -(1/Sqrt[x]) - ArcCoth[Sqrt[x]]/x + ArcTanh[Sqrt[x]]
```

Rule 51

```
Int[((a_.) + (b_.)*(x_))^(m_)*((c_.) + (d_.)*(x_))^(n_), x_Symbol] :> Simp[
((a + b*x)^(m + 1)*(c + d*x)^(n + 1))/((b*c - a*d)*(m + 1)), x] - Dist[(d*(
m + n + 2))/((b*c - a*d)*(m + 1)), Int[(a + b*x)^(m + 1)*(c + d*x)^n, x], x
] /; FreeQ[{a, b, c, d, n}, x] && NeQ[b*c - a*d, 0] && LtQ[m, -1] && !(LtQ
[n, -1] && (EqQ[a, 0] || (NeQ[c, 0] && LtQ[m - n, 0] && IntegerQ[n]))) && I
ntLinearQ[a, b, c, d, m, n, x]
```

Rule 63

```
Int[((a_.) + (b_.)*(x_))^(m_)*((c_.) + (d_.)*(x_))^(n_), x_Symbol] :> With[
{p = Denominator[m]}, Dist[p/b, Subst[Int[x^(p*(m + 1) - 1)*(c - (a*d)/b +
(d*x^p)/b)^n, x], x, (a + b*x)^(1/p)], x]] /; FreeQ[{a, b, c, d}, x] && NeQ
[b*c - a*d, 0] && LtQ[-1, m, 0] && LeQ[-1, n, 0] && LeQ[Denominator[n], Den
ominator[m]] && IntLinearQ[a, b, c, d, m, n, x]
```

Rule 206

```
Int[((a_) + (b_.)*(x_)^2)^(-1), x_Symbol] :> Simp[(1*ArcTanh[(Rt[-b, 2]*x)/
Rt[a, 2]])/(Rt[a, 2]*Rt[-b, 2]), x] /; FreeQ[{a, b}, x] && NegQ[a/b] && (Gt
Q[a, 0] || LtQ[b, 0])
```

Rule 6098

```
Int[((a_.) + ArcCoth[(c_.)*(x_)^(n_)]*(b_.))*((d_.)*(x_))^(m_.), x_Symbol]
:> Simp[((d*x)^(m + 1)*(a + b*ArcCoth[c*x^n]))/(d*(m + 1)), x] - Dist[(b*c*
n)/(d*(m + 1)), Int[(x^(n - 1)*(d*x)^(m + 1))/(1 - c^2*x^(2*n)), x], x] /;
FreeQ[{a, b, c, d, m, n}, x] && NeQ[m, -1]
```

Rubi steps

$$\int \frac{\coth^{-1}\left(\sqrt{x}\right)}{x^2}\,dx = -\frac{\coth^{-1}\left(\sqrt{x}\right)}{x} + \frac{1}{2}\int \frac{1}{(1-x)x^{3/2}}\,dx$$
$$= -\frac{1}{\sqrt{x}} - \frac{\coth^{-1}\left(\sqrt{x}\right)}{x} + \frac{1}{2}\int \frac{1}{(1-x)\sqrt{x}}\,dx$$
$$= -\frac{1}{\sqrt{x}} - \frac{\coth^{-1}\left(\sqrt{x}\right)}{x} + \text{Subst}\left(\int \frac{1}{1-x^2}\,dx, x, \sqrt{x}\right)$$
$$= -\frac{1}{\sqrt{x}} - \frac{\coth^{-1}\left(\sqrt{x}\right)}{x} + \tanh^{-1}\left(\sqrt{x}\right)$$

**Mathematica** [A] time = 0.02, size = 45, normalized size = 1.80

$$-\frac{1}{\sqrt{x}} - \frac{1}{2}\log\left(1-\sqrt{x}\right) + \frac{1}{2}\log\left(\sqrt{x}+1\right) - \frac{\coth^{-1}\left(\sqrt{x}\right)}{x}$$

Antiderivative was successfully verified.

```
[In] Integrate[ArcCoth[Sqrt[x]]/x^2,x]
[Out] -(1/Sqrt[x]) - ArcCoth[Sqrt[x]]/x - Log[1 - Sqrt[x]]/2 + Log[1 + Sqrt[x]]/2
```

**fricas** [A] time = 0.49, size = 30, normalized size = 1.20

$$\frac{(x-1)\log\left(\frac{x+2\sqrt{x}+1}{x-1}\right) - 2\sqrt{x}}{2x}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(x^(1/2))/x^2,x, algorithm="fricas")
[Out] 1/2*((x - 1)*log((x + 2*sqrt(x) + 1)/(x - 1)) - 2*sqrt(x))/x
```

**giac** [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\text{arcoth}\left(\sqrt{x}\right)}{x^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(x^(1/2))/x^2,x, algorithm="giac")
[Out] integrate(arccoth(sqrt(x))/x^2, x)
```

**maple** [A] time = 0.05, size = 32, normalized size = 1.28

$$-\frac{\text{arccoth}\left(\sqrt{x}\right)}{x} - \frac{1}{\sqrt{x}} - \frac{\ln\left(-1+\sqrt{x}\right)}{2} + \frac{\ln\left(1+\sqrt{x}\right)}{2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(arccoth(x^(1/2))/x^2,x)
[Out] -arccoth(x^(1/2))/x-1/x^(1/2)-1/2*ln(-1+x^(1/2))+1/2*ln(1+x^(1/2))
```

**maxima** [A] time = 0.30, size = 31, normalized size = 1.24

$$-\frac{\text{arcoth}\left(\sqrt{x}\right)}{x} - \frac{1}{\sqrt{x}} + \frac{1}{2}\log\left(\sqrt{x}+1\right) - \frac{1}{2}\log\left(\sqrt{x}-1\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(x^(1/2))/x^2,x, algorithm="maxima")
```

```
[Out] -arccoth(sqrt(x))/x - 1/sqrt(x) + 1/2*log(sqrt(x) + 1) - 1/2*log(sqrt(x) -
1)
```

**mupad [B]** time = 1.27, size = 18, normalized size = 0.72

$$\operatorname{atanh}\left(\sqrt{x}\right)-\frac{\operatorname{acoth}\left(\sqrt{x}\right)+\sqrt{x}}{x}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(x^(1/2))/x^2,x)
```

```
[Out] atanh(x^(1/2)) - (acoth(x^(1/2)) + x^(1/2))/x
```

**sympy [B]** time = 2.12, size = 92, normalized size = 3.68

$$\frac{x^{\frac{5}{2}}\operatorname{acoth}\left(\sqrt{x}\right)}{x^{\frac{5}{2}}-x^{\frac{3}{2}}}-\frac{2x^{\frac{3}{2}}\operatorname{acoth}\left(\sqrt{x}\right)}{x^{\frac{5}{2}}-x^{\frac{3}{2}}}+\frac{\sqrt{x}\operatorname{acoth}\left(\sqrt{x}\right)}{x^{\frac{5}{2}}-x^{\frac{3}{2}}}-\frac{x^{2}}{x^{\frac{5}{2}}-x^{\frac{3}{2}}}+\frac{x}{x^{\frac{5}{2}}-x^{\frac{3}{2}}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(x**(1/2))/x**2,x)
```

```
[Out] x**(5/2)*acoth(sqrt(x))/(x**(5/2) - x**(3/2)) - 2*x**(3/2)*acoth(sqrt(x))/(
x**(5/2) - x**(3/2)) + sqrt(x)*acoth(sqrt(x))/(x**(5/2) - x**(3/2)) - x**2/
(x**(5/2) - x**(3/2)) + x/(x**(5/2) - x**(3/2))
```

# 3.88 $\int \frac{\coth^{-1}\left(\sqrt{x}\right)}{x^3} dx$

**Optimal**. Leaf size=42

$$-\frac{1}{6x^{3/2}} - \frac{\coth^{-1}\left(\sqrt{x}\right)}{2x^2} - \frac{1}{2\sqrt{x}} + \frac{1}{2}\tanh^{-1}\left(\sqrt{x}\right)$$

```
[Out] -1/6/x^(3/2)-1/2*arccoth(x^(1/2))/x^2+1/2*arctanh(x^(1/2))-1/2/x^(1/2)
```

**Rubi [A]** time = 0.01, antiderivative size = 42, normalized size of antiderivative = 1.00, number of steps used = 5, number of rules used = 4, integrand size = 10, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.400, Rules used = {6098, 51, 63, 206}

$$-\frac{1}{6x^{3/2}} - \frac{\coth^{-1}\left(\sqrt{x}\right)}{2x^2} - \frac{1}{2\sqrt{x}} + \frac{1}{2}\tanh^{-1}\left(\sqrt{x}\right)$$

Antiderivative was successfully verified.

```
[In] Int[ArcCoth[Sqrt[x]]/x^3,x]
```

```
[Out] -1/(6*x^(3/2)) - 1/(2*Sqrt[x]) - ArcCoth[Sqrt[x]]/(2*x^2) + ArcTanh[Sqrt[x]
]/2
```

Rule 51

```
Int[((a_.) + (b_.)*(x_))^(m_)*((c_.) + (d_.)*(x_))^(n_), x_Symbol] :> Simp[
((a + b*x)^(m + 1)*(c + d*x)^(n + 1))/((b*c - a*d)*(m + 1)), x] - Dist[(d*(
m + n + 2))/((b*c - a*d)*(m + 1)), Int[(a + b*x)^(m + 1)*(c + d*x)^n, x], x
] /; FreeQ[{a, b, c, d, n}, x] && NeQ[b*c - a*d, 0] && LtQ[m, -1] &&  !(LtQ
[n, -1] && (EqQ[a, 0] || (NeQ[c, 0] && LtQ[m - n, 0] && IntegerQ[n]))) && I
ntLinearQ[a, b, c, d, m, n, x]
```

Rule 63

```
Int[((a_.) + (b_.)*(x_))^(m_)*((c_.) + (d_.)*(x_))^(n_), x_Symbol] :> With[
{p = Denominator[m]}, Dist[p/b, Subst[Int[x^(p*(m + 1) - 1)*(c - (a*d)/b +
(d*x^p)/b)^n, x], x, (a + b*x)^(1/p)], x]] /; FreeQ[{a, b, c, d}, x] && NeQ
[b*c - a*d, 0] && LtQ[-1, m, 0] && LeQ[-1, n, 0] && LeQ[Denominator[n], Den
ominator[m]] && IntLinearQ[a, b, c, d, m, n, x]
```

Rule 206

```
Int[((a_) + (b_.)*(x_)^2)^(-1), x_Symbol] :> Simp[(1*ArcTanh[(Rt[-b, 2]*x)/
Rt[a, 2]])/(Rt[a, 2]*Rt[-b, 2]), x] /; FreeQ[{a, b}, x] && NegQ[a/b] && (Gt
Q[a, 0] || LtQ[b, 0])
```

Rule 6098

```
Int[((a_.) + ArcCoth[(c_.)*(x_)^(n_)]*(b_.))*((d_.)*(x_))^(m_.), x_Symbol]
:> Simp[((d*x)^(m + 1)*(a + b*ArcCoth[c*x^n]))/(d*(m + 1)), x] - Dist[(b*c*
n)/(d*(m + 1)), Int[(x^(n - 1)*(d*x)^(m + 1))/(1 - c^2*x^(2*n)), x], x] /;
FreeQ[{a, b, c, d, m, n}, x] && NeQ[m, -1]
```

Rubi steps

$$
\begin{aligned}
\int \frac{\coth^{-1}\left(\sqrt{x}\right)}{x^3}\,dx &= -\frac{\coth^{-1}\left(\sqrt{x}\right)}{2x^2}+\frac{1}{4}\int \frac{1}{(1-x)x^{5/2}}\,dx\\
&= -\frac{1}{6x^{3/2}}-\frac{\coth^{-1}\left(\sqrt{x}\right)}{2x^2}+\frac{1}{4}\int \frac{1}{(1-x)x^{3/2}}\,dx\\
&= -\frac{1}{6x^{3/2}}-\frac{1}{2\sqrt{x}}-\frac{\coth^{-1}\left(\sqrt{x}\right)}{2x^2}+\frac{1}{4}\int \frac{1}{(1-x)\sqrt{x}}\,dx\\
&= -\frac{1}{6x^{3/2}}-\frac{1}{2\sqrt{x}}-\frac{\coth^{-1}\left(\sqrt{x}\right)}{2x^2}+\frac{1}{2}\,\text{Subst}\left(\int \frac{1}{1-x^2}\,dx,x,\sqrt{x}\right)\\
&= -\frac{1}{6x^{3/2}}-\frac{1}{2\sqrt{x}}-\frac{\coth^{-1}\left(\sqrt{x}\right)}{2x^2}+\frac{1}{2}\tanh^{-1}\left(\sqrt{x}\right)
\end{aligned}
$$

**Mathematica** [A] time = 0.02, size = 58, normalized size = 1.38

$$
-\frac{1}{6x^{3/2}}-\frac{\coth^{-1}\left(\sqrt{x}\right)}{2x^2}-\frac{1}{2\sqrt{x}}-\frac{1}{4}\log\left(1-\sqrt{x}\right)+\frac{1}{4}\log\left(\sqrt{x}+1\right)
$$

Antiderivative was successfully verified.

```
[In] Integrate[ArcCoth[Sqrt[x]]/x^3,x]
[Out] -1/6*1/x^(3/2) - 1/(2*Sqrt[x]) - ArcCoth[Sqrt[x]]/(2*x^2) - Log[1 - Sqrt[x]
]/4 + Log[1 + Sqrt[x]]/4
```

**fricas** [A] time = 0.51, size = 38, normalized size = 0.90

$$
\frac{3\left(x^2-1\right)\log\left(\frac{x+2\sqrt{x}+1}{x-1}\right)-2\,(3\,x+1)\sqrt{x}}{12\,x^2}
$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(x^(1/2))/x^3,x, algorithm="fricas")
[Out] 1/12*(3*(x^2 - 1)*log((x + 2*sqrt(x) + 1)/(x - 1)) - 2*(3*x + 1)*sqrt(x))/x
^2
```

**giac** [F] time = 0.00, size = 0, normalized size = 0.00

$$
\int \frac{\operatorname{arcoth}\left(\sqrt{x}\right)}{x^3}\,dx
$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(x^(1/2))/x^3,x, algorithm="giac")
[Out] integrate(arccoth(sqrt(x))/x^3, x)
```

**maple** [A] time = 0.05, size = 37, normalized size = 0.88

$$
-\frac{\operatorname{arccoth}\left(\sqrt{x}\right)}{2x^2}-\frac{1}{6x^{\frac{3}{2}}}-\frac{1}{2\sqrt{x}}-\frac{\ln\left(-1+\sqrt{x}\right)}{4}+\frac{\ln\left(1+\sqrt{x}\right)}{4}
$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(arccoth(x^(1/2))/x^3,x)
```

```
[Out] -1/2*arccoth(x^(1/2))/x^2-1/6/x^(3/2)-1/2/x^(1/2)-1/4*ln(-1+x^(1/2))+1/4*ln
(1+x^(1/2))
```

**maxima [A]** time = 0.31, size = 36, normalized size = 0.86

$$-\frac{3x+1}{6x^{\frac{3}{2}}}-\frac{\operatorname{arcoth}\left(\sqrt{x}\right)}{2x^2}+\frac{1}{4}\log\left(\sqrt{x}+1\right)-\frac{1}{4}\log\left(\sqrt{x}-1\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(x^(1/2))/x^3,x, algorithm="maxima")
```

```
[Out] -1/6*(3*x + 1)/x^(3/2) - 1/2*arccoth(sqrt(x))/x^2 + 1/4*log(sqrt(x) + 1) -
1/4*log(sqrt(x) - 1)
```

**mupad [B]** time = 1.49, size = 45, normalized size = 1.07

$$\frac{\ln\left(1-\frac{1}{\sqrt{x}}\right)}{4x^2}-\frac{\frac{x}{2}+\frac{1}{6}}{x^{3/2}}-\frac{\ln\left(\frac{1}{\sqrt{x}}+1\right)}{4x^2}-\frac{\operatorname{atan}\left(\sqrt{x}\,1i\right)1i}{2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(x^(1/2))/x^3,x)
```

```
[Out] log(1 - 1/x^(1/2))/(4*x^2) - (atan(x^(1/2)*1i)*1i)/2 - (x/2 + 1/6)/x^(3/2)
- log(1/x^(1/2) + 1)/(4*x^2)
```

**sympy [B]** time = 5.45, size = 160, normalized size = 3.81

$$\frac{3x^{\frac{7}{2}}\operatorname{acoth}\left(\sqrt{x}\right)}{6x^{\frac{7}{2}}-6x^{\frac{5}{2}}}-\frac{3x^{\frac{5}{2}}\operatorname{acoth}\left(\sqrt{x}\right)}{6x^{\frac{7}{2}}-6x^{\frac{5}{2}}}-\frac{3x^{\frac{3}{2}}\operatorname{acoth}\left(\sqrt{x}\right)}{6x^{\frac{7}{2}}-6x^{\frac{5}{2}}}+\frac{3\sqrt{x}\operatorname{acoth}\left(\sqrt{x}\right)}{6x^{\frac{7}{2}}-6x^{\frac{5}{2}}}-\frac{3x^3}{6x^{\frac{7}{2}}-6x^{\frac{5}{2}}}+\frac{2x^2}{6x^{\frac{7}{2}}-6x^{\frac{5}{2}}}+\frac{x}{6x^{\frac{7}{2}}-6x^{\frac{5}{2}}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(x**(1/2))/x**3,x)
```

```
[Out] 3*x**(7/2)*acoth(sqrt(x))/(6*x**(7/2) - 6*x**(5/2)) - 3*x**(5/2)*acoth(sqrt
(x))/(6*x**(7/2) - 6*x**(5/2)) - 3*x**(3/2)*acoth(sqrt(x))/(6*x**(7/2) - 6*
x**(5/2)) + 3*sqrt(x)*acoth(sqrt(x))/(6*x**(7/2) - 6*x**(5/2)) - 3*x**3/(6*
x**(7/2) - 6*x**(5/2)) + 2*x**2/(6*x**(7/2) - 6*x**(5/2)) + x/(6*x**(7/2) -
 6*x**(5/2))
```

## 3.89 $\int x^{3/2}\coth^{-1}\left(\sqrt{x}\right)\,dx$

**Optimal**. Leaf size=38

$$\frac{2}{5}x^{5/2}\coth^{-1}\left(\sqrt{x}\right)+\frac{x^2}{10}+\frac{x}{5}+\frac{1}{5}\log(1-x)$$

```
[Out] 1/5*x+1/10*x^2+2/5*x^(5/2)*arccoth(x^(1/2))+1/5*ln(1-x)
```

**Rubi [A]** time = 0.02, antiderivative size = 38, normalized size of antiderivative = 1.00, number of steps used = 3, number of rules used = 2, integrand size = 12, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.167, Rules used = {6098, 43}

$$\frac{x^2}{10}+\frac{2}{5}x^{5/2}\coth^{-1}\left(\sqrt{x}\right)+\frac{x}{5}+\frac{1}{5}\log(1-x)$$

Antiderivative was successfully verified.

```
[In] Int[x^(3/2)*ArcCoth[Sqrt[x]],x]
```

```
[Out] x/5 + x^2/10 + (2*x^(5/2)*ArcCoth[Sqrt[x]])/5 + Log[1 - x]/5
```

Rule 43

```
Int[((a_.) + (b_.)*(x_))^(m_.)*((c_.) + (d_.)*(x_))^(n_.), x_Symbol] :> Int
[ExpandIntegrand[(a + b*x)^m*(c + d*x)^n, x], x] /; FreeQ[{a, b, c, d, n},
x] && NeQ[b*c - a*d, 0] && IGtQ[m, 0] && ( !IntegerQ[n] || (EqQ[c, 0] && Le
Q[7*m + 4*n + 4, 0]) || LtQ[9*m + 5*(n + 1), 0] || GtQ[m + n + 2, 0])
```

Rule 6098

```
Int[((a_.) + ArcCoth[(c_.)*(x_)^(n_)]*(b_.))*((d_.)*(x_))^(m_.), x_Symbol]
:> Simp[((d*x)^(m + 1)*(a + b*ArcCoth[c*x^n]))/(d*(m + 1)), x] - Dist[(b*c*
n)/(d*(m + 1)), Int[(x^(n - 1)*(d*x)^(m + 1))/(1 - c^2*x^(2*n)), x], x] /;
FreeQ[{a, b, c, d, m, n}, x] && NeQ[m, -1]
```

Rubi steps

$$\begin{aligned}\int x^{3/2}\coth^{-1}\left(\sqrt{x}\right)\,dx&=\frac{2}{5}x^{5/2}\coth^{-1}\left(\sqrt{x}\right)-\frac{1}{5}\int\frac{x^2}{1-x}\,dx\\&=\frac{2}{5}x^{5/2}\coth^{-1}\left(\sqrt{x}\right)-\frac{1}{5}\int\left(-1+\frac{1}{1-x}-x\right)dx\\&=\frac{x}{5}+\frac{x^2}{10}+\frac{2}{5}x^{5/2}\coth^{-1}\left(\sqrt{x}\right)+\frac{1}{5}\log(1-x)\end{aligned}$$

**Mathematica [A]** time = 0.02, size = 31, normalized size = 0.82

$$\frac{1}{10}\left(4x^{5/2}\coth^{-1}\left(\sqrt{x}\right)+(x+2)x+2\log(1-x)\right)$$

Antiderivative was successfully verified.

```
[In] Integrate[x^(3/2)*ArcCoth[Sqrt[x]],x]
```

```
[Out] (x*(2 + x) + 4*x^(5/2)*ArcCoth[Sqrt[x]] + 2*Log[1 - x])/10
```

**fricas [A]** time = 1.27, size = 35, normalized size = 0.92

$$\frac{1}{5}x^{\frac{5}{2}}\log\left(\frac{x+2\sqrt{x}+1}{x-1}\right)+\frac{1}{10}x^2+\frac{1}{5}x+\frac{1}{5}\log(x-1)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^(3/2)*arccoth(x^(1/2)),x, algorithm="fricas")
```

```
[Out] 1/5*x^(5/2)*log((x + 2*sqrt(x) + 1)/(x - 1)) + 1/10*x^2 + 1/5*x + 1/5*log(x
 - 1)
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int x^{\frac{3}{2}} \operatorname{arcoth}\left(\sqrt{x}\right) dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^(3/2)*arccoth(x^(1/2)),x, algorithm="giac")
```

```
[Out] integrate(x^(3/2)*arccoth(sqrt(x)), x)
```

**maple [A]** time = 0.05, size = 35, normalized size = 0.92

$$\frac{2x^{\frac{5}{2}}\operatorname{arccoth}\left(\sqrt{x}\right)}{5}+\frac{x^{2}}{10}+\frac{x}{5}+\frac{\ln\left(-1+\sqrt{x}\right)}{5}+\frac{\ln\left(1+\sqrt{x}\right)}{5}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^(3/2)*arccoth(x^(1/2)),x)
```

```
[Out] 2/5*x^(5/2)*arccoth(x^(1/2))+1/10*x^2+1/5*x+1/5*ln(-1+x^(1/2))+1/5*ln(1+x^(
1/2))
```

**maxima [A]** time = 0.31, size = 24, normalized size = 0.63

$$\frac{2}{5}\,x^{\frac{5}{2}} \operatorname{arcoth}\left(\sqrt{x}\right)+\frac{1}{10}\,x^{2}+\frac{1}{5}\,x+\frac{1}{5}\,\log\left(x-1\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^(3/2)*arccoth(x^(1/2)),x, algorithm="maxima")
```

```
[Out] 2/5*x^(5/2)*arccoth(sqrt(x)) + 1/10*x^2 + 1/5*x + 1/5*log(x - 1)
```

**mupad [B]** time = 1.26, size = 24, normalized size = 0.63

$$\frac{x}{5}+\frac{\ln\left(x-1\right)}{5}+\frac{2\,x^{5/2}\,\mathrm{acoth}\left(\sqrt{x}\right)}{5}+\frac{x^2}{10}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^(3/2)*acoth(x^(1/2)),x)
```

```
[Out] x/5 + log(x - 1)/5 + (2*x^(5/2)*acoth(x^(1/2)))/5 + x^2/10
```

**sympy [B]** time = 5.35, size = 121, normalized size = 3.18

$$\frac{4x^{\frac{7}{2}}\operatorname{acoth}\left(\sqrt{x}\right)}{10x-10}-\frac{4x^{\frac{5}{2}}\operatorname{acoth}\left(\sqrt{x}\right)}{10x-10}+\frac{x^{3}}{10x-10}+\frac{x^{2}}{10x-10}+\frac{4x\log\left(\sqrt{x}+1\right)}{10x-10}-\frac{4x\operatorname{acoth}\left(\sqrt{x}\right)}{10x-10}-\frac{4\log\left(\sqrt{x}+1\right)}{10x-10}+$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**(3/2)*acoth(x**(1/2)),x)
```

```
[Out] 4*x**(7/2)*acoth(sqrt(x))/(10*x - 10) - 4*x**(5/2)*acoth(sqrt(x))/(10*x - 1
0) + x**3/(10*x - 10) + x**2/(10*x - 10) + 4*x*log(sqrt(x) + 1)/(10*x - 10)
 - 4*x*acoth(sqrt(x))/(10*x - 10) - 4*log(sqrt(x) + 1)/(10*x - 10) + 4*acot
h(sqrt(x))/(10*x - 10) - 2/(10*x - 10)
```

## 3.90 $\int \sqrt{x} \coth^{-1}\left(\sqrt{x}\right) dx$

**Optimal**. Leaf size=31

$$\frac{2}{3}x^{3/2}\coth^{-1}\left(\sqrt{x}\right)+\frac{x}{3}+\frac{1}{3}\log(1-x)$$

```
[Out] 1/3*x+2/3*x^(3/2)*arccoth(x^(1/2))+1/3*ln(1-x)
```

**Rubi [A]** time = 0.01, antiderivative size = 31, normalized size of antiderivative = 1.00, number of steps used = 3, number of rules used = 2, integrand size = 12, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.167, Rules used = {6098, 43}

$$\frac{2}{3}x^{3/2}\coth^{-1}\left(\sqrt{x}\right)+\frac{x}{3}+\frac{1}{3}\log(1-x)$$

Antiderivative was successfully verified.

```
[In] Int[Sqrt[x]*ArcCoth[Sqrt[x]],x]
```

```
[Out] x/3 + (2*x^(3/2)*ArcCoth[Sqrt[x]])/3 + Log[1 - x]/3
```

Rule 43

```
Int[((a_.) + (b_.)*(x_))^(m_.)*((c_.) + (d_.)*(x_))^(n_.), x_Symbol] :> Int
[ExpandIntegrand[(a + b*x)^m*(c + d*x)^n, x], x] /; FreeQ[{a, b, c, d, n},
x] && NeQ[b*c - a*d, 0] && IGtQ[m, 0] && ( !IntegerQ[n] || (EqQ[c, 0] && Le
Q[7*m + 4*n + 4, 0]) || LtQ[9*m + 5*(n + 1), 0] || GtQ[m + n + 2, 0])
```

Rule 6098

```
Int[((a_.) + ArcCoth[(c_.)*(x_)^(n_)]*(b_.))*((d_.)*(x_))^(m_.), x_Symbol]
:> Simp[((d*x)^(m + 1)*(a + b*ArcCoth[c*x^n]))/(d*(m + 1)), x] - Dist[(b*c*
n)/(d*(m + 1)), Int[(x^(n - 1)*(d*x)^(m + 1))/(1 - c^2*x^(2*n)), x], x] /;
FreeQ[{a, b, c, d, m, n}, x] && NeQ[m, -1]
```

Rubi steps

$$\begin{aligned}\int \sqrt{x}\coth^{-1}\left(\sqrt{x}\right) dx &= \frac{2}{3}x^{3/2}\coth^{-1}\left(\sqrt{x}\right)-\frac{1}{3}\int \frac{x}{1-x}\,dx\\ &= \frac{2}{3}x^{3/2}\coth^{-1}\left(\sqrt{x}\right)-\frac{1}{3}\int \left(-1+\frac{1}{1-x}\right) dx\\ &= \frac{x}{3}+\frac{2}{3}x^{3/2}\coth^{-1}\left(\sqrt{x}\right)+\frac{1}{3}\log(1-x)\end{aligned}$$

**Mathematica [A]** time = 0.01, size = 25, normalized size = 0.81

$$\frac{1}{3}\left(2x^{3/2}\coth^{-1}\left(\sqrt{x}\right)+x+\log(1-x)\right)$$

Antiderivative was successfully verified.

```
[In] Integrate[Sqrt[x]*ArcCoth[Sqrt[x]],x]
```

```
[Out] (x + 2*x^(3/2)*ArcCoth[Sqrt[x]] + Log[1 - x])/3
```

**fricas [A]** time = 0.65, size = 30, normalized size = 0.97

$$\frac{1}{3}x^{\frac{3}{2}}\log\left(\frac{x+2\sqrt{x}+1}{x-1}\right)+\frac{1}{3}x+\frac{1}{3}\log\left(x-1\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(x^(1/2))*x^(1/2),x, algorithm="fricas")
[Out] 1/3*x^(3/2)*log((x + 2*sqrt(x) + 1)/(x - 1)) + 1/3*x + 1/3*log(x - 1)
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \sqrt{x} \operatorname{arcoth}\left(\sqrt{x}\right) dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(x^(1/2))*x^(1/2),x, algorithm="giac")
[Out] integrate(sqrt(x)*arccoth(sqrt(x)), x)
```

**maple [A]** time = 0.04, size = 30, normalized size = 0.97

$$\frac{2x^{\frac{3}{2}}\operatorname{arccoth}\left(\sqrt{x}\right)}{3}+\frac{x}{3}+\frac{\ln\left(-1+\sqrt{x}\right)}{3}+\frac{\ln\left(1+\sqrt{x}\right)}{3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(arccoth(x^(1/2))*x^(1/2),x)
[Out] 2/3*x^(3/2)*arccoth(x^(1/2))+1/3*x+1/3*ln(-1+x^(1/2))+1/3*ln(1+x^(1/2))
```

**maxima [A]** time = 0.31, size = 19, normalized size = 0.61

$$\frac{2}{3}\,x^{\frac{3}{2}} \operatorname{arcoth}\left(\sqrt{x}\right)+\frac{1}{3}\,x+\frac{1}{3}\,\log\left(x-1\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(x^(1/2))*x^(1/2),x, algorithm="maxima")
[Out] 2/3*x^(3/2)*arccoth(sqrt(x)) + 1/3*x + 1/3*log(x - 1)
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.03

$$\int \sqrt{x}\,\mathrm{acoth}\left(\sqrt{x}\right) dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^(1/2)*acoth(x^(1/2)),x)
[Out] int(x^(1/2)*acoth(x^(1/2)), x)
```

**sympy [A]** time = 1.07, size = 39, normalized size = 1.26

$$\frac{2x^{\frac{3}{2}}\operatorname{acoth}\left(\sqrt{x}\right)}{3}+\frac{x}{3}+\frac{2\log\left(\sqrt{x}+1\right)}{3}-\frac{2\operatorname{acoth}\left(\sqrt{x}\right)}{3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(x**(1/2))*x**(1/2),x)
[Out] 2*x**(3/2)*acoth(sqrt(x))/3 + x/3 + 2*log(sqrt(x) + 1)/3 - 2*acoth(sqrt(x))
/3
```

# 3.91 $\int \frac{\coth^{-1}(\sqrt{x})}{\sqrt{x}} \, dx$

**Optimal**. Leaf size=20

$$\log(1-x) + 2\sqrt{x}\coth^{-1}\left(\sqrt{x}\right)$$

```
[Out] ln(1-x)+2*arccoth(x^(1/2))*x^(1/2)
```

**Rubi [A]** time = 0.01, antiderivative size = 20, normalized size of antiderivative = 1.00, number of steps used = 2, number of rules used = 2, integrand size = 12, $\frac{\text{number of rules}}{\text{integrand size}} = 0.167$, Rules used = {6098, 31}

$$\log(1-x) + 2\sqrt{x}\coth^{-1}\left(\sqrt{x}\right)$$

Antiderivative was successfully verified.

```
[In] Int[ArcCoth[Sqrt[x]]/Sqrt[x],x]
```

```
[Out] 2*Sqrt[x]*ArcCoth[Sqrt[x]] + Log[1 - x]
```

Rule 31

```
Int[((a_) + (b_.)*(x_))^(-1), x_Symbol] :> Simp[Log[RemoveContent[a + b*x, x]]/b, x] /; FreeQ[{a, b}, x]
```

Rule 6098

```
Int[((a_.) + ArcCoth[(c_.)*(x_)^(n_)]*(b_.))*((d_.)*(x_))^(m_.), x_Symbol] :> Simp[((d*x)^(m + 1)*(a + b*ArcCoth[c*x^n]))/(d*(m + 1)), x] - Dist[(b*c*n)/(d*(m + 1)), Int[(x^(n - 1)*(d*x)^(m + 1))/(1 - c^2*x^(2*n)), x], x] /; FreeQ[{a, b, c, d, m, n}, x] && NeQ[m, -1]
```

Rubi steps

$$\begin{aligned}\int \frac{\coth^{-1}\left(\sqrt{x}\right)}{\sqrt{x}} \, dx &= 2\sqrt{x}\coth^{-1}\left(\sqrt{x}\right) - \int \frac{1}{1-x} \, dx \\ &= 2\sqrt{x}\coth^{-1}\left(\sqrt{x}\right) + \log(1-x)\end{aligned}$$

**Mathematica [A]** time = 0.01, size = 20, normalized size = 1.00

$$\log(1-x) + 2\sqrt{x}\coth^{-1}\left(\sqrt{x}\right)$$

Antiderivative was successfully verified.

```
[In] Integrate[ArcCoth[Sqrt[x]]/Sqrt[x],x]
```

```
[Out] 2*Sqrt[x]*ArcCoth[Sqrt[x]] + Log[1 - x]
```

**fricas [A]** time = 0.65, size = 24, normalized size = 1.20

$$\sqrt{x}\log\left(\frac{x+2\sqrt{x}+1}{x-1}\right) + \log(x-1)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(x^(1/2))/x^(1/2),x, algorithm="fricas")
```

```
[Out] sqrt(x)*log((x + 2*sqrt(x) + 1)/(x - 1)) + log(x - 1)
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{arcoth}\left(\sqrt{x}\right)}{\sqrt{x}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(x^(1/2))/x^(1/2),x, algorithm="giac")
[Out] integrate(arccoth(sqrt(x))/sqrt(x), x)
```

**maple [A]** time = 0.05, size = 15, normalized size = 0.75

$$2\operatorname{arccoth}\left(\sqrt{x}\right)\sqrt{x}+\ln\left(-1+x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(arccoth(x^(1/2))/x^(1/2),x)
[Out] 2*arccoth(x^(1/2))*x^(1/2)+ln(-1+x)
```

**maxima [A]** time = 0.30, size = 16, normalized size = 0.80

$$2\sqrt{x}\,\operatorname{arcoth}\left(\sqrt{x}\right)+\log\left(-x+1\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(x^(1/2))/x^(1/2),x, algorithm="maxima")
[Out] 2*sqrt(x)*arccoth(sqrt(x)) + log(-x + 1)
```

**mupad [B]** time = 1.29, size = 14, normalized size = 0.70

$$\ln\left(x-1\right)+2\sqrt{x}\,\operatorname{acoth}\left(\sqrt{x}\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(x^(1/2))/x^(1/2),x)
[Out] log(x - 1) + 2*x^(1/2)*acoth(x^(1/2))
```

**sympy [B]** time = 0.54, size = 87, normalized size = 4.35

$$\frac{2x^{\frac{3}{2}}\operatorname{acoth}\left(\sqrt{x}\right)}{x-1}-\frac{2\sqrt{x}\,\operatorname{acoth}\left(\sqrt{x}\right)}{x-1}+\frac{2x\log\left(\sqrt{x}+1\right)}{x-1}-\frac{2x\operatorname{acoth}\left(\sqrt{x}\right)}{x-1}-\frac{2\log\left(\sqrt{x}+1\right)}{x-1}+\frac{2\operatorname{acoth}\left(\sqrt{x}\right)}{x-1}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(x**(1/2))/x**(1/2),x)
[Out] 2*x**(3/2)*acoth(sqrt(x))/(x - 1) - 2*sqrt(x)*acoth(sqrt(x))/(x - 1) + 2*x*
log(sqrt(x) + 1)/(x - 1) - 2*x*acoth(sqrt(x))/(x - 1) - 2*log(sqrt(x) + 1)/
(x - 1) + 2*acoth(sqrt(x))/(x - 1)
```

# 3.92 $\int \frac{\coth^{-1}(\sqrt{x})}{x^{3/2}}\,dx$

**Optimal**. Leaf size=24

$$-\log(1-x)+\log(x)-\frac{2\coth^{-1}(\sqrt{x})}{\sqrt{x}}$$

```
[Out] -ln(1-x)+ln(x)-2*arccoth(x^(1/2))/x^(1/2)
```

**Rubi [A]** time = 0.01, antiderivative size = 24, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 4, integrand size = 12, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.333, Rules used = {6098, 36, 31, 29}

$$-\log(1-x)+\log(x)-\frac{2\coth^{-1}(\sqrt{x})}{\sqrt{x}}$$

Antiderivative was successfully verified.

```
[In] Int[ArcCoth[Sqrt[x]]/x^(3/2),x]
```

```
[Out] (-2*ArcCoth[Sqrt[x]])/Sqrt[x] - Log[1 - x] + Log[x]
```

Rule 29

```
Int[(x_)^(-1), x_Symbol] :> Simp[Log[x], x]
```

Rule 31

```
Int[((a_) + (b_.)*(x_))^(-1), x_Symbol] :> Simp[Log[RemoveContent[a + b*x, x]]/b, x] /; FreeQ[{a, b}, x]
```

Rule 36

```
Int[1/(((a_.) + (b_.)*(x_))*((c_.) + (d_.)*(x_))), x_Symbol] :> Dist[b/(b*c - a*d), Int[1/(a + b*x), x], x] - Dist[d/(b*c - a*d), Int[1/(c + d*x), x], x] /; FreeQ[{a, b, c, d}, x] && NeQ[b*c - a*d, 0]
```

Rule 6098

```
Int[((a_.) + ArcCoth[(c_.)*(x_)^(n_)]*(b_.))*((d_.)*(x_))^(m_.), x_Symbol] :> Simp[((d*x)^(m + 1)*(a + b*ArcCoth[c*x^n]))/(d*(m + 1)), x] - Dist[(b*c*n)/(d*(m + 1)), Int[(x^(n - 1)*(d*x)^(m + 1))/(1 - c^2*x^(2*n)), x], x] /; FreeQ[{a, b, c, d, m, n}, x] && NeQ[m, -1]
```

Rubi steps

$$\begin{aligned}
\int \frac{\coth^{-1}(\sqrt{x})}{x^{3/2}}\,dx &= -\frac{2\coth^{-1}(\sqrt{x})}{\sqrt{x}}+\int \frac{1}{(1-x)x}\,dx\\
&= -\frac{2\coth^{-1}(\sqrt{x})}{\sqrt{x}}+\int \frac{1}{1-x}\,dx+\int \frac{1}{x}\,dx\\
&= -\frac{2\coth^{-1}(\sqrt{x})}{\sqrt{x}}-\log(1-x)+\log(x)
\end{aligned}$$

**Mathematica** [A] time = 0.02, size = 24, normalized size = 1.00

$$-\log(1-x)+\log(x)-\frac{2\coth^{-1}\left(\sqrt{x}\right)}{\sqrt{x}}$$

Antiderivative was successfully verified.

```
[In] Integrate[ArcCoth[Sqrt[x]]/x^(3/2),x]
[Out] (-2*ArcCoth[Sqrt[x]])/Sqrt[x] - Log[1 - x] + Log[x]
```

**fricas** [A] time = 0.49, size = 36, normalized size = 1.50

$$-\frac{x\log\left(x-1\right)-x\log(x)+\sqrt{x}\log\left(\frac{x+2\sqrt{x}+1}{x-1}\right)}{x}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(x^(1/2))/x^(3/2),x, algorithm="fricas")
[Out] -(x*log(x - 1) - x*log(x) + sqrt(x)*log((x + 2*sqrt(x) + 1)/(x - 1)))/x
```

**giac** [F] time = 0.00, size = 0, normalized size = 0.00

$$\int\frac{\operatorname{arcoth}\left(\sqrt{x}\right)}{x^{\frac{3}{2}}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(x^(1/2))/x^(3/2),x, algorithm="giac")
[Out] integrate(arccoth(sqrt(x))/x^(3/2), x)
```

**maple** [A] time = 0.05, size = 29, normalized size = 1.21

$$-\frac{2\operatorname{arccoth}\left(\sqrt{x}\right)}{\sqrt{x}}+\ln(x)-\ln\left(-1+\sqrt{x}\right)-\ln\left(1+\sqrt{x}\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(arccoth(x^(1/2))/x^(3/2),x)
[Out] -2*arccoth(x^(1/2))/x^(1/2)+ln(x)-ln(-1+x^(1/2))-ln(1+x^(1/2))
```

**maxima** [A] time = 0.31, size = 18, normalized size = 0.75

$$-\frac{2\operatorname{arcoth}\left(\sqrt{x}\right)}{\sqrt{x}}-\log\left(x-1\right)+\log(x)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(x^(1/2))/x^(3/2),x, algorithm="maxima")
[Out] -2*arccoth(sqrt(x))/sqrt(x) - log(x - 1) + log(x)
```

**mupad** [B] time = 1.25, size = 22, normalized size = 0.92

$$2\ln\left(\sqrt{x}\right)-\ln\left(x-1\right)-\frac{2\operatorname{acoth}\left(\sqrt{x}\right)}{\sqrt{x}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(x^(1/2))/x^(3/2),x)
```

```
[Out] 2*log(x^(1/2)) - log(x - 1) - (2*acoth(x^(1/2)))/x^(1/2)
```

**sympy [B]** time = 1.38, size = 126, normalized size = 5.25

$$-\frac{2x^{\frac{3}{2}}\operatorname{acoth}\left(\sqrt{x}\right)}{x^2-x}+\frac{2\sqrt{x}\operatorname{acoth}\left(\sqrt{x}\right)}{x^2-x}+\frac{x^2\log\left(x\right)}{x^2-x}-\frac{2x^2\log\left(\sqrt{x}+1\right)}{x^2-x}+\frac{2x^2\operatorname{acoth}\left(\sqrt{x}\right)}{x^2-x}-\frac{x\log\left(x\right)}{x^2-x}+\frac{2x\log\left(\sqrt{x}+\right.}{x^2-x}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(x**(1/2))/x**(3/2),x)
```

```
[Out] -2*x**(3/2)*acoth(sqrt(x))/(x**2 - x) + 2*sqrt(x)*acoth(sqrt(x))/(x**2 - x)
 + x**2*log(x)/(x**2 - x) - 2*x**2*log(sqrt(x) + 1)/(x**2 - x) + 2*x**2*aco
th(sqrt(x))/(x**2 - x) - x*log(x)/(x**2 - x) + 2*x*log(sqrt(x) + 1)/(x**2 -
 x) - 2*x*acoth(sqrt(x))/(x**2 - x)
```

## 3.93 $\int \frac{\coth^{-1}(ax^5)}{x}\,dx$

**Optimal**. Leaf size=28

$$\frac{1}{10}\text{Li}_2\left(-\frac{1}{ax^5}\right)-\frac{1}{10}\text{Li}_2\left(\frac{1}{ax^5}\right)$$

```
[Out] 1/10*polylog(2,-1/a/x^5)-1/10*polylog(2,1/a/x^5)
```

**Rubi [A]** time = 0.02, antiderivative size = 28, normalized size of antiderivative = 1.00, number of steps used = 2, number of rules used = 2, integrand size = 10, $\frac{\text{number of rules}}{\text{integrand size}} = 0.200$, Rules used = {6096, 5913}

$$\frac{1}{10}\text{PolyLog}\left(2,-\frac{1}{ax^5}\right)-\frac{1}{10}\text{PolyLog}\left(2,\frac{1}{ax^5}\right)$$

Antiderivative was successfully verified.

```
[In] Int[ArcCoth[a*x^5]/x,x]
```

```
[Out] PolyLog[2, -(1/(a*x^5))]/10 - PolyLog[2, 1/(a*x^5)]/10
```

Rule 5913

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))/(x_), x_Symbol] :> Simp[a*Log[x], x
] + (Simp[(b*PolyLog[2, -(c*x)^(-1)])/2, x] - Simp[(b*PolyLog[2, 1/(c*x)])/
2, x]) /; FreeQ[{a, b, c}, x]
```

Rule 6096

```
Int[((a_.) + ArcCoth[(c_.)*(x_)^(n_)]*(b_.))^(p_.)/(x_), x_Symbol] :> Dist[
1/n, Subst[Int[(a + b*ArcCoth[c*x])^p/x, x], x, x^n], x] /; FreeQ[{a, b, c,
 n}, x] && IGtQ[p, 0]
```

Rubi steps

$$\begin{aligned}\int \frac{\coth^{-1}(ax^5)}{x}\,dx &= \frac{1}{5}\text{Subst}\left(\int \frac{\coth^{-1}(ax)}{x}\,dx,x,x^5\right)\\ &= \frac{1}{10}\text{Li}_2\left(-\frac{1}{ax^5}\right)-\frac{1}{10}\text{Li}_2\left(\frac{1}{ax^5}\right)\end{aligned}$$

**Mathematica [A]** time = 0.01, size = 26, normalized size = 0.93

$$\frac{1}{10}\left(\text{Li}_2\left(-\frac{1}{ax^5}\right)-\text{Li}_2\left(\frac{1}{ax^5}\right)\right)$$

Antiderivative was successfully verified.

```
[In] Integrate[ArcCoth[a*x^5]/x,x]
```

```
[Out] (PolyLog[2, -(1/(a*x^5))] - PolyLog[2, 1/(a*x^5)])/10
```

**fricas [F]** time = 0.51, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{\text{arcoth}\left(ax^5\right)}{x},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(a*x^5)/x,x, algorithm="fricas")
```

```
[Out] integral(arccoth(a*x^5)/x, x)
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{arcoth}\left(ax^5\right)}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(a*x^5)/x,x, algorithm="giac")
```

```
[Out] integrate(arccoth(a*x^5)/x, x)
```

**maple [C]** time = 0.17, size = 85, normalized size = 3.04

$$\ln(x)\operatorname{arccoth}\left(a\,x^5\right)-\frac{\left(\sum_{\_R1=\mathrm{RootOf}\left(a\,\_Z^5+1\right)}\left(\ln(x)\ln\left(\frac{\_R1-x}{\_R1}\right)+\operatorname{dilog}\left(\frac{\_R1-x}{\_R1}\right)\right)\right)}{2}+\frac{\left(\sum_{\_R1=\mathrm{RootOf}\left(a\,\_Z^5-1\right)}\left(\ln(x)\ln\left(\frac{\_R1-x}{\_R1}\right.\right.\right.}{2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(arccoth(a*x^5)/x,x)
```

```
[Out] ln(x)*arccoth(a*x^5)-1/2*sum(ln(x)*ln((_R1-x)/_R1)+dilog((_R1-x)/_R1),_R1=R
ootOf(_Z^5*a+1))+1/2*sum(ln(x)*ln((_R1-x)/_R1)+dilog((_R1-x)/_R1),_R1=RootO
f(_Z^5*a-1))
```

**maxima [B]** time = 0.31, size = 104, normalized size = 3.71

$$-\frac{1}{2}\,a\left(\frac{\log\left(ax^5+1\right)}{a}-\frac{\log\left(ax^5-1\right)}{a}\right)\log(x)-\frac{1}{10}\,a\left(\frac{\log\left(ax^5-1\right)\log\left(ax^5\right)+\mathrm{Li}_2\left(-ax^5+1\right)}{a}-\frac{\log\left(ax^5+1\right)\log\left(\right.}{}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(a*x^5)/x,x, algorithm="maxima")
```

```
[Out] -1/2*a*(log(a*x^5 + 1)/a - log(a*x^5 - 1)/a)*log(x) - 1/10*a*((log(a*x^5 -
1)*log(a*x^5) + dilog(-a*x^5 + 1))/a - (log(a*x^5 + 1)*log(-a*x^5) + dilog(
a*x^5 + 1))/a) + arccoth(a*x^5)*log(x)
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.04

$$\int \frac{\operatorname{acoth}\left(a\,x^5\right)}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(a*x^5)/x,x)
```

```
[Out] int(acoth(a*x^5)/x, x)
```

**sympy [F(-1)]** time = 0.00, size = 0, normalized size = 0.00

Timed out

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(a*x**5)/x,x)
```

```
[Out] Timed out
```

# 3.94 $\int \coth^{-1}\left(\frac{1}{x}\right)\,dx$

**Optimal**. Leaf size=19

$$\frac{1}{2}\log\left(1-x^2\right)+x\coth^{-1}\left(\frac{1}{x}\right)$$

```
[Out] x*arccoth(1/x)+1/2*ln(-x^2+1)
```

**Rubi** [A] time = 0.01, antiderivative size = 19, normalized size of antiderivative = 1.00, number of steps used = 3, number of rules used = 3, integrand size = 4, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.750, Rules used = {6092, 263, 260}

$$\frac{1}{2}\log\left(1-x^2\right)+x\coth^{-1}\left(\frac{1}{x}\right)$$

Antiderivative was successfully verified.

```
[In] Int[ArcCoth[x^(-1)],x]
[Out] x*ArcCoth[x^(-1)] + Log[1 - x^2]/2
```

Rule 260

```
Int[(x_)^(m_.)/((a_) + (b_.)*(x_)^(n_)), x_Symbol] :> Simp[Log[RemoveConten
t[a + b*x^n, x]]/(b*n), x] /; FreeQ[{a, b, m, n}, x] && EqQ[m, n - 1]
```

Rule 263

```
Int[(x_)^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Int[x^(m + n*p)*
(b + a/x^n)^p, x] /; FreeQ[{a, b, m, n}, x] && IntegerQ[p] && NegQ[n]
```

Rule 6092

```
Int[ArcCoth[(c_.)*(x_)^(n_)], x_Symbol] :> Simp[x*ArcCoth[c*x^n], x] - Dist
[c*n, Int[x^n/(1 - c^2*x^(2*n)), x], x] /; FreeQ[{c, n}, x]
```

Rubi steps

$$\begin{aligned}\int \coth^{-1}\left(\frac{1}{x}\right)\,dx &= x\coth^{-1}\left(\frac{1}{x}\right)+\int \frac{1}{\left(1-\frac{1}{x^2}\right)x}\,dx\\ &= x\coth^{-1}\left(\frac{1}{x}\right)+\int \frac{x}{-1+x^2}\,dx\\ &= x\coth^{-1}\left(\frac{1}{x}\right)+\frac{1}{2}\log\left(1-x^2\right)\end{aligned}$$

**Mathematica** [A] time = 0.00, size = 19, normalized size = 1.00

$$\frac{1}{2}\log\left(1-x^2\right)+x\coth^{-1}\left(\frac{1}{x}\right)$$

Antiderivative was successfully verified.

```
[In] Integrate[ArcCoth[x^(-1)],x]
[Out] x*ArcCoth[x^(-1)] + Log[1 - x^2]/2
```

**fricas** [A] time = 0.99, size = 23, normalized size = 1.21

$$\frac{1}{2}\,x\log\left(-\frac{x+1}{x-1}\right)+\frac{1}{2}\,\log\left(x^2-1\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(1/x),x, algorithm="fricas")
[Out] 1/2*x*log(-(x + 1)/(x - 1)) + 1/2*log(x^2 - 1)
```

**giac** [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \operatorname{arcoth}\left(\frac{1}{x}\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(1/x),x, algorithm="giac")
[Out] integrate(arccoth(1/x), x)
```

**maple** [A] time = 0.07, size = 30, normalized size = 1.58

$$x\operatorname{arccoth}\left(\frac{1}{x}\right)-\ln\left(\frac{1}{x}\right)+\frac{\ln\left(\frac{1}{x}-1\right)}{2}+\frac{\ln\left(\frac{1}{x}+1\right)}{2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(arccoth(1/x),x)
[Out] x*arccoth(1/x)-ln(1/x)+1/2*ln(1/x-1)+1/2*ln(1/x+1)
```

**maxima** [A] time = 0.30, size = 15, normalized size = 0.79

$$x\operatorname{arcoth}\left(\frac{1}{x}\right)+\frac{1}{2}\,\log\left(x^2-1\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(1/x),x, algorithm="maxima")
[Out] x*arccoth(1/x) + 1/2*log(x^2 - 1)
```

**mupad** [B] time = 1.13, size = 26, normalized size = 1.37

$$\frac{\ln\left(x^2-1\right)}{2}+x\left(\frac{\ln\left(x+1\right)}{2}-\frac{\ln\left(1-x\right)}{2}\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(1/x),x)
[Out] log(x^2 - 1)/2 + x*(log(x + 1)/2 - log(1 - x)/2)
```

**sympy** [A] time = 0.20, size = 15, normalized size = 0.79

$$x\operatorname{acoth}\left(\frac{1}{x}\right)+\log\left(x+1\right)-\operatorname{acoth}\left(\frac{1}{x}\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(1/x),x)
[Out] x*acoth(1/x) + log(x + 1) - acoth(1/x)
```

## 3.95 $\int \frac{\coth^{-1}(ax^n)}{x}\,dx$

**Optimal**. Leaf size=38

$$\frac{\text{Li}_2\left(-\frac{x^{-n}}{a}\right)}{2n}-\frac{\text{Li}_2\left(\frac{x^{-n}}{a}\right)}{2n}$$

```
[Out] 1/2*polylog(2,-1/a/(x^n))/n-1/2*polylog(2,1/a/(x^n))/n
```

**Rubi [A]** time = 0.02, antiderivative size = 38, normalized size of antiderivative = 1.00, number of steps used = 2, number of rules used = 2, integrand size = 10, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.200, Rules used = {6096, 5913}

$$\frac{\text{PolyLog}\left(2,-\frac{x^{-n}}{a}\right)}{2n}-\frac{\text{PolyLog}\left(2,\frac{x^{-n}}{a}\right)}{2n}$$

Antiderivative was successfully verified.

```
[In] Int[ArcCoth[a*x^n]/x,x]
```

```
[Out] PolyLog[2, -(1/(a*x^n))]/(2*n) - PolyLog[2, 1/(a*x^n)]/(2*n)
```

Rule 5913

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))/(x_), x_Symbol] :> Simp[a*Log[x], x
] + (Simp[(b*PolyLog[2, -(c*x)^(-1)])/2, x] - Simp[(b*PolyLog[2, 1/(c*x)])/
2, x]) /; FreeQ[{a, b, c}, x]
```

Rule 6096

```
Int[((a_.) + ArcCoth[(c_.)*(x_)^(n_)]*(b_.))^(p_.)/(x_), x_Symbol] :> Dist[
1/n, Subst[Int[(a + b*ArcCoth[c*x])^p/x, x], x, x^n], x] /; FreeQ[{a, b, c,
 n}, x] && IGtQ[p, 0]
```

Rubi steps

$$\begin{aligned}\int \frac{\coth^{-1}(ax^n)}{x}\,dx &= \frac{\text{Subst}\left(\int \frac{\coth^{-1}(ax)}{x}\,dx,x,x^n\right)}{n}\\ &= \frac{\text{Li}_2\left(-\frac{x^{-n}}{a}\right)}{2n}-\frac{\text{Li}_2\left(\frac{x^{-n}}{a}\right)}{2n}\end{aligned}$$

**Mathematica [B]** time = 0.05, size = 97, normalized size = 2.55

$$\frac{-\text{Li}_2(1-ax^n)+\text{Li}_2(ax^n+1)+n\log(x)\log(ax^n-1)-n\log(x)\log(ax^n+1)-\log(ax^n)\log(ax^n-1)+\log}{2n}$$

Antiderivative was successfully verified.

```
[In] Integrate[ArcCoth[a*x^n]/x,x]
```

```
[Out] (2*n*ArcCoth[a*x^n]*Log[x] + n*Log[x]*Log[-1 + a*x^n] - Log[a*x^n]*Log[-1 +
 a*x^n] - n*Log[x]*Log[1 + a*x^n] + Log[-(a*x^n)]*Log[1 + a*x^n] - PolyLog[
2, 1 - a*x^n] + PolyLog[2, 1 + a*x^n])/(2*n)
```

**fricas [B]** time = 0.58, size = 128, normalized size = 3.37

$$-\frac{n\log\left(a\cosh\left(n\log(x)\right)+a\sinh\left(n\log(x)\right)+1\right)\log(x)-n\log\left(-a\cosh\left(n\log(x)\right)-a\sinh\left(n\log(x)\right)+1\right)\log$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(a*x^n)/x,x, algorithm="fricas")
```

```
[Out] -1/2*(n*log(a*cosh(n*log(x)) + a*sinh(n*log(x)) + 1)*log(x) - n*log(-a*cosh
(n*log(x)) - a*sinh(n*log(x)) + 1)*log(x) - n*log(x)*log((a*cosh(n*log(x))
+ a*sinh(n*log(x)) + 1)/(a*cosh(n*log(x)) + a*sinh(n*log(x)) - 1)) - dilog(
a*cosh(n*log(x)) + a*sinh(n*log(x))) + dilog(-a*cosh(n*log(x)) - a*sinh(n*l
og(x))))/n
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{arcoth}\left(ax^{n}\right)}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(a*x^n)/x,x, algorithm="giac")
```

```
[Out] integrate(arccoth(a*x^n)/x, x)
```

**maple [A]** time = 0.09, size = 61, normalized size = 1.61

$$\frac{\ln\left(a\,x^{n}\right)\operatorname{arccoth}\left(a\,x^{n}\right)}{n}-\frac{\operatorname{dilog}\left(a\,x^{n}\right)}{2n}-\frac{\operatorname{dilog}\left(a\,x^{n}+1\right)}{2n}-\frac{\ln\left(a\,x^{n}\right)\ln\left(a\,x^{n}+1\right)}{2n}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(arccoth(a*x^n)/x,x)
```

```
[Out] 1/n*ln(a*x^n)*arccoth(a*x^n)-1/2/n*dilog(a*x^n)-1/2/n*dilog(a*x^n+1)-1/2/n*
ln(a*x^n)*ln(a*x^n+1)
```

**maxima [B]** time = 0.42, size = 147, normalized size = 3.87

$$-\frac{1}{2}\,an\left(\frac{\log\left(\frac{ax^{n}+1}{a}\right)}{an}-\frac{\log\left(\frac{ax^{n}-1}{a}\right)}{an}\right)\log(x)+\frac{1}{2}\,an\left(\frac{\log\left(ax^{n}+1\right)\log(x)-\log\left(ax^{n}-1\right)\log(x)}{an}-\frac{n\log\left(ax^{n}+1\right)\log}{an^{2}}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(a*x^n)/x,x, algorithm="maxima")
```

```
[Out] -1/2*a*n*(log((a*x^n + 1)/a)/(a*n) - log((a*x^n - 1)/a)/(a*n))*log(x) + 1/2
*a*n*((log(a*x^n + 1)*log(x) - log(a*x^n - 1)*log(x))/(a*n) - (n*log(a*x^n
+ 1)*log(x) + dilog(-a*x^n))/(a*n^2) + (n*log(-a*x^n + 1)*log(x) + dilog(a*
x^n))/(a*n^2)) + arccoth(a*x^n)*log(x)
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.03

$$\int \frac{\operatorname{acoth}\left(a\,x^{n}\right)}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(a*x^n)/x,x)
```

```
[Out] int(acoth(a*x^n)/x, x)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{acoth}(ax^n)}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(a*x**n)/x,x)
```

```
[Out] Integral(acoth(a*x**n)/x, x)
```

## 3.96 $\int (a+bx)\coth^{-1}(a+bx)\,dx$

**Optimal**. Leaf size=39

$$-\frac{\tanh^{-1}(a+bx)}{2b}+\frac{(a+bx)^2\coth^{-1}(a+bx)}{2b}+\frac{x}{2}$$

```
[Out] 1/2*x+1/2*(b*x+a)^2*arccoth(b*x+a)/b-1/2*arctanh(b*x+a)/b
```

**Rubi [A]** time = 0.02, antiderivative size = 39, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 4, integrand size = 12, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.333, Rules used = {6108, 5917, 321, 206}

$$-\frac{\tanh^{-1}(a+bx)}{2b}+\frac{(a+bx)^2\coth^{-1}(a+bx)}{2b}+\frac{x}{2}$$

Antiderivative was successfully verified.

```
[In] Int[(a + b*x)*ArcCoth[a + b*x],x]
```

```
[Out] x/2 + ((a + b*x)^2*ArcCoth[a + b*x])/(2*b) - ArcTanh[a + b*x]/(2*b)
```

Rule 206

```
Int[((a_) + (b_.)*(x_)^2)^(-1), x_Symbol] :> Simp[(1*ArcTanh[(Rt[-b, 2]*x)/
Rt[a, 2]])/(Rt[a, 2]*Rt[-b, 2]), x] /; FreeQ[{a, b}, x] && NegQ[a/b] && (Gt
Q[a, 0] || LtQ[b, 0])
```

Rule 321

```
Int[((c_.)*(x_))^(m_)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Simp[(c^(
n - 1)*(c*x)^(m - n + 1)*(a + b*x^n)^(p + 1))/(b*(m + n*p + 1)), x] - Dist[
(a*c^n*(m - n + 1))/(b*(m + n*p + 1)), Int[(c*x)^(m - n)*(a + b*x^n)^p, x],
 x] /; FreeQ[{a, b, c, p}, x] && IGtQ[n, 0] && GtQ[m, n - 1] && NeQ[m + n*p
 + 1, 0] && IntBinomialQ[a, b, c, n, m, p, x]
```

Rule 5917

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)*((d_.)*(x_))^(m_.), x_Symbol]
 :> Simp[((d*x)^(m + 1)*(a + b*ArcCoth[c*x])^p)/(d*(m + 1)), x] - Dist[(b*c
*p)/(d*(m + 1)), Int[((d*x)^(m + 1)*(a + b*ArcCoth[c*x])^(p - 1))/(1 - c^2*
x^2), x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[p, 0] && (EqQ[p, 1] || In
tegerQ[m]) && NeQ[m, -1]
```

Rule 6108

```
Int[((a_.) + ArcCoth[(c_) + (d_.)*(x_)]*(b_.))^(p_.)*((e_.) + (f_.)*(x_))^(
m_.), x_Symbol] :> Dist[1/d, Subst[Int[((f*x)/d)^m*(a + b*ArcCoth[x])^p, x]
, x, c + d*x], x] /; FreeQ[{a, b, c, d, e, f, m}, x] && EqQ[d*e - c*f, 0] &
& IGtQ[p, 0]
```

Rubi steps

$$\int (a+bx)\coth^{-1}(a+bx)\,dx = \frac{\text{Subst}\left(\int x\coth^{-1}(x)\,dx, x, a+bx\right)}{b}$$
$$= \frac{(a+bx)^2\coth^{-1}(a+bx)}{2b} - \frac{\text{Subst}\left(\int \frac{x^2}{1-x^2}\,dx, x, a+bx\right)}{2b}$$
$$= \frac{x}{2} + \frac{(a+bx)^2\coth^{-1}(a+bx)}{2b} - \frac{\text{Subst}\left(\int \frac{1}{1-x^2}\,dx, x, a+bx\right)}{2b}$$
$$= \frac{x}{2} + \frac{(a+bx)^2\coth^{-1}(a+bx)}{2b} - \frac{\tanh^{-1}(a+bx)}{2b}$$

**Mathematica [A]** time = 0.03, size = 66, normalized size = 1.69

$$\frac{a^2\log(a+bx+1) - \left(a^2-1\right)\log(-a-bx+1) - \log(a+bx+1) + 2bx(2a+bx)\coth^{-1}(a+bx) + 2bx}{4b}$$

Antiderivative was successfully verified.

```
[In] Integrate[(a + b*x)*ArcCoth[a + b*x],x]
```

```
[Out] (2*b*x + 2*b*x*(2*a + b*x)*ArcCoth[a + b*x] - (-1 + a^2)*Log[1 - a - b*x] -
 Log[1 + a + b*x] + a^2*Log[1 + a + b*x])/(4*b)
```

**fricas [A]** time = 0.57, size = 44, normalized size = 1.13

$$\frac{2\,bx + \left(b^2x^2 + 2\,abx + a^2 - 1\right)\log\left(\frac{bx+a+1}{bx+a-1}\right)}{4\,b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((b*x+a)*arccoth(b*x+a),x, algorithm="fricas")
```

```
[Out] 1/4*(2*b*x + (b^2*x^2 + 2*a*b*x + a^2 - 1)*log((b*x + a + 1)/(b*x + a - 1))
)/b
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int (bx+a)\,\text{arcoth}\,(bx+a)\;dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((b*x+a)*arccoth(b*x+a),x, algorithm="giac")
```

```
[Out] integrate((b*x + a)*arccoth(b*x + a), x)
```

**maple [B]** time = 0.03, size = 70, normalized size = 1.79

$$\frac{b\,\text{arccoth}\,(bx+a)\,x^2}{2} + \text{arccoth}\,(bx+a)\,xa + \frac{\text{arccoth}\,(bx+a)\,a^2}{2b} + \frac{x}{2} + \frac{a}{2b} + \frac{\ln(bx+a-1)}{4b} - \frac{\ln(bx+a+1)}{4b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((b*x+a)*arccoth(b*x+a),x)
```

```
[Out] 1/2*b*arccoth(b*x+a)*x^2+arccoth(b*x+a)*x*a+1/2/b*arccoth(b*x+a)*a^2+1/2*x+
1/2*a/b+1/4/b*ln(b*x+a-1)-1/4*ln(b*x+a+1)/b
```

**maxima** [A] time = 0.31, size = 62, normalized size = 1.59

$$\frac{1}{4}\,b\left(\frac{2\,x}{b}+\frac{\left(a^2-1\right)\log\left(bx+a+1\right)}{b^2}-\frac{\left(a^2-1\right)\log\left(bx+a-1\right)}{b^2}\right)+\frac{1}{2}\left(bx^2+2\,ax\right)\operatorname{arcoth}\left(bx+a\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((b*x+a)*arccoth(b*x+a),x, algorithm="maxima")
```

```
[Out] 1/4*b*(2*x/b + (a^2 - 1)*log(b*x + a + 1)/b^2 - (a^2 - 1)*log(b*x + a - 1)/
b^2) + 1/2*(b*x^2 + 2*a*x)*arccoth(b*x + a)
```

**mupad** [B] time = 2.02, size = 50, normalized size = 1.28

$$\frac{x}{2}-\frac{\frac{\operatorname{acoth}(a+b\,x)}{2}-\frac{a^2\operatorname{acoth}(a+b\,x)}{2}}{b}+a\,x\operatorname{acoth}\left(a+b\,x\right)+\frac{b\,x^2\operatorname{acoth}\left(a+b\,x\right)}{2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(a + b*x)*(a + b*x),x)
```

```
[Out] x/2 - (acoth(a + b*x)/2 - (a^2*acoth(a + b*x))/2)/b + a*x*acoth(a + b*x) +
(b*x^2*acoth(a + b*x))/2
```

**sympy** [A] time = 0.78, size = 56, normalized size = 1.44

$$\begin{cases}\frac{a^2\operatorname{acoth}(a+bx)}{2b}+ax\operatorname{acoth}\left(a+bx\right)+\frac{bx^2\operatorname{acoth}(a+bx)}{2}+\frac{x}{2}-\frac{\operatorname{acoth}(a+bx)}{2b} & \text{for } b\neq 0\\ ax\operatorname{acoth}\left(a\right) & \text{otherwise}\end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((b*x+a)*acoth(b*x+a),x)
```

```
[Out] Piecewise((a**2*acoth(a + b*x)/(2*b) + a*x*acoth(a + b*x) + b*x**2*acoth(a
+ b*x)/2 + x/2 - acoth(a + b*x)/(2*b), Ne(b, 0)), (a*x*acoth(a), True))
```

## 3.97 $\int (a+bx)^2 \coth^{-1}(a+bx) \, dx$

**Optimal**. Leaf size=54

$$\frac{(a+bx)^2}{6b}+\frac{\log\left(1-(a+bx)^2\right)}{6b}+\frac{(a+bx)^3\coth^{-1}(a+bx)}{3b}$$

```
[Out] 1/6*(b*x+a)^2/b+1/3*(b*x+a)^3*arccoth(b*x+a)/b+1/6*ln(1-(b*x+a)^2)/b
```

**Rubi [A]** time = 0.05, antiderivative size = 54, normalized size of antiderivative = 1.00, number of steps used = 5, number of rules used = 4, integrand size = 14, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.286, Rules used = {6108, 5917, 266, 43}

$$\frac{(a+bx)^2}{6b}+\frac{\log\left(1-(a+bx)^2\right)}{6b}+\frac{(a+bx)^3\coth^{-1}(a+bx)}{3b}$$

Antiderivative was successfully verified.

```
[In] Int[(a + b*x)^2*ArcCoth[a + b*x],x]
```

```
[Out] (a + b*x)^2/(6*b) + ((a + b*x)^3*ArcCoth[a + b*x])/(3*b) + Log[1 - (a + b*x
)^2]/(6*b)
```

Rule 43

```
Int[((a_.) + (b_.)*(x_))^(m_.)*((c_.) + (d_.)*(x_))^(n_.), x_Symbol] :> Int
[ExpandIntegrand[(a + b*x)^m*(c + d*x)^n, x], x] /; FreeQ[{a, b, c, d, n},
x] && NeQ[b*c - a*d, 0] && IGtQ[m, 0] && ( !IntegerQ[n] || (EqQ[c, 0] && Le
Q[7*m + 4*n + 4, 0]) || LtQ[9*m + 5*(n + 1), 0] || GtQ[m + n + 2, 0])
```

Rule 266

```
Int[(x_)^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Dist[1/n, Subst[
Int[x^(Simplify[(m + 1)/n] - 1)*(a + b*x)^p, x], x, x^n], x] /; FreeQ[{a, b
, m, n, p}, x] && IntegerQ[Simplify[(m + 1)/n]]
```

Rule 5917

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)*((d_.)*(x_))^(m_.), x_Symbol]
 :> Simp[((d*x)^(m + 1)*(a + b*ArcCoth[c*x])^p)/(d*(m + 1)), x] - Dist[(b*c
*p)/(d*(m + 1)), Int[((d*x)^(m + 1)*(a + b*ArcCoth[c*x])^(p - 1))/(1 - c^2*
x^2), x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[p, 0] && (EqQ[p, 1] || In
tegerQ[m]) && NeQ[m, -1]
```

Rule 6108

```
Int[((a_.) + ArcCoth[(c_) + (d_.)*(x_)]*(b_.))^(p_.)*((e_.) + (f_.)*(x_))^(
m_.), x_Symbol] :> Dist[1/d, Subst[Int[((f*x)/d)^m*(a + b*ArcCoth[x])^p, x]
, x, c + d*x], x] /; FreeQ[{a, b, c, d, e, f, m}, x] && EqQ[d*e - c*f, 0] &
& IGtQ[p, 0]
```

Rubi steps

$$\int (a+bx)^2 \coth^{-1}(a+bx)\,dx = \frac{\text{Subst}\left(\int x^2\coth^{-1}(x)\,dx, x, a+bx\right)}{b}$$
$$= \frac{(a+bx)^3\coth^{-1}(a+bx)}{3b} - \frac{\text{Subst}\left(\int \frac{x^3}{1-x^2}\,dx, x, a+bx\right)}{3b}$$
$$= \frac{(a+bx)^3\coth^{-1}(a+bx)}{3b} - \frac{\text{Subst}\left(\int \frac{x}{1-x}\,dx, x, (a+bx)^2\right)}{6b}$$
$$= \frac{(a+bx)^3\coth^{-1}(a+bx)}{3b} - \frac{\text{Subst}\left(\int \left(-1+\frac{1}{1-x}\right)dx, x, (a+bx)^2\right)}{6b}$$
$$= \frac{(a+bx)^2}{6b} + \frac{(a+bx)^3\coth^{-1}(a+bx)}{3b} + \frac{\log\left(1-(a+bx)^2\right)}{6b}$$

**Mathematica [A]** time = 0.04, size = 42, normalized size = 0.78

$$\frac{(a+bx)^2 + \log\left(1-(a+bx)^2\right) + 2(a+bx)^3\coth^{-1}(a+bx)}{6b}$$

Antiderivative was successfully verified.

```
[In] Integrate[(a + b*x)^2*ArcCoth[a + b*x],x]
[Out] ((a + b*x)^2 + 2*(a + b*x)^3*ArcCoth[a + b*x] + Log[1 - (a + b*x)^2])/(6*b)
```

**fricas [A]** time = 0.58, size = 86, normalized size = 1.59

$$\frac{b^2x^2 + 2\,abx + \left(a^3+1\right)\log\left(bx+a+1\right) - \left(a^3-1\right)\log\left(bx+a-1\right) + \left(b^3x^3 + 3\,ab^2x^2 + 3\,a^2bx\right)\log\left(\frac{bx+a+1}{bx+a-1}\right)}{6\,b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((b*x+a)^2*arccoth(b*x+a),x, algorithm="fricas")
[Out] 1/6*(b^2*x^2 + 2*a*b*x + (a^3 + 1)*log(b*x + a + 1) - (a^3 - 1)*log(b*x + a
 - 1) + (b^3*x^3 + 3*a*b^2*x^2 + 3*a^2*b*x)*log((b*x + a + 1)/(b*x + a - 1)
))/b
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int (bx+a)^2 \operatorname{arcoth}(bx+a)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((b*x+a)^2*arccoth(b*x+a),x, algorithm="giac")
[Out] integrate((b*x + a)^2*arccoth(b*x + a), x)
```

**maple [A]** time = 0.03, size = 95, normalized size = 1.76

$$\frac{b^2\operatorname{arccoth}(bx+a)\,x^3}{3} + b\operatorname{arccoth}(bx+a)\,x^2a + \operatorname{arccoth}(bx+a)\,x\,a^2 + \frac{\operatorname{arccoth}(bx+a)\,a^3}{3b} + \frac{b\,x^2}{6} + \frac{ax}{3} + \frac{a^2}{6b} + \frac{\ln(bx}{6}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((b*x+a)^2*arccoth(b*x+a),x)
```

```
[Out] 1/3*b^2*arccoth(b*x+a)*x^3+b*arccoth(b*x+a)*x^2*a+arccoth(b*x+a)*x*a^2+1/3/
b*arccoth(b*x+a)*a^3+1/6*b*x^2+1/3*a*x+1/6/b*a^2+1/6/b*ln(b*x+a-1)+1/6*ln(b
*x+a+1)/b
```

**maxima [A]** time = 0.31, size = 81, normalized size = 1.50

$$\frac{1}{6}\,b\left(\frac{bx^2+2\,ax}{b}+\frac{\left(a^3+1\right)\log\left(bx+a+1\right)}{b^2}-\frac{\left(a^3-1\right)\log\left(bx+a-1\right)}{b^2}\right)+\frac{1}{3}\left(b^2x^3+3\,abx^2+3\,a^2x\right)\operatorname{arcoth}\left(bx\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((b*x+a)^2*arccoth(b*x+a),x, algorithm="maxima")
```

```
[Out] 1/6*b*((b*x^2 + 2*a*x)/b + (a^3 + 1)*log(b*x + a + 1)/b^2 - (a^3 - 1)*log(b
*x + a - 1)/b^2) + 1/3*(b^2*x^3 + 3*a*b*x^2 + 3*a^2*x)*arccoth(b*x + a)
```

**mupad [B]** time = 1.54, size = 114, normalized size = 2.11

$$\frac{a\,x}{3}+\ln\left(\frac{1}{a+b\,x}+1\right)\left(\frac{a^2\,x}{2}+\frac{a\,b\,x^2}{2}+\frac{b^2\,x^3}{6}\right)+\frac{b\,x^2}{6}-\ln\left(1-\frac{1}{a+b\,x}\right)\left(\frac{a^2\,x}{2}+\frac{a\,b\,x^2}{2}+\frac{b^2\,x^3}{6}\right)-\frac{\ln\left(a+b\,x-1\right)}{6\,b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(a + b*x)*(a + b*x)^2,x)
```

```
[Out] (a*x)/3 + log(1/(a + b*x) + 1)*((a^2*x)/2 + (b^2*x^3)/6 + (a*b*x^2)/2) + (b
*x^2)/6 - log(1 - 1/(a + b*x))*((a^2*x)/2 + (b^2*x^3)/6 + (a*b*x^2)/2) - (l
og(a + b*x - 1)*(a^3 - 1))/(6*b) + (log(a + b*x + 1)*(a^3 + 1))/(6*b)
```

**sympy [A]** time = 1.22, size = 97, normalized size = 1.80

$$\begin{cases}\frac{a^3\operatorname{acoth}\left(a+bx\right)}{3b}+a^2x\operatorname{acoth}\left(a+bx\right)+abx^2\operatorname{acoth}\left(a+bx\right)+\frac{ax}{3}+\frac{b^2x^3\operatorname{acoth}\left(a+bx\right)}{3}+\frac{bx^2}{6}+\frac{\log\left(\frac{a}{b}+x+\frac{1}{b}\right)}{3b}-\frac{\operatorname{acoth}\left(a+bx\right.}{3b}\\ a^2x\operatorname{acoth}\left(a\right)\end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((b*x+a)**2*acoth(b*x+a),x)
```

```
[Out] Piecewise((a**3*acoth(a + b*x)/(3*b) + a**2*x*acoth(a + b*x) + a*b*x**2*aco
th(a + b*x) + a*x/3 + b**2*x**3*acoth(a + b*x)/3 + b*x**2/6 + log(a/b + x +
 1/b)/(3*b) - acoth(a + b*x)/(3*b), Ne(b, 0)), (a**2*x*acoth(a), True))
```

# 3.98 $\int \frac{\coth^{-1}(a+bx)}{a+bx}\,dx$

**Optimal**. Leaf size=35

$$\frac{\text{Li}_2\left(-\frac{1}{a+bx}\right)}{2b}-\frac{\text{Li}_2\left(\frac{1}{a+bx}\right)}{2b}$$

```
[Out] 1/2*polylog(2,-1/(b*x+a))/b-1/2*polylog(2,1/(b*x+a))/b
```

**Rubi [A]** time = 0.03, antiderivative size = 35, normalized size of antiderivative = 1.00, number of steps used = 2, number of rules used = 2, integrand size = 14, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.143, Rules used = {6108, 5913}

$$\frac{\text{PolyLog}\left(2,-\frac{1}{a+bx}\right)}{2b}-\frac{\text{PolyLog}\left(2,\frac{1}{a+bx}\right)}{2b}$$

Antiderivative was successfully verified.

```
[In] Int[ArcCoth[a + b*x]/(a + b*x),x]
```

```
[Out] PolyLog[2, -(a + b*x)^(-1)]/(2*b) - PolyLog[2, (a + b*x)^(-1)]/(2*b)
```

Rule 5913

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))/(x_), x_Symbol] :> Simp[a*Log[x], x
] + (Simp[(b*PolyLog[2, -(c*x)^(-1)])/2, x] - Simp[(b*PolyLog[2, 1/(c*x)])/
2, x]) /; FreeQ[{a, b, c}, x]
```

Rule 6108

```
Int[((a_.) + ArcCoth[(c_) + (d_.)*(x_)]*(b_.))^(p_.)*((e_.) + (f_.)*(x_))^(
m_.), x_Symbol] :> Dist[1/d, Subst[Int[((f*x)/d)^m*(a + b*ArcCoth[x])^p, x]
, x, c + d*x], x] /; FreeQ[{a, b, c, d, e, f, m}, x] && EqQ[d*e - c*f, 0] &
& IGtQ[p, 0]
```

Rubi steps

$$\begin{aligned}\int \frac{\coth^{-1}(a+bx)}{a+bx}\,dx &= \frac{\text{Subst}\left(\int \frac{\coth^{-1}(x)}{x}\,dx, x, a+bx\right)}{b}\\ &= \frac{\text{Li}_2\left(-\frac{1}{a+bx}\right)}{2b}-\frac{\text{Li}_2\left(\frac{1}{a+bx}\right)}{2b}\end{aligned}$$

**Mathematica [B]** time = 0.03, size = 286, normalized size = 8.17

$$-\frac{\text{Li}_2(-a-bx)}{2b}+\frac{\text{Li}_2(a+bx)}{2b}-\frac{\log^2\left(\frac{ab-(a-1)b}{b(a+bx)}\right)}{4b}+\frac{\log^2\left(\frac{ab-(a+1)b}{b(a+bx)}\right)}{4b}-\frac{\log\left(\frac{b(a+bx-1)}{(a-1)b-ab}\right)\log\left(\frac{ab-(a-1)b}{b(a+bx)}\right)}{2b}+\frac{\log\left(\frac{a+bx-1}{a+bx}\right)\log}{2b}$$

Warning: Unable to verify antiderivative.

```
[In] Integrate[ArcCoth[a + b*x]/(a + b*x),x]
```

```
[Out] -1/2*(Log[(b*(-1 + a + b*x))/((-1 + a)*b - a*b)]*Log[(-((-1 + a)*b) + a*b)/
(b*(a + b*x))])/b - Log[(-((-1 + a)*b) + a*b)/(b*(a + b*x))]^2/(4*b) + (Log
[(b*(-1 - a - b*x))/((-1 - a)*b + a*b)]*Log[(a*b - (1 + a)*b)/(b*(a + b*x))
])/(2*b) + Log[(a*b - (1 + a)*b)/(b*(a + b*x))]^2/(4*b) + (Log[(-((-1 + a)*
```

```
b) + a*b)/(b*(a + b*x))]*Log[(-1 + a + b*x)/(a + b*x)])/(2*b) - (Log[(a*b -
 (1 + a)*b)/(b*(a + b*x))]*Log[(1 + a + b*x)/(a + b*x)])/(2*b) - PolyLog[2,
 -a - b*x]/(2*b) + PolyLog[2, a + b*x]/(2*b)
```

**fricas [F]** time = 0.83, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{\operatorname{arcoth}(bx+a)}{bx+a}, x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(b*x+a)/(b*x+a),x, algorithm="fricas")
```

```
[Out] integral(arccoth(b*x + a)/(b*x + a), x)
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{arcoth}(bx+a)}{bx+a}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(b*x+a)/(b*x+a),x, algorithm="giac")
```

```
[Out] integrate(arccoth(b*x + a)/(b*x + a), x)
```

**maple [A]** time = 0.05, size = 59, normalized size = 1.69

$$\frac{\ln(bx+a)\operatorname{arccoth}(bx+a)}{b} - \frac{\operatorname{dilog}(bx+a)}{2b} - \frac{\operatorname{dilog}(bx+a+1)}{2b} - \frac{\ln(bx+a)\ln(bx+a+1)}{2b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(arccoth(b*x+a)/(b*x+a),x)
```

```
[Out] 1/b*ln(b*x+a)*arccoth(b*x+a)-1/2/b*dilog(b*x+a)-1/2/b*dilog(b*x+a+1)-1/2/b*
ln(b*x+a)*ln(b*x+a+1)
```

**maxima [B]** time = 0.32, size = 112, normalized size = 3.20

$$-\frac{1}{2}b\left(\frac{\log(bx+a)\log(bx+a-1)+\operatorname{Li}_2(-bx-a+1)}{b^2} - \frac{\log(bx+a+1)\log(-bx-a)+\operatorname{Li}_2(bx+a+1)}{b^2}\right) - \frac{1}{2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(b*x+a)/(b*x+a),x, algorithm="maxima")
```

```
[Out] -1/2*b*((log(b*x + a)*log(b*x + a - 1) + dilog(-b*x - a + 1))/b^2 - (log(b*
x + a + 1)*log(-b*x - a) + dilog(b*x + a + 1))/b^2) - 1/2*(log(b*x + a + 1)
/b - log(b*x + a - 1)/b)*log(b*x + a) + arccoth(b*x + a)*log(b*x + a)/b
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.03

$$\int \frac{\operatorname{acoth}(a+b\,x)}{a+b\,x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(a + b*x)/(a + b*x),x)
```

```
[Out] int(acoth(a + b*x)/(a + b*x), x)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{acoth}(a+bx)}{a+bx}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(b*x+a)/(b*x+a),x)
```

```
[Out] Integral(acoth(a + b*x)/(a + b*x), x)
```

## 3.99 $\int \frac{\coth^{-1}(a+bx)}{(a+bx)^2} dx$

**Optimal**. Leaf size=48

$$\frac{\log(a+bx)}{b}-\frac{\log\left(1-(a+bx)^2\right)}{2b}-\frac{\coth^{-1}(a+bx)}{b(a+bx)}$$

```
[Out] -arccoth(b*x+a)/b/(b*x+a)+ln(b*x+a)/b-1/2*ln(1-(b*x+a)^2)/b
```

**Rubi [A]** time = 0.05, antiderivative size = 48, normalized size of antiderivative = 1.00, number of steps used = 6, number of rules used = 6, integrand size = 14, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.429, Rules used = {6108, 5917, 266, 36, 31, 29}

$$\frac{\log(a+bx)}{b}-\frac{\log\left(1-(a+bx)^2\right)}{2b}-\frac{\coth^{-1}(a+bx)}{b(a+bx)}$$

Antiderivative was successfully verified.

```
[In] Int[ArcCoth[a + b*x]/(a + b*x)^2,x]
```

```
[Out] -(ArcCoth[a + b*x]/(b*(a + b*x))) + Log[a + b*x]/b - Log[1 - (a + b*x)^2]/(
2*b)
```

Rule 29

```
Int[(x_)^(-1), x_Symbol] :> Simp[Log[x], x]
```

Rule 31

```
Int[((a_) + (b_.)*(x_))^(-1), x_Symbol] :> Simp[Log[RemoveContent[a + b*x,
x]]/b, x] /; FreeQ[{a, b}, x]
```

Rule 36

```
Int[1/(((a_.) + (b_.)*(x_))*((c_.) + (d_.)*(x_))), x_Symbol] :> Dist[b/(b*c
 - a*d), Int[1/(a + b*x), x], x] - Dist[d/(b*c - a*d), Int[1/(c + d*x), x],
 x] /; FreeQ[{a, b, c, d}, x] && NeQ[b*c - a*d, 0]
```

Rule 266

```
Int[(x_)^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Dist[1/n, Subst[
Int[x^(Simplify[(m + 1)/n] - 1)*(a + b*x)^p, x], x, x^n], x] /; FreeQ[{a, b
, m, n, p}, x] && IntegerQ[Simplify[(m + 1)/n]]
```

Rule 5917

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)*((d_.)*(x_))^(m_.), x_Symbol]
 :> Simp[((d*x)^(m + 1)*(a + b*ArcCoth[c*x])^p)/(d*(m + 1)), x] - Dist[(b*c
*p)/(d*(m + 1)), Int[((d*x)^(m + 1)*(a + b*ArcCoth[c*x])^(p - 1))/(1 - c^2*
x^2), x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[p, 0] && (EqQ[p, 1] || In
tegerQ[m]) && NeQ[m, -1]
```

Rule 6108

```
Int[((a_.) + ArcCoth[(c_) + (d_.)*(x_)]*(b_.))^(p_.)*((e_.) + (f_.)*(x_))^(
m_.), x_Symbol] :> Dist[1/d, Subst[Int[((f*x)/d)^m*(a + b*ArcCoth[x])^p, x]
, x, c + d*x], x] /; FreeQ[{a, b, c, d, e, f, m}, x] && EqQ[d*e - c*f, 0] &
& IGtQ[p, 0]
```

Rubi steps

$$\int \frac{\coth^{-1}(a+bx)}{(a+bx)^2}\,dx = \frac{\text{Subst}\left(\int \frac{\coth^{-1}(x)}{x^2}\,dx, x, a+bx\right)}{b}$$
$$= -\frac{\coth^{-1}(a+bx)}{b(a+bx)} + \frac{\text{Subst}\left(\int \frac{1}{x(1-x^2)}\,dx, x, a+bx\right)}{b}$$
$$= -\frac{\coth^{-1}(a+bx)}{b(a+bx)} + \frac{\text{Subst}\left(\int \frac{1}{(1-x)x}\,dx, x, (a+bx)^2\right)}{2b}$$
$$= -\frac{\coth^{-1}(a+bx)}{b(a+bx)} + \frac{\text{Subst}\left(\int \frac{1}{1-x}\,dx, x, (a+bx)^2\right)}{2b} + \frac{\text{Subst}\left(\int \frac{1}{x}\,dx, x, (a+bx)^2\right)}{2b}$$
$$= -\frac{\coth^{-1}(a+bx)}{b(a+bx)} + \frac{\log(a+bx)}{b} - \frac{\log\left(1-(a+bx)^2\right)}{2b}$$

**Mathematica [A]** time = 0.03, size = 43, normalized size = 0.90

$$-\frac{-2\log(a+bx)+\log\left(1-(a+bx)^2\right)+\frac{2\coth^{-1}(a+bx)}{a+bx}}{2b}$$

Antiderivative was successfully verified.

```
[In] Integrate[ArcCoth[a + b*x]/(a + b*x)^2,x]
```

```
[Out] -1/2*((2*ArcCoth[a + b*x])/(a + b*x) - 2*Log[a + b*x] + Log[1 - (a + b*x)^2
])/b
```

**fricas [A]** time = 0.54, size = 67, normalized size = 1.40

$$-\frac{(bx+a)\log\left(b^2x^2+2\,abx+a^2-1\right)-2\,(bx+a)\log\left(bx+a\right)+\log\left(\frac{bx+a+1}{bx+a-1}\right)}{2\left(b^2x+ab\right)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(b*x+a)/(b*x+a)^2,x, algorithm="fricas")
```

```
[Out] -1/2*((b*x + a)*log(b^2*x^2 + 2*a*b*x + a^2 - 1) - 2*(b*x + a)*log(b*x + a)
 + log((b*x + a + 1)/(b*x + a - 1)))/(b^2*x + a*b)
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{arcoth}\left(bx+a\right)}{\left(bx+a\right)^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(b*x+a)/(b*x+a)^2,x, algorithm="giac")
```

```
[Out] integrate(arccoth(b*x + a)/(b*x + a)^2, x)
```

**maple [A]** time = 0.04, size = 54, normalized size = 1.12

$$-\frac{\operatorname{arccoth}\left(bx+a\right)}{b\left(bx+a\right)}+\frac{\ln\left(bx+a\right)}{b}-\frac{\ln\left(bx+a-1\right)}{2b}-\frac{\ln\left(bx+a+1\right)}{2b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(arccoth(b*x+a)/(b*x+a)^2,x)
```

```
[Out] -arccoth(b*x+a)/b/(b*x+a)+ln(b*x+a)/b-1/2/b*ln(b*x+a-1)-1/2*ln(b*x+a+1)/b
```

**maxima** [A] time = 0.31, size = 53, normalized size = 1.10

$$-\frac{\log(bx+a+1)}{2b}+\frac{\log(bx+a)}{b}-\frac{\log(bx+a-1)}{2b}-\frac{\operatorname{arcoth}(bx+a)}{(bx+a)b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(b*x+a)/(b*x+a)^2,x, algorithm="maxima")
```

```
[Out] -1/2*log(b*x + a + 1)/b + log(b*x + a)/b - 1/2*log(b*x + a - 1)/b - arccoth
(b*x + a)/((b*x + a)*b)
```

**mupad** [B] time = 1.41, size = 93, normalized size = 1.94

$$\frac{\ln(a+b\,x)}{b}-\frac{\ln\left(a^2+2\,a\,b\,x+b^2\,x^2-1\right)}{2\,b}-\frac{\ln\left(\frac{a+b\,x+1}{a+b\,x}\right)}{2\,\left(x\,b^2+a\,b\right)}+\frac{\ln\left(\frac{a+b\,x-1}{a+b\,x}\right)}{2\,x\,b^2+2\,a\,b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(a + b*x)/(a + b*x)^2,x)
```

```
[Out] log(a + b*x)/b - log(a^2 + b^2*x^2 + 2*a*b*x - 1)/(2*b) - log((a + b*x + 1)
/(a + b*x))/(2*(a*b + b^2*x)) + log((a + b*x - 1)/(a + b*x))/(2*a*b + 2*b^2
*x)
```

**sympy** [A] time = 1.40, size = 136, normalized size = 2.83

$$\begin{cases} \frac{a\log\left(\frac{a}{b}+x\right)}{ab+b^2x}-\frac{a\log\left(\frac{a}{b}+x+\frac{1}{b}\right)}{ab+b^2x}+\frac{a\operatorname{acoth}(a+bx)}{ab+b^2x}+\frac{bx\log\left(\frac{a}{b}+x\right)}{ab+b^2x}-\frac{bx\log\left(\frac{a}{b}+x+\frac{1}{b}\right)}{ab+b^2x}+\frac{bx\operatorname{acoth}(a+bx)}{ab+b^2x}-\frac{\operatorname{acoth}(a+bx)}{ab+b^2x} & \text{for } b\neq 0\\ \frac{x\operatorname{acoth}(a)}{a^2} & \text{otherwise} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(b*x+a)/(b*x+a)**2,x)
```

```
[Out] Piecewise((a*log(a/b + x)/(a*b + b**2*x) - a*log(a/b + x + 1/b)/(a*b + b**2
*x) + a*acoth(a + b*x)/(a*b + b**2*x) + b*x*log(a/b + x)/(a*b + b**2*x) - b
*x*log(a/b + x + 1/b)/(a*b + b**2*x) + b*x*acoth(a + b*x)/(a*b + b**2*x) -
acoth(a + b*x)/(a*b + b**2*x), Ne(b, 0)), (x*acoth(a)/a**2, True))
```

# 3.100 $\int \frac{\coth^{-1}(1+x)}{2+2x} \, dx$

**Optimal**. Leaf size=25

$$\frac{1}{4}\text{Li}_2\left(-\frac{1}{x+1}\right)-\frac{1}{4}\text{Li}_2\left(\frac{1}{x+1}\right)$$

[Out] 1/4*polylog(2,-1/(1+x))-1/4*polylog(2,1/(1+x))

**Rubi [A]** time = 0.02, antiderivative size = 25, normalized size of antiderivative = 1.00, number of steps used = 3, number of rules used = 3, integrand size = 12, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.250, Rules used = {6108, 12, 5913}

$$\frac{1}{4}\text{PolyLog}\left(2,-\frac{1}{x+1}\right)-\frac{1}{4}\text{PolyLog}\left(2,\frac{1}{x+1}\right)$$

Antiderivative was successfully verified.

[In] Int[ArcCoth[1 + x]/(2 + 2*x),x]

[Out] PolyLog[2, -(1 + x)^(-1)]/4 - PolyLog[2, (1 + x)^(-1)]/4

Rule 12

```
Int[(a_)*(u_), x_Symbol] :> Dist[a, Int[u, x], x] /; FreeQ[a, x] &&  !Match
Q[u, (b_)*(v_) /; FreeQ[b, x]]
```

Rule 5913

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))/(x_), x_Symbol] :> Simp[a*Log[x], x
] + (Simp[(b*PolyLog[2, -(c*x)^(-1)])/2, x] - Simp[(b*PolyLog[2, 1/(c*x)])/
2, x]) /; FreeQ[{a, b, c}, x]
```

Rule 6108

```
Int[((a_.) + ArcCoth[(c_) + (d_.)*(x_)]*(b_.))^(p_.)*((e_.) + (f_.)*(x_))^(
m_.), x_Symbol] :> Dist[1/d, Subst[Int[((f*x)/d)^m*(a + b*ArcCoth[x])^p, x]
, x, c + d*x], x] /; FreeQ[{a, b, c, d, e, f, m}, x] && EqQ[d*e - c*f, 0] &
& IGtQ[p, 0]
```

Rubi steps

$$\begin{aligned}\int \frac{\coth^{-1}(1+x)}{2+2x} \, dx &= \text{Subst}\left(\int \frac{\coth^{-1}(x)}{2x} \, dx,x,1+x\right)\\ &= \frac{1}{2}\text{Subst}\left(\int \frac{\coth^{-1}(x)}{x} \, dx,x,1+x\right)\\ &= \frac{1}{4}\text{Li}_2\left(-\frac{1}{1+x}\right)-\frac{1}{4}\text{Li}_2\left(\frac{1}{1+x}\right)\end{aligned}$$

**Mathematica [B]** time = 0.02, size = 117, normalized size = 4.68

$$-\frac{\text{Li}_2(-x-1)}{4}+\frac{\text{Li}_2(x+1)}{4}+\frac{1}{8}\log^2\left(-\frac{1}{x+1}\right)-\frac{1}{8}\log^2\left(\frac{1}{x+1}\right)+\frac{1}{4}\log(x+2)\log\left(-\frac{1}{x+1}\right)-\frac{1}{4}\log\left(\frac{x+2}{x+1}\right)\log\left(-\frac{1}{x+\cdots}\right.$$

Warning: Unable to verify antiderivative.

[In] Integrate[ArcCoth[1 + x]/(2 + 2*x),x]

```
[Out] Log[-(1 + x)^(-1)]^2/8 - (Log[-x]*Log[(1 + x)^(-1)])/4 - Log[(1 + x)^(-1)]^
2/8 + (Log[(1 + x)^(-1)]*Log[x/(1 + x)])/4 + (Log[-(1 + x)^(-1)]*Log[2 + x]
)/4 - (Log[-(1 + x)^(-1)]*Log[(2 + x)/(1 + x)])/4 - PolyLog[2, -1 - x]/4 +
PolyLog[2, 1 + x]/4
```

**fricas [F]** time = 0.55, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{\text{arcoth}\,(x+1)}{2\,(x+1)}, x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(1+x)/(2+2*x),x, algorithm="fricas")
```

```
[Out] integral(1/2*arccoth(x + 1)/(x + 1), x)
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\text{arcoth}\,(x+1)}{2\,(x+1)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(1+x)/(2+2*x),x, algorithm="giac")
```

```
[Out] integrate(1/2*arccoth(x + 1)/(x + 1), x)
```

**maple [A]** time = 0.05, size = 34, normalized size = 1.36

$$\frac{\ln(1+x)\,\text{arccoth}\,(1+x)}{2}-\frac{\text{dilog}\,(1+x)}{4}-\frac{\text{dilog}\,(x+2)}{4}-\frac{\ln(1+x)\ln(x+2)}{4}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(arccoth(1+x)/(2+2*x),x)
```

```
[Out] 1/2*ln(1+x)*arccoth(1+x)-1/4*dilog(1+x)-1/4*dilog(x+2)-1/4*ln(1+x)*ln(x+2)
```

**maxima [B]** time = 0.31, size = 58, normalized size = 2.32

$$-\frac{1}{4}\left(\log(x+2)-\log(x)\right)\log(x+1)+\frac{1}{2}\,\text{arcoth}\,(x+1)\log(x+1)-\frac{1}{4}\,\log(x+1)\log(x)+\frac{1}{4}\,\log(x+2)\log(-$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(1+x)/(2+2*x),x, algorithm="maxima")
```

```
[Out] -1/4*(log(x + 2) - log(x))*log(x + 1) + 1/2*arccoth(x + 1)*log(x + 1) - 1/4
*log(x + 1)*log(x) + 1/4*log(x + 2)*log(-x - 1) - 1/4*dilog(-x) + 1/4*dilog
(x + 2)
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.04

$$\int \frac{\text{acoth}\,(x+1)}{2\,x+2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(x + 1)/(2*x + 2),x)
```

```
[Out] int(acoth(x + 1)/(2*x + 2), x)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\frac{\int \frac{\text{acoth}\,(x+1)}{x+1}\,dx}{2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(1+x)/(2+2*x),x)
```

```
[Out] Integral(acoth(x + 1)/(x + 1), x)/2
```

# 3.101 $\int \frac{\coth^{-1}(a+bx)}{\frac{ad}{b}+dx}\,dx$

**Optimal**. Leaf size=35

$$\frac{\text{Li}_2\left(-\frac{1}{a+bx}\right)}{2d}-\frac{\text{Li}_2\left(\frac{1}{a+bx}\right)}{2d}$$

```
[Out] 1/2*polylog(2,-1/(b*x+a))/d-1/2*polylog(2,1/(b*x+a))/d
```

**Rubi [A]** time = 0.03, antiderivative size = 35, normalized size of antiderivative = 1.00, number of steps used = 3, number of rules used = 3, integrand size = 19, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.158, Rules used = {6108, 12, 5913}

$$\frac{\text{PolyLog}\left(2,-\frac{1}{a+bx}\right)}{2d}-\frac{\text{PolyLog}\left(2,\frac{1}{a+bx}\right)}{2d}$$

Antiderivative was successfully verified.

```
[In] Int[ArcCoth[a + b*x]/((a*d)/b + d*x),x]
```

```
[Out] PolyLog[2, -(a + b*x)^(-1)]/(2*d) - PolyLog[2, (a + b*x)^(-1)]/(2*d)
```

Rule 12

```
Int[(a_)*(u_), x_Symbol] :> Dist[a, Int[u, x], x] /; FreeQ[a, x] &&  !Match
Q[u, (b_)*(v_) /; FreeQ[b, x]]
```

Rule 5913

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))/(x_), x_Symbol] :> Simp[a*Log[x], x
] + (Simp[(b*PolyLog[2, -(c*x)^(-1)])/2, x] - Simp[(b*PolyLog[2, 1/(c*x)])/
2, x]) /; FreeQ[{a, b, c}, x]
```

Rule 6108

```
Int[((a_.) + ArcCoth[(c_) + (d_.)*(x_)]*(b_.))^(p_.)*((e_.) + (f_.)*(x_))^(
m_.), x_Symbol] :> Dist[1/d, Subst[Int[((f*x)/d)^m*(a + b*ArcCoth[x])^p, x]
, x, c + d*x], x] /; FreeQ[{a, b, c, d, e, f, m}, x] && EqQ[d*e - c*f, 0] &
& IGtQ[p, 0]
```

Rubi steps

$$\begin{aligned}\int \frac{\coth^{-1}(a+bx)}{\frac{ad}{b}+dx}\,dx &= \frac{\text{Subst}\left(\int \frac{b\coth^{-1}(x)}{dx}\,dx,x,a+bx\right)}{b}\\ &= \frac{\text{Subst}\left(\int \frac{\coth^{-1}(x)}{x}\,dx,x,a+bx\right)}{d}\\ &= \frac{\text{Li}_2\left(-\frac{1}{a+bx}\right)}{2d}-\frac{\text{Li}_2\left(\frac{1}{a+bx}\right)}{2d}\end{aligned}$$

**Mathematica [B]** time = 0.03, size = 312, normalized size = 8.91

$$b\left(-\frac{\text{Li}_2(-a-bx)}{2bd}+\frac{\text{Li}_2(a+bx)}{2bd}-\frac{\log^2\left(\frac{ab-(a-1)b}{b(a+bx)}\right)}{4bd}+\frac{\log^2\left(\frac{ab-(a+1)b}{b(a+bx)}\right)}{4bd}-\frac{\log\left(\frac{b(a+bx-1)}{(a-1)b-ab}\right)\log\left(\frac{ab-(a-1)b}{b(a+bx)}\right)}{2bd}+\frac{\log\left(\right.}{}\right.$$

Warning: Unable to verify antiderivative.

```
[In] Integrate[ArcCoth[a + b*x]/((a*d)/b + d*x),x]
```

```
[Out] b*(-1/2*(Log[(b*(-1 + a + b*x))/((-1 + a)*b - a*b)]*Log[(-((-1 + a)*b) + a*
b)/(b*(a + b*x))])/(b*d) - Log[(-((-1 + a)*b) + a*b)/(b*(a + b*x))]^2/(4*b*
d) + (Log[(b*(-1 - a - b*x))/((-1 - a)*b + a*b)]*Log[(a*b - (1 + a)*b)/(b*(
a + b*x))])/(2*b*d) + Log[(a*b - (1 + a)*b)/(b*(a + b*x))]^2/(4*b*d) + (Log
[(-((-1 + a)*b) + a*b)/(b*(a + b*x))]*Log[(-1 + a + b*x)/(a + b*x)])/(2*b*d
) - (Log[(a*b - (1 + a)*b)/(b*(a + b*x))]*Log[(1 + a + b*x)/(a + b*x)])/(2*
b*d) - PolyLog[2, -a - b*x]/(2*b*d) + PolyLog[2, a + b*x]/(2*b*d))
```

**fricas [F]** time = 1.09, size = 0, normalized size = 0.00

$$\mathrm{integral}\left(\frac{b\,\mathrm{arcoth}\left(bx+a\right)}{bdx+ad},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(b*x+a)/(a*d/b+d*x),x, algorithm="fricas")
```

```
[Out] integral(b*arccoth(b*x + a)/(b*d*x + a*d), x)
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\mathrm{arcoth}\left(bx+a\right)}{dx+\frac{ad}{b}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(b*x+a)/(a*d/b+d*x),x, algorithm="giac")
```

```
[Out] integrate(arccoth(b*x + a)/(d*x + a*d/b), x)
```

**maple [A]** time = 0.05, size = 59, normalized size = 1.69

$$\frac{\ln\left(bx+a\right)\mathrm{arccoth}\left(bx+a\right)}{d}-\frac{\mathrm{dilog}\left(bx+a\right)}{2d}-\frac{\mathrm{dilog}\left(bx+a+1\right)}{2d}-\frac{\ln\left(bx+a\right)\ln\left(bx+a+1\right)}{2d}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(arccoth(b*x+a)/(a*d/b+d*x),x)
```

```
[Out] 1/d*ln(b*x+a)*arccoth(b*x+a)-1/2/d*dilog(b*x+a)-1/2/d*dilog(b*x+a+1)-1/2/d*
ln(b*x+a)*ln(b*x+a+1)
```

**maxima [B]** time = 0.33, size = 132, normalized size = 3.77

$$-\frac{1}{2}b\left(\frac{\log\left(bx+a\right)\log\left(bx+a-1\right)+\mathrm{Li}_2\left(-bx-a+1\right)}{bd}-\frac{\log\left(bx+a+1\right)\log\left(-bx-a\right)+\mathrm{Li}_2\left(bx+a+1\right)}{bd}\right)-\frac{b\left(\log\right.}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(b*x+a)/(a*d/b+d*x),x, algorithm="maxima")
```

```
[Out] -1/2*b*((log(b*x + a)*log(b*x + a - 1) + dilog(-b*x - a + 1))/(b*d) - (log(
b*x + a + 1)*log(-b*x - a) + dilog(b*x + a + 1))/(b*d)) - 1/2*b*(log(b*x +
a + 1)/b - log(b*x + a - 1)/b)*log(d*x + a*d/b)/d + arccoth(b*x + a)*log(d*
x + a*d/b)/d
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.03

$$\int \frac{\mathrm{acoth}\left(a+b\,x\right)}{d\,x+\frac{a\,d}{b}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(a + b*x)/(d*x + (a*d)/b),x)
```

```
[Out] int(acoth(a + b*x)/(d*x + (a*d)/b), x)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\frac{b\int\frac{\operatorname{acoth}(a+bx)}{a+bx}\,dx}{d}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(b*x+a)/(a*d/b+d*x),x)
```

```
[Out] b*Integral(acoth(a + b*x)/(a + b*x), x)/d
```

# 3.102 $\int (e+fx)^3 \left(a+b\coth^{-1}(c+dx)\right) dx$

**Optimal**. Leaf size=168

$$\frac{(e+fx)^4\left(a+b\coth^{-1}(c+dx)\right)}{4f}+\frac{bfx\left(\left(6c^2+1\right)f^2-12cdef+6d^2e^2\right)}{4d^3}+\frac{bf^2(c+dx)^2(de-cf)}{2d^4}-\frac{b(-cf+de-f)^4}{8d^4}$$

[Out] 1/4*b*f*(6*d^2*e^2-12*c*d*e*f+(6*c^2+1)*f^2)*x/d^3+1/2*b*f^2*(-c*f+d*e)*(d*x+c)^2/d^4+1/12*b*f^3*(d*x+c)^3/d^4+1/4*(f*x+e)^4*(a+b*arccoth(d*x+c))/f+1/8*b*(-c*f+d*e+f)^4*ln(-d*x-c+1)/d^4/f-1/8*b*(-c*f+d*e-f)^4*ln(d*x+c+1)/d^4/f

**Rubi [A]** time = 0.34, antiderivative size = 168, normalized size of antiderivative = 1.00, number of steps used = 7, number of rules used = 5, integrand size = 18, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.278, Rules used = {6112, 5927, 702, 633, 31}

$$\frac{(e+fx)^4\left(a+b\coth^{-1}(c+dx)\right)}{4f}+\frac{bfx\left(\left(6c^2+1\right)f^2-12cdef+6d^2e^2\right)}{4d^3}+\frac{bf^2(c+dx)^2(de-cf)}{2d^4}-\frac{b(-cf+de-f)^4}{8d^4}$$

Antiderivative was successfully verified.

[In] Int[(e + f*x)^3*(a + b*ArcCoth[c + d*x]),x]

[Out] (b*f*(6*d^2*e^2 - 12*c*d*e*f + (1 + 6*c^2)*f^2)*x)/(4*d^3) + (b*f^2*(d*e - c*f)*(c + d*x)^2)/(2*d^4) + (b*f^3*(c + d*x)^3)/(12*d^4) + ((e + f*x)^4*(a + b*ArcCoth[c + d*x]))/(4*f) + (b*(d*e + f - c*f)^4*Log[1 - c - d*x])/(8*d^4*f) - (b*(d*e - f - c*f)^4*Log[1 + c + d*x])/(8*d^4*f)

Rule 31

```
Int[((a_) + (b_.)*(x_))^(-1), x_Symbol] :> Simp[Log[RemoveContent[a + b*x, x]]/b, x] /; FreeQ[{a, b}, x]
```

Rule 633

```
Int[((d_) + (e_.)*(x_))/((a_) + (c_.)*(x_)^2), x_Symbol] :> With[{q = Rt[-(a*c), 2]}, Dist[e/2 + (c*d)/(2*q), Int[1/(-q + c*x), x], x] + Dist[e/2 - (c*d)/(2*q), Int[1/(q + c*x), x], x]] /; FreeQ[{a, c, d, e}, x] && NiceSqrtQ[-(a*c)]
```

Rule 702

```
Int[((d_) + (e_.)*(x_))^(m_)/((a_) + (c_.)*(x_)^2), x_Symbol] :> Int[PolynomialDivide[(d + e*x)^m, a + c*x^2, x], x] /; FreeQ[{a, c, d, e}, x] && NeQ[c*d^2 + a*e^2, 0] && IGtQ[m, 1] && (NeQ[d, 0] || GtQ[m, 2])
```

Rule 5927

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))*((d_) + (e_.)*(x_))^(q_.), x_Symbol] :> Simp[((d + e*x)^(q + 1)*(a + b*ArcCoth[c*x]))/(e*(q + 1)), x] - Dist[(b*c)/(e*(q + 1)), Int[(d + e*x)^(q + 1)/(1 - c^2*x^2), x], x] /; FreeQ[{a, b, c, d, e, q}, x] && NeQ[q, -1]
```

Rule 6112

```
Int[((a_.) + ArcCoth[(c_) + (d_.)*(x_)]*(b_.))^(p_.)*((e_.) + (f_.)*(x_))^(m_.), x_Symbol] :> Dist[1/d, Subst[Int[(((d*e - c*f)/d + (f*x)/d)^m*(a + b*ArcCoth[x])^p, x], x, c + d*x], x] /; FreeQ[{a, b, c, d, e, f, m}, x] && IGtQ[p, 0]
```

Rubi steps

$$\int (e+fx)^3 \left(a+b\coth^{-1}(c+dx)\right) dx = \frac{\text{Subst}\left(\int \left(\frac{de-cf}{d}+\frac{fx}{d}\right)^3 \left(a+b\coth^{-1}(x)\right) dx, x, c+dx\right)}{d}$$

$$= \frac{(e+fx)^4 \left(a+b\coth^{-1}(c+dx)\right)}{4f} - \frac{b\,\text{Subst}\left(\int \frac{\left(\frac{de-cf}{d}+\frac{fx}{d}\right)^4}{1-x^2} dx, x, c+dx\right.}{4f}$$

$$= \frac{(e+fx)^4 \left(a+b\coth^{-1}(c+dx)\right)}{4f} - \frac{b\,\text{Subst}\left(\int \left(-\frac{f^2\left(6d^2e^2-12cdef+\left(1+6c^2\right.\right.}{d^4}\right.\right.}{}$$

$$= \frac{bf\left(6d^2e^2-12cdef+\left(1+6c^2\right)f^2\right)x}{4d^3} + \frac{bf^2(de-cf)(c+dx)^2}{2d^4} + \frac{bf^3(}{}$$

$$= \frac{bf\left(6d^2e^2-12cdef+\left(1+6c^2\right)f^2\right)x}{4d^3} + \frac{bf^2(de-cf)(c+dx)^2}{2d^4} + \frac{bf^3(}{}$$

$$= \frac{bf\left(6d^2e^2-12cdef+\left(1+6c^2\right)f^2\right)x}{4d^3} + \frac{bf^2(de-cf)(c+dx)^2}{2d^4} + \frac{bf^3(}{}$$

**Mathematica [A]** time = 0.30, size = 270, normalized size = 1.61

$$\frac{6dx\left(4ad^3e^3+bf\left(\left(3c^2+1\right)f^2-8cdef+6d^2e^2\right)\right)+6d^2fx^2\left(6ad^2e^2+bf(2de-cf)\right)+2d^3f^2x^3(12ade+bf)+}{}$$

Antiderivative was successfully verified.

```
[In] Integrate[(e + f*x)^3*(a + b*ArcCoth[c + d*x]),x]
```

```
[Out] (6*d*(4*a*d^3*e^3 + b*f*(6*d^2*e^2 - 8*c*d*e*f + (1 + 3*c^2)*f^2))*x + 6*d^
2*f*(6*a*d^2*e^2 + b*f*(2*d*e - c*f))*x^2 + 2*d^3*f^2*(12*a*d*e + b*f)*x^3
+ 6*a*d^4*f^3*x^4 + 6*b*d^4*x*(4*e^3 + 6*e^2*f*x + 4*e*f^2*x^2 + f^3*x^3)*A
rcCoth[c + d*x] - 3*b*(-1 + c)*(4*d^3*e^3 - 6*(-1 + c)*d^2*e^2*f + 4*(-1 +
c)^2*d*e*f^2 - (-1 + c)^3*f^3)*Log[1 - c - d*x] - 3*b*(1 + c)*(-4*d^3*e^3 +
 6*(1 + c)*d^2*e^2*f - 4*(1 + c)^2*d*e*f^2 + (1 + c)^3*f^3)*Log[1 + c + d*x
])/(24*d^4)
```

**fricas [B]** time = 0.55, size = 385, normalized size = 2.29

$$\frac{6\,ad^4f^3x^4+2\left(12\,ad^4ef^2+bd^3f^3\right)x^3+6\left(6\,ad^4e^2f+2\,bd^3ef^2-bcd^2f^3\right)x^2+6\left(4\,ad^4e^3+6\,bd^3e^2f-8\,bcd^2ef\right.}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((f*x+e)^3*(a+b*arccoth(d*x+c)),x, algorithm="fricas")
```

```
[Out] 1/24*(6*a*d^4*f^3*x^4 + 2*(12*a*d^4*e*f^2 + b*d^3*f^3)*x^3 + 6*(6*a*d^4*e^2
*f + 2*b*d^3*e*f^2 - b*c*d^2*f^3)*x^2 + 6*(4*a*d^4*e^3 + 6*b*d^3*e^2*f - 8*
b*c*d^2*e*f^2 + (3*b*c^2 + b)*d*f^3)*x + 3*(4*(b*c + b)*d^3*e^3 - 6*(b*c^2
+ 2*b*c + b)*d^2*e^2*f + 4*(b*c^3 + 3*b*c^2 + 3*b*c + b)*d*e*f^2 - (b*c^4 +
 4*b*c^3 + 6*b*c^2 + 4*b*c + b)*f^3)*log(d*x + c + 1) - 3*(4*(b*c - b)*d^3*
e^3 - 6*(b*c^2 - 2*b*c + b)*d^2*e^2*f + 4*(b*c^3 - 3*b*c^2 + 3*b*c - b)*d*e
*f^2 - (b*c^4 - 4*b*c^3 + 6*b*c^2 - 4*b*c + b)*f^3)*log(d*x + c - 1) + 3*(b
*d^4*f^3*x^4 + 4*b*d^4*e*f^2*x^3 + 6*b*d^4*e^2*f*x^2 + 4*b*d^4*e^3*x)*log((
d*x + c + 1)/(d*x + c - 1)))/d^4
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \left(fx+e\right)^{3}\left(b\,\mathrm{arcoth}\left(dx+c\right)+a\right)dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((f*x+e)^3*(a+b*arccoth(d*x+c)),x, algorithm="giac")
```

```
[Out] integrate((f*x + e)^3*(b*arccoth(d*x + c) + a), x)
```

**maple [B]** time = 0.04, size = 786, normalized size = 4.68

$$-\frac{3bf\ln\left(dx+c+1\right)c\,e^{2}}{2d^{2}}-\frac{3bf\ln\left(dx+c+1\right)c^{2}e^{2}}{4d^{2}}-\frac{3bf\ln\left(dx+c-1\right)c\,e^{2}}{2d^{2}}-\frac{b\,f^{2}\ln\left(dx+c-1\right)c^{3}e}{2d^{3}}+\frac{3b\,f^{2}\ln\left(dx+\right.}{2d^{3}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((f*x+e)^3*(a+b*arccoth(d*x+c)),x)
```

```
[Out] -3/2/d^2*b*f*ln(d*x+c+1)*c*e^2-3/4/d^2*b*f*ln(d*x+c+1)*c^2*e^2-3/2/d^2*b*f*
ln(d*x+c-1)*c*e^2-1/2/d^3*b*f^2*ln(d*x+c-1)*c^3*e+3/2/d^3*b*f^2*ln(d*x+c-1)
*c^2*e+1/2/d^3*b*f^2*ln(d*x+c+1)*c^3*e+3/2/d^3*b*f^2*ln(d*x+c+1)*c*e-3/2/d^
3*b*f^2*ln(d*x+c-1)*c*e-2*b/d^2*f^2*c*e*x+3/2/d^3*b*f^2*ln(d*x+c+1)*c^2*e+3
/4/d^2*b*f*ln(d*x+c-1)*c^2*e^2+1/2/d*b*ln(d*x+c-1)*e^3+3/2*a*f*x^2*e^2+a*f^
2*x^3*e+arccoth(d*x+c)*x*b*e^3+1/4*b/f*arccoth(d*x+c)*e^4-1/8*b/f*ln(d*x+c+
1)*e^4+1/8*b/f*ln(d*x+c-1)*e^4+1/12/d*b*f^3*x^3+1/8/d^4*b*f^3*ln(d*x+c-1)-1
/8/d^4*b*f^3*ln(d*x+c+1)+1/4*b/d^3*f^3*x+1/2/d*b*ln(d*x+c+1)*e^3+1/4*b*f^3*
arccoth(d*x+c)*x^4+13/12/d^4*b*f^3*c^3+1/4/d^4*b*f^3*c+1/4*a/f*e^4+3/2/d^2*
b*f*c*e^2-1/2/d^4*b*f^3*ln(d*x+c-1)*c^3+1/2/d*b*ln(d*x+c+1)*c*e^3-1/2/d*b*l
n(d*x+c-1)*c*e^3+1/2/d^3*b*f^2*ln(d*x+c+1)*e-3/4/d^2*b*f*ln(d*x+c+1)*e^2+3/
4/d^4*b*f^3*ln(d*x+c-1)*c^2-1/2/d^4*b*f^3*ln(d*x+c-1)*c-1/4/d^2*b*f^3*x^2*c
+1/2/d*b*f^2*e*x^2+b*f^2*arccoth(d*x+c)*e*x^3-1/2/d^4*b*f^3*ln(d*x+c+1)*c^3
+1/2/d^3*b*f^2*ln(d*x+c-1)*e-1/8/d^4*b*f^3*ln(d*x+c+1)*c^4-1/2/d^4*b*f^3*ln
(d*x+c+1)*c+3/4/d^2*b*f*ln(d*x+c-1)*e^2+3/2*b*f*arccoth(d*x+c)*e^2*x^2+3/2*
b/d*f*e^2*x+3/4*b/d^3*f^3*c^2*x-3/4/d^4*b*f^3*ln(d*x+c+1)*c^2+1/8/d^4*b*f^3
*ln(d*x+c-1)*c^4+a*x*e^3+1/4*a*f^3*x^4-5/2/d^3*b*f^2*c^2*e
```

**maxima [B]** time = 0.31, size = 333, normalized size = 1.98

$$\frac{1}{4}\,af^{3}x^{4}+aef^{2}x^{3}+\frac{3}{2}\,ae^{2}fx^{2}+\frac{3}{4}\left(2\,x^{2}\,\mathrm{arcoth}\left(dx+c\right)+d\left(\frac{2\,x}{d^{2}}-\frac{\left(c^{2}+2\,c+1\right)\log\left(dx+c+1\right)}{d^{3}}+\frac{\left(c^{2}-2\,c+1\right)\log}{d^{3}}\right.\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((f*x+e)^3*(a+b*arccoth(d*x+c)),x, algorithm="maxima")
```

```
[Out] 1/4*a*f^3*x^4 + a*e*f^2*x^3 + 3/2*a*e^2*f*x^2 + 3/4*(2*x^2*arccoth(d*x + c)
 + d*(2*x/d^2 - (c^2 + 2*c + 1)*log(d*x + c + 1)/d^3 + (c^2 - 2*c + 1)*log(
d*x + c - 1)/d^3))*b*e^2*f + 1/2*(2*x^3*arccoth(d*x + c) + d*((d*x^2 - 4*c*
x)/d^3 + (c^3 + 3*c^2 + 3*c + 1)*log(d*x + c + 1)/d^4 - (c^3 - 3*c^2 + 3*c
- 1)*log(d*x + c - 1)/d^4))*b*e*f^2 + 1/24*(6*x^4*arccoth(d*x + c) + d*(2*(
d^2*x^3 - 3*c*d*x^2 + 3*(3*c^2 + 1)*x)/d^4 - 3*(c^4 + 4*c^3 + 6*c^2 + 4*c +
 1)*log(d*x + c + 1)/d^5 + 3*(c^4 - 4*c^3 + 6*c^2 - 4*c + 1)*log(d*x + c -
1)/d^5))*b*f^3 + a*e^3*x + 1/2*(2*(d*x + c)*arccoth(d*x + c) + log(-(d*x +
c)^2 + 1))*b*e^3/d
```

**mupad [B]** time = 2.17, size = 742, normalized size = 4.42

$$x\left(\frac{e\left(6\,a\,c^2\,f^2+12\,a\,c\,d\,e\,f+2\,a\,d^2\,e^2+3\,b\,d\,e\,f-6\,a\,f^2\right)}{2\,d^2}-\frac{\left(4\,c^2-4\right)\left(\frac{f^2\left(b\,f+8\,a\,c\,f+12\,a\,d\,e\right)}{4\,d}-\frac{2\,a\,c\,f^3}{d}\right)}{4\,d^2}+\frac{2\,c\left(2 -\right.}{}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((e + f*x)^3*(a + b*acoth(c + d*x)),x)
```

```
[Out] x*((e*(6*a*c^2*f^2 - 6*a*f^2 + 2*a*d^2*e^2 + 3*b*d*e*f + 12*a*c*d*e*f))/(2*
d^2) - ((4*c^2 - 4)*((f^2*(b*f + 8*a*c*f + 12*a*d*e))/(4*d) - (2*a*c*f^3)/d
))/(4*d^2) + (2*c*((2*c*((f^2*(b*f + 8*a*c*f + 12*a*d*e))/(4*d) - (2*a*c*f^
3)/d))/d - (4*a*c^2*f^3 - 4*a*f^3 + 4*b*d*e*f^2 + 12*a*d^2*e^2*f + 24*a*c*d
*e*f^2)/(4*d^2) + (a*f^3*(4*c^2 - 4))/(4*d^2)))/d) - log(1 - 1/(c + d*x))*(
(b*f^3*x^4)/8 + (b*e^3*x)/2 + (3*b*e^2*f*x^2)/4 + (b*e*f^2*x^3)/2) - x^2*((
c*((f^2*(b*f + 8*a*c*f + 12*a*d*e))/(4*d) - (2*a*c*f^3)/d))/d - (4*a*c^2*f^
3 - 4*a*f^3 + 4*b*d*e*f^2 + 12*a*d^2*e^2*f + 24*a*c*d*e*f^2)/(8*d^2) + (a*f
^3*(4*c^2 - 4))/(8*d^2)) + x^3*((f^2*(b*f + 8*a*c*f + 12*a*d*e))/(12*d) - (
2*a*c*f^3)/(3*d)) + log(1/(c + d*x) + 1)*((b*f^3*x^4)/8 + (b*e^3*x)/2 + (3*
b*e^2*f*x^2)/4 + (b*e*f^2*x^3)/2) + (a*f^3*x^4)/4 + (log(c + d*x - 1)*(b*f^
3 + 6*b*c^2*f^3 - 4*b*c^3*f^3 + 4*b*d^3*e^3 + b*c^4*f^3 - 4*b*c*f^3 + 4*b*d
*e*f^2 - 4*b*c*d^3*e^3 + 6*b*d^2*e^2*f - 12*b*c*d^2*e^2*f + 12*b*c^2*d*e*f^
2 - 4*b*c^3*d*e*f^2 + 6*b*c^2*d^2*e^2*f - 12*b*c*d*e*f^2))/(8*d^4) - (log(c
 + d*x + 1)*(b*f^3 + 6*b*c^2*f^3 + 4*b*c^3*f^3 - 4*b*d^3*e^3 + b*c^4*f^3 +
4*b*c*f^3 - 4*b*d*e*f^2 - 4*b*c*d^3*e^3 + 6*b*d^2*e^2*f + 12*b*c*d^2*e^2*f
- 12*b*c^2*d*e*f^2 - 4*b*c^3*d*e*f^2 + 6*b*c^2*d^2*e^2*f - 12*b*c*d*e*f^2))
/(8*d^4)
```

**sympy [A]** time = 7.46, size = 644, normalized size = 3.83

$$\begin{cases} ae^3x+\frac{3ae^2fx^2}{2}+aef^2x^3+\frac{af^3x^4}{4}-\frac{bc^4f^3\operatorname{acoth}(c+dx)}{4d^4}+\frac{bc^3ef^2\operatorname{acoth}(c+dx)}{d^3}-\frac{bc^3f^3\log\left(\frac{c}{d}+x+\frac{1}{d}\right)}{d^4}+\frac{bc^3f^3\operatorname{acoth}(c+dx)}{d^4}-\frac{3bc^2}{} \\ (a+b\operatorname{acoth}(c))\left(e^3x+\frac{3e^2fx^2}{2}+ef^2x^3+\frac{f^3x^4}{4}\right) \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((f*x+e)**3*(a+b*acoth(d*x+c)),x)
```

```
[Out] Piecewise((a*e**3*x + 3*a*e**2*f*x**2/2 + a*e*f**2*x**3 + a*f**3*x**4/4 - b
*c**4*f**3*acoth(c + d*x)/(4*d**4) + b*c**3*e*f**2*acoth(c + d*x)/d**3 - b*
c**3*f**3*log(c/d + x + 1/d)/d**4 + b*c**3*f**3*acoth(c + d*x)/d**4 - 3*b*c
**2*e**2*f*acoth(c + d*x)/(2*d**2) + 3*b*c**2*e*f**2*log(c/d + x + 1/d)/d**
3 - 3*b*c**2*e*f**2*acoth(c + d*x)/d**3 + 3*b*c**2*f**3*x/(4*d**3) - 3*b*c*
*2*f**3*acoth(c + d*x)/(2*d**4) + b*c*e**3*acoth(c + d*x)/d - 3*b*c*e**2*f*
log(c/d + x + 1/d)/d**2 + 3*b*c*e**2*f*acoth(c + d*x)/d**2 - 2*b*c*e*f**2*x
/d**2 - b*c*f**3*x**2/(4*d**2) + 3*b*c*e*f**2*acoth(c + d*x)/d**3 - b*c*f**
3*log(c/d + x + 1/d)/d**4 + b*c*f**3*acoth(c + d*x)/d**4 + b*e**3*x*acoth(c
 + d*x) + 3*b*e**2*f*x**2*acoth(c + d*x)/2 + b*e*f**2*x**3*acoth(c + d*x) +
 b*f**3*x**4*acoth(c + d*x)/4 + b*e**3*log(c/d + x + 1/d)/d - b*e**3*acoth(
c + d*x)/d + 3*b*e**2*f*x/(2*d) + b*e*f**2*x**2/(2*d) + b*f**3*x**3/(12*d)
- 3*b*e**2*f*acoth(c + d*x)/(2*d**2) + b*e*f**2*log(c/d + x + 1/d)/d**3 - b
*e*f**2*acoth(c + d*x)/d**3 + b*f**3*x/(4*d**3) - b*f**3*acoth(c + d*x)/(4*
d**4), Ne(d, 0)), ((a + b*acoth(c))*(e**3*x + 3*e**2*f*x**2/2 + e*f**2*x**3
 + f**3*x**4/4), True))
```

# 3.103 $\int (e+fx)^2 \left(a+b\coth^{-1}(c+dx)\right) dx$

**Optimal**. Leaf size=120

$$\frac{(e+fx)^3\left(a+b\coth^{-1}(c+dx)\right)}{3f}+\frac{b(-cf+de+f)^3\log(-c-dx+1)}{6d^3f}-\frac{b(de-(c+1)f)^3\log(c+dx+1)}{6d^3f}+\frac{bf^2(c+}{6d^3}$$

```
[Out] b*f*(-c*f+d*e)*x/d^2+1/6*b*f^2*(d*x+c)^2/d^3+1/3*(f*x+e)^3*(a+b*arccoth(d*x
+c))/f+1/6*b*(-c*f+d*e+f)^3*ln(-d*x-c+1)/d^3/f-1/6*b*(d*e-(1+c)*f)^3*ln(d*x
+c+1)/d^3/f
```

**Rubi [A]** time = 0.20, antiderivative size = 120, normalized size of antiderivative = 1.00, number of steps used = 7, number of rules used = 5, integrand size = 18, $\frac{\text{number of rules}}{\text{integrand size}} = 0.278$, Rules used = {6112, 5927, 702, 633, 31}

$$\frac{(e+fx)^3\left(a+b\coth^{-1}(c+dx)\right)}{3f}+\frac{bfx(de-cf)}{d^2}+\frac{b(-cf+de+f)^3\log(-c-dx+1)}{6d^3f}-\frac{b(de-(c+1)f)^3\log(c+dx}{6d^3f}$$

Antiderivative was successfully verified.

```
[In] Int[(e + f*x)^2*(a + b*ArcCoth[c + d*x]),x]
```

```
[Out] (b*f*(d*e - c*f)*x)/d^2 + (b*f^2*(c + d*x)^2)/(6*d^3) + ((e + f*x)^3*(a + b
*ArcCoth[c + d*x]))/(3*f) + (b*(d*e + f - c*f)^3*Log[1 - c - d*x])/(6*d^3*f
) - (b*(d*e - (1 + c)*f)^3*Log[1 + c + d*x])/(6*d^3*f)
```

Rule 31

```
Int[((a_) + (b_.)*(x_))^(-1), x_Symbol] :> Simp[Log[RemoveContent[a + b*x,
x]]/b, x] /; FreeQ[{a, b}, x]
```

Rule 633

```
Int[((d_) + (e_.)*(x_))/((a_) + (c_.)*(x_)^2), x_Symbol] :> With[{q = Rt[-(
a*c), 2]}, Dist[e/2 + (c*d)/(2*q), Int[1/(-q + c*x), x], x] + Dist[e/2 - (c
*d)/(2*q), Int[1/(q + c*x), x], x]] /; FreeQ[{a, c, d, e}, x] && NiceSqrtQ[
-(a*c)]
```

Rule 702

```
Int[((d_) + (e_.)*(x_))^(m_)/((a_) + (c_.)*(x_)^2), x_Symbol] :> Int[Polyno
mialDivide[(d + e*x)^m, a + c*x^2, x], x] /; FreeQ[{a, c, d, e}, x] && NeQ[
c*d^2 + a*e^2, 0] && IGtQ[m, 1] && (NeQ[d, 0] || GtQ[m, 2])
```

Rule 5927

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))*((d_) + (e_.)*(x_))^(q_.), x_Symbol
] :> Simp[((d + e*x)^(q + 1)*(a + b*ArcCoth[c*x]))/(e*(q + 1)), x] - Dist[(
b*c)/(e*(q + 1)), Int[(d + e*x)^(q + 1)/(1 - c^2*x^2), x], x] /; FreeQ[{a,
b, c, d, e, q}, x] && NeQ[q, -1]
```

Rule 6112

```
Int[((a_.) + ArcCoth[(c_) + (d_.)*(x_)]*(b_.))^(p_.)*((e_.) + (f_.)*(x_))^(
m_.), x_Symbol] :> Dist[1/d, Subst[Int[(((d*e - c*f)/d + (f*x)/d)^m*(a + b*A
rcCoth[x])^p, x], x, c + d*x], x] /; FreeQ[{a, b, c, d, e, f, m}, x] && IGt
Q[p, 0]
```

Rubi steps

$$\int (e+fx)^2 \left(a+b\coth^{-1}(c+dx)\right) dx = \frac{\text{Subst}\left(\int \left(\frac{de-cf}{d}+\frac{fx}{d}\right)^2 \left(a+b\coth^{-1}(x)\right) dx, x, c+dx\right)}{d}$$

$$= \frac{(e+fx)^3 \left(a+b\coth^{-1}(c+dx)\right)}{3f} - \frac{b\,\text{Subst}\left(\int \frac{\left(\frac{de-cf}{d}+\frac{fx}{d}\right)^3}{1-x^2} dx, x, c+dx\right.}{3f}$$

$$= \frac{(e+fx)^3 \left(a+b\coth^{-1}(c+dx)\right)}{3f} - \frac{b\,\text{Subst}\left(\int \left(-\frac{3f^2(de-cf)}{d^3} - \frac{f^3x}{d^3} + \frac{(de}{} \right.\right.}{3f}$$

$$= \frac{bf(de-cf)x}{d^2} + \frac{bf^2(c+dx)^2}{6d^3} + \frac{(e+fx)^3 \left(a+b\coth^{-1}(c+dx)\right)}{3f} - \frac{bS}{}$$

$$= \frac{bf(de-cf)x}{d^2} + \frac{bf^2(c+dx)^2}{6d^3} + \frac{(e+fx)^3 \left(a+b\coth^{-1}(c+dx)\right)}{3f} - \frac{(b}{}$$

$$= \frac{bf(de-cf)x}{d^2} + \frac{bf^2(c+dx)^2}{6d^3} + \frac{(e+fx)^3 \left(a+b\coth^{-1}(c+dx)\right)}{3f} + \frac{b(}{}$$

**Mathematica [A]** time = 0.17, size = 174, normalized size = 1.45

$$\frac{2dx\left(3ad^2e^2+bf(3de-2cf)\right)+d^2fx^2(6ade+bf)+2ad^3f^2x^3+2bd^3x\left(3e^2+3efx+f^2x^2\right)\coth^{-1}(c+dx)-}{}$$

Antiderivative was successfully verified.

```
[In] Integrate[(e + f*x)^2*(a + b*ArcCoth[c + d*x]),x]
```

```
[Out] (2*d*(3*a*d^2*e^2 + b*f*(3*d*e - 2*c*f))*x + d^2*f*(6*a*d*e + b*f)*x^2 + 2*
a*d^3*f^2*x^3 + 2*b*d^3*x*(3*e^2 + 3*e*f*x + f^2*x^2)*ArcCoth[c + d*x] - b*
(-1 + c)*(3*d^2*e^2 - 3*(-1 + c)*d*e*f + (-1 + c)^2*f^2)*Log[1 - c - d*x] +
 b*(1 + c)*(3*d^2*e^2 - 3*(1 + c)*d*e*f + (1 + c)^2*f^2)*Log[1 + c + d*x])/
(6*d^3)
```

**fricas [B]** time = 0.43, size = 241, normalized size = 2.01

$$\frac{2\,ad^3f^2x^3+\left(6\,ad^3ef+bd^2f^2\right)x^2+2\left(3\,ad^3e^2+3\,bd^2ef-2\,bcdf^2\right)x+\left(3\,(bc+b)d^2e^2-3\left(bc^2+2\,bc+b\right)def\right.}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((f*x+e)^2*(a+b*arccoth(d*x+c)),x, algorithm="fricas")
```

```
[Out] 1/6*(2*a*d^3*f^2*x^3 + (6*a*d^3*e*f + b*d^2*f^2)*x^2 + 2*(3*a*d^3*e^2 + 3*b
*d^2*e*f - 2*b*c*d*f^2)*x + (3*(b*c + b)*d^2*e^2 - 3*(b*c^2 + 2*b*c + b)*d*
e*f + (b*c^3 + 3*b*c^2 + 3*b*c + b)*f^2)*log(d*x + c + 1) - (3*(b*c - b)*d^
2*e^2 - 3*(b*c^2 - 2*b*c + b)*d*e*f + (b*c^3 - 3*b*c^2 + 3*b*c - b)*f^2)*lo
g(d*x + c - 1) + (b*d^3*f^2*x^3 + 3*b*d^3*e*f*x^2 + 3*b*d^3*e^2*x)*log((d*x
 + c + 1)/(d*x + c - 1)))/d^3
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \left(fx+e\right)^2 (b\,\text{arcoth}\,(dx+c)+a)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((f*x+e)^2*(a+b*arccoth(d*x+c)),x, algorithm="giac")
```

```
[Out] integrate((f*x + e)^2*(b*arccoth(d*x + c) + a), x)
```

**maple** [B] time = 0.04, size = 477, normalized size = 3.98

$$-\frac{bf\ln(dx+c-1)ce}{d^2}-\frac{bf\ln(dx+c+1)ce}{d^2}-\frac{bf\ln(dx+c+1)c^2e}{2d^2}+\frac{bf\ln(dx+c-1)c^2e}{2d^2}+\frac{b\ln(dx+c-1)e^2}{2d}-\frac{b}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((f*x+e)^2*(a+b*arccoth(d*x+c)),x)
```

```
[Out] -1/d^2*b*f*ln(d*x+c-1)*c*e-1/d^2*b*f*ln(d*x+c+1)*c*e-1/2/d^2*b*f*ln(d*x+c+1
)*c^2*e+1/2/d^2*b*f*ln(d*x+c-1)*c^2*e+1/2/d*b*ln(d*x+c-1)*e^2-1/6*b/f*ln(d*
x+c+1)*e^3+1/3*b/f*arccoth(d*x+c)*e^3+arccoth(d*x+c)*x*b*e^2+1/3*b*f^2*arcc
oth(d*x+c)*x^3+1/6*b/f*ln(d*x+c-1)*e^3+1/6/d*b*f^2*x^2+a*f*x^2*e+1/6/d^3*b*
f^2*ln(d*x+c+1)+1/6/d^3*b*f^2*ln(d*x+c-1)+1/2/d*b*ln(d*x+c+1)*e^2-5/6/d^3*b
*f^2*c^2+1/3*a/f*e^3+1/3*a*f^2*x^3+a*x*e^2+1/6/d^3*b*f^2*ln(d*x+c+1)*c^3+1/
2/d^2*b*f*ln(d*x+c-1)*e-1/6/d^3*b*f^2*ln(d*x+c-1)*c^3+1/2/d^3*b*f^2*ln(d*x+
c+1)*c^2+1/2/d^3*b*f^2*ln(d*x+c-1)*c^2-1/2/d^3*b*f^2*ln(d*x+c-1)*c-1/2/d^2*
b*f*ln(d*x+c+1)*e+b*f*arccoth(d*x+c)*e*x^2-1/2/d*b*ln(d*x+c-1)*c*e^2-2/3*b/
d^2*f^2*c*x+b/d*f*e*x+1/2/d*b*ln(d*x+c+1)*c*e^2+1/2/d^3*b*f^2*ln(d*x+c+1)*c
+1/d^2*b*f*c*e
```

**maxima** [A] time = 0.30, size = 207, normalized size = 1.72

$$\frac{1}{3}af^2x^3+aefx^2+\frac{1}{2}\left(2x^2\operatorname{arcoth}(dx+c)+d\left(\frac{2x}{d^2}-\frac{(c^2+2c+1)\log(dx+c+1)}{d^3}+\frac{(c^2-2c+1)\log(dx+c-1)}{d^3}\right.\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((f*x+e)^2*(a+b*arccoth(d*x+c)),x, algorithm="maxima")
```

```
[Out] 1/3*a*f^2*x^3 + a*e*f*x^2 + 1/2*(2*x^2*arccoth(d*x + c) + d*(2*x/d^2 - (c^2
 + 2*c + 1)*log(d*x + c + 1)/d^3 + (c^2 - 2*c + 1)*log(d*x + c - 1)/d^3))*b
*e*f + 1/6*(2*x^3*arccoth(d*x + c) + d*((d*x^2 - 4*c*x)/d^3 + (c^3 + 3*c^2
+ 3*c + 1)*log(d*x + c + 1)/d^4 - (c^3 - 3*c^2 + 3*c - 1)*log(d*x + c - 1)/
d^4))*b*f^2 + a*e^2*x + 1/2*(2*(d*x + c)*arccoth(d*x + c) + log(-(d*x + c)^
2 + 1))*b*e^2/d
```

**mupad** [B] time = 1.93, size = 386, normalized size = 3.22

$$x^2\left(\frac{f\left(bf+6acf+6ade\right)}{6d}-\frac{acf^2}{d}\right)-\ln\left(1-\frac{1}{c+dx}\right)\left(\frac{be^2x}{2}+\frac{befx^2}{2}+\frac{bf^2x^3}{6}\right)-x\left(\frac{2c\left(\frac{f\left(bf+6acf+6ade\right)}{3d}-\right.}{d}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((e + f*x)^2*(a + b*acoth(c + d*x)),x)
```

```
[Out] x^2*((f*(b*f + 6*a*c*f + 6*a*d*e))/(6*d) - (a*c*f^2)/d) - log(1 - 1/(c + d*
x))*((b*f^2*x^3)/6 + (b*e^2*x)/2 + (b*e*f*x^2)/2) - x*((2*c*((f*(b*f + 6*a*
c*f + 6*a*d*e))/(3*d) - (2*a*c*f^2)/d))/d - (3*a*c^2*f^2 - 3*a*f^2 + 3*a*d^
2*e^2 + 3*b*d*e*f + 12*a*c*d*e*f)/(3*d^2) + (a*f^2*(3*c^2 - 3))/(3*d^2)) +
log(1/(c + d*x) + 1)*((b*f^2*x^3)/6 + (b*e^2*x)/2 + (b*e*f*x^2)/2) + (a*f^2
*x^3)/3 + (log(c + d*x - 1)*((b*f^2)/6 + d*((b*e*f)/2 + (b*c^2*e*f)/2 - b*c
*e*f) + d^2*((b*e^2)/2 - (b*c*e^2)/2) + (b*c^2*f^2)/2 - (b*c^3*f^2)/6 - (b*
c*f^2)/2))/d^3 + (log(c + d*x + 1)*((b*f^2)/6 - d*((b*e*f)/2 + (b*c^2*e*f)/
2 + b*c*e*f) + d^2*((b*e^2)/2 + (b*c*e^2)/2) + (b*c^2*f^2)/2 + (b*c^3*f^2)/
6 + (b*c*f^2)/2))/d^3
```

<u>**sympy**</u> **[A]** time = 4.45, size = 369, normalized size = 3.08

$$\begin{cases} ae^2x + aefx^2 + \frac{af^2x^3}{3} + \frac{bc^3f^2\,\mathrm{acoth}\,(c+dx)}{3d^3} - \frac{bc^2ef\,\mathrm{acoth}\,(c+dx)}{d^2} + \frac{bc^2f^2\log\left(\frac{c}{d}+x+\frac{1}{d}\right)}{d^3} - \frac{bc^2f^2\,\mathrm{acoth}\,(c+dx)}{d^3} + \frac{bce^2\,\mathrm{acoth}\,(c+dx)}{d} \cdot \\ (a + b\,\mathrm{acoth}\,(c))\left(e^2x + efx^2 + \frac{f^2x^3}{3}\right) \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((f*x+e)**2*(a+b*acoth(d*x+c)),x)
```

```
[Out] Piecewise((a*e**2*x + a*e*f*x**2 + a*f**2*x**3/3 + b*c**3*f**2*acoth(c + d*
x)/(3*d**3) - b*c**2*e*f*acoth(c + d*x)/d**2 + b*c**2*f**2*log(c/d + x + 1/
d)/d**3 - b*c**2*f**2*acoth(c + d*x)/d**3 + b*c*e**2*acoth(c + d*x)/d - 2*b
*c*e*f*log(c/d + x + 1/d)/d**2 + 2*b*c*e*f*acoth(c + d*x)/d**2 - 2*b*c*f**2
*x/(3*d**2) + b*c*f**2*acoth(c + d*x)/d**3 + b*e**2*x*acoth(c + d*x) + b*e*
f*x**2*acoth(c + d*x) + b*f**2*x**3*acoth(c + d*x)/3 + b*e**2*log(c/d + x +
 1/d)/d - b*e**2*acoth(c + d*x)/d + b*e*f*x/d + b*f**2*x**2/(6*d) - b*e*f*a
coth(c + d*x)/d**2 + b*f**2*log(c/d + x + 1/d)/(3*d**3) - b*f**2*acoth(c +
d*x)/(3*d**3), Ne(d, 0)), ((a + b*acoth(c))*(e**2*x + e*f*x**2 + f**2*x**3/
3), True))
```

# 3.104 $\int (e+fx)\left(a+b\coth^{-1}(c+dx)\right)\,dx$

**Optimal**. Leaf size=97

$$\frac{(e+fx)^2\left(a+b\coth^{-1}(c+dx)\right)}{2f}+\frac{b(-cf+de+f)^2\log(-c-dx+1)}{4d^2f}-\frac{b(de-(c+1)f)^2\log(c+dx+1)}{4d^2f}+\frac{bfx}{2d}$$

```
[Out] 1/2*b*f*x/d+1/2*(f*x+e)^2*(a+b*arccoth(d*x+c))/f+1/4*b*(-c*f+d*e+f)^2*ln(-d
*x-c+1)/d^2/f-1/4*b*(d*e-(1+c)*f)^2*ln(d*x+c+1)/d^2/f
```

**Rubi [A]** time = 0.17, antiderivative size = 97, normalized size of antiderivative = 1.00, number of steps used = 7, number of rules used = 5, integrand size = 16, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.312, Rules used = {6112, 5927, 702, 633, 31}

$$\frac{(e+fx)^2\left(a+b\coth^{-1}(c+dx)\right)}{2f}+\frac{b(-cf+de+f)^2\log(-c-dx+1)}{4d^2f}-\frac{b(de-(c+1)f)^2\log(c+dx+1)}{4d^2f}+\frac{bfx}{2d}$$

Antiderivative was successfully verified.

```
[In] Int[(e + f*x)*(a + b*ArcCoth[c + d*x]),x]
```

```
[Out] (b*f*x)/(2*d) + ((e + f*x)^2*(a + b*ArcCoth[c + d*x]))/(2*f) + (b*(d*e + f
- c*f)^2*Log[1 - c - d*x])/(4*d^2*f) - (b*(d*e - (1 + c)*f)^2*Log[1 + c + d
*x])/(4*d^2*f)
```

Rule 31

```
Int[((a_) + (b_.)*(x_))^(-1), x_Symbol] :> Simp[Log[RemoveContent[a + b*x,
x]]/b, x] /; FreeQ[{a, b}, x]
```

Rule 633

```
Int[((d_) + (e_.)*(x_))/((a_) + (c_.)*(x_)^2), x_Symbol] :> With[{q = Rt[-(
a*c), 2]}, Dist[e/2 + (c*d)/(2*q), Int[1/(-q + c*x), x], x] + Dist[e/2 - (c
*d)/(2*q), Int[1/(q + c*x), x], x]] /; FreeQ[{a, c, d, e}, x] && NiceSqrtQ[
-(a*c)]
```

Rule 702

```
Int[((d_) + (e_.)*(x_))^(m_)/((a_) + (c_.)*(x_)^2), x_Symbol] :> Int[Polyno
mialDivide[(d + e*x)^m, a + c*x^2, x], x] /; FreeQ[{a, c, d, e}, x] && NeQ[
c*d^2 + a*e^2, 0] && IGtQ[m, 1] && (NeQ[d, 0] || GtQ[m, 2])
```

Rule 5927

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))*((d_) + (e_.)*(x_))^(q_.), x_Symbol
] :> Simp[((d + e*x)^(q + 1)*(a + b*ArcCoth[c*x]))/(e*(q + 1)), x] - Dist[(
b*c)/(e*(q + 1)), Int[(d + e*x)^(q + 1)/(1 - c^2*x^2), x], x] /; FreeQ[{a,
b, c, d, e, q}, x] && NeQ[q, -1]
```

Rule 6112

```
Int[((a_.) + ArcCoth[(c_) + (d_.)*(x_)]*(b_.))^(p_.)*((e_.) + (f_.)*(x_))^(
m_.), x_Symbol] :> Dist[1/d, Subst[Int[((d*e - c*f)/d + (f*x)/d)^m*(a + b*A
rcCoth[x])^p, x], x, c + d*x], x] /; FreeQ[{a, b, c, d, e, f, m}, x] && IGt
Q[p, 0]
```

Rubi steps

$$\int (e+fx)\left(a+b\coth^{-1}(c+dx)\right)dx = \frac{\text{Subst}\left(\int \left(\frac{de-cf}{d}+\frac{fx}{d}\right)\left(a+b\coth^{-1}(x)\right)dx, x, c+dx\right)}{d}$$

$$= \frac{(e+fx)^2\left(a+b\coth^{-1}(c+dx)\right)}{2f} - \frac{b\,\text{Subst}\left(\int \frac{\left(\frac{de-cf}{d}+\frac{fx}{d}\right)^2}{1-x^2}dx, x, c+dx\right)}{2f}$$

$$= \frac{(e+fx)^2\left(a+b\coth^{-1}(c+dx)\right)}{2f} - \frac{b\,\text{Subst}\left(\int \left(-\frac{f^2}{d^2}+\frac{d^2e^2-2cdef+\left(1+c^2\right)f}{d^2\left(1-x^2\right)}\right.\right.}{2f}$$

$$= \frac{bfx}{2d} + \frac{(e+fx)^2\left(a+b\coth^{-1}(c+dx)\right)}{2f} - \frac{b\,\text{Subst}\left(\int \frac{d^2e^2-2cdef+\left(1+c^2\right)f}{1-x^2}\right.}{2d^2f}$$

$$= \frac{bfx}{2d} + \frac{(e+fx)^2\left(a+b\coth^{-1}(c+dx)\right)}{2f} - \frac{\left(b(de+f-cf)^2\right)\text{Subst}\left(\int\right.}{4d^2f}$$

$$= \frac{bfx}{2d} + \frac{(e+fx)^2\left(a+b\coth^{-1}(c+dx)\right)}{2f} + \frac{b(de+f-cf)^2\log(1-c-}{4d^2f}$$

<u>**Mathematica**</u> **[A]** time = 0.05, size = 138, normalized size = 1.42

$$aex+\frac{1}{2}afx^2+\frac{b\left(c^2-2c+1\right)f\log(-c-dx+1)}{4d^2}+\frac{b\left(-c^2-2c-1\right)f\log(c+dx+1)}{4d^2}+\frac{be((c+1)\log(c+dx+1)}{2}$$

Antiderivative was successfully verified.

```
[In] Integrate[(e + f*x)*(a + b*ArcCoth[c + d*x]),x]
```

```
[Out] a*e*x + (b*f*x)/(2*d) + (a*f*x^2)/2 + b*e*x*ArcCoth[c + d*x] + (b*f*x^2*Arc
Coth[c + d*x])/2 + (b*(1 - 2*c + c^2)*f*Log[1 - c - d*x])/(4*d^2) + (b*(-1
- 2*c - c^2)*f*Log[1 + c + d*x])/(4*d^2) + (b*e*(-((-1 + c)*Log[1 - c - d*x
]) + (1 + c)*Log[1 + c + d*x]))/(2*d)
```

<u>**fricas**</u> **[A]** time = 0.45, size = 133, normalized size = 1.37

$$\frac{2\,ad^2fx^2+2\left(2\,ad^2e+bdf\right)x+\left(2\,(bc+b)de-\left(bc^2+2\,bc+b\right)f\right)\log\left(dx+c+1\right)-\left(2\,(bc-b)de-\left(bc^2-2\,bc\right.\right.}{4\,d^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((f*x+e)*(a+b*arccoth(d*x+c)),x, algorithm="fricas")
```

```
[Out] 1/4*(2*a*d^2*f*x^2 + 2*(2*a*d^2*e + b*d*f)*x + (2*(b*c + b)*d*e - (b*c^2 +
2*b*c + b)*f)*log(d*x + c + 1) - (2*(b*c - b)*d*e - (b*c^2 - 2*b*c + b)*f)*
log(d*x + c - 1) + (b*d^2*f*x^2 + 2*b*d^2*e*x)*log((d*x + c + 1)/(d*x + c -
 1)))/d^2
```

<u>**giac**</u> **[F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \left(fx+e\right)\left(b\,\text{arcoth}\left(dx+c\right)+a\right)dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((f*x+e)*(a+b*arccoth(d*x+c)),x, algorithm="giac")
```

```
[Out] integrate((f*x + e)*(b*arccoth(d*x + c) + a), x)
```

**maple [B]** time = 0.03, size = 184, normalized size = 1.90

$$\frac{a x^2 f}{2}-\frac{a c^2 f}{2d^2}+axe+\frac{ace}{d}+\frac{b \operatorname{arccoth}(dx+c) f x^2}{2}-\frac{b \operatorname{arccoth}(dx+c) f c^2}{2d^2}+\operatorname{arccoth}(dx+c) xbe+\frac{\operatorname{arccoth}(dx+c)}{d}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((f*x+e)*(a+b*arccoth(d*x+c)),x)
```

```
[Out] 1/2*a*x^2*f-1/2/d^2*a*c^2*f+a*x*e+1/d*a*c*e+1/2*b*arccoth(d*x+c)*f*x^2-1/2/
d^2*b*arccoth(d*x+c)*f*c^2+arccoth(d*x+c)*x*b*e+1/d*arccoth(d*x+c)*b*c*e+1/
2*b*f*x/d+1/2/d^2*b*c*f-1/2/d^2*b*ln(d*x+c-1)*c*f+1/2/d*b*ln(d*x+c-1)*e+1/4
/d^2*b*ln(d*x+c-1)*f-1/2/d^2*b*ln(d*x+c+1)*c*f+1/2/d*b*ln(d*x+c+1)*e-1/4/d^
2*b*ln(d*x+c+1)*f
```

**maxima [A]** time = 0.30, size = 109, normalized size = 1.12

$$\frac{1}{2} afx^2+\frac{1}{4}\left(2x^2 \operatorname{arcoth}(dx+c)+d\left(\frac{2x}{d^2}-\frac{\left(c^2+2c+1\right)\log(dx+c+1)}{d^3}+\frac{\left(c^2-2c+1\right)\log(dx+c-1)}{d^3}\right)\right)bf+a$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((f*x+e)*(a+b*arccoth(d*x+c)),x, algorithm="maxima")
```

```
[Out] 1/2*a*f*x^2 + 1/4*(2*x^2*arccoth(d*x + c) + d*(2*x/d^2 - (c^2 + 2*c + 1)*lo
g(d*x + c + 1)/d^3 + (c^2 - 2*c + 1)*log(d*x + c - 1)/d^3))*b*f + a*e*x + 1
/2*(2*(d*x + c)*arccoth(d*x + c) + log(-(d*x + c)^2 + 1))*b*e/d
```

**mupad [B]** time = 2.40, size = 136, normalized size = 1.40

$$a\,e\,x+\frac{a\,f\,x^2}{2}+\frac{b\,e\,\ln\left(c^2+2\,c\,d\,x+d^2\,x^2-1\right)}{2\,d}-\frac{b\,f\,\mathrm{acoth}\left(c+d\,x\right)}{2\,d^2}+\frac{b\,f\,x^2\,\mathrm{acoth}\left(c+d\,x\right)}{2}+\frac{b\,f\,x}{2\,d}+b\,e\,x\,\mathrm{acoth}\left(c+d\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((e + f*x)*(a + b*acoth(c + d*x)),x)
```

```
[Out] a*e*x + (a*f*x^2)/2 + (b*e*log(c^2 + d^2*x^2 + 2*c*d*x - 1))/(2*d) - (b*f*a
coth(c + d*x))/(2*d^2) + (b*f*x^2*acoth(c + d*x))/2 + (b*f*x)/(2*d) + b*e*x
*acoth(c + d*x) - (b*c^2*f*acoth(c + d*x))/(2*d^2) - (b*c*f*log(c^2 + d^2*x
^2 + 2*c*d*x - 1))/(2*d^2) + (b*c*e*acoth(c + d*x))/d
```

**sympy [A]** time = 2.27, size = 173, normalized size = 1.78

$$\begin{cases} aex+\frac{afx^2}{2}-\frac{bc^2f\,\mathrm{acoth}\,(c+dx)}{2d^2}+\frac{bce\,\mathrm{acoth}\,(c+dx)}{d}-\frac{bcf\log\left(\frac{c}{d}+x+\frac{1}{d}\right)}{d^2}+\frac{bcf\,\mathrm{acoth}\,(c+dx)}{d^2}+bex\,\mathrm{acoth}\,(c+dx)+\frac{bfx^2\,\mathrm{acoth}\,(c+dx)}{2} \\ (a+b\,\mathrm{acoth}\,(c))\left(ex+\frac{fx^2}{2}\right) \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((f*x+e)*(a+b*acoth(d*x+c)),x)
```

```
[Out] Piecewise((a*e*x + a*f*x**2/2 - b*c**2*f*acoth(c + d*x)/(2*d**2) + b*c*e*ac
oth(c + d*x)/d - b*c*f*log(c/d + x + 1/d)/d**2 + b*c*f*acoth(c + d*x)/d**2
+ b*e*x*acoth(c + d*x) + b*f*x**2*acoth(c + d*x)/2 + b*e*log(c/d + x + 1/d)
/d - b*e*acoth(c + d*x)/d + b*f*x/(2*d) - b*f*acoth(c + d*x)/(2*d**2), Ne(d
, 0)), ((a + b*acoth(c))*(e*x + f*x**2/2), True))
```

# 3.105 $\int \left(a+b \coth^{-1}(c+dx)\right) dx$

**Optimal**. Leaf size=40

$$ax+\frac{b \log \left(1-(c+dx)^2\right)}{2d}+\frac{b(c+dx) \coth^{-1}(c+dx)}{d}$$

```
[Out] a*x+b*(d*x+c)*arccoth(d*x+c)/d+1/2*b*ln(1-(d*x+c)^2)/d
```

**Rubi** [A] time = 0.02, antiderivative size = 40, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 3, integrand size = 10, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.300, Rules used = {6104, 5911, 260}

$$ax+\frac{b \log \left(1-(c+dx)^2\right)}{2d}+\frac{b(c+dx) \coth^{-1}(c+dx)}{d}$$

Antiderivative was successfully verified.

```
[In] Int[a + b*ArcCoth[c + d*x],x]
```

```
[Out] a*x + (b*(c + d*x)*ArcCoth[c + d*x])/d + (b*Log[1 - (c + d*x)^2])/(2*d)
```

Rule 260

```
Int[(x_)^(m_.)/((a_) + (b_.)*(x_)^(n_)), x_Symbol] :> Simp[Log[RemoveConten
t[a + b*x^n, x]]/(b*n), x] /; FreeQ[{a, b, m, n}, x] && EqQ[m, n - 1]
```

Rule 5911

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.), x_Symbol] :> Simp[x*(a + b*A
rcCoth[c*x])^p, x] - Dist[b*c*p, Int[(x*(a + b*ArcCoth[c*x])^(p - 1))/(1 -
c^2*x^2), x], x] /; FreeQ[{a, b, c}, x] && IGtQ[p, 0]
```

Rule 6104

```
Int[((a_.) + ArcCoth[(c_) + (d_.)*(x_)]*(b_.))^(p_.), x_Symbol] :> Dist[1/d
, Subst[Int[(a + b*ArcCoth[x])^p, x], x, c + d*x], x] /; FreeQ[{a, b, c, d}
, x] && IGtQ[p, 0]
```

Rubi steps

$$\begin{aligned}
\int \left(a+b \coth^{-1}(c+dx)\right) dx &= ax+b \int \coth^{-1}(c+dx)\, dx\\
&= ax+\frac{b \operatorname{Subst}\left(\int \coth^{-1}(x)\, dx,x,c+dx\right)}{d}\\
&= ax+\frac{b(c+dx) \coth^{-1}(c+dx)}{d}-\frac{b \operatorname{Subst}\left(\int \frac{x}{1-x^2}\, dx,x,c+dx\right)}{d}\\
&= ax+\frac{b(c+dx) \coth^{-1}(c+dx)}{d}+\frac{b \log \left(1-(c+dx)^2\right)}{2d}
\end{aligned}$$

**Mathematica** [A] time = 0.02, size = 48, normalized size = 1.20

$$ax+\frac{b((c+1) \log (c+dx+1)-(c-1) \log (-c-dx+1))}{2d}+bx \coth^{-1}(c+dx)$$

Antiderivative was successfully verified.

```
[In] Integrate[a + b*ArcCoth[c + d*x],x]
```

```
[Out] a*x + b*x*ArcCoth[c + d*x] + (b*(-((-1 + c)*Log[1 - c - d*x]) + (1 + c)*Log
[1 + c + d*x]))/(2*d)
```

**fricas [A]** time = 0.88, size = 60, normalized size = 1.50

$$\frac{bdx\log\left(\frac{dx+c+1}{dx+c-1}\right) + 2\,adx + (bc+b)\log\left(dx+c+1\right) - (bc-b)\log\left(dx+c-1\right)}{2\,d}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(a+b*arccoth(d*x+c),x, algorithm="fricas")
```

```
[Out] 1/2*(b*d*x*log((d*x + c + 1)/(d*x + c - 1)) + 2*a*d*x + (b*c + b)*log(d*x +
 c + 1) - (b*c - b)*log(d*x + c - 1))/d
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int b\,\text{arcoth}\left(dx+c\right) + a\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(a+b*arccoth(d*x+c),x, algorithm="giac")
```

```
[Out] integrate(b*arccoth(d*x + c) + a, x)
```

**maple [A]** time = 0.03, size = 42, normalized size = 1.05

$$ax + b\,\text{arccoth}\left(dx+c\right)x + \frac{b\,\text{arccoth}\left(dx+c\right)c}{d} + \frac{b\ln\left((dx+c)^2-1\right)}{2d}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(a+b*arccoth(d*x+c),x)
```

```
[Out] a*x+b*arccoth(d*x+c)*x+b/d*arccoth(d*x+c)*c+1/2*b/d*ln((d*x+c)^2-1)
```

**maxima [A]** time = 0.30, size = 36, normalized size = 0.90

$$ax + \frac{\left(2\left(dx+c\right)\text{arcoth}\left(dx+c\right) + \log\left(-(dx+c)^2+1\right)\right)b}{2\,d}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(a+b*arccoth(d*x+c),x, algorithm="maxima")
```

```
[Out] a*x + 1/2*(2*(d*x + c)*arccoth(d*x + c) + log(-(d*x + c)^2 + 1))*b/d
```

**mupad [B]** time = 1.75, size = 48, normalized size = 1.20

$$a\,x + \frac{\frac{b\,\ln\left(c^2+2\,c\,d\,x+d^2\,x^2-1\right)}{2} + b\,c\,\text{acoth}\left(c+d\,x\right)}{d} + b\,x\,\text{acoth}\left(c+d\,x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(a + b*acoth(c + d*x),x)
```

```
[Out] a*x + ((b*log(c^2 + d^2*x^2 + 2*c*d*x - 1))/2 + b*c*acoth(c + d*x))/d + b*x
*acoth(c + d*x)
```

**sympy [A]** time = 0.58, size = 46, normalized size = 1.15

$$ax + b\left(\begin{cases} \frac{c \operatorname{acoth}(c+dx)}{d} + x \operatorname{acoth}(c + dx) + \frac{\log(c+dx+1)}{d} - \frac{\operatorname{acoth}(c+dx)}{d} & \text{for } d \neq 0 \\ x \operatorname{acoth}(c) & \text{otherwise} \end{cases}\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(a+b*acoth(d*x+c),x)
```

```
[Out] a*x + b*Piecewise((c*acoth(c + d*x)/d + x*acoth(c + d*x) + log(c + d*x + 1)
/d - acoth(c + d*x)/d, Ne(d, 0)), (x*acoth(c), True))
```

# 3.106 $\int \frac{a+b\coth^{-1}(c+dx)}{e+fx}\,dx$

**Optimal**. Leaf size=130

$$\frac{\left(a+b\coth^{-1}(c+dx)\right)\log\left(\frac{2d(e+fx)}{(c+dx+1)(-cf+de+f)}\right)}{f}-\frac{\log\left(\frac{2}{c+dx+1}\right)\left(a+b\coth^{-1}(c+dx)\right)}{f}-\frac{b\text{Li}_2\left(1-\frac{2d(e+fx)}{(de-cf+f)(c+dx+1)}\right)}{2f}+$$

```
[Out] -(a+b*arccoth(d*x+c))*ln(2/(d*x+c+1))/f+(a+b*arccoth(d*x+c))*ln(2*d*(f*x+e)
/(-c*f+d*e+f)/(d*x+c+1))/f+1/2*b*polylog(2,1-2/(d*x+c+1))/f-1/2*b*polylog(2
,1-2*d*(f*x+e)/(-c*f+d*e+f)/(d*x+c+1))/f
```

**Rubi [A]** time = 0.14, antiderivative size = 130, normalized size of antiderivative = 1.00, number of steps used = 5, number of rules used = 5, integrand size = 18, $\frac{\text{number of rules}}{\text{integrand size}} = 0.278$, Rules used = {6112, 5921, 2402, 2315, 2447}

$$-\frac{b\text{PolyLog}\left(2,1-\frac{2d(e+fx)}{(c+dx+1)(-cf+de+f)}\right)}{2f}+\frac{b\text{PolyLog}\left(2,1-\frac{2}{c+dx+1}\right)}{2f}+\frac{\left(a+b\coth^{-1}(c+dx)\right)\log\left(\frac{2d(e+fx)}{(c+dx+1)(-cf+de+f)}\right)}{f}$$

Antiderivative was successfully verified.

```
[In] Int[(a + b*ArcCoth[c + d*x])/(e + f*x),x]
```

```
[Out] -(((a + b*ArcCoth[c + d*x])*Log[2/(1 + c + d*x)])/f) + ((a + b*ArcCoth[c +
d*x])*Log[(2*d*(e + f*x))/((d*e + f - c*f)*(1 + c + d*x))])/f + (b*PolyLog[
2, 1 - 2/(1 + c + d*x)])/(2*f) - (b*PolyLog[2, 1 - (2*d*(e + f*x))/((d*e +
f - c*f)*(1 + c + d*x))])/(2*f)
```

Rule 2315

```
Int[Log[(c_.)*(x_)]/((d_) + (e_.)*(x_)), x_Symbol] :> -Simp[PolyLog[2, 1 -
c*x]/e, x] /; FreeQ[{c, d, e}, x] && EqQ[e + c*d, 0]
```

Rule 2402

```
Int[Log[(c_.)/((d_) + (e_.)*(x_))]/((f_) + (g_.)*(x_)^2), x_Symbol] :> -Dis
t[e/g, Subst[Int[Log[2*d*x]/(1 - 2*d*x), x], x, 1/(d + e*x)], x] /; FreeQ[{
c, d, e, f, g}, x] && EqQ[c, 2*d] && EqQ[e^2*f + d^2*g, 0]
```

Rule 2447

```
Int[Log[u_]*(Pq_)^(m_.), x_Symbol] :> With[{C = FullSimplify[(Pq^m*(1 - u))
/D[u, x]]}, Simp[C*PolyLog[2, 1 - u], x] /; FreeQ[C, x]] /; IntegerQ[m] &&
PolyQ[Pq, x] && RationalFunctionQ[u, x] && LeQ[RationalFunctionExponents[u,
 x][[2]], Expon[Pq, x]]
```

Rule 5921

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))/((d_) + (e_.)*(x_)), x_Symbol] :> -
Simp[((a + b*ArcCoth[c*x])*Log[2/(1 + c*x)])/e, x] + (Dist[(b*c)/e, Int[Log
[2/(1 + c*x)]/(1 - c^2*x^2), x], x] - Dist[(b*c)/e, Int[Log[(2*c*(d + e*x))
/((c*d + e)*(1 + c*x))]/(1 - c^2*x^2), x], x] + Simp[((a + b*ArcCoth[c*x])*
Log[(2*c*(d + e*x))/((c*d + e)*(1 + c*x))])/e, x]) /; FreeQ[{a, b, c, d, e}
, x] && NeQ[c^2*d^2 - e^2, 0]
```

Rule 6112

```
Int[((a_.) + ArcCoth[(c_) + (d_.)*(x_)]*(b_.))^(p_.)*((e_.) + (f_.)*(x_))^(
m_.), x_Symbol] :> Dist[1/d, Subst[Int[((d*e - c*f)/d + (f*x)/d)^m*(a + b*A
```

```
rcCoth[x])^p, x], x, c + d*x], x] /; FreeQ[{a, b, c, d, e, f, m}, x] && IGt
Q[p, 0]
```

Rubi steps

$$\int \frac{a+b\coth^{-1}(c+dx)}{e+fx}\,dx = \frac{\text{Subst}\left(\int \frac{a+b\coth^{-1}(x)}{\frac{de-cf}{d}+\frac{fx}{d}}\,dx, x, c+dx\right)}{d}$$

$$= -\frac{\left(a+b\coth^{-1}(c+dx)\right)\log\left(\frac{2}{1+c+dx}\right)}{f} + \frac{\left(a+b\coth^{-1}(c+dx)\right)\log\left(\frac{2d(e+fx)}{(de+f-cf)(1+c-}\right)}{f}$$

$$= -\frac{\left(a+b\coth^{-1}(c+dx)\right)\log\left(\frac{2}{1+c+dx}\right)}{f} + \frac{\left(a+b\coth^{-1}(c+dx)\right)\log\left(\frac{2d(e+fx)}{(de+f-cf)(1+c-}\right)}{f}$$

$$= -\frac{\left(a+b\coth^{-1}(c+dx)\right)\log\left(\frac{2}{1+c+dx}\right)}{f} + \frac{\left(a+b\coth^{-1}(c+dx)\right)\log\left(\frac{2d(e+fx)}{(de+f-cf)(1+c-}\right)}{f}$$

**Mathematica [A]** time = 0.12, size = 206, normalized size = 1.58

$$\frac{a\log(e+fx)}{f} - \frac{b\text{Li}_2\left(\frac{d(e+fx)}{de-cf-f}\right)}{2f} + \frac{b\text{Li}_2\left(\frac{d(e+fx)}{de-cf+f}\right)}{2f} + \frac{b\log(e+fx)\log\left(\frac{f(-c-dx+1)}{-cf+de+f}\right)}{2f} - \frac{b\log\left(-\frac{-c-dx+1}{c+dx}\right)\log(e+fx)}{2f} -$$

Warning: Unable to verify antiderivative.

```
[In] Integrate[(a + b*ArcCoth[c + d*x])/(e + f*x),x]
```

```
[Out] (a*Log[e + f*x])/f + (b*Log[(f*(1 - c - d*x))/(d*e + f - c*f)]*Log[e + f*x]
)/(2*f) - (b*Log[-((1 - c - d*x)/(c + d*x))]*Log[e + f*x])/(2*f) - (b*Log[-
((f*(1 + c + d*x))/(d*e - f - c*f))]*Log[e + f*x])/(2*f) + (b*Log[(1 + c +
d*x)/(c + d*x)]*Log[e + f*x])/(2*f) - (b*PolyLog[2, (d*(e + f*x))/(d*e - f
- c*f)])/(2*f) + (b*PolyLog[2, (d*(e + f*x))/(d*e + f - c*f)])/(2*f)
```

**fricas [F]** time = 0.64, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{b\,\text{arcoth}\,(dx+c)+a}{fx+e}, x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccoth(d*x+c))/(f*x+e),x, algorithm="fricas")
```

```
[Out] integral((b*arccoth(d*x + c) + a)/(f*x + e), x)
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{b\,\text{arcoth}\,(dx+c)+a}{fx+e}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccoth(d*x+c))/(f*x+e),x, algorithm="giac")
```

```
[Out] integrate((b*arccoth(d*x + c) + a)/(f*x + e), x)
```

**maple [A]** time = 0.08, size = 202, normalized size = 1.55

$$\frac{a\ln\left((dx+c)f-cf+de\right)}{f}+\frac{b\ln\left((dx+c)f-cf+de\right)\operatorname{arccoth}(dx+c)}{f}-\frac{b\ln\left((dx+c)f-cf+de\right)\ln\left(\frac{(dx+c)f+f}{cf-de+f}\right)}{2f}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a+b*arccoth(d*x+c))/(f*x+e),x)
```

```
[Out] a*ln((d*x+c)*f-c*f+d*e)/f+b*ln((d*x+c)*f-c*f+d*e)/f*arccoth(d*x+c)-1/2*b/f*
ln((d*x+c)*f-c*f+d*e)*ln(((d*x+c)*f+f)/(c*f-d*e+f))-1/2*b/f*dilog(((d*x+c)*
f+f)/(c*f-d*e+f))+1/2*b/f*ln((d*x+c)*f-c*f+d*e)*ln(((d*x+c)*f-f)/(c*f-d*e-f
))+1/2*b/f*dilog(((d*x+c)*f-f)/(c*f-d*e-f))
```

**maxima [F]** time = 0.00, size = 0, normalized size = 0.00

$$\frac{1}{2}b\int\frac{\log\left(\frac{1}{dx+c}+1\right)-\log\left(-\frac{1}{dx+c}+1\right)}{fx+e}\,dx+\frac{a\log\left(fx+e\right)}{f}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccoth(d*x+c))/(f*x+e),x, algorithm="maxima")
```

```
[Out] 1/2*b*integrate((log(1/(d*x + c) + 1) - log(-1/(d*x + c) + 1))/(f*x + e), x
) + a*log(f*x + e)/f
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.01

$$\int\frac{a+b\operatorname{acoth}(c+d\,x)}{e+f\,x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a + b*acoth(c + d*x))/(e + f*x),x)
```

```
[Out] int((a + b*acoth(c + d*x))/(e + f*x), x)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int\frac{a+b\operatorname{acoth}(c+dx)}{e+fx}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*acoth(d*x+c))/(f*x+e),x)
```

```
[Out] Integral((a + b*acoth(c + d*x))/(e + f*x), x)
```

# 3.107 $\int \frac{a+b\coth^{-1}(c+dx)}{(e+fx)^2}\,dx$

**Optimal**. Leaf size=115

$$-\frac{a+b\coth^{-1}(c+dx)}{f(e+fx)}-\frac{bd\log(-c-dx+1)}{2f(-cf+de+f)}+\frac{bd\log(c+dx+1)}{2f(-cf+de-f)}-\frac{bd\log(e+fx)}{(-cf+de+f)(de-(c+1)f)}$$

```
[Out] (-a-b*arccoth(d*x+c))/f/(f*x+e)-1/2*b*d*ln(-d*x-c+1)/f/(-c*f+d*e+f)+1/2*b*d
*ln(d*x+c+1)/f/(-c*f+d*e-f)-b*d*ln(f*x+e)/(-c*f+d*e-f)/(-c*f+d*e+f)
```

**Rubi [A]** time = 0.17, antiderivative size = 115, normalized size of antiderivative = 1.00, number of steps used = 7, number of rules used = 5, integrand size = 18, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.278, Rules used = {6110, 1982, 705, 31, 632}

$$-\frac{a+b\coth^{-1}(c+dx)}{f(e+fx)}-\frac{bd\log(-c-dx+1)}{2f(-cf+de+f)}+\frac{bd\log(c+dx+1)}{2f(-cf+de-f)}-\frac{bd\log(e+fx)}{(-cf+de+f)(de-(c+1)f)}$$

Antiderivative was successfully verified.

```
[In] Int[(a + b*ArcCoth[c + d*x])/(e + f*x)^2,x]
```

```
[Out] -((a + b*ArcCoth[c + d*x])/(f*(e + f*x))) - (b*d*Log[1 - c - d*x])/(2*f*(d*
e + f - c*f)) + (b*d*Log[1 + c + d*x])/(2*f*(d*e - f - c*f)) - (b*d*Log[e +
 f*x])/((d*e + f - c*f)*(d*e - (1 + c)*f))
```

Rule 31

```
Int[((a_) + (b_.)*(x_))^(-1), x_Symbol] :> Simp[Log[RemoveContent[a + b*x,
x]]/b, x] /; FreeQ[{a, b}, x]
```

Rule 632

```
Int[((d_.) + (e_.)*(x_))/((a_) + (b_.)*(x_) + (c_.)*(x_)^2), x_Symbol] :> W
ith[{q = Rt[b^2 - 4*a*c, 2]}, Dist[(c*d - e*(b/2 - q/2))/q, Int[1/(b/2 - q/
2 + c*x), x], x] - Dist[(c*d - e*(b/2 + q/2))/q, Int[1/(b/2 + q/2 + c*x), x
], x]] /; FreeQ[{a, b, c, d, e}, x] && NeQ[2*c*d - b*e, 0] && NeQ[b^2 - 4*a
*c, 0] && NiceSqrtQ[b^2 - 4*a*c]
```

Rule 705

```
Int[1/(((d_.) + (e_.)*(x_))*((a_.) + (b_.)*(x_) + (c_.)*(x_)^2)), x_Symbol]
 :> Dist[e^2/(c*d^2 - b*d*e + a*e^2), Int[1/(d + e*x), x], x] + Dist[1/(c*d
^2 - b*d*e + a*e^2), Int[(c*d - b*e - c*e*x)/(a + b*x + c*x^2), x], x] /; F
reeQ[{a, b, c, d, e}, x] && NeQ[b^2 - 4*a*c, 0] && NeQ[c*d^2 - b*d*e + a*e^
2, 0] && NeQ[2*c*d - b*e, 0]
```

Rule 1982

```
Int[(u_)^(m_.)*(v_)^(p_.), x_Symbol] :> Int[ExpandToSum[u, x]^m*ExpandToSum
[v, x]^p, x] /; FreeQ[{m, p}, x] && LinearQ[u, x] && QuadraticQ[v, x] &&  !
(LinearMatchQ[u, x] && QuadraticMatchQ[v, x])
```

Rule 6110

```
Int[((a_.) + ArcCoth[(c_) + (d_.)*(x_)]*(b_.))^(p_.)*((e_.) + (f_.)*(x_))^(
m_), x_Symbol] :> Simp[((e + f*x)^(m + 1)*(a + b*ArcCoth[c + d*x])^p)/(f*(m
 + 1)), x] - Dist[(b*d*p)/(f*(m + 1)), Int[((e + f*x)^(m + 1)*(a + b*ArcCot
h[c + d*x])^(p - 1))/(1 - (c + d*x)^2), x], x] /; FreeQ[{a, b, c, d, e, f},
 x] && IGtQ[p, 0] && ILtQ[m, -1]
```

Rubi steps

$$\int \frac{a+b\coth^{-1}(c+dx)}{(e+fx)^2}\,dx = -\frac{a+b\coth^{-1}(c+dx)}{f(e+fx)} + \frac{(bd)\int \frac{1}{(e+fx)\left(1-(c+dx)^2\right)}\,dx}{f}$$
$$= -\frac{a+b\coth^{-1}(c+dx)}{f(e+fx)} + \frac{(bd)\int \frac{1}{(e+fx)\left(1-c^2-2cdx-d^2x^2\right)}\,dx}{f}$$
$$= -\frac{a+b\coth^{-1}(c+dx)}{f(e+fx)} + \frac{(bd)\int \frac{-d^2e+2cdf+d^2fx}{1-c^2-2cdx-d^2x^2}\,dx}{f\left(-d^2e^2+2cdef+\left(1-c^2\right)f^2\right)} + \frac{(bdf)\int \frac{1}{e+fx}\,dx}{-d^2e^2+2cdef+\left(1-c\right.}$$
$$= -\frac{a+b\coth^{-1}(c+dx)}{f(e+fx)} - \frac{bd\log(e+fx)}{(de-f-cf)(de+f-cf)} - \frac{\left(bd^3\right)\int \frac{1}{-d-cd-d^2x}\,dx}{2f(de-f-cf)} + \frac{\left(bd^3\right)}{2f(}$$
$$= -\frac{a+b\coth^{-1}(c+dx)}{f(e+fx)} - \frac{bd\log(1-c-dx)}{2f(de+f-cf)} + \frac{bd\log(1+c+dx)}{2f(de-f-cf)} - \frac{bd\log(e+}{(de-f-cf)(de}$$

**Mathematica [A]** time = 0.19, size = 125, normalized size = 1.09

$$\frac{1}{2}\left(-\frac{2a}{f(e+fx)} - \frac{2bd\log(e+fx)}{\left(c^2-1\right)f^2-2cdef+d^2e^2} + \frac{bd\log(-c-dx+1)}{f((c-1)f-de)} - \frac{bd\log(c+dx+1)}{f(cf-de+f)} - \frac{2b\coth^{-1}(c+dx)}{f(e+fx)}\right)$$

Antiderivative was successfully verified.

```
[In] Integrate[(a + b*ArcCoth[c + d*x])/(e + f*x)^2,x]
```

```
[Out] ((-2*a)/(f*(e + f*x)) - (2*b*ArcCoth[c + d*x])/(f*(e + f*x)) + (b*d*Log[1 -
 c - d*x])/(f*(-(d*e) + (-1 + c)*f)) - (b*d*Log[1 + c + d*x])/(f*(-(d*e) +
f + c*f)) - (2*b*d*Log[e + f*x])/(d^2*e^2 - 2*c*d*e*f + (-1 + c^2)*f^2))/2
```

**fricas [B]** time = 0.80, size = 262, normalized size = 2.28

$$-\frac{2\,ad^2e^2-4\,acdef+2\left(ac^2-a\right)f^2-\left(bd^2e^2-(bc-b)def+\left(bd^2ef-(bc-b)df^2\right)x\right)\log\left(dx+c+1\right)+\left(bd^2e^2-\right.}{2\left(d^2e^3f-2\,cde^2f^2+\left(\right.\right.}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccoth(d*x+c))/(f*x+e)^2,x, algorithm="fricas")
```

```
[Out] -1/2*(2*a*d^2*e^2 - 4*a*c*d*e*f + 2*(a*c^2 - a)*f^2 - (b*d^2*e^2 - (b*c - b
)*d*e*f + (b*d^2*e*f - (b*c - b)*d*f^2)*x)*log(d*x + c + 1) + (b*d^2*e^2 -
(b*c + b)*d*e*f + (b*d^2*e*f - (b*c + b)*d*f^2)*x)*log(d*x + c - 1) + 2*(b*
d*f^2*x + b*d*e*f)*log(f*x + e) + (b*d^2*e^2 - 2*b*c*d*e*f + (b*c^2 - b)*f^
2)*log((d*x + c + 1)/(d*x + c - 1)))/(d^2*e^3*f - 2*c*d*e^2*f^2 + (c^2 - 1)
*e*f^3 + (d^2*e^2*f^2 - 2*c*d*e*f^3 + (c^2 - 1)*f^4)*x)
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{b\,\mathrm{arcoth}\left(dx+c\right)+a}{\left(fx+e\right)^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccoth(d*x+c))/(f*x+e)^2,x, algorithm="giac")
```

```
[Out] integrate((b*arccoth(d*x + c) + a)/(f*x + e)^2, x)
```

**maple** [A] time = 0.04, size = 141, normalized size = 1.23

$$-\frac{da}{\left(dfx+de\right)f}-\frac{db\,\mathrm{arccoth}\left(dx+c\right)}{\left(dfx+de\right)f}-\frac{db\ln\left(\left(dx+c\right)f-cf+de\right)}{\left(cf-de-f\right)\left(cf-de+f\right)}+\frac{db\ln\left(dx+c-1\right)}{f\left(2cf-2de-2f\right)}-\frac{db\ln\left(dx+c+1\right)}{f\left(2cf-2de+2f\right)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a+b*arccoth(d*x+c))/(f*x+e)^2,x)
```

```
[Out] -d*a/(d*f*x+d*e)/f-d*b/(d*f*x+d*e)/f*arccoth(d*x+c)-d*b/(c*f-d*e-f)/(c*f-d*
e+f)*ln((d*x+c)*f-c*f+d*e)+d*b/f/(2*c*f-2*d*e-2*f)*ln(d*x+c-1)-d*b/f/(2*c*f
-2*d*e+2*f)*ln(d*x+c+1)
```

**maxima** [A] time = 0.31, size = 121, normalized size = 1.05

$$\frac{1}{2}\left(d\left(\frac{\log\left(dx+c+1\right)}{def-(c+1)f^2}-\frac{\log\left(dx+c-1\right)}{def-(c-1)f^2}-\frac{2\log\left(fx+e\right)}{d^2e^2-2\,cdef+\left(c^2-1\right)f^2}\right)-\frac{2\,\mathrm{arcoth}\left(dx+c\right)}{f^2x+ef}\right)b-\frac{a}{f^2x+ef}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccoth(d*x+c))/(f*x+e)^2,x, algorithm="maxima")
```

```
[Out] 1/2*(d*(log(d*x + c + 1)/(d*e*f - (c + 1)*f^2) - log(d*x + c - 1)/(d*e*f -
(c - 1)*f^2) - 2*log(f*x + e)/(d^2*e^2 - 2*c*d*e*f + (c^2 - 1)*f^2)) - 2*ar
ccoth(d*x + c)/(f^2*x + e*f))*b - a/(f^2*x + e*f)
```

**mupad** [B] time = 2.08, size = 175, normalized size = 1.52

$$\ln\left(e+f\,x\right)\left(\frac{b\,\left(c-1\right)}{2\,e\,\left(d\,e-f\,\left(c-1\right)\right)}-\frac{b\,\left(c+1\right)}{2\,e\,\left(d\,e-f\,\left(c+1\right)\right)}\right)-\frac{a}{x\,f^2+e\,f}-\frac{b\,\ln\left(\frac{1}{c+d\,x}+1\right)}{2\,f\,\left(e+f\,x\right)}-\frac{b\,d\,\ln\left(c+d\,x-1\right)}{2\,f^2-2\,c\,f^2+2\,d\,e\,f}-$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a + b*acoth(c + d*x))/(e + f*x)^2,x)
```

```
[Out] log(e + f*x)*((b*(c - 1))/(2*e*(d*e - f*(c - 1))) - (b*(c + 1))/(2*e*(d*e -
 f*(c + 1)))) - a/(e*f + f^2*x) - (b*log(1/(c + d*x) + 1))/(2*f*(e + f*x))
- (b*d*log(c + d*x - 1))/(2*f^2 - 2*c*f^2 + 2*d*e*f) - (b*d*log(c + d*x + 1
))/(2*c*f^2 + 2*f^2 - 2*d*e*f) + (b*log(1 - 1/(c + d*x)))/(f*(2*e + 2*f*x))
```

**sympy** [A] time = 9.48, size = 1658, normalized size = 14.42

result too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*acoth(d*x+c))/(f*x+e)**2,x)
```

```
[Out] Piecewise(((a*x + b*c*acoth(c + d*x)/d + b*x*acoth(c + d*x) + b*log(c/d + x
 + 1/d)/d - b*acoth(c + d*x)/d)/e**2, Eq(f, 0)), (-2*a*f/(2*e*f**2 + 2*f**3
*x) + b*d*e*acoth(d*e/f + d*x - 1)/(2*e*f**2 + 2*f**3*x) + b*d*f*x*acoth(d*
e/f + d*x - 1)/(2*e*f**2 + 2*f**3*x) - 2*b*f*acoth(d*e/f + d*x - 1)/(2*e*f*
*2 + 2*f**3*x) - b*f/(2*e*f**2 + 2*f**3*x), Eq(c, (d*e - f)/f)), (-2*a*f/(2
*e*f**2 + 2*f**3*x) - b*d*e*acoth(d*e/f + d*x + 1)/(2*e*f**2 + 2*f**3*x) -
b*d*f*x*acoth(d*e/f + d*x + 1)/(2*e*f**2 + 2*f**3*x) - 2*b*f*acoth(d*e/f +
d*x + 1)/(2*e*f**2 + 2*f**3*x) + b*f/(2*e*f**2 + 2*f**3*x), Eq(c, (d*e + f)
/f)), (zoo*(a*x + b*c*acoth(c + d*x)/d + b*x*acoth(c + d*x) + b*log(c/d + x
 + 1/d)/d - b*acoth(c + d*x)/d), Eq(e, -f*x)), (-(a + b*acoth(c))/(e*f + f*
*2*x), Eq(d, 0)), (-a*c**2*f**2/(c**2*e*f**3 + c**2*f**4*x - 2*c*d*e**2*f**
2 - 2*c*d*e*f**3*x + d**2*e**3*f + d**2*e**2*f**2*x - e*f**3 - f**4*x) + 2*
```

```
a*c*d*e*f/(c**2*e*f**3 + c**2*f**4*x - 2*c*d*e**2*f**2 - 2*c*d*e*f**3*x + d
**2*e**3*f + d**2*e**2*f**2*x - e*f**3 - f**4*x) - a*d**2*e**2/(c**2*e*f**3
 + c**2*f**4*x - 2*c*d*e**2*f**2 - 2*c*d*e*f**3*x + d**2*e**3*f + d**2*e**2
*f**2*x - e*f**3 - f**4*x) + a*f**2/(c**2*e*f**3 + c**2*f**4*x - 2*c*d*e**2
*f**2 - 2*c*d*e*f**3*x + d**2*e**3*f + d**2*e**2*f**2*x - e*f**3 - f**4*x)
- b*c**2*f**2*acoth(c + d*x)/(c**2*e*f**3 + c**2*f**4*x - 2*c*d*e**2*f**2 -
 2*c*d*e*f**3*x + d**2*e**3*f + d**2*e**2*f**2*x - e*f**3 - f**4*x) + b*c*d
*e*f*acoth(c + d*x)/(c**2*e*f**3 + c**2*f**4*x - 2*c*d*e**2*f**2 - 2*c*d*e*
f**3*x + d**2*e**3*f + d**2*e**2*f**2*x - e*f**3 - f**4*x) - b*c*d*f**2*x*a
coth(c + d*x)/(c**2*e*f**3 + c**2*f**4*x - 2*c*d*e**2*f**2 - 2*c*d*e*f**3*x
 + d**2*e**3*f + d**2*e**2*f**2*x - e*f**3 - f**4*x) + b*d**2*e*f*x*acoth(c
 + d*x)/(c**2*e*f**3 + c**2*f**4*x - 2*c*d*e**2*f**2 - 2*c*d*e*f**3*x + d**
2*e**3*f + d**2*e**2*f**2*x - e*f**3 - f**4*x) - b*d*e*f*log(e/f + x)/(c**2
*e*f**3 + c**2*f**4*x - 2*c*d*e**2*f**2 - 2*c*d*e*f**3*x + d**2*e**3*f + d*
*2*e**2*f**2*x - e*f**3 - f**4*x) + b*d*e*f*log(c/d + x + 1/d)/(c**2*e*f**3
 + c**2*f**4*x - 2*c*d*e**2*f**2 - 2*c*d*e*f**3*x + d**2*e**3*f + d**2*e**2
*f**2*x - e*f**3 - f**4*x) - b*d*e*f*acoth(c + d*x)/(c**2*e*f**3 + c**2*f**
4*x - 2*c*d*e**2*f**2 - 2*c*d*e*f**3*x + d**2*e**3*f + d**2*e**2*f**2*x - e
*f**3 - f**4*x) - b*d*f**2*x*log(e/f + x)/(c**2*e*f**3 + c**2*f**4*x - 2*c*
d*e**2*f**2 - 2*c*d*e*f**3*x + d**2*e**3*f + d**2*e**2*f**2*x - e*f**3 - f*
*4*x) + b*d*f**2*x*log(c/d + x + 1/d)/(c**2*e*f**3 + c**2*f**4*x - 2*c*d*e*
*2*f**2 - 2*c*d*e*f**3*x + d**2*e**3*f + d**2*e**2*f**2*x - e*f**3 - f**4*x
) - b*d*f**2*x*acoth(c + d*x)/(c**2*e*f**3 + c**2*f**4*x - 2*c*d*e**2*f**2
- 2*c*d*e*f**3*x + d**2*e**3*f + d**2*e**2*f**2*x - e*f**3 - f**4*x) + b*f*
*2*acoth(c + d*x)/(c**2*e*f**3 + c**2*f**4*x - 2*c*d*e**2*f**2 - 2*c*d*e*f*
*3*x + d**2*e**3*f + d**2*e**2*f**2*x - e*f**3 - f**4*x), True))
```

## 3.108 $\int \frac{a+b\coth^{-1}(c+dx)}{(e+fx)^3}\,dx$

**Optimal**. Leaf size=167

$$-\frac{a+b\coth^{-1}(c+dx)}{2f(e+fx)^2}-\frac{bd^2\log(-c-dx+1)}{4f(-cf+de+f)^2}+\frac{bd^2\log(c+dx+1)}{4f(-cf+de-f)^2}-\frac{bd^2(de-cf)\log(e+fx)}{(-cf+de+f)^2(de-(c+1)f)^2}+\frac{}{2(e+fx}$$

```
[Out] 1/2*b*d/(-c*f+d*e-f)/(-c*f+d*e+f)/(f*x+e)+1/2*(-a-b*arccoth(d*x+c))/f/(f*x+
e)^2-1/4*b*d^2*ln(-d*x-c+1)/f/(-c*f+d*e+f)^2+1/4*b*d^2*ln(d*x+c+1)/f/(-c*f+
d*e-f)^2-b*d^2*(-c*f+d*e)*ln(f*x+e)/(-c*f+d*e+f)^2/(d*e-(1+c)*f)^2
```

**Rubi [A]** time = 0.23, antiderivative size = 167, normalized size of antiderivative = 1.00, number of steps used = 5, number of rules used = 4, integrand size = 18, $\frac{\text{number of rules}}{\text{integrand size}} = 0.222$, Rules used = {6110, 1982, 709, 800}

$$-\frac{a+b\coth^{-1}(c+dx)}{2f(e+fx)^2}-\frac{bd^2\log(-c-dx+1)}{4f(-cf+de+f)^2}+\frac{bd^2\log(c+dx+1)}{4f(-cf+de-f)^2}-\frac{bd^2(de-cf)\log(e+fx)}{(-cf+de+f)^2(de-(c+1)f)^2}+\frac{}{2(e+fx}$$

Antiderivative was successfully verified.

```
[In] Int[(a + b*ArcCoth[c + d*x])/(e + f*x)^3,x]
```

```
[Out] (b*d)/(2*(d*e + f - c*f)*(d*e - (1 + c)*f)*(e + f*x)) - (a + b*ArcCoth[c +
d*x])/(2*f*(e + f*x)^2) - (b*d^2*Log[1 - c - d*x])/(4*f*(d*e + f - c*f)^2)
+ (b*d^2*Log[1 + c + d*x])/(4*f*(d*e - f - c*f)^2) - (b*d^2*(d*e - c*f)*Log
[e + f*x])/((d*e + f - c*f)^2*(d*e - (1 + c)*f)^2)
```

Rule 709

```
Int[((d_.) + (e_.)*(x_))^(m_)/((a_.) + (b_.)*(x_) + (c_.)*(x_)^2), x_Symbol
] :> Simp[(e*(d + e*x)^(m + 1))/((m + 1)*(c*d^2 - b*d*e + a*e^2)), x] + Dis
t[1/(c*d^2 - b*d*e + a*e^2), Int[((d + e*x)^(m + 1)*Simp[c*d - b*e - c*e*x,
 x])/(a + b*x + c*x^2), x], x] /; FreeQ[{a, b, c, d, e, m}, x] && NeQ[b^2 -
 4*a*c, 0] && NeQ[c*d^2 - b*d*e + a*e^2, 0] && NeQ[2*c*d - b*e, 0] && LtQ[m
, -1]
```

Rule 800

```
Int[(((d_.) + (e_.)*(x_))^(m_)*((f_.) + (g_.)*(x_)))/((a_.) + (b_.)*(x_) +
(c_.)*(x_)^2), x_Symbol] :> Int[ExpandIntegrand[((d + e*x)^m*(f + g*x))/(a
+ b*x + c*x^2), x], x] /; FreeQ[{a, b, c, d, e, f, g}, x] && NeQ[b^2 - 4*a*
c, 0] && NeQ[c*d^2 - b*d*e + a*e^2, 0] && IntegerQ[m]
```

Rule 1982

```
Int[(u_)^(m_.)*(v_)^(p_.), x_Symbol] :> Int[ExpandToSum[u, x]^m*ExpandToSum
[v, x]^p, x] /; FreeQ[{m, p}, x] && LinearQ[u, x] && QuadraticQ[v, x] &&  !
(LinearMatchQ[u, x] && QuadraticMatchQ[v, x])
```

Rule 6110

```
Int[((a_.) + ArcCoth[(c_) + (d_.)*(x_)]*(b_.))^(p_.)*((e_.) + (f_.)*(x_))^(
m_), x_Symbol] :> Simp[((e + f*x)^(m + 1)*(a + b*ArcCoth[c + d*x])^p)/(f*(m
 + 1)), x] - Dist[(b*d*p)/(f*(m + 1)), Int[((e + f*x)^(m + 1)*(a + b*ArcCot
h[c + d*x])^(p - 1))/(1 - (c + d*x)^2), x], x] /; FreeQ[{a, b, c, d, e, f},
 x] && IGtQ[p, 0] && ILtQ[m, -1]
```

Rubi steps

$$\int \frac{a+b\coth^{-1}(c+dx)}{(e+fx)^3}\,dx = -\frac{a+b\coth^{-1}(c+dx)}{2f(e+fx)^2} + \frac{(bd)\int \frac{1}{(e+fx)^2\left(1-(c+dx)^2\right)}dx}{2f}$$

$$= -\frac{a+b\coth^{-1}(c+dx)}{2f(e+fx)^2} + \frac{(bd)\int \frac{1}{(e+fx)^2\left(1-c^2-2cdx-d^2x^2\right)}dx}{2f}$$

$$= \frac{bd}{2(de+f-cf)(de-(1+c)f)(e+fx)} - \frac{a+b\coth^{-1}(c+dx)}{2f(e+fx)^2} + \frac{(bd)\int \frac{-d(de-2cf}{(e+fx)\left(1-c^2-\right.}}{2f\left(-d^2e^2+2cdef\right.}$$

$$= \frac{bd}{2(de+f-cf)(de-(1+c)f)(e+fx)} - \frac{a+b\coth^{-1}(c+dx)}{2f(e+fx)^2} + \frac{(bd)\int \left(\frac{d^2(-de+(1+c}{2(de+f-cf)(1-}\right.}{}$$

$$= \frac{bd}{2(de+f-cf)(de-(1+c)f)(e+fx)} - \frac{a+b\coth^{-1}(c+dx)}{2f(e+fx)^2} - \frac{bd^2\log(1-c-dx)}{4f(de+f-cf)^2}$$

**Mathematica [A]** time = 0.33, size = 174, normalized size = 1.04

$$\frac{1}{4}\left(-\frac{2a}{f(e+fx)^2} + \frac{2bd}{(e+fx)\left(\left(c^2-1\right)f^2-2cdef+d^2e^2\right)} - \frac{4bd^2(de-cf)\log(e+fx)}{\left(\left(c^2-1\right)f^2-2cdef+d^2e^2\right)^2} - \frac{bd^2\log(-c-dx+1)}{f(-cf+de+f)^2} -\right.$$

Antiderivative was successfully verified.

```
[In] Integrate[(a + b*ArcCoth[c + d*x])/(e + f*x)^3,x]
```

```
[Out] ((-2*a)/(f*(e + f*x)^2) + (2*b*d)/((d^2*e^2 - 2*c*d*e*f + (-1 + c^2)*f^2)*(
e + f*x)) - (2*b*ArcCoth[c + d*x])/(f*(e + f*x)^2) - (b*d^2*Log[1 - c - d*x
])/(f*(d*e + f - c*f)^2) + (b*d^2*Log[1 + c + d*x])/(f*(-(d*e) + f + c*f)^2
) - (4*b*d^2*(d*e - c*f)*Log[e + f*x])/(d^2*e^2 - 2*c*d*e*f + (-1 + c^2)*f^
2)^2)/4
```

**fricas [B]** time = 1.70, size = 833, normalized size = 4.99

$$-\frac{2\,ad^4e^4 - 2\,(4\,ac+b)d^3e^3f + 4\left(3\,ac^2+bc-a\right)d^2e^2f^2 - 2\left(4\,ac^3+bc^2-4\,ac-b\right)def^3 + 2\left(ac^4-2\,ac^2+a\right)f^4 -}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccoth(d*x+c))/(f*x+e)^3,x, algorithm="fricas")
```

```
[Out] -1/4*(2*a*d^4*e^4 - 2*(4*a*c + b)*d^3*e^3*f + 4*(3*a*c^2 + b*c - a)*d^2*e^2
*f^2 - 2*(4*a*c^3 + b*c^2 - 4*a*c - b)*d*e*f^3 + 2*(a*c^4 - 2*a*c^2 + a)*f^
4 - 2*(b*d^3*e^2*f^2 - 2*b*c*d^2*e*f^3 + (b*c^2 - b)*d*f^4)*x - (b*d^4*e^4
 - 2*(b*c - b)*d^3*e^3*f + (b*c^2 - 2*b*c + b)*d^2*e^2*f^2 + (b*d^4*e^2*f^2
 - 2*(b*c - b)*d^3*e*f^3 + (b*c^2 - 2*b*c + b)*d^2*f^4)*x^2 + 2*(b*d^4*e^3*f
 - 2*(b*c - b)*d^3*e^2*f^2 + (b*c^2 - 2*b*c + b)*d^2*e*f^3)*x)*log(d*x + c
+ 1) + (b*d^4*e^4 - 2*(b*c + b)*d^3*e^3*f + (b*c^2 + 2*b*c + b)*d^2*e^2*f^2
 + (b*d^4*e^2*f^2 - 2*(b*c + b)*d^3*e*f^3 + (b*c^2 + 2*b*c + b)*d^2*f^4)*x^
2 + 2*(b*d^4*e^3*f - 2*(b*c + b)*d^3*e^2*f^2 + (b*c^2 + 2*b*c + b)*d^2*e*f^
3)*x)*log(d*x + c - 1) + 4*(b*d^3*e^3*f - b*c*d^2*e^2*f^2 + (b*d^3*e*f^3 -
b*c*d^2*f^4)*x^2 + 2*(b*d^3*e^2*f^2 - b*c*d^2*e*f^3)*x)*log(f*x + e) + (b*d
^4*e^4 - 4*b*c*d^3*e^3*f + 2*(3*b*c^2 - b)*d^2*e^2*f^2 - 4*(b*c^3 - b*c)*d*
e*f^3 + (b*c^4 - 2*b*c^2 + b)*f^4)*log((d*x + c + 1)/(d*x + c - 1)))/(d^4*e
^6*f - 4*c*d^3*e^5*f^2 + 2*(3*c^2 - 1)*d^2*e^4*f^3 - 4*(c^3 - c)*d*e^3*f^4
+ (c^4 - 2*c^2 + 1)*e^2*f^5 + (d^4*e^4*f^3 - 4*c*d^3*e^3*f^4 + 2*(3*c^2 - 1
```

```
)*d^2*e^2*f^5 - 4*(c^3 - c)*d*e*f^6 + (c^4 - 2*c^2 + 1)*f^7)*x^2 + 2*(d^4*e
^5*f^2 - 4*c*d^3*e^4*f^3 + 2*(3*c^2 - 1)*d^2*e^3*f^4 - 4*(c^3 - c)*d*e^2*f^
5 + (c^4 - 2*c^2 + 1)*e*f^6)*x)
```

**giac** [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{b \operatorname{arcoth}(dx+c)+a}{\left(fx+e\right)^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccoth(d*x+c))/(f*x+e)^3,x, algorithm="giac")
```

```
[Out] integrate((b*arccoth(d*x + c) + a)/(f*x + e)^3, x)
```

**maple** [A] time = 0.05, size = 236, normalized size = 1.41

$$-\frac{d^2 a}{2\left(dfx+de\right)^2 f}-\frac{d^2 b \operatorname{arccoth}(dx+c)}{2\left(dfx+de\right)^2 f}+\frac{d^2 b}{2\left(cf-de-f\right)\left(cf-de+f\right)\left(dfx+de\right)}+\frac{d^2 bf \ln\left((dx+c)f-cf+\right.}{\left(cf-de-f\right)^2\left(cf-de+\right.}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a+b*arccoth(d*x+c))/(f*x+e)^3,x)
```

```
[Out] -1/2*d^2*a/(d*f*x+d*e)^2/f-1/2*d^2*b/(d*f*x+d*e)^2/f*arccoth(d*x+c)+1/2*d^2
*b/(c*f-d*e-f)/(c*f-d*e+f)/(d*f*x+d*e)+d^2*b*f/(c*f-d*e-f)^2/(c*f-d*e+f)^2*
ln((d*x+c)*f-c*f+d*e)*c-d^3*b/(c*f-d*e-f)^2/(c*f-d*e+f)^2*ln((d*x+c)*f-c*f+
d*e)*e-1/4*d^2*b/f/(c*f-d*e-f)^2*ln(d*x+c-1)+1/4*d^2*b/f/(c*f-d*e+f)^2*ln(d
*x+c+1)
```

**maxima** [A] time = 0.33, size = 291, normalized size = 1.74

$$\frac{1}{4}\left(d\left(\frac{d\log(dx+c+1)}{d^2e^2f-2(c+1)def^2+\left(c^2+2c+1\right)f^3}-\frac{d\log(dx+c-1)}{d^2e^2f-2(c-1)def^2+\left(c^2-2c+1\right)f^3}-\frac{}{d^4e^4-4cd^3e^3f+2\cdots}\right.\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccoth(d*x+c))/(f*x+e)^3,x, algorithm="maxima")
```

```
[Out] 1/4*(d*(d*log(d*x + c + 1)/(d^2*e^2*f - 2*(c + 1)*d*e*f^2 + (c^2 + 2*c + 1)
*f^3) - d*log(d*x + c - 1)/(d^2*e^2*f - 2*(c - 1)*d*e*f^2 + (c^2 - 2*c + 1)
*f^3) - 4*(d^2*e - c*d*f)*log(f*x + e)/(d^4*e^4 - 4*c*d^3*e^3*f + 2*(3*c^2
- 1)*d^2*e^2*f^2 - 4*(c^3 - c)*d*e*f^3 + (c^4 - 2*c^2 + 1)*f^4) + 2/(d^2*e^
3 - 2*c*d*e^2*f + (c^2 - 1)*e*f^2 + (d^2*e^2*f - 2*c*d*e*f^2 + (c^2 - 1)*f^
3)*x)) - 2*arccoth(d*x + c)/(f^3*x^2 + 2*e*f^2*x + e^2*f))*b - 1/2*a/(f^3*x
^2 + 2*e*f^2*x + e^2*f)
```

**mupad** [B] time = 3.30, size = 422, normalized size = 2.53

$$\frac{b\ln\left(1-\frac{1}{c+dx}\right)}{2f\left(2e^2+4efx+2f^2x^2\right)}-\frac{\ln\left(e+fx\right)\left(bd^3e-bcd^2f\right)}{c^4f^4-4c^3def^3+6c^2d^2e^2f^2-2c^2f^4-4cd^3e^3f+4cdef^3+d^4e^4-2d^2e\cdots}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a + b*acoth(c + d*x))/(e + f*x)^3,x)
```

```
[Out] (b*log(1 - 1/(c + d*x)))/(2*f*(2*e^2 + 2*f^2*x^2 + 4*e*f*x)) - (log(e + f*x
)*(b*d^3*e - b*c*d^2*f))/(f^4 - 2*c^2*f^4 + c^4*f^4 + d^4*e^4 - 2*d^2*e^2*f
^2 + 4*c*d*e*f^3 + 6*c^2*d^2*e^2*f^2 - 4*c*d^3*e^3*f - 4*c^3*d*e*f^3) - ((a
*f^2 - a*c^2*f^2 - a*d^2*e^2 + b*d*e*f + 2*a*c*d*e*f)/(f^2 - c^2*f^2 - d^2*
```

```
e^2 + 2*c*d*e*f) + (b*d*f^2*x)/(f^2 - c^2*f^2 - d^2*e^2 + 2*c*d*e*f))/(2*e^
2*f + 2*f^3*x^2 + 4*e*f^2*x) - (b*d^2*log(c + d*x - 1))/(4*f^3 - 8*c*f^3 +
4*c^2*f^3 + 4*d^2*e^2*f + 8*d*e*f^2 - 8*c*d*e*f^2) + (b*d^2*log(c + d*x + 1
))/(8*c*f^3 + 4*f^3 + 4*c^2*f^3 + 4*d^2*e^2*f - 8*d*e*f^2 - 8*c*d*e*f^2) -
(b*log(1/(c + d*x) + 1))/(4*f*(e^2 + f^2*x^2 + 2*e*f*x))
```

**sympy** [**F(-1)**] time = 0.00, size = 0, normalized size = 0.00

Timed out

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*acoth(d*x+c))/(f*x+e)**3,x)
```

```
[Out] Timed out
```

# 3.109 $\int (e+fx)^2 \left(a+b\coth^{-1}(c+dx)\right)^2 \, dx$

**Optimal**. Leaf size=374

$$-\frac{(de-cf)\left(\left(c^2+3\right)f^2-2cdef+d^2e^2\right)\left(a+b\coth^{-1}(c+dx)\right)^2}{3d^3f}+\frac{\left(\left(3c^2+1\right)f^2-6cdef+3d^2e^2\right)\left(a+b\coth^{-1}\right.}{3d^3}$$

```
[Out] 1/3*b^2*f^2*x/d^2+2*a*b*f*(-c*f+d*e)*x/d^2+2*b^2*f*(-c*f+d*e)*(d*x+c)*arcco
th(d*x+c)/d^3+1/3*b*f^2*(d*x+c)^2*(a+b*arccoth(d*x+c))/d^3-1/3*(-c*f+d*e)*(
d^2*e^2-2*c*d*e*f+(c^2+3)*f^2)*(a+b*arccoth(d*x+c))^2/d^3/f+1/3*(3*d^2*e^2-
6*c*d*e*f+(3*c^2+1)*f^2)*(a+b*arccoth(d*x+c))^2/d^3+1/3*(f*x+e)^3*(a+b*arcc
oth(d*x+c))^2/f-1/3*b^2*f^2*arctanh(d*x+c)/d^3-2/3*b*(3*d^2*e^2-6*c*d*e*f+(
3*c^2+1)*f^2)*(a+b*arccoth(d*x+c))*ln(2/(-d*x-c+1))/d^3+b^2*f*(-c*f+d*e)*ln
(1-(d*x+c)^2)/d^3-1/3*b^2*(3*d^2*e^2-6*c*d*e*f+(3*c^2+1)*f^2)*polylog(2,(-d
*x-c-1)/(-d*x-c+1))/d^3
```

**Rubi [A]** time = 0.64, antiderivative size = 374, normalized size of antiderivative = 1.00, number of steps used = 16, number of rules used = 13, integrand size = 20, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.650, Rules used = {6112, 5929, 5911, 260, 5917, 321, 206, 6049, 5949, 5985, 5919, 2402, 2315}

$$-\frac{b^2\left(\left(3c^2+1\right)f^2-6cdef+3d^2e^2\right)\text{PolyLog}\left(2,-\frac{c+dx+1}{-c-dx+1}\right)}{3d^3}-\frac{(de-cf)\left(\left(c^2+3\right)f^2-2cdef+d^2e^2\right)\left(a+b\,\text{coth}\right.}{3d^3f}$$

Antiderivative was successfully verified.

```
[In] Int[(e + f*x)^2*(a + b*ArcCoth[c + d*x])^2,x]
```

```
[Out] (b^2*f^2*x)/(3*d^2) + (2*a*b*f*(d*e - c*f)*x)/d^2 + (2*b^2*f*(d*e - c*f)*(c
 + d*x)*ArcCoth[c + d*x])/d^3 + (b*f^2*(c + d*x)^2*(a + b*ArcCoth[c + d*x])
)/(3*d^3) - ((d*e - c*f)*(d^2*e^2 - 2*c*d*e*f + (3 + c^2)*f^2)*(a + b*ArcCo
th[c + d*x])^2)/(3*d^3*f) + ((3*d^2*e^2 - 6*c*d*e*f + (1 + 3*c^2)*f^2)*(a +
 b*ArcCoth[c + d*x])^2)/(3*d^3) + ((e + f*x)^3*(a + b*ArcCoth[c + d*x])^2)/
(3*f) - (b^2*f^2*ArcTanh[c + d*x])/(3*d^3) - (2*b*(3*d^2*e^2 - 6*c*d*e*f +
(1 + 3*c^2)*f^2)*(a + b*ArcCoth[c + d*x])*Log[2/(1 - c - d*x)])/(3*d^3) + (
b^2*f*(d*e - c*f)*Log[1 - (c + d*x)^2])/d^3 - (b^2*(3*d^2*e^2 - 6*c*d*e*f +
 (1 + 3*c^2)*f^2)*PolyLog[2, -((1 + c + d*x)/(1 - c - d*x))])/(3*d^3)
```

Rule 206

```
Int[((a_) + (b_.)*(x_)^2)^(-1), x_Symbol] :> Simp[(1*ArcTanh[(Rt[-b, 2]*x)/
Rt[a, 2]])/(Rt[a, 2]*Rt[-b, 2]), x] /; FreeQ[{a, b}, x] && NegQ[a/b] && (Gt
Q[a, 0] || LtQ[b, 0])
```

Rule 260

```
Int[(x_)^(m_.)/((a_) + (b_.)*(x_)^(n_)), x_Symbol] :> Simp[Log[RemoveConten
t[a + b*x^n, x]]/(b*n), x] /; FreeQ[{a, b, m, n}, x] && EqQ[m, n - 1]
```

Rule 321

```
Int[((c_.)*(x_))^(m_)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Simp[(c^(
n - 1)*(c*x)^(m - n + 1)*(a + b*x^n)^(p + 1))/(b*(m + n*p + 1)), x] - Dist[
(a*c^n*(m - n + 1))/(b*(m + n*p + 1)), Int[(c*x)^(m - n)*(a + b*x^n)^p, x],
 x] /; FreeQ[{a, b, c, p}, x] && IGtQ[n, 0] && GtQ[m, n - 1] && NeQ[m + n*p
 + 1, 0] && IntBinomialQ[a, b, c, n, m, p, x]
```

Rule 2315

```
Int[Log[(c_.)*(x_)]/((d_) + (e_.)*(x_)), x_Symbol] :> -Simp[PolyLog[2, 1 -
c*x]/e, x] /; FreeQ[{c, d, e}, x] && EqQ[e + c*d, 0]
```

Rule 2402

```
Int[Log[(c_.)/((d_) + (e_.)*(x_))]/((f_) + (g_.)*(x_)^2), x_Symbol] :> -Dis
t[e/g, Subst[Int[Log[2*d*x]/(1 - 2*d*x), x], x, 1/(d + e*x)], x] /; FreeQ[{
c, d, e, f, g}, x] && EqQ[c, 2*d] && EqQ[e^2*f + d^2*g, 0]
```

Rule 5911

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.), x_Symbol] :> Simp[x*(a + b*A
rcCoth[c*x])^p, x] - Dist[b*c*p, Int[(x*(a + b*ArcCoth[c*x])^(p - 1))/(1 -
c^2*x^2), x], x] /; FreeQ[{a, b, c}, x] && IGtQ[p, 0]
```

Rule 5917

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)*((d_.)*(x_))^(m_.), x_Symbol]
 :> Simp[((d*x)^(m + 1)*(a + b*ArcCoth[c*x])^p)/(d*(m + 1)), x] - Dist[(b*c
*p)/(d*(m + 1)), Int[((d*x)^(m + 1)*(a + b*ArcCoth[c*x])^(p - 1))/(1 - c^2*
x^2), x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[p, 0] && (EqQ[p, 1] || In
tegerQ[m]) && NeQ[m, -1]
```

Rule 5919

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)/((d_) + (e_.)*(x_)), x_Symbol
] :> -Simp[((a + b*ArcCoth[c*x])^p*Log[2/(1 + (e*x)/d)])/e, x] + Dist[(b*c*
p)/e, Int[((a + b*ArcCoth[c*x])^(p - 1)*Log[2/(1 + (e*x)/d)])/(1 - c^2*x^2)
, x], x] /; FreeQ[{a, b, c, d, e}, x] && IGtQ[p, 0] && EqQ[c^2*d^2 - e^2, 0
]
```

Rule 5929

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_)*((d_) + (e_.)*(x_))^(q_.), x_S
ymbol] :> Simp[((d + e*x)^(q + 1)*(a + b*ArcCoth[c*x])^p)/(e*(q + 1)), x] -
 Dist[(b*c*p)/(e*(q + 1)), Int[ExpandIntegrand[(a + b*ArcCoth[c*x])^(p - 1)
, (d + e*x)^(q + 1)/(1 - c^2*x^2), x], x], x] /; FreeQ[{a, b, c, d, e}, x]
&& IGtQ[p, 1] && IntegerQ[q] && NeQ[q, -1]
```

Rule 5949

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)/((d_) + (e_.)*(x_)^2), x_Symb
ol] :> Simp[(a + b*ArcCoth[c*x])^(p + 1)/(b*c*d*(p + 1)), x] /; FreeQ[{a, b
, c, d, e, p}, x] && EqQ[c^2*d + e, 0] && NeQ[p, -1]
```

Rule 5985

```
Int[(((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)*(x_))/((d_) + (e_.)*(x_)^2),
 x_Symbol] :> Simp[(a + b*ArcCoth[c*x])^(p + 1)/(b*e*(p + 1)), x] + Dist[1/
(c*d), Int[(a + b*ArcCoth[c*x])^p/(1 - c*x), x], x] /; FreeQ[{a, b, c, d, e
}, x] && EqQ[c^2*d + e, 0] && IGtQ[p, 0]
```

Rule 6049

```
Int[(((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)*((f_) + (g_.)*(x_))^(m_.))/(
(d_) + (e_.)*(x_)^2), x_Symbol] :> Int[ExpandIntegrand[(a + b*ArcCoth[c*x])
^p/(d + e*x^2), (f + g*x)^m, x], x] /; FreeQ[{a, b, c, d, e, f, g}, x] && I
GtQ[p, 0] && EqQ[c^2*d + e, 0] && IGtQ[m, 0]
```

Rule 6112

```
Int[((a_.) + ArcCoth[(c_) + (d_.)*(x_)]*(b_.))^(p_.)*((e_.) + (f_.)*(x_))^(
m_.), x_Symbol] :> Dist[1/d, Subst[Int[((d*e - c*f)/d + (f*x)/d)^m*(a + b*A
rcCoth[x])^p, x], x, c + d*x], x] /; FreeQ[{a, b, c, d, e, f, m}, x] && IGt
Q[p, 0]
```

Rubi steps

$$\int (e+fx)^2 \left(a+b\coth^{-1}(c+dx)\right)^2 dx = \frac{\text{Subst}\left(\int \left(\frac{de-cf}{d}+\frac{fx}{d}\right)^2 \left(a+b\coth^{-1}(x)\right)^2 dx, x, c+dx\right)}{d}$$

$$= \frac{(e+fx)^3 \left(a+b\coth^{-1}(c+dx)\right)^2}{3f} - \frac{(2b)\,\text{Subst}\left(\int \left(-\frac{3f^2(de-cf)\left(a+b\cot\right.}{d^3}\right.\right.}{}$$

$$= \frac{(e+fx)^3 \left(a+b\coth^{-1}(c+dx)\right)^2}{3f} - \frac{(2b)\,\text{Subst}\left(\int \frac{\left((de-cf)\left(d^2e^2-2cdef+\right.\right.}{}\right.}{}$$

$$= \frac{2abf(de-cf)x}{d^2} + \frac{bf^2(c+dx)^2\left(a+b\coth^{-1}(c+dx)\right)}{3d^3} + \frac{(e+fx)^3\left(\right.}{}$$

$$= \frac{b^2f^2x}{3d^2} + \frac{2abf(de-cf)x}{d^2} + \frac{2b^2f(de-cf)(c+dx)\coth^{-1}(c+dx)}{d^3} +$$

$$= \frac{b^2f^2x}{3d^2} + \frac{2abf(de-cf)x}{d^2} + \frac{2b^2f(de-cf)(c+dx)\coth^{-1}(c+dx)}{d^3} +$$

$$= \frac{b^2f^2x}{3d^2} + \frac{2abf(de-cf)x}{d^2} + \frac{2b^2f(de-cf)(c+dx)\coth^{-1}(c+dx)}{d^3} +$$

$$= \frac{b^2f^2x}{3d^2} + \frac{2abf(de-cf)x}{d^2} + \frac{2b^2f(de-cf)(c+dx)\coth^{-1}(c+dx)}{d^3} +$$

$$= \frac{b^2f^2x}{3d^2} + \frac{2abf(de-cf)x}{d^2} + \frac{2b^2f(de-cf)(c+dx)\coth^{-1}(c+dx)}{d^3} +$$

**Mathematica [B]** time = 7.36, size = 1054, normalized size = 2.82

$$\frac{1}{3}a^2f^2x^3+a^2efx^2+a^2e^2x+\frac{1}{3}ab\left(2x\left(3e^2+3fxe+f^2x^2\right)\coth^{-1}(c+dx)+\frac{dfx(6de-4cf+dfx)-(c-1)\left(3d^2e\right.}{}\right.$$

Warning: Unable to verify antiderivative.

```
[In] Integrate[(e + f*x)^2*(a + b*ArcCoth[c + d*x])^2,x]
```

```
[Out] a^2*e^2*x + a^2*e*f*x^2 + (a^2*f^2*x^3)/3 + (a*b*(2*x*(3*e^2 + 3*e*f*x + f^
2*x^2)*ArcCoth[c + d*x] + (d*f*x*(6*d*e - 4*c*f + d*f*x) - (-1 + c)*(3*d^2*
```

```
e^2 - 3*(-1 + c)*d*e*f + (-1 + c)^2*f^2)*Log[1 - c - d*x] + (1 + c)*(3*d^2*
e^2 - 3*(1 + c)*d*e*f + (1 + c)^2*f^2)*Log[1 + c + d*x])/d^3))/3 + (b^2*e^2
*(1 - (c + d*x)^2)*(ArcCoth[c + d*x]*(ArcCoth[c + d*x] - (c + d*x)*ArcCoth[
c + d*x] + 2*Log[1 - E^(-2*ArcCoth[c + d*x])]) - PolyLog[2, E^(-2*ArcCoth[c
 + d*x])]))/(d*(c + d*x)^2*(1 - (c + d*x)^(-2))) - (b^2*e*f*(1 - (c + d*x)^
2)*(2*c*ArcCoth[c + d*x]^2 + (c + d*x)^2*(1 - (c + d*x)^(-2))*ArcCoth[c + d
*x]^2 - 2*(c + d*x)*ArcCoth[c + d*x]*(-1 + c*ArcCoth[c + d*x]) + 4*c*ArcCot
h[c + d*x]*Log[1 - E^(-2*ArcCoth[c + d*x])] - 2*Log[1/((c + d*x)*Sqrt[1 - (
c + d*x)^(-2)])] - 2*c*PolyLog[2, E^(-2*ArcCoth[c + d*x])]))/(d^2*(c + d*x)
^2*(1 - (c + d*x)^(-2))) - (b^2*f^2*(c + d*x)*Sqrt[1 - (c + d*x)^(-2)]*(1 -
 (c + d*x)^2)*((4*ArcCoth[c + d*x])/((c + d*x)*Sqrt[1 - (c + d*x)^(-2)]) +
(3*ArcCoth[c + d*x]^2)/((c + d*x)*Sqrt[1 - (c + d*x)^(-2)]) - (12*c*ArcCoth
[c + d*x]^2)/((c + d*x)*Sqrt[1 - (c + d*x)^(-2)]) + (9*c^2*ArcCoth[c + d*x]
^2)/((c + d*x)*Sqrt[1 - (c + d*x)^(-2)]) + (-1 + 6*c*ArcCoth[c + d*x] + 3*A
rcCoth[c + d*x]^2 - 3*c^2*ArcCoth[c + d*x]^2)/Sqrt[1 - (c + d*x)^(-2)] + Co
sh[3*ArcCoth[c + d*x]] - 6*c*ArcCoth[c + d*x]*Cosh[3*ArcCoth[c + d*x]] + Ar
cCoth[c + d*x]^2*Cosh[3*ArcCoth[c + d*x]] + 3*c^2*ArcCoth[c + d*x]^2*Cosh[3
*ArcCoth[c + d*x]] + (6*ArcCoth[c + d*x]*Log[1 - E^(-2*ArcCoth[c + d*x])])/
((c + d*x)*Sqrt[1 - (c + d*x)^(-2)]) + (18*c^2*ArcCoth[c + d*x]*Log[1 - E^(
-2*ArcCoth[c + d*x])])/((c + d*x)*Sqrt[1 - (c + d*x)^(-2)]) - (18*c*Log[1/(
(c + d*x)*Sqrt[1 - (c + d*x)^(-2)])])/((c + d*x)*Sqrt[1 - (c + d*x)^(-2)])
+ (4*(1 + 3*c^2)*PolyLog[2, E^(-2*ArcCoth[c + d*x])])/((c + d*x)^3*(1 - (c
+ d*x)^(-2))^(3/2)) - ArcCoth[c + d*x]^2*Sinh[3*ArcCoth[c + d*x]] - 3*c^2*A
rcCoth[c + d*x]^2*Sinh[3*ArcCoth[c + d*x]] - 2*ArcCoth[c + d*x]*Log[1 - E^(
-2*ArcCoth[c + d*x])]*Sinh[3*ArcCoth[c + d*x]] - 6*c^2*ArcCoth[c + d*x]*Log
[1 - E^(-2*ArcCoth[c + d*x])]*Sinh[3*ArcCoth[c + d*x]] + 6*c*Log[1/((c + d*
x)*Sqrt[1 - (c + d*x)^(-2)])]*Sinh[3*ArcCoth[c + d*x]]))/(12*d^3)
```

**fricas [F]** time = 0.58, size = 0, normalized size = 0.00

$$\text{integral}\left(a^2f^2x^2 + 2\,a^2efx + a^2e^2 + \left(b^2f^2x^2 + 2\,b^2efx + b^2e^2\right)\text{arcoth}\left(dx + c\right)^2 + 2\left(abf^2x^2 + 2\,abefx + abe^2\right)\text{ar}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((f*x+e)^2*(a+b*arccoth(d*x+c))^2,x, algorithm="fricas")
```

```
[Out] integral(a^2*f^2*x^2 + 2*a^2*e*f*x + a^2*e^2 + (b^2*f^2*x^2 + 2*b^2*e*f*x +
 b^2*e^2)*arccoth(d*x + c)^2 + 2*(a*b*f^2*x^2 + 2*a*b*e*f*x + a*b*e^2)*arcc
oth(d*x + c), x)
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \left(fx + e\right)^2 \left(b\,\text{arcoth}\left(dx + c\right) + a\right)^2 dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((f*x+e)^2*(a+b*arccoth(d*x+c))^2,x, algorithm="giac")
```

```
[Out] integrate((f*x + e)^2*(b*arccoth(d*x + c) + a)^2, x)
```

**maple [B]** time = 0.08, size = 2694, normalized size = 7.20

Expression too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((f*x+e)^2*(a+b*arccoth(d*x+c))^2,x)
```

```
[Out] 1/3*b^2*f^2*x/d^2+1/2/d^3*b^2*f^2*ln(-1/2*d*x-1/2*c+1/2)*ln(d*x+c+1)*c^2+1/
2/d^2*b^2*f*ln(d*x+c+1)^2*c*e-1/3/d^3*a*b*f^2*ln(d*x+c-1)*c^3-1/d^2*b^2*f*a
rccoth(d*x+c)*ln(d*x+c+1)*e+1/d^2*b^2*f*arccoth(d*x+c)*ln(d*x+c-1)*e-1/6/d^
```

```
3*b^2*f^2*ln(1/2+1/2*d*x+1/2*c)*ln(-1/2*d*x-1/2*c+1/2)*c^3+1/2/d^3*b^2*f^2*
ln(1/2+1/2*d*x+1/2*c)*ln(d*x+c-1)*c+2/d^2*a*b*f*c*e+1/d^2*b^2*f*ln(d*x+c+1)
*e-1/d^3*b^2*f^2*ln(d*x+c-1)*c-1/4/d*b^2*ln(d*x+c-1)^2*c*e^2-1/2/d*b^2*ln(1
/2+1/2*d*x+1/2*c)*ln(-1/2*d*x-1/2*c+1/2)*e^2+1/2/d*b^2*ln(-1/2*d*x-1/2*c+1/
2)*ln(d*x+c+1)*e^2-5/3/d^3*b^2*f^2*arccoth(d*x+c)*c^2+2/3*a*b*f^2*arccoth(d
*x+c)*x^3+1/3*b^2/f*arccoth(d*x+c)*ln(d*x+c-1)*e^3-1/4/d^3*b^2*f^2*ln(d*x+c
+1)^2*c+1/3/d^3*b^2*f^2*arccoth(d*x+c)*ln(d*x+c-1)-1/12/d^3*b^2*f^2*ln(d*x+
c+1)^2*c^3+1/3/d^3*a*b*f^2*ln(d*x+c+1)-1/d^3*b^2*f^2*ln(d*x+c+1)*c+2*a*b*f*
arccoth(d*x+c)*e*x^2+1/2/d^3*b^2*f^2*ln(-1/2*d*x-1/2*c+1/2)*ln(d*x+c+1)*c+1
/d^3*b^2*f^2*arccoth(d*x+c)*ln(d*x+c-1)*c^2-1/3/d^3*b^2*f^2*arccoth(d*x+c)*
ln(d*x+c-1)*c^3-1/2/d^3*b^2*f^2*ln(1/2+1/2*d*x+1/2*c)*ln(-1/2*d*x-1/2*c+1/2
)*c^2+1/2/d^2*b^2*f*ln(1/2+1/2*d*x+1/2*c)*ln(-1/2*d*x-1/2*c+1/2)*e-1/2/d^2*
b^2*f*ln(-1/2*d*x-1/2*c+1/2)*ln(d*x+c+1)*e+2*a*b/d*f*e*x-4/3*a*b/d^2*f^2*c*
x+1/2/d*b^2*ln(-1/2*d*x-1/2*c+1/2)*ln(d*x+c+1)*c*e^2+1/2/d*b^2*ln(1/2+1/2*d
*x+1/2*c)*ln(d*x+c-1)*c*e^2+1/d^3*a*b*f^2*ln(d*x+c-1)*c^2+1/3/d^3*a*b*f^2*l
n(d*x+c+1)*c^3+2/d^2*b^2*f*dilog(1/2+1/2*d*x+1/2*c)*c*e+1/d^3*b^2*f^2*arcco
th(d*x+c)*ln(d*x+c+1)*c^2-1/d^3*b^2*f^2*arccoth(d*x+c)*ln(d*x+c-1)*c+b^2*f*
arccoth(d*x+c)^2*e*x^2+2*arccoth(d*x+c)*x*a*b*e^2+1/d*a*b*ln(d*x+c+1)*e^2+1
/3*a*b/f*ln(d*x+c-1)*e^3+2/3*a*b/f*arccoth(d*x+c)*e^3-1/3*b^2/f*arccoth(d*x
+c)*ln(d*x+c+1)*e^3-1/6*b^2/f*ln(-1/2*d*x-1/2*c+1/2)*ln(d*x+c+1)*e^3+1/6*b^
2/f*ln(1/2+1/2*d*x+1/2*c)*ln(-1/2*d*x-1/2*c+1/2)*e^3-1/6*b^2/f*ln(1/2+1/2*d
*x+1/2*c)*ln(d*x+c-1)*e^3-1/3*a*b/f*ln(d*x+c+1)*e^3+1/3/d^3*a*b*f^2*ln(d*x+
c-1)-1/4/d^3*b^2*f^2*ln(d*x+c+1)^2*c^2+1/4/d^2*b^2*f*ln(d*x+c-1)^2*e-1/12/d
^3*b^2*f^2*ln(d*x+c-1)^2*c^3+1/4/d^3*b^2*f^2*ln(d*x+c-1)^2*c^2-1/4/d^3*b^2*
f^2*ln(d*x+c-1)^2*c+1/d^2*b^2*f*ln(d*x+c-1)*e-1/d^3*b^2*f^2*dilog(1/2+1/2*d
*x+1/2*c)*c^2+1/4/d^2*b^2*f*ln(d*x+c+1)^2*e-1/4/d*b^2*ln(d*x+c+1)^2*c*e^2-1
/2/d*b^2*ln(1/2+1/2*d*x+1/2*c)*ln(d*x+c-1)*e^2-1/2/d*b^2*ln(1/2+1/2*d*x+1/2
*c)*ln(-1/2*d*x-1/2*c+1/2)*c*e^2+1/d*b^2*arccoth(d*x+c)*ln(d*x+c+1)*c*e^2-1
/d*b^2*arccoth(d*x+c)*ln(d*x+c-1)*c*e^2+1/3/d^3*b^2*f^2*arccoth(d*x+c)*ln(d
*x+c+1)*c^3+1/6/d^3*b^2*f^2*ln(1/2+1/2*d*x+1/2*c)*ln(d*x+c-1)*c^3-1/2/d^3*b
^2*f^2*ln(1/2+1/2*d*x+1/2*c)*ln(d*x+c-1)*c^2+1/d^3*b^2*f^2*arccoth(d*x+c)*l
n(d*x+c+1)*c+1/4/d^2*b^2*f*ln(d*x+c-1)^2*c^2*e-1/2/d^2*b^2*f*ln(1/2+1/2*d*x
+1/2*c)*ln(d*x+c-1)*e-1/2/d^2*b^2*f*ln(d*x+c-1)^2*c*e+1/d^3*a*b*f^2*ln(d*x+
c+1)*c^2-1/2/d^3*b^2*f^2*ln(1/2+1/2*d*x+1/2*c)*ln(-1/2*d*x-1/2*c+1/2)*c+1/6
/d^3*b^2*f^2*ln(-1/2*d*x-1/2*c+1/2)*ln(d*x+c+1)*c^3+2/d*b^2*f*arccoth(d*x+c
)*e*x+2/d^2*b^2*f*arccoth(d*x+c)*e*c-4/3/d^2*b^2*f^2*arccoth(d*x+c)*x*c+1/4
/d^2*b^2*f*ln(d*x+c+1)^2*c^2*e+1/d^3*a*b*f^2*ln(d*x+c+1)*c-1/d^3*a*b*f^2*ln
(d*x+c-1)*c+1/d^2*a*b*f*ln(d*x+c-1)*e-1/d^2*a*b*f*ln(d*x+c+1)*e-1/d^2*b^2*f
*ln(-1/2*d*x-1/2*c+1/2)*ln(d*x+c+1)*c*e+1/d^2*b^2*f*ln(1/2+1/2*d*x+1/2*c)*l
n(d*x+c-1)*c*e+1/d^2*b^2*f*arccoth(d*x+c)*ln(d*x+c-1)*c^2*e-1/d^2*a*b*f*ln(
d*x+c+1)*c^2*e-2/d^2*a*b*f*ln(d*x+c+1)*c*e-2/d^2*b^2*f*arccoth(d*x+c)*ln(d*
x+c+1)*c*e+1/d^2*a*b*f*ln(d*x+c-1)*c^2*e-2/d^2*a*b*f*ln(d*x+c-1)*c*e-2/d^2*
b^2*f*arccoth(d*x+c)*ln(d*x+c-1)*c*e-1/2/d^2*b^2*f*ln(1/2+1/2*d*x+1/2*c)*ln
(d*x+c-1)*c^2*e-1/d^2*b^2*f*arccoth(d*x+c)*ln(d*x+c+1)*c^2*e+1/2/d^2*b^2*f*
ln(1/2+1/2*d*x+1/2*c)*ln(-1/2*d*x-1/2*c+1/2)*c^2*e+1/d^2*b^2*f*ln(1/2+1/2*d
*x+1/2*c)*ln(-1/2*d*x-1/2*c+1/2)*c*e-1/2/d^2*b^2*f*ln(-1/2*d*x-1/2*c+1/2)*l
n(d*x+c+1)*c^2*e+1/3*a^2*f^2*x^3+a^2*x*e^2+1/3/d^3*b^2*f^2*c+1/3*a^2/f*e^3+
a^2*f*x^2*e+1/3*b^2/f*arccoth(d*x+c)^2*e^3+1/3*b^2*f^2*arccoth(d*x+c)^2*x^3
+arccoth(d*x+c)^2*x*b^2*e^2-1/3/d^3*b^2*f^2*dilog(1/2+1/2*d*x+1/2*c)+1/6/d^
3*b^2*f^2*ln(d*x+c-1)-1/4/d*b^2*ln(d*x+c+1)^2*e^2+1/4/d*b^2*ln(d*x+c-1)^2*e
^2-1/d*b^2*dilog(1/2+1/2*d*x+1/2*c)*e^2-1/6/d^3*b^2*f^2*ln(d*x+c+1)+1/12/d^
3*b^2*f^2*ln(d*x+c-1)^2-1/12/d^3*b^2*f^2*ln(d*x+c+1)^2+1/12*b^2/f*ln(d*x+c+
1)^2*e^3+1/12*b^2/f*ln(d*x+c-1)^2*e^3+1/d*b^2*arccoth(d*x+c)*ln(d*x+c-1)*e^
2+1/d*b^2*arccoth(d*x+c)*ln(d*x+c+1)*e^2-1/6/d^3*b^2*f^2*ln(1/2+1/2*d*x+1/2
*c)*ln(d*x+c-1)+1/3/d^3*b^2*f^2*arccoth(d*x+c)*ln(d*x+c+1)+1/6/d^3*b^2*f^2*
ln(-1/2*d*x-1/2*c+1/2)*ln(d*x+c+1)-1/6/d^3*b^2*f^2*ln(1/2+1/2*d*x+1/2*c)*ln
(-1/2*d*x-1/2*c+1/2)+1/3/d*b^2*f^2*arccoth(d*x+c)*x^2+1/3/d*a*b*f^2*x^2-5/3
/d^3*a*b*f^2*c^2+1/d*a*b*ln(d*x+c+1)*c*e^2-1/d*a*b*ln(d*x+c-1)*c*e^2+1/d*a*
b*ln(d*x+c-1)*e^2
```

**maxima [B]** time = 0.62, size = 791, normalized size = 2.11

$$\frac{1}{3}a^2f^2x^3+a^2efx^2+\left(2x^2\operatorname{arcoth}(dx+c)+d\left(\frac{2x}{d^2}-\frac{(c^2+2c+1)\log(dx+c+1)}{d^3}+\frac{(c^2-2c+1)\log(dx+c-1)}{d^3}\right.\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((f*x+e)^2*(a+b*arccoth(d*x+c))^2,x, algorithm="maxima")
```

```
[Out] 1/3*a^2*f^2*x^3 + a^2*e*f*x^2 + (2*x^2*arccoth(d*x + c) + d*(2*x/d^2 - (c^2
 + 2*c + 1)*log(d*x + c + 1)/d^3 + (c^2 - 2*c + 1)*log(d*x + c - 1)/d^3))*a
*b*e*f + 1/3*(2*x^3*arccoth(d*x + c) + d*((d*x^2 - 4*c*x)/d^3 + (c^3 + 3*c^
2 + 3*c + 1)*log(d*x + c + 1)/d^4 - (c^3 - 3*c^2 + 3*c - 1)*log(d*x + c - 1
)/d^4))*a*b*f^2 + a^2*e^2*x + (2*(d*x + c)*arccoth(d*x + c) + log(-(d*x + c
)^2 + 1))*a*b*e^2/d - 1/3*(3*d^2*e^2 - 6*c*d*e*f + 3*c^2*f^2 + f^2)*(log(d*
x + c - 1)*log(1/2*d*x + 1/2*c + 1/2) + dilog(-1/2*d*x - 1/2*c + 1/2))*b^2/
d^3 - 1/6*(5*c^2*f^2 - 6*d*e*f - 6*(d*e*f - f^2)*c + f^2)*b^2*log(d*x + c +
 1)/d^3 + 1/12*(4*b^2*d*f^2*x + (b^2*d^3*f^2*x^3 + 3*b^2*d^3*e*f*x^2 + 3*b^
2*d^3*e^2*x + (c^3*f^2 + 3*d^2*e^2 - 3*(d*e*f - f^2)*c^2 - 3*d*e*f + 3*(d^2
*e^2 - 2*d*e*f + f^2)*c + f^2)*b^2)*log(d*x + c + 1)^2 + (b^2*d^3*f^2*x^3 +
 3*b^2*d^3*e*f*x^2 + 3*b^2*d^3*e^2*x + (c^3*f^2 - 3*d^2*e^2 - 3*(d*e*f + f^
2)*c^2 - 3*d*e*f + 3*(d^2*e^2 + 2*d*e*f + f^2)*c - f^2)*b^2)*log(d*x + c -
1)^2 + 2*(b^2*d^2*f^2*x^2 + 2*(3*d^2*e*f - 2*c*d*f^2)*b^2*x - (b^2*d^3*f^2*
x^3 + 3*b^2*d^3*e*f*x^2 + 3*b^2*d^3*e^2*x + (c^3*f^2 - 3*d^2*e^2 - 3*(d*e*f
 + f^2)*c^2 - 3*d*e*f + 3*(d^2*e^2 + 2*d*e*f + f^2)*c - f^2)*b^2)*log(d*x +
 c - 1))*log(d*x + c + 1) - 2*(b^2*d^2*f^2*x^2 + 2*(3*d^2*e*f - 2*c*d*f^2)*
b^2*x - (5*c^2*f^2 + 6*d*e*f - 6*(d*e*f + f^2)*c + f^2)*b^2)*log(d*x + c -
1))/d^3
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.00

$$\int (e+f\,x)^2\,(a+b\,\mathrm{acoth}\,(c+d\,x))^2\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((e + f*x)^2*(a + b*acoth(c + d*x))^2,x)
```

```
[Out] int((e + f*x)^2*(a + b*acoth(c + d*x))^2, x)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int (a+b\,\mathrm{acoth}\,(c+dx))^2\,(e+fx)^2\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((f*x+e)**2*(a+b*acoth(d*x+c))**2,x)
```

```
[Out] Integral((a + b*acoth(c + d*x))**2*(e + f*x)**2, x)
```

# 3.110 $\int (e + fx)\left(a + b\coth^{-1}(c + dx)\right)^2 \, dx$

**Optimal**. Leaf size=221

$$-\frac{\left(\left(c^2+1\right)f^2-2cdef+d^2e^2\right)\left(a+b\coth^{-1}(c+dx)\right)^2}{2d^2f}+\frac{(de-cf)\left(a+b\coth^{-1}(c+dx)\right)^2}{d^2}-\frac{2b(de-cf)\log\left(\frac{\quad}{-c\cdot}\right.}{}$$

```
[Out] a*b*f*x/d+b^2*f*(d*x+c)*arccoth(d*x+c)/d^2+(-c*f+d*e)*(a+b*arccoth(d*x+c))^
2/d^2-1/2*(d^2*e^2-2*c*d*e*f+(c^2+1)*f^2)*(a+b*arccoth(d*x+c))^2/d^2/f+1/2*
(f*x+e)^2*(a+b*arccoth(d*x+c))^2/f-2*b*(-c*f+d*e)*(a+b*arccoth(d*x+c))*ln(2
/(-d*x-c+1))/d^2+1/2*b^2*f*ln(1-(d*x+c)^2)/d^2-b^2*(-c*f+d*e)*polylog(2,(-d
*x-c-1)/(-d*x-c+1))/d^2
```

**Rubi [A]** time = 0.44, antiderivative size = 220, normalized size of antiderivative = 1.00, number of steps used = 13, number of rules used = 10, integrand size = 18, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.556, Rules used = {6112, 5929, 5911, 260, 6049, 5949, 5985, 5919, 2402, 2315}

$$-\frac{b^2(de-cf)\text{PolyLog}\left(2,-\frac{c+dx+1}{-c-dx+1}\right)}{d^2}+\frac{\left(-\frac{\left(c^2+1\right)f}{d}+2ce-\frac{de^2}{f}\right)\left(a+b\coth^{-1}(c+dx)\right)^2}{2d}+\frac{(de-cf)\left(a+b\coth^{-1}(c\right.}{d^2}$$

Antiderivative was successfully verified.

```
[In] Int[(e + f*x)*(a + b*ArcCoth[c + d*x])^2,x]
```

```
[Out] (a*b*f*x)/d + (b^2*f*(c + d*x)*ArcCoth[c + d*x])/d^2 + ((d*e - c*f)*(a + b*
ArcCoth[c + d*x])^2)/d^2 + ((2*c*e - (d*e^2)/f - ((1 + c^2)*f)/d)*(a + b*Ar
cCoth[c + d*x])^2)/(2*d) + ((e + f*x)^2*(a + b*ArcCoth[c + d*x])^2)/(2*f) -
 (2*b*(d*e - c*f)*(a + b*ArcCoth[c + d*x])*Log[2/(1 - c - d*x)])/d^2 + (b^2
*f*Log[1 - (c + d*x)^2])/(2*d^2) - (b^2*(d*e - c*f)*PolyLog[2, -((1 + c + d
*x)/(1 - c - d*x))])/d^2
```

Rule 260

```
Int[(x_)^(m_.)/((a_) + (b_.)*(x_)^(n_)), x_Symbol] :> Simp[Log[RemoveConten
t[a + b*x^n, x]]/(b*n), x] /; FreeQ[{a, b, m, n}, x] && EqQ[m, n - 1]
```

Rule 2315

```
Int[Log[(c_.)*(x_)]/((d_) + (e_.)*(x_)), x_Symbol] :> -Simp[PolyLog[2, 1 -
c*x]/e, x] /; FreeQ[{c, d, e}, x] && EqQ[e + c*d, 0]
```

Rule 2402

```
Int[Log[(c_.)/((d_) + (e_.)*(x_))]/((f_) + (g_.)*(x_)^2), x_Symbol] :> -Dis
t[e/g, Subst[Int[Log[2*d*x]/(1 - 2*d*x), x], x, 1/(d + e*x)], x] /; FreeQ[{
c, d, e, f, g}, x] && EqQ[c, 2*d] && EqQ[e^2*f + d^2*g, 0]
```

Rule 5911

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.), x_Symbol] :> Simp[x*(a + b*A
rcCoth[c*x])^p, x] - Dist[b*c*p, Int[(x*(a + b*ArcCoth[c*x])^(p - 1))/(1 -
c^2*x^2), x], x] /; FreeQ[{a, b, c}, x] && IGtQ[p, 0]
```

Rule 5919

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)/((d_) + (e_.)*(x_)), x_Symbol
] :> -Simp[((a + b*ArcCoth[c*x])^p*Log[2/(1 + (e*x)/d)])/e, x] + Dist[(b*c*
```

```
p)/e, Int[((a + b*ArcCoth[c*x])^(p - 1)*Log[2/(1 + (e*x)/d)])/(1 - c^2*x^2)
, x], x] /; FreeQ[{a, b, c, d, e}, x] && IGtQ[p, 0] && EqQ[c^2*d^2 - e^2, 0
]
```

Rule 5929

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_)*((d_) + (e_.)*(x_))^(q_.), x_S
ymbol] :> Simp[((d + e*x)^(q + 1)*(a + b*ArcCoth[c*x])^p)/(e*(q + 1)), x] -
 Dist[(b*c*p)/(e*(q + 1)), Int[ExpandIntegrand[(a + b*ArcCoth[c*x])^(p - 1)
, (d + e*x)^(q + 1)/(1 - c^2*x^2), x], x], x] /; FreeQ[{a, b, c, d, e}, x]
&& IGtQ[p, 1] && IntegerQ[q] && NeQ[q, -1]
```

Rule 5949

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)/((d_) + (e_.)*(x_)^2), x_Symb
ol] :> Simp[(a + b*ArcCoth[c*x])^(p + 1)/(b*c*d*(p + 1)), x] /; FreeQ[{a, b
, c, d, e, p}, x] && EqQ[c^2*d + e, 0] && NeQ[p, -1]
```

Rule 5985

```
Int[(((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)*(x_))/((d_) + (e_.)*(x_)^2),
 x_Symbol] :> Simp[(a + b*ArcCoth[c*x])^(p + 1)/(b*e*(p + 1)), x] + Dist[1/
(c*d), Int[(a + b*ArcCoth[c*x])^p/(1 - c*x), x], x] /; FreeQ[{a, b, c, d, e
}, x] && EqQ[c^2*d + e, 0] && IGtQ[p, 0]
```

Rule 6049

```
Int[(((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)*((f_) + (g_.)*(x_))^(m_.))/(
(d_) + (e_.)*(x_)^2), x_Symbol] :> Int[ExpandIntegrand[(a + b*ArcCoth[c*x])
^p/(d + e*x^2), (f + g*x)^m, x], x] /; FreeQ[{a, b, c, d, e, f, g}, x] && I
GtQ[p, 0] && EqQ[c^2*d + e, 0] && IGtQ[m, 0]
```

Rule 6112

```
Int[((a_.) + ArcCoth[(c_) + (d_.)*(x_)]*(b_.))^(p_.)*((e_.) + (f_.)*(x_))^(
m_.), x_Symbol] :> Dist[1/d, Subst[Int[((d*e - c*f)/d + (f*x)/d)^m*(a + b*A
rcCoth[x])^p, x], x, c + d*x], x] /; FreeQ[{a, b, c, d, e, f, m}, x] && IGt
Q[p, 0]
```

Rubi steps

$$\int (e+fx)\left(a+b\coth^{-1}(c+dx)\right)^2 dx = \frac{\text{Subst}\left(\int \left(\frac{de-cf}{d}+\frac{fx}{d}\right)\left(a+b\coth^{-1}(x)\right)^2 dx, x, c+dx\right)}{d}$$

$$= \frac{(e+fx)^2\left(a+b\coth^{-1}(c+dx)\right)^2}{2f} - \frac{b\,\text{Subst}\left(\int \left(-\frac{f^2(a+b\coth^{-1}(x))}{d^2} + \frac{(d}{}\right.\right.}{}$$

$$= \frac{(e+fx)^2\left(a+b\coth^{-1}(c+dx)\right)^2}{2f} - \frac{b\,\text{Subst}\left(\int \frac{(d^2e^2-2cdef+(1+c^2)f^2+2f(}{1-x^2}\right.}{d^2}$$

$$= \frac{abfx}{d} + \frac{(e+fx)^2\left(a+b\coth^{-1}(c+dx)\right)^2}{2f} - \frac{b\,\text{Subst}\left(\int \left(\frac{d^2e^2\left(1+\frac{f(-2cde+}{d^2}\right.}{}\right.\right.}{}$$

$$= \frac{abfx}{d} + \frac{b^2f(c+dx)\coth^{-1}(c+dx)}{d^2} + \frac{(e+fx)^2\left(a+b\coth^{-1}(c+dx)\right.}{2f}$$

$$= \frac{abfx}{d} + \frac{b^2f(c+dx)\coth^{-1}(c+dx)}{d^2} + \frac{(de-cf)\left(a+b\coth^{-1}(c+dx)\right.}{d^2}$$

$$= \frac{abfx}{d} + \frac{b^2f(c+dx)\coth^{-1}(c+dx)}{d^2} + \frac{(de-cf)\left(a+b\coth^{-1}(c+dx)\right.}{d^2}$$

$$= \frac{abfx}{d} + \frac{b^2f(c+dx)\coth^{-1}(c+dx)}{d^2} + \frac{(de-cf)\left(a+b\coth^{-1}(c+dx)\right.}{d^2}$$

$$= \frac{abfx}{d} + \frac{b^2f(c+dx)\coth^{-1}(c+dx)}{d^2} + \frac{(de-cf)\left(a+b\coth^{-1}(c+dx)\right.}{d^2}$$

**Mathematica [A]** time = 0.61, size = 295, normalized size = 1.33

$$\frac{-a^2c^2f + 2a^2cde + 2a^2d^2ex + a^2d^2fx^2 + 2b\coth^{-1}(c+dx)\left(-((c+dx)(acf-ad(2e+fx)-bf)) - 2b(de-cf\right.}{}$$

Warning: Unable to verify antiderivative.

```
[In] Integrate[(e + f*x)*(a + b*ArcCoth[c + d*x])^2,x]
```

```
[Out] (2*a^2*c*d*e + 2*a*b*c*f - a^2*c^2*f + 2*a^2*d^2*e*x + 2*a*b*d*f*x + a^2*d^
2*f*x^2 + b^2*(-1 + c + d*x)*(2*d*e + f - c*f + d*f*x)*ArcCoth[c + d*x]^2 +
 2*b*ArcCoth[c + d*x]*(-((c + d*x)*(-(b*f) + a*c*f - a*d*(2*e + f*x))) - 2*
b*(d*e - c*f)*Log[1 - E^(-2*ArcCoth[c + d*x])]) + a*b*f*Log[1 - c - d*x] -
a*b*f*Log[1 + c + d*x] - 4*a*b*d*e*Log[1/((c + d*x)*Sqrt[1 - (c + d*x)^(-2)
])] - 2*b^2*f*Log[1/((c + d*x)*Sqrt[1 - (c + d*x)^(-2)])] + 4*a*b*c*f*Log[1
/((c + d*x)*Sqrt[1 - (c + d*x)^(-2)])] + 2*b^2*(d*e - c*f)*PolyLog[2, E^(-2
*ArcCoth[c + d*x])])/(2*d^2)
```

**fricas [F]** time = 0.40, size = 0, normalized size = 0.00

$$\text{integral}\left(a^2fx + a^2e + \left(b^2fx + b^2e\right)\text{arcoth}\left(dx+c\right)^2 + 2\left(abfx + abe\right)\text{arcoth}\left(dx+c\right), x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((f*x+e)*(a+b*arccoth(d*x+c))^2,x, algorithm="fricas")
```

```
[Out] integral(a^2*f*x + a^2*e + (b^2*f*x + b^2*e)*arccoth(d*x + c)^2 + 2*(a*b*f*
x + a*b*e)*arccoth(d*x + c), x)
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int (fx+e)(b\,\mathrm{arcoth}\,(dx+c)+a)^2\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((f*x+e)*(a+b*arccoth(d*x+c))^2,x, algorithm="giac")
```

```
[Out] integrate((f*x + e)*(b*arccoth(d*x + c) + a)^2, x)
```

**maple [B]** time = 0.07, size = 857, normalized size = 3.88

result too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((f*x+e)*(a+b*arccoth(d*x+c))^2,x)
```

```
[Out] 1/4/d*b^2*ln(d*x+c-1)^2*e+1/d*a^2*c*e-1/2/d^2*a^2*c^2*f+a*b*f*x/d-1/d^2*a*b
*ln(d*x+c+1)*c*f-1/d^2*a*b*ln(d*x+c-1)*c*f-1/d^2*b^2*arccoth(d*x+c)*ln(d*x+
c+1)*c*f+1/2/d^2*b^2*ln(-1/2*d*x-1/2*c+1/2)*ln(1/2+1/2*d*x+1/2*c)*c*f-1/2/d
^2*b^2*ln(d*x+c+1)*ln(-1/2*d*x-1/2*c+1/2)*c*f+1/2/d^2*b^2*ln(d*x+c-1)*ln(1/
2+1/2*d*x+1/2*c)*c*f-1/d*b^2*dilog(1/2+1/2*d*x+1/2*c)*e-1/4/d*b^2*ln(d*x+c+
1)^2*e+1/2/d^2*b^2*ln(d*x+c+1)*f+1/2/d^2*b^2*ln(d*x+c-1)*f+1/8/d^2*b^2*ln(d
*x+c+1)^2*f+1/8/d^2*b^2*ln(d*x+c-1)^2*f+1/2*b^2*arccoth(d*x+c)^2*f*x^2+arcc
oth(d*x+c)^2*x*b^2*e-1/d^2*b^2*arccoth(d*x+c)*ln(d*x+c-1)*c*f-1/d^2*a*b*arc
coth(d*x+c)*c^2*f+2/d*arccoth(d*x+c)*a*b*c*e+1/2*a^2*x^2*f+a^2*x*e-1/2/d*b^
2*ln(d*x+c-1)*ln(1/2+1/2*d*x+1/2*c)*e+a*b*arccoth(d*x+c)*f*x^2+2*arccoth(d*
x+c)*x*a*b*e-1/4/d^2*b^2*ln(d*x+c+1)*ln(-1/2*d*x-1/2*c+1/2)*f-1/2/d^2*b^2*a
rccoth(d*x+c)^2*c^2*f+1/2/d*b^2*ln(d*x+c+1)*ln(-1/2*d*x-1/2*c+1/2)*e-1/2/d*
b^2*ln(-1/2*d*x-1/2*c+1/2)*ln(1/2+1/2*d*x+1/2*c)*e+1/d*b^2*arccoth(d*x+c)*l
n(d*x+c-1)*e+1/d*a*b*ln(d*x+c+1)*e+1/d*a*b*ln(d*x+c-1)*e-1/4/d^2*b^2*ln(d*x
+c-1)*ln(1/2+1/2*d*x+1/2*c)*f+1/4/d^2*b^2*ln(-1/2*d*x-1/2*c+1/2)*ln(1/2+1/2
*d*x+1/2*c)*f+1/d^2*a*b*c*f+1/d*b^2*arccoth(d*x+c)*f*x-1/2/d^2*b^2*arccoth(
d*x+c)*ln(d*x+c+1)*f+1/d^2*b^2*arccoth(d*x+c)*f*c+1/d*arccoth(d*x+c)^2*b^2*
c*e+1/d*b^2*arccoth(d*x+c)*ln(d*x+c+1)*e+1/2/d^2*b^2*arccoth(d*x+c)*ln(d*x+
c-1)*f-1/2/d^2*a*b*ln(d*x+c+1)*f+1/4/d^2*b^2*ln(d*x+c+1)^2*c*f+1/d^2*b^2*di
log(1/2+1/2*d*x+1/2*c)*c*f-1/4/d^2*b^2*ln(d*x+c-1)^2*c*f+1/2/d^2*a*b*ln(d*x
+c-1)*f
```

**maxima [A]** time = 0.61, size = 400, normalized size = 1.81

$$\frac{1}{2}a^2fx^2+\frac{1}{2}\left(2x^2\,\mathrm{arcoth}\,(dx+c)+d\left(\frac{2x}{d^2}-\frac{\left(c^2+2c+1\right)\log(dx+c+1)}{d^3}+\frac{\left(c^2-2c+1\right)\log(dx+c-1)}{d^3}\right)\right)abf-$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((f*x+e)*(a+b*arccoth(d*x+c))^2,x, algorithm="maxima")
```

```
[Out] 1/2*a^2*f*x^2 + 1/2*(2*x^2*arccoth(d*x + c) + d*(2*x/d^2 - (c^2 + 2*c + 1)*
log(d*x + c + 1)/d^3 + (c^2 - 2*c + 1)*log(d*x + c - 1)/d^3))*a*b*f + a^2*e
*x + (2*(d*x + c)*arccoth(d*x + c) + log(-(d*x + c)^2 + 1))*a*b*e/d - (d*e
- c*f)*(log(d*x + c - 1)*log(1/2*d*x + 1/2*c + 1/2) + dilog(-1/2*d*x - 1/2*
c + 1/2))*b^2/d^2 + 1/2*(c*f + f)*b^2*log(d*x + c + 1)/d^2 + 1/8*((b^2*d^2*
f*x^2 + 2*b^2*d^2*e*x - (c^2*f - 2*(d*e - f)*c - 2*d*e + f)*b^2)*log(d*x +
c + 1)^2 + (b^2*d^2*f*x^2 + 2*b^2*d^2*e*x - (c^2*f - 2*(d*e + f)*c + 2*d*e
```

```
+ f)*b^2)*log(d*x + c - 1)^2 + 2*(2*b^2*d*f*x - (b^2*d^2*f*x^2 + 2*b^2*d^2*
e*x - (c^2*f - 2*(d*e + f)*c + 2*d*e + f)*b^2)*log(d*x + c - 1))*log(d*x +
c + 1) - 4*(b^2*d*f*x + (c*f - f)*b^2)*log(d*x + c - 1))/d^2
```

**mupad** **[F]** time = 0.00, size = -1, normalized size = -0.00

$$\int \left(e + f\,x\right)\,\left(a + b\,\mathrm{acoth}\left(c + d\,x\right)\right)^2\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((e + f*x)*(a + b*acoth(c + d*x))^2,x)
```

```
[Out] int((e + f*x)*(a + b*acoth(c + d*x))^2, x)
```

**sympy** **[F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \left(a + b\,\mathrm{acoth}\left(c + dx\right)\right)^2 \left(e + fx\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((f*x+e)*(a+b*acoth(d*x+c))**2,x)
```

```
[Out] Integral((a + b*acoth(c + d*x))**2*(e + f*x), x)
```

# 3.111 $\int \left(a+b\coth^{-1}(c+dx)\right)^2\,dx$

**Optimal**. Leaf size=97

$$\frac{(c+dx)\left(a+b\coth^{-1}(c+dx)\right)^2}{d}+\frac{\left(a+b\coth^{-1}(c+dx)\right)^2}{d}-\frac{2b\log\left(\frac{2}{-c-dx+1}\right)\left(a+b\coth^{-1}(c+dx)\right)}{d}-\frac{b^2\mathrm{Li}_2\left(-\frac{c+d}{-c-d}\right.}{d}$$

[Out] (a+b*arccoth(d*x+c))^2/d+(d*x+c)*(a+b*arccoth(d*x+c))^2/d-2*b*(a+b*arccoth(d*x+c))*ln(2/(-d*x-c+1))/d-b^2*polylog(2,(-d*x-c-1)/(-d*x-c+1))/d

**Rubi [A]** time = 0.12, antiderivative size = 97, normalized size of antiderivative = 1.00, number of steps used = 6, number of rules used = 6, integrand size = 12, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.500, Rules used = {6104, 5911, 5985, 5919, 2402, 2315}

$$-\frac{b^2\mathrm{PolyLog}\left(2,-\frac{c+dx+1}{-c-dx+1}\right)}{d}+\frac{(c+dx)\left(a+b\coth^{-1}(c+dx)\right)^2}{d}+\frac{\left(a+b\coth^{-1}(c+dx)\right)^2}{d}-\frac{2b\log\left(\frac{2}{-c-dx+1}\right)\left(a+b\,\mathrm{co}\right.}{d}$$

Antiderivative was successfully verified.

[In] Int[(a + b*ArcCoth[c + d*x])^2,x]

[Out] (a + b*ArcCoth[c + d*x])^2/d + ((c + d*x)*(a + b*ArcCoth[c + d*x])^2)/d - (2*b*(a + b*ArcCoth[c + d*x])*Log[2/(1 - c - d*x)])/d - (b^2*PolyLog[2, -((1 + c + d*x)/(1 - c - d*x))])/d

Rule 2315

```
Int[Log[(c_.)*(x_)]/((d_) + (e_.)*(x_)), x_Symbol] :> -Simp[PolyLog[2, 1 -
c*x]/e, x] /; FreeQ[{c, d, e}, x] && EqQ[e + c*d, 0]
```

Rule 2402

```
Int[Log[(c_.)/((d_) + (e_.)*(x_))]/((f_) + (g_.)*(x_)^2), x_Symbol] :> -Dis
t[e/g, Subst[Int[Log[2*d*x]/(1 - 2*d*x), x], x, 1/(d + e*x)], x] /; FreeQ[{
c, d, e, f, g}, x] && EqQ[c, 2*d] && EqQ[e^2*f + d^2*g, 0]
```

Rule 5911

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.), x_Symbol] :> Simp[x*(a + b*A
rcCoth[c*x])^p, x] - Dist[b*c*p, Int[(x*(a + b*ArcCoth[c*x])^(p - 1))/(1 -
c^2*x^2), x], x] /; FreeQ[{a, b, c}, x] && IGtQ[p, 0]
```

Rule 5919

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)/((d_) + (e_.)*(x_)), x_Symbol
] :> -Simp[((a + b*ArcCoth[c*x])^p*Log[2/(1 + (e*x)/d)])/e, x] + Dist[(b*c*
p)/e, Int[((a + b*ArcCoth[c*x])^(p - 1)*Log[2/(1 + (e*x)/d)])/(1 - c^2*x^2)
, x], x] /; FreeQ[{a, b, c, d, e}, x] && IGtQ[p, 0] && EqQ[c^2*d^2 - e^2, 0
]
```

Rule 5985

```
Int[(((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)*(x_))/((d_) + (e_.)*(x_)^2),
 x_Symbol] :> Simp[(a + b*ArcCoth[c*x])^(p + 1)/(b*e*(p + 1)), x] + Dist[1/
(c*d), Int[(a + b*ArcCoth[c*x])^p/(1 - c*x), x], x] /; FreeQ[{a, b, c, d, e
}, x] && EqQ[c^2*d + e, 0] && IGtQ[p, 0]
```

Rule 6104

```
Int[((a_.) + ArcCoth[(c_) + (d_.)*(x_)]*(b_.))^(p_.), x_Symbol] :> Dist[1/d
, Subst[Int[(a + b*ArcCoth[x])^p, x], x, c + d*x], x] /; FreeQ[{a, b, c, d}
, x] && IGtQ[p, 0]
```

Rubi steps

$$\int \left(a+b\coth^{-1}(c+dx)\right)^2\,dx=\frac{\text{Subst}\left(\int \left(a+b\coth^{-1}(x)\right)^2\,dx,x,c+dx\right)}{d}$$
$$=\frac{(c+dx)\left(a+b\coth^{-1}(c+dx)\right)^2}{d}-\frac{(2b)\,\text{Subst}\left(\int \frac{x\left(a+b\coth^{-1}(x)\right)}{1-x^2}\,dx,x,c+dx\right)}{d}$$
$$=\frac{\left(a+b\coth^{-1}(c+dx)\right)^2}{d}+\frac{(c+dx)\left(a+b\coth^{-1}(c+dx)\right)^2}{d}-\frac{(2b)\,\text{Subst}\left(\int \frac{a}{}\right.}{}$$
$$=\frac{\left(a+b\coth^{-1}(c+dx)\right)^2}{d}+\frac{(c+dx)\left(a+b\coth^{-1}(c+dx)\right)^2}{d}-\frac{2b\left(a+b\coth^{-1}\right.}{}$$
$$=\frac{\left(a+b\coth^{-1}(c+dx)\right)^2}{d}+\frac{(c+dx)\left(a+b\coth^{-1}(c+dx)\right)^2}{d}-\frac{2b\left(a+b\coth^{-1}\right.}{}$$
$$=\frac{\left(a+b\coth^{-1}(c+dx)\right)^2}{d}+\frac{(c+dx)\left(a+b\coth^{-1}(c+dx)\right)^2}{d}-\frac{2b\left(a+b\coth^{-1}\right.}{}$$

**Mathematica [A]** time = 0.17, size = 111, normalized size = 1.14

$$\frac{a\left(ac+adx-2b\log\left(\frac{1}{(c+dx)\sqrt{1-\frac{1}{(c+dx)^2}}}\right)\right)+2b\coth^{-1}(c+dx)\left(ac+adx-b\log\left(1-e^{-2\coth^{-1}(c+dx)}\right)\right)+b^2\text{Li}_2\left(e^{-}\right.}{d}$$

Warning: Unable to verify antiderivative.

```
[In] Integrate[(a + b*ArcCoth[c + d*x])^2,x]
```

```
[Out] (b^2*(-1 + c + d*x)*ArcCoth[c + d*x]^2 + 2*b*ArcCoth[c + d*x]*(a*c + a*d*x
- b*Log[1 - E^(-2*ArcCoth[c + d*x])]) + a*(a*c + a*d*x - 2*b*Log[1/((c + d*
x)*Sqrt[1 - (c + d*x)^(-2)])]) + b^2*PolyLog[2, E^(-2*ArcCoth[c + d*x])])/d
```

**fricas [F]** time = 0.45, size = 0, normalized size = 0.00

$$\text{integral}\left(b^2\,\text{arcoth}\,(dx+c)^2+2\,ab\,\text{arcoth}\,(dx+c)+a^2,x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccoth(d*x+c))^2,x, algorithm="fricas")
```

```
[Out] integral(b^2*arccoth(d*x + c)^2 + 2*a*b*arccoth(d*x + c) + a^2, x)
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int (b\,\text{arcoth}\,(dx+c)+a)^2\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccoth(d*x+c))^2,x, algorithm="giac")
```

```
[Out] integrate((b*arccoth(d*x + c) + a)^2, x)
```

**maple [B]** time = 0.24, size = 226, normalized size = 2.33

$$\operatorname{arccoth}(dx+c)^2 x b^2+\frac{\operatorname{arccoth}(dx+c)^2 b^2 c}{d}+2\operatorname{arccoth}(dx+c)\,xab+\frac{b^2\operatorname{arccoth}(dx+c)^2}{d}-\frac{2\operatorname{arccoth}(dx+c)\ln}{d}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a+b*arccoth(d*x+c))^2,x)
```

```
[Out] arccoth(d*x+c)^2*x*b^2+1/d*arccoth(d*x+c)^2*b^2*c+2*arccoth(d*x+c)*x*a*b+1/
d*b^2*arccoth(d*x+c)^2-2/d*arccoth(d*x+c)*ln(1+1/((d*x+c-1)/(d*x+c+1))^(1/2
))*b^2-2/d*arccoth(d*x+c)*ln(1-1/((d*x+c-1)/(d*x+c+1))^(1/2))*b^2+2/d*arcco
th(d*x+c)*a*b*c+a^2*x+1/d*a*b*ln((d*x+c)^2-1)-2/d*polylog(2,-1/((d*x+c-1)/(
d*x+c+1))^(1/2))*b^2-2/d*polylog(2,1/((d*x+c-1)/(d*x+c+1))^(1/2))*b^2+a^2*c
/d
```

**maxima [F]** time = 0.00, size = 0, normalized size = 0.00

$$a^2x+\frac{1}{4}b^2\left(\frac{dx\log(dx+c-1)^2+(dx+c+1)\log(dx+c+1)^2-2(dx+c-1)\log(dx+c+1)\log(dx+c-1)}{d}+\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccoth(d*x+c))^2,x, algorithm="maxima")
```

```
[Out] a^2*x + 1/4*b^2*((d*x*log(d*x + c - 1)^2 + (d*x + c + 1)*log(d*x + c + 1)^2
 - 2*(d*x + c - 1)*log(d*x + c + 1)*log(d*x + c - 1))/d + integrate(2*(c^2
+ (c*d - 3*d)*x - 2*c + 1)*log(d*x + c - 1)/(d^2*x^2 + 2*c*d*x + c^2 - 1),
x)) + (2*(d*x + c)*arccoth(d*x + c) + log(-(d*x + c)^2 + 1))*a*b/d
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.01

$$\int (a+b\,\mathrm{acoth}(c+d\,x))^2\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a + b*acoth(c + d*x))^2,x)
```

```
[Out] int((a + b*acoth(c + d*x))^2, x)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int (a+b\operatorname{acoth}(c+dx))^2\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*acoth(d*x+c))**2,x)
```

```
[Out] Integral((a + b*acoth(c + d*x))**2, x)
```

# 3.112 $\int \frac{\left(a+b\coth^{-1}(c+dx)\right)^2}{e+fx}\,dx$

**Optimal**. Leaf size=214

$$-\frac{b\left(a+b\coth^{-1}(c+dx)\right)\text{Li}_2\left(1-\frac{2d(e+fx)}{(de-cf+f)(c+dx+1)}\right)}{f}+\frac{\left(a+b\coth^{-1}(c+dx)\right)^2\log\left(\frac{2d(e+fx)}{(c+dx+1)(-cf+de+f)}\right)}{f}+\frac{b\text{Li}_2\left(1\right.}{}$$

```
[Out] -(a+b*arccoth(d*x+c))^2*ln(2/(d*x+c+1))/f+(a+b*arccoth(d*x+c))^2*ln(2*d*(f*
x+e)/(-c*f+d*e+f)/(d*x+c+1))/f+b*(a+b*arccoth(d*x+c))*polylog(2,1-2/(d*x+c+
1))/f-b*(a+b*arccoth(d*x+c))*polylog(2,1-2*d*(f*x+e)/(-c*f+d*e+f)/(d*x+c+1)
)/f+1/2*b^2*polylog(3,1-2/(d*x+c+1))/f-1/2*b^2*polylog(3,1-2*d*(f*x+e)/(-c*
f+d*e+f)/(d*x+c+1))/f
```

**Rubi [A]** time = 0.15, antiderivative size = 214, normalized size of antiderivative = 1.00, number of steps used = 2, number of rules used = 2, integrand size = 20, $\frac{\text{number of rules}}{\text{integrand size}} = 0.100$, Rules used = {6112, 5923}

$$-\frac{b\left(a+b\coth^{-1}(c+dx)\right)\text{PolyLog}\left(2,1-\frac{2d(e+fx)}{(c+dx+1)(-cf+de+f)}\right)}{f}+\frac{b\text{PolyLog}\left(2,1-\frac{2}{c+dx+1}\right)\left(a+b\coth^{-1}(c+dx)\right)}{f}$$

Antiderivative was successfully verified.

```
[In] Int[(a + b*ArcCoth[c + d*x])^2/(e + f*x),x]
```

```
[Out] -(((a + b*ArcCoth[c + d*x])^2*Log[2/(1 + c + d*x)])/f) + ((a + b*ArcCoth[c
+ d*x])^2*Log[(2*d*(e + f*x))/((d*e + f - c*f)*(1 + c + d*x))])/f + (b*(a +
 b*ArcCoth[c + d*x])*PolyLog[2, 1 - 2/(1 + c + d*x)])/f - (b*(a + b*ArcCoth
[c + d*x])*PolyLog[2, 1 - (2*d*(e + f*x))/((d*e + f - c*f)*(1 + c + d*x))])
/f + (b^2*PolyLog[3, 1 - 2/(1 + c + d*x)])/(2*f) - (b^2*PolyLog[3, 1 - (2*d
*(e + f*x))/((d*e + f - c*f)*(1 + c + d*x))])/(2*f)
```

Rule 5923

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^2/((d_) + (e_.)*(x_)), x_Symbol] :>
 -Simp[((a + b*ArcCoth[c*x])^2*Log[2/(1 + c*x)])/e, x] + (Simp[((a + b*ArcC
oth[c*x])^2*Log[(2*c*(d + e*x))/((c*d + e)*(1 + c*x))])/e, x] + Simp[(b*(a
+ b*ArcCoth[c*x])*PolyLog[2, 1 - 2/(1 + c*x)])/e, x] - Simp[(b*(a + b*ArcCo
th[c*x])*PolyLog[2, 1 - (2*c*(d + e*x))/((c*d + e)*(1 + c*x))])/e, x] + Sim
p[(b^2*PolyLog[3, 1 - 2/(1 + c*x)])/(2*e), x] - Simp[(b^2*PolyLog[3, 1 - (2
*c*(d + e*x))/((c*d + e)*(1 + c*x))])/(2*e), x]) /; FreeQ[{a, b, c, d, e},
x] && NeQ[c^2*d^2 - e^2, 0]
```

Rule 6112

```
Int[((a_.) + ArcCoth[(c_) + (d_.)*(x_)]*(b_.))^(p_.)*((e_.) + (f_.)*(x_))^(
m_.), x_Symbol] :> Dist[1/d, Subst[Int[((d*e - c*f)/d + (f*x)/d)^m*(a + b*A
rcCoth[x])^p, x], x, c + d*x], x] /; FreeQ[{a, b, c, d, e, f, m}, x] && IGt
Q[p, 0]
```

Rubi steps

$$\int \frac{\left(a+b\coth^{-1}(c+dx)\right)^2}{e+fx}\,dx = \frac{\text{Subst}\left(\int \frac{\left(a+b\coth^{-1}(x)\right)^2}{\frac{de-cf}{d}+\frac{fx}{d}}\,dx, x, c+dx\right)}{d}$$
$$= -\frac{\left(a+b\coth^{-1}(c+dx)\right)^2\log\left(\frac{2}{1+c+dx}\right)}{f} + \frac{\left(a+b\coth^{-1}(c+dx)\right)^2\log\left(\frac{2d(e+f\cdot}{(de+f-cf)(1\cdot}\right.}{f}$$

**Mathematica [C]** time = 31.06, size = 3759, normalized size = 17.57

Result too large to show

Warning: Unable to verify antiderivative.

```
[In] Integrate[(a + b*ArcCoth[c + d*x])^2/(e + f*x),x]
```

```
[Out] (a^2*Log[e + f*x])/f + 2*a*b*(((ArcCoth[c + d*x] - ArcTanh[c + d*x])*Log[e
+ f*x])/f - (I*(I*ArcTanh[c + d*x]*(-Log[1/Sqrt[1 - (c + d*x)^2]] + Log[I*S
inh[ArcTanh[(d*e - c*f)/f] + ArcTanh[c + d*x]]]) + ((-I)*(I*ArcTanh[(d*e -
c*f)/f] + I*ArcTanh[c + d*x])^2 - (I/4)*(Pi - (2*I)*ArcTanh[c + d*x])^2 + 2
*(I*ArcTanh[(d*e - c*f)/f] + I*ArcTanh[c + d*x])*Log[1 - E^((2*I)*(I*ArcTan
h[(d*e - c*f)/f] + I*ArcTanh[c + d*x]))] + (Pi - (2*I)*ArcTanh[c + d*x])*Lo
g[1 - E^(I*(Pi - (2*I)*ArcTanh[c + d*x]))] - (Pi - (2*I)*ArcTanh[c + d*x])*
Log[2*Sin[(Pi - (2*I)*ArcTanh[c + d*x])/2]] - 2*(I*ArcTanh[(d*e - c*f)/f] +
 I*ArcTanh[c + d*x])*Log[(2*I)*Sinh[ArcTanh[(d*e - c*f)/f] + ArcTanh[c + d*
x]]] - I*PolyLog[2, E^((2*I)*(I*ArcTanh[(d*e - c*f)/f] + I*ArcTanh[c + d*x]
))] - I*PolyLog[2, E^(I*(Pi - (2*I)*ArcTanh[c + d*x]))])/2))/f) - (b^2*(d*e
 - c*f + f*(c + d*x))*(1 - (c + d*x)^2)*(-1/24*(I*f*Pi^3 - 8*d*e*ArcCoth[c
+ d*x]^3 - 8*f*ArcCoth[c + d*x]^3 + 8*c*f*ArcCoth[c + d*x]^3 + 24*f*ArcCoth
[c + d*x]^2*Log[1 - E^(2*ArcCoth[c + d*x])] + 24*f*ArcCoth[c + d*x]*PolyLog
[2, E^(2*ArcCoth[c + d*x])] - 12*f*PolyLog[3, E^(2*ArcCoth[c + d*x])])/f^2
+ ((-(d*e) - f + c*f)*(-(d*e) + f + c*f)*(2*d^2*e^2*ArcCoth[c + d*x]^3 - 8*
d*e*f*ArcCoth[c + d*x]^3 - 4*c*d*e*f*ArcCoth[c + d*x]^3 + 4*d*e*E^(2*ArcTan
h[f/(d*e - c*f)])*f*ArcCoth[c + d*x]^3 - 10*f^2*ArcCoth[c + d*x]^3 + 8*c*f^
2*ArcCoth[c + d*x]^3 + 2*c^2*f^2*ArcCoth[c + d*x]^3 - 4*E^(2*ArcTanh[f/(d*e
 - c*f)])*f^2*ArcCoth[c + d*x]^3 - 4*c*E^(2*ArcTanh[f/(d*e - c*f)])*f^2*Arc
Coth[c + d*x]^3 - (4*d^2*e^2*Sqrt[(d^2*e^2 - 2*c*d*e*f + (-1 + c^2)*f^2)/(d
*e - c*f)^2]*ArcCoth[c + d*x]^3)/E^ArcTanh[f/(d*e - c*f)] - (4*d*e*f*Sqrt[(
d^2*e^2 - 2*c*d*e*f + (-1 + c^2)*f^2)/(d*e - c*f)^2]*ArcCoth[c + d*x]^3)/E^
ArcTanh[f/(d*e - c*f)] + (8*c*d*e*f*Sqrt[(d^2*e^2 - 2*c*d*e*f + (-1 + c^2)*
f^2)/(d*e - c*f)^2]*ArcCoth[c + d*x]^3)/E^ArcTanh[f/(d*e - c*f)] + (4*c*f^2
*Sqrt[(d^2*e^2 - 2*c*d*e*f + (-1 + c^2)*f^2)/(d*e - c*f)^2]*ArcCoth[c + d*x
]^3)/E^ArcTanh[f/(d*e - c*f)] - (4*c^2*f^2*Sqrt[(d^2*e^2 - 2*c*d*e*f + (-1
+ c^2)*f^2)/(d*e - c*f)^2]*ArcCoth[c + d*x]^3)/E^ArcTanh[f/(d*e - c*f)] + (
6*I)*d*e*f*Pi*ArcCoth[c + d*x]*Log[2] + (6*I)*f^2*Pi*ArcCoth[c + d*x]*Log[2
] - (6*I)*c*f^2*Pi*ArcCoth[c + d*x]*Log[2] - d*e*f*ArcCoth[c + d*x]^2*Log[6
4] - f^2*ArcCoth[c + d*x]^2*Log[64] + c*f^2*ArcCoth[c + d*x]^2*Log[64] - (6
*I)*d*e*f*Pi*ArcCoth[c + d*x]*Log[E^(-ArcCoth[c + d*x]) + E^ArcCoth[c + d*x
]] - (6*I)*f^2*Pi*ArcCoth[c + d*x]*Log[E^(-ArcCoth[c + d*x]) + E^ArcCoth[c
+ d*x]] + (6*I)*c*f^2*Pi*ArcCoth[c + d*x]*Log[E^(-ArcCoth[c + d*x]) + E^Arc
Coth[c + d*x]] + 6*d*e*f*ArcCoth[c + d*x]^2*Log[1 - E^(2*(ArcCoth[c + d*x]
+ ArcTanh[f/(d*e - c*f)]))] - 6*d*e*E^(2*ArcTanh[f/(d*e - c*f)])*f*ArcCoth[
c + d*x]^2*Log[1 - E^(2*(ArcCoth[c + d*x] + ArcTanh[f/(d*e - c*f)]))] + 6*f
^2*ArcCoth[c + d*x]^2*Log[1 - E^(2*(ArcCoth[c + d*x] + ArcTanh[f/(d*e - c*f
)]))] - 6*c*f^2*ArcCoth[c + d*x]^2*Log[1 - E^(2*(ArcCoth[c + d*x] + ArcTanh
[f/(d*e - c*f)]))] + 6*E^(2*ArcTanh[f/(d*e - c*f)])*f^2*ArcCoth[c + d*x]^2*
Log[1 - E^(2*(ArcCoth[c + d*x] + ArcTanh[f/(d*e - c*f)]))] + 6*c*E^(2*ArcTa
```

nh[f/(d*e - c*f)])*f^2*ArcCoth[c + d*x]^2*Log[1 - E^(2*(ArcCoth[c + d*x] + ArcTanh[f/(d*e - c*f)]))] + 12*d*e*f*ArcCoth[c + d*x]*ArcTanh[f/(d*e - c*f) ]*Log[(I/2)*E^(-ArcCoth[c + d*x] - ArcTanh[f/(d*e - c*f)])*(-1 + E^(2*(ArcC oth[c + d*x] + ArcTanh[f/(d*e - c*f)])))] + 12*f^2*ArcCoth[c + d*x]*ArcTanh [f/(d*e - c*f)]*Log[(I/2)*E^(-ArcCoth[c + d*x] - ArcTanh[f/(d*e - c*f)])*(- 1 + E^(2*(ArcCoth[c + d*x] + ArcTanh[f/(d*e - c*f)])))] - 12*c*f^2*ArcCoth[ c + d*x]*ArcTanh[f/(d*e - c*f)]*Log[(I/2)*E^(-ArcCoth[c + d*x] - ArcTanh[f/ (d*e - c*f)])*(-1 + E^(2*(ArcCoth[c + d*x] + ArcTanh[f/(d*e - c*f)])))] + 6 *d*e*f*ArcCoth[c + d*x]^2*Log[-((d*e*(-1 + E^(2*ArcCoth[c + d*x])) + (1 + c + E^(2*ArcCoth[c + d*x]) - c*E^(2*ArcCoth[c + d*x]))*f)/E^ArcCoth[c + d*x] )] + 6*f^2*ArcCoth[c + d*x]^2*Log[-((d*e*(-1 + E^(2*ArcCoth[c + d*x])) + (1 + c + E^(2*ArcCoth[c + d*x]) - c*E^(2*ArcCoth[c + d*x]))*f)/E^ArcCoth[c + d*x])] - 6*c*f^2*ArcCoth[c + d*x]^2*Log[-((d*e*(-1 + E^(2*ArcCoth[c + d*x]) ) + (1 + c + E^(2*ArcCoth[c + d*x]) - c*E^(2*ArcCoth[c + d*x]))*f)/E^ArcCot h[c + d*x])] + 6*d*e*f*ArcCoth[c + d*x]^2*Log[1 - (E^ArcCoth[c + d*x]*Sqrt[ d*e + f - c*f])/Sqrt[d*e - (1 + c)*f]] + 6*f^2*ArcCoth[c + d*x]^2*Log[1 - ( E^ArcCoth[c + d*x]*Sqrt[d*e + f - c*f])/Sqrt[d*e - (1 + c)*f]] - 6*c*f^2*Ar cCoth[c + d*x]^2*Log[1 - (E^ArcCoth[c + d*x]*Sqrt[d*e + f - c*f])/Sqrt[d*e - (1 + c)*f]] + 6*d*e*f*ArcCoth[c + d*x]^2*Log[1 + (E^ArcCoth[c + d*x]*Sqrt [d*e + f - c*f])/Sqrt[d*e - (1 + c)*f]] + 6*f^2*ArcCoth[c + d*x]^2*Log[1 + (E^ArcCoth[c + d*x]*Sqrt[d*e + f - c*f])/Sqrt[d*e - (1 + c)*f]] - 6*c*f^2*A rcCoth[c + d*x]^2*Log[1 + (E^ArcCoth[c + d*x]*Sqrt[d*e + f - c*f])/Sqrt[d*e - (1 + c)*f]] + (6*I)*d*e*f*Pi*ArcCoth[c + d*x]*Log[1/Sqrt[1 - (c + d*x)^( -2)]] + (6*I)*f^2*Pi*ArcCoth[c + d*x]*Log[1/Sqrt[1 - (c + d*x)^(-2)]] - (6* I)*c*f^2*Pi*ArcCoth[c + d*x]*Log[1/Sqrt[1 - (c + d*x)^(-2)]] - 6*d*e*f*ArcC oth[c + d*x]^2*Log[-(f/Sqrt[1 - (c + d*x)^(-2)]) - (d*e)/((c + d*x)*Sqrt[1 - (c + d*x)^(-2)]) + (c*f)/((c + d*x)*Sqrt[1 - (c + d*x)^(-2)])] - 6*f^2*Ar cCoth[c + d*x]^2*Log[-(f/Sqrt[1 - (c + d*x)^(-2)]) - (d*e)/((c + d*x)*Sqrt[ 1 - (c + d*x)^(-2)]) + (c*f)/((c + d*x)*Sqrt[1 - (c + d*x)^(-2)])] + 6*c*f^ 2*ArcCoth[c + d*x]^2*Log[-(f/Sqrt[1 - (c + d*x)^(-2)]) - (d*e)/((c + d*x)*S qrt[1 - (c + d*x)^(-2)]) + (c*f)/((c + d*x)*Sqrt[1 - (c + d*x)^(-2)])] - 12 *d*e*f*ArcCoth[c + d*x]*ArcTanh[f/(d*e - c*f)]*Log[I*Sinh[ArcCoth[c + d*x] + ArcTanh[f/(d*e - c*f)]]] - 12*f^2*ArcCoth[c + d*x]*ArcTanh[f/(d*e - c*f)] *Log[I*Sinh[ArcCoth[c + d*x] + ArcTanh[f/(d*e - c*f)]]] + 12*c*f^2*ArcCoth[ c + d*x]*ArcTanh[f/(d*e - c*f)]*Log[I*Sinh[ArcCoth[c + d*x] + ArcTanh[f/(d* e - c*f)]]] + 6*f*(-(d*e*(-1 + E^(2*ArcTanh[f/(d*e - c*f)]))) + (1 + E^(2*A rcTanh[f/(d*e - c*f)]) + c*(-1 + E^(2*ArcTanh[f/(d*e - c*f)])))*f)*ArcCoth[ c + d*x]*PolyLog[2, E^(2*(ArcCoth[c + d*x] + ArcTanh[f/(d*e - c*f)]))] + 12 *f*(d*e + f - c*f)*ArcCoth[c + d*x]*PolyLog[2, -((E^ArcCoth[c + d*x]*Sqrt[d *e + f - c*f])/Sqrt[d*e - (1 + c)*f])] + 12*d*e*f*ArcCoth[c + d*x]*PolyLog[ 2, (E^ArcCoth[c + d*x]*Sqrt[d*e + f - c*f])/Sqrt[d*e - (1 + c)*f]] + 12*f^2 *ArcCoth[c + d*x]*PolyLog[2, (E^ArcCoth[c + d*x]*Sqrt[d*e + f - c*f])/Sqrt[ d*e - (1 + c)*f]] - 12*c*f^2*ArcCoth[c + d*x]*PolyLog[2, (E^ArcCoth[c + d*x ]*Sqrt[d*e + f - c*f])/Sqrt[d*e - (1 + c)*f]] - 3*d*e*f*PolyLog[3, E^(2*(Ar cCoth[c + d*x] + ArcTanh[f/(d*e - c*f)]))] + 3*d*e*E^(2*ArcTanh[f/(d*e - c* f)])*f*PolyLog[3, E^(2*(ArcCoth[c + d*x] + ArcTanh[f/(d*e - c*f)]))] - 3*f^ 2*PolyLog[3, E^(2*(ArcCoth[c + d*x] + ArcTanh[f/(d*e - c*f)]))] + 3*c*f^2*P olyLog[3, E^(2*(ArcCoth[c + d*x] + ArcTanh[f/(d*e - c*f)]))] - 3*E^(2*ArcTa nh[f/(d*e - c*f)])*f^2*PolyLog[3, E^(2*(ArcCoth[c + d*x] + ArcTanh[f/(d*e - c*f)]))] - 3*c*E^(2*ArcTanh[f/(d*e - c*f)])*f^2*PolyLog[3, E^(2*(ArcCoth[c + d*x] + ArcTanh[f/(d*e - c*f)]))] - 12*d*e*f*PolyLog[3, -((E^ArcCoth[c + d*x]*Sqrt[d*e + f - c*f])/Sqrt[d*e - (1 + c)*f])] - 12*f^2*PolyLog[3, -((E^ ArcCoth[c + d*x]*Sqrt[d*e + f - c*f])/Sqrt[d*e - (1 + c)*f])] + 12*c*f^2*Po lyLog[3, -((E^ArcCoth[c + d*x]*Sqrt[d*e + f - c*f])/Sqrt[d*e - (1 + c)*f])] - 12*d*e*f*PolyLog[3, (E^ArcCoth[c + d*x]*Sqrt[d*e + f - c*f])/Sqrt[d*e - (1 + c)*f]] - 12*f^2*PolyLog[3, (E^ArcCoth[c + d*x]*Sqrt[d*e + f - c*f])/Sq rt[d*e - (1 + c)*f]] + 12*c*f^2*PolyLog[3, (E^ArcCoth[c + d*x]*Sqrt[d*e + f - c*f])/Sqrt[d*e - (1 + c)*f]]))/(6*f^2*(d*e + f - c*f)^2*(d*e - (1 + c)*f ))))/(d*(c + d*x)^2*(e + f*x)*(1 - (c + d*x)^(-2)))

**fricas [F]** time = 0.49, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{b^2\,\text{arcoth}\,(dx+c)^2+2\,ab\,\text{arcoth}\,(dx+c)+a^2}{fx+e},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccoth(d*x+c))^2/(f*x+e),x, algorithm="fricas")
```

```
[Out] integral((b^2*arccoth(d*x + c)^2 + 2*a*b*arccoth(d*x + c) + a^2)/(f*x + e),
 x)
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int\frac{(b\,\text{arcoth}\,(dx+c)+a)^2}{fx+e}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccoth(d*x+c))^2/(f*x+e),x, algorithm="giac")
```

```
[Out] integrate((b*arccoth(d*x + c) + a)^2/(f*x + e), x)
```

**maple [C]** time = 1.50, size = 1845, normalized size = 8.62

result too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a+b*arccoth(d*x+c))^2/(f*x+e),x)
```

```
[Out] -1/2*b^2*c/(c*f-d*e-f)*polylog(3,(c*f-d*e-f)*(d*x+c+1)/(d*x+c-1)/(c*f-d*e+f
))+b^2*ln((d*x+c)*f-c*f+d*e)/f*arccoth(d*x+c)^2-b^2/f*arccoth(d*x+c)^2*ln(1
+1/((d*x+c-1)/(d*x+c+1))^(1/2))-2*b^2/f*arccoth(d*x+c)*polylog(2,-1/((d*x+c
-1)/(d*x+c+1))^(1/2))-b^2/f*arccoth(d*x+c)^2*ln(1-1/((d*x+c-1)/(d*x+c+1))^(
1/2))-2*b^2/f*arccoth(d*x+c)*polylog(2,1/((d*x+c-1)/(d*x+c+1))^(1/2))+b^2/f
*arccoth(d*x+c)^2*ln((d*x+c+1)/(d*x+c-1)-1)-b^2/(c*f-d*e-f)*arccoth(d*x+c)^
2*ln(1-(c*f-d*e-f)*(d*x+c+1)/(d*x+c-1)/(c*f-d*e+f))-b^2/(c*f-d*e-f)*arccoth
(d*x+c)*polylog(2,(c*f-d*e-f)*(d*x+c+1)/(d*x+c-1)/(c*f-d*e+f))-b^2/f*arccot
h(d*x+c)^2*ln(((d*x+c+1)/(d*x+c-1)-1)*c*f+(1-(d*x+c+1)/(d*x+c-1))*e*d+(-(d*
x+c+1)/(d*x+c-1)-1)*f)-a*b/f*dilog(((d*x+c)*f+f)/(c*f-d*e+f))+a*b/f*dilog((
(d*x+c)*f-f)/(c*f-d*e-f))+2*b^2/f*polylog(3,-1/((d*x+c-1)/(d*x+c+1))^(1/2))
+1/2*b^2/(c*f-d*e-f)*polylog(3,(c*f-d*e-f)*(d*x+c+1)/(d*x+c-1)/(c*f-d*e+f))
+a^2*ln((d*x+c)*f-c*f+d*e)/f+2*b^2/f*polylog(3,1/((d*x+c-1)/(d*x+c+1))^(1/2
))+1/2*I*b^2/f*Pi*arccoth(d*x+c)^2*csgn(I/((d*x+c+1)/(d*x+c-1)-1))*csgn(I*(
((d*x+c+1)/(d*x+c-1)-1)*c*f+(1-(d*x+c+1)/(d*x+c-1))*e*d+(-(d*x+c+1)/(d*x+c-
1)-1)*f))*csgn(I*(((d*x+c+1)/(d*x+c-1)-1)*c*f+(1-(d*x+c+1)/(d*x+c-1))*e*d+(
-(d*x+c+1)/(d*x+c-1)-1)*f)/((d*x+c+1)/(d*x+c-1)-1))-a*b/f*ln((d*x+c)*f-c*f+
d*e)*ln(((d*x+c)*f+f)/(c*f-d*e+f))+a*b/f*ln((d*x+c)*f-c*f+d*e)*ln(((d*x+c)*
f-f)/(c*f-d*e-f))+b^2*c/(c*f-d*e-f)*arccoth(d*x+c)^2*ln(1-(c*f-d*e-f)*(d*x+
c+1)/(d*x+c-1)/(c*f-d*e+f))+b^2*c/(c*f-d*e-f)*arccoth(d*x+c)*polylog(2,(c*f
-d*e-f)*(d*x+c+1)/(d*x+c-1)/(c*f-d*e+f))+2*a*b*ln((d*x+c)*f-c*f+d*e)/f*arcc
oth(d*x+c)-I*b^2/f*Pi*arccoth(d*x+c)^2+I*b^2/f*Pi*arccoth(d*x+c)^2*csgn(I*(
((d*x+c+1)/(d*x+c-1)-1)*c*f+(1-(d*x+c+1)/(d*x+c-1))*e*d+(-(d*x+c+1)/(d*x+c-
1)-1)*f)/((d*x+c+1)/(d*x+c-1)-1))^2+1/2*d*b^2/f*e/(c*f-d*e-f)*polylog(3,(c*
f-d*e-f)*(d*x+c+1)/(d*x+c-1)/(c*f-d*e+f))-1/2*I*b^2/f*Pi*arccoth(d*x+c)^2*c
sgn(I*(((d*x+c+1)/(d*x+c-1)-1)*c*f+(1-(d*x+c+1)/(d*x+c-1))*e*d+(-(d*x+c+1)/
(d*x+c-1)-1)*f)/((d*x+c+1)/(d*x+c-1)-1))^3-d*b^2/f*e/(c*f-d*e-f)*arccoth(d*
x+c)^2*ln(1-(c*f-d*e-f)*(d*x+c+1)/(d*x+c-1)/(c*f-d*e+f))-d*b^2/f*e/(c*f-d*e
-f)*arccoth(d*x+c)*polylog(2,(c*f-d*e-f)*(d*x+c+1)/(d*x+c-1)/(c*f-d*e+f))-1
/2*I*b^2/f*Pi*arccoth(d*x+c)^2*csgn(I/((d*x+c+1)/(d*x+c-1)-1))*csgn(I*(((d*
```

```
x+c+1)/(d*x+c-1)-1)*c*f+(1-(d*x+c+1)/(d*x+c-1))*e*d+(-(d*x+c+1)/(d*x+c-1)-1
)*f)/((d*x+c+1)/(d*x+c-1)-1))^2-1/2*I*b^2/f*Pi*arccoth(d*x+c)^2*csgn(I*(((d
*x+c+1)/(d*x+c-1)-1)*c*f+(1-(d*x+c+1)/(d*x+c-1))*e*d+(-(d*x+c+1)/(d*x+c-1)-
1)*f))*csgn(I*(((d*x+c+1)/(d*x+c-1)-1)*c*f+(1-(d*x+c+1)/(d*x+c-1))*e*d+(-(d
*x+c+1)/(d*x+c-1)-1)*f)/((d*x+c+1)/(d*x+c-1)-1))^2
```

**maxima [F]** time = 0.00, size = 0, normalized size = 0.00

$$\frac{a^2\log\left(fx+e\right)}{f}+\int\frac{b^2\left(\log\left(\frac{1}{dx+c}+1\right)-\log\left(-\frac{1}{dx+c}+1\right)\right)^2}{4\left(fx+e\right)}+\frac{ab\left(\log\left(\frac{1}{dx+c}+1\right)-\log\left(-\frac{1}{dx+c}+1\right)\right)}{fx+e}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccoth(d*x+c))^2/(f*x+e),x, algorithm="maxima")
```

```
[Out] a^2*log(f*x + e)/f + integrate(1/4*b^2*(log(1/(d*x + c) + 1) - log(-1/(d*x
+ c) + 1))^2/(f*x + e) + a*b*(log(1/(d*x + c) + 1) - log(-1/(d*x + c) + 1))
/(f*x + e), x)
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.00

$$\int\frac{\left(a+b\,\mathrm{acoth}\left(c+d\,x\right)\right)^2}{e+f\,x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a + b*acoth(c + d*x))^2/(e + f*x),x)
```

```
[Out] int((a + b*acoth(c + d*x))^2/(e + f*x), x)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int\frac{\left(a+b\operatorname{acoth}\left(c+dx\right)\right)^2}{e+fx}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*acoth(d*x+c))**2/(f*x+e),x)
```

```
[Out] Integral((a + b*acoth(c + d*x))**2/(e + f*x), x)
```

# 3.113 $\int \frac{\left(a+b\coth^{-1}(c+dx)\right)^2}{(e+fx)^2}\,dx$

**Optimal**. Leaf size=480

$$\frac{2abd\log(e+fx)}{f^2-(de-cf)^2}-\frac{abd\log(-c-dx+1)}{f(-cf+de+f)}+\frac{abd\log(c+dx+1)}{f(-cf+de-f)}-\frac{\left(a+b\coth^{-1}(c+dx)\right)^2}{f(e+fx)}+\frac{b^2d\mathrm{Li}_2\left(-\frac{c+dx+1}{-c-dx+1}\right)}{2f(-cf+de+f)}+\frac{b^2d\mathrm{l}}{2f}$$

```
[Out] -(a+b*arccoth(d*x+c))^2/f/(f*x+e)+b^2*d*arccoth(d*x+c)*ln(2/(-d*x-c+1))/f/(
-c*f+d*e+f)-a*b*d*ln(-d*x-c+1)/f/(-c*f+d*e+f)-b^2*d*arccoth(d*x+c)*ln(2/(d*
x+c+1))/f/(-c*f+d*e-f)+2*b^2*d*arccoth(d*x+c)*ln(2/(d*x+c+1))/(-c*f+d*e-f)/
(-c*f+d*e+f)+a*b*d*ln(d*x+c+1)/f/(-c*f+d*e-f)+2*a*b*d*ln(f*x+e)/(f^2-(-c*f+
d*e)^2)-2*b^2*d*arccoth(d*x+c)*ln(2*d*(f*x+e)/(-c*f+d*e+f)/(d*x+c+1))/(-c*f
+d*e-f)/(-c*f+d*e+f)+1/2*b^2*d*polylog(2,(-d*x-c-1)/(-d*x-c+1))/f/(-c*f+d*e
+f)+1/2*b^2*d*polylog(2,1-2/(d*x+c+1))/f/(-c*f+d*e-f)-b^2*d*polylog(2,1-2/(
d*x+c+1))/(-c*f+d*e-f)/(-c*f+d*e+f)+b^2*d*polylog(2,1-2*d*(f*x+e)/(-c*f+d*e
+f)/(d*x+c+1))/(-c*f+d*e-f)/(-c*f+d*e+f)
```

**Rubi [A]** time = 1.74, antiderivative size = 485, normalized size of antiderivative = 1.01, number of steps used = 21, number of rules used = 19, integrand size = 20, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.950, Rules used = {6110, 1982, 705, 31, 632, 6741, 6122, 706, 633, 6688, 12, 6725, 72, 6742, 5919, 2402, 2315, 5921, 2447}

$$\frac{b^2d\text{PolyLog}\left(2,-\frac{c+dx+1}{-c-dx+1}\right)}{2f(-cf+de+f)}+\frac{b^2d\text{PolyLog}\left(2,1-\frac{2}{c+dx+1}\right)}{2f(-cf+de-f)}-\frac{b^2d\text{PolyLog}\left(2,1-\frac{2}{c+dx+1}\right)}{(-cf+de+f)(de-(c+1)f)}+\frac{b^2d\text{PolyLog}\left(2,1-\frac{}{(c+d}\right)}{(-cf+de+f)(de-}$$

Antiderivative was successfully verified.

```
[In] Int[(a + b*ArcCoth[c + d*x])^2/(e + f*x)^2,x]
```

```
[Out] -((a + b*ArcCoth[c + d*x])^2/(f*(e + f*x))) + (b^2*d*ArcCoth[c + d*x]*Log[2
/(1 - c - d*x)])/(f*(d*e + f - c*f)) - (a*b*d*Log[1 - c - d*x])/(f*(d*e + f
 - c*f)) - (b^2*d*ArcCoth[c + d*x]*Log[2/(1 + c + d*x)])/(f*(d*e - f - c*f)
) + (2*b^2*d*ArcCoth[c + d*x]*Log[2/(1 + c + d*x)])/((d*e + f - c*f)*(d*e -
 (1 + c)*f)) + (a*b*d*Log[1 + c + d*x])/(f*(d*e - f - c*f)) - (2*a*b*d*Log[
e + f*x])/((d*e + f - c*f)*(d*e - (1 + c)*f)) - (2*b^2*d*ArcCoth[c + d*x]*L
og[(2*d*(e + f*x))/((d*e + f - c*f)*(1 + c + d*x))])/((d*e + f - c*f)*(d*e
- (1 + c)*f)) + (b^2*d*PolyLog[2, -((1 + c + d*x)/(1 - c - d*x))])/(2*f*(d*
e + f - c*f)) + (b^2*d*PolyLog[2, 1 - 2/(1 + c + d*x)])/(2*f*(d*e - f - c*f
)) - (b^2*d*PolyLog[2, 1 - 2/(1 + c + d*x)])/((d*e + f - c*f)*(d*e - (1 + c
)*f)) + (b^2*d*PolyLog[2, 1 - (2*d*(e + f*x))/((d*e + f - c*f)*(1 + c + d*x
))])/((d*e + f - c*f)*(d*e - (1 + c)*f))
```

Rule 12

```
Int[(a_)*(u_), x_Symbol] :> Dist[a, Int[u, x], x] /; FreeQ[a, x] &&  !Match
Q[u, (b_)*(v_) /; FreeQ[b, x]]
```

Rule 31

```
Int[((a_) + (b_.)*(x_))^(-1), x_Symbol] :> Simp[Log[RemoveContent[a + b*x,
x]]/b, x] /; FreeQ[{a, b}, x]
```

Rule 72

```
Int[((e_.) + (f_.)*(x_))^(p_.)/(((a_.) + (b_.)*(x_))*((c_.) + (d_.)*(x_))),
 x_Symbol] :> Int[ExpandIntegrand[(e + f*x)^p/((a + b*x)*(c + d*x)), x], x]
 /; FreeQ[{a, b, c, d, e, f}, x] && IntegerQ[p]
```

Rule 632

```
Int[((d_.) + (e_.)*(x_))/((a_) + (b_.)*(x_) + (c_.)*(x_)^2), x_Symbol] :> W
ith[{q = Rt[b^2 - 4*a*c, 2]}, Dist[(c*d - e*(b/2 - q/2))/q, Int[1/(b/2 - q/
2 + c*x), x], x] - Dist[(c*d - e*(b/2 + q/2))/q, Int[1/(b/2 + q/2 + c*x), x
], x]] /; FreeQ[{a, b, c, d, e}, x] && NeQ[2*c*d - b*e, 0] && NeQ[b^2 - 4*a
*c, 0] && NiceSqrtQ[b^2 - 4*a*c]
```

Rule 633

```
Int[((d_) + (e_.)*(x_))/((a_) + (c_.)*(x_)^2), x_Symbol] :> With[{q = Rt[-(
a*c), 2]}, Dist[e/2 + (c*d)/(2*q), Int[1/(-q + c*x), x], x] + Dist[e/2 - (c
*d)/(2*q), Int[1/(q + c*x), x], x]] /; FreeQ[{a, c, d, e}, x] && NiceSqrtQ[
-(a*c)]
```

Rule 705

```
Int[1/(((d_.) + (e_.)*(x_))*((a_.) + (b_.)*(x_) + (c_.)*(x_)^2)), x_Symbol]
 :> Dist[e^2/(c*d^2 - b*d*e + a*e^2), Int[1/(d + e*x), x], x] + Dist[1/(c*d
^2 - b*d*e + a*e^2), Int[(c*d - b*e - c*e*x)/(a + b*x + c*x^2), x], x] /; F
reeQ[{a, b, c, d, e}, x] && NeQ[b^2 - 4*a*c, 0] && NeQ[c*d^2 - b*d*e + a*e^
2, 0] && NeQ[2*c*d - b*e, 0]
```

Rule 706

```
Int[1/(((d_) + (e_.)*(x_))*((a_) + (c_.)*(x_)^2)), x_Symbol] :> Dist[e^2/(c
*d^2 + a*e^2), Int[1/(d + e*x), x], x] + Dist[1/(c*d^2 + a*e^2), Int[(c*d -
 c*e*x)/(a + c*x^2), x], x] /; FreeQ[{a, c, d, e}, x] && NeQ[c*d^2 + a*e^2,
 0]
```

Rule 1982

```
Int[(u_)^(m_.)*(v_)^(p_.), x_Symbol] :> Int[ExpandToSum[u, x]^m*ExpandToSum
[v, x]^p, x] /; FreeQ[{m, p}, x] && LinearQ[u, x] && QuadraticQ[v, x] &&  !
(LinearMatchQ[u, x] && QuadraticMatchQ[v, x])
```

Rule 2315

```
Int[Log[(c_.)*(x_)]/((d_) + (e_.)*(x_)), x_Symbol] :> -Simp[PolyLog[2, 1 -
c*x]/e, x] /; FreeQ[{c, d, e}, x] && EqQ[e + c*d, 0]
```

Rule 2402

```
Int[Log[(c_.)/((d_) + (e_.)*(x_))]/((f_) + (g_.)*(x_)^2), x_Symbol] :> -Dis
t[e/g, Subst[Int[Log[2*d*x]/(1 - 2*d*x), x], x, 1/(d + e*x)], x] /; FreeQ[{
c, d, e, f, g}, x] && EqQ[c, 2*d] && EqQ[e^2*f + d^2*g, 0]
```

Rule 2447

```
Int[Log[u_]*(Pq_)^(m_.), x_Symbol] :> With[{C = FullSimplify[(Pq^m*(1 - u))
/D[u, x]]}, Simp[C*PolyLog[2, 1 - u], x] /; FreeQ[C, x]] /; IntegerQ[m] &&
PolyQ[Pq, x] && RationalFunctionQ[u, x] && LeQ[RationalFunctionExponents[u,
 x][[2]], Expon[Pq, x]]
```

Rule 5919

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)/((d_) + (e_.)*(x_)), x_Symbol
] :> -Simp[((a + b*ArcCoth[c*x])^p*Log[2/(1 + (e*x)/d)])/e, x] + Dist[(b*c*
p)/e, Int[((a + b*ArcCoth[c*x])^(p - 1)*Log[2/(1 + (e*x)/d)])/(1 - c^2*x^2)
, x], x] /; FreeQ[{a, b, c, d, e}, x] && IGtQ[p, 0] && EqQ[c^2*d^2 - e^2, 0
```

]

Rule 5921

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))/((d_) + (e_.)*(x_)), x_Symbol] :> -
Simp[((a + b*ArcCoth[c*x])*Log[2/(1 + c*x)])/e, x] + (Dist[(b*c)/e, Int[Log
[2/(1 + c*x)]/(1 - c^2*x^2), x], x] - Dist[(b*c)/e, Int[Log[(2*c*(d + e*x))
/((c*d + e)*(1 + c*x))]/(1 - c^2*x^2), x], x] + Simp[((a + b*ArcCoth[c*x])*
Log[(2*c*(d + e*x))/((c*d + e)*(1 + c*x))])/e, x]) /; FreeQ[{a, b, c, d, e}
, x] && NeQ[c^2*d^2 - e^2, 0]
```

Rule 6110

```
Int[((a_.) + ArcCoth[(c_) + (d_.)*(x_)]*(b_.))^(p_.)*((e_.) + (f_.)*(x_))^(
m_), x_Symbol] :> Simp[((e + f*x)^(m + 1)*(a + b*ArcCoth[c + d*x])^p)/(f*(m
 + 1)), x] - Dist[(b*d*p)/(f*(m + 1)), Int[((e + f*x)^(m + 1)*(a + b*ArcCot
h[c + d*x])^(p - 1))/(1 - (c + d*x)^2), x], x] /; FreeQ[{a, b, c, d, e, f},
 x] && IGtQ[p, 0] && ILtQ[m, -1]
```

Rule 6122

```
Int[((a_.) + ArcCoth[(c_) + (d_.)*(x_)]*(b_.))^(p_.)*((e_.) + (f_.)*(x_))^(
m_.)*((A_.) + (B_.)*(x_) + (C_.)*(x_)^2)^(q_.), x_Symbol] :> Dist[1/d, Subs
t[Int[((d*e - c*f)/d + (f*x)/d)^m*(-(C/d^2) + (C*x^2)/d^2)^q*(a + b*ArcCoth
[x])^p, x], x, c + d*x], x] /; FreeQ[{a, b, c, d, e, f, A, B, C, m, p, q},
x] && EqQ[B*(1 - c^2) + 2*A*c*d, 0] && EqQ[2*c*C - B*d, 0]
```

Rule 6688

```
Int[u_, x_Symbol] :> With[{v = SimplifyIntegrand[u, x]}, Int[v, x] /; Simpl
erIntegrandQ[v, u, x]]
```

Rule 6725

```
Int[(u_)/((a_) + (b_.)*(x_)^(n_)), x_Symbol] :> With[{v = RationalFunctionE
xpand[u/(a + b*x^n), x]}, Int[v, x] /; SumQ[v]] /; FreeQ[{a, b}, x] && IGtQ
[n, 0]
```

Rule 6741

```
Int[u_, x_Symbol] :> With[{v = NormalizeIntegrand[u, x]}, Int[v, x] /; v =!
= u]
```

Rule 6742

```
Int[u_, x_Symbol] :> With[{v = ExpandIntegrand[u, x]}, Int[v, x] /; SumQ[v]
]
```

Rubi steps

$$
\begin{aligned}
\int \frac{\left(a+b\coth^{-1}(c+dx)\right)^2}{(e+fx)^2}\,dx &= -\frac{\left(a+b\coth^{-1}(c+dx)\right)^2}{f(e+fx)}+\frac{(2bd)\int \frac{a+b\coth^{-1}(c+dx)}{(e+fx)\left(1-(c+dx)^2\right)}\,dx}{f}\\
&= -\frac{\left(a+b\coth^{-1}(c+dx)\right)^2}{f(e+fx)}+\frac{(2bd)\int \frac{a+b\coth^{-1}(c+dx)}{(e+fx)\left(1-c^2-2cdx-d^2x^2\right)}\,dx}{f}\\
&= -\frac{\left(a+b\coth^{-1}(c+dx)\right)^2}{f(e+fx)}+\frac{(2b)\operatorname{Subst}\left(\int \frac{a+b\coth^{-1}(x)}{\left(\frac{de-cf}{d}+\frac{fx}{d}\right)(1-x^2)}\,dx,x,c+dx\right)}{f}\\
&= -\frac{\left(a+b\coth^{-1}(c+dx)\right)^2}{f(e+fx)}+\frac{(2b)\operatorname{Subst}\left(\int \frac{d\left(a+b\coth^{-1}(x)\right)}{(de-cf+fx)(1-x^2)}\,dx,x,c+dx\right)}{f}\\
&= -\frac{\left(a+b\coth^{-1}(c+dx)\right)^2}{f(e+fx)}+\frac{(2bd)\operatorname{Subst}\left(\int \frac{a+b\coth^{-1}(x)}{(de-cf+fx)(1-x^2)}\,dx,x,c+dx\right)}{f}\\
&= -\frac{\left(a+b\coth^{-1}(c+dx)\right)^2}{f(e+fx)}+\frac{(2bd)\operatorname{Subst}\left(\int\left(-\frac{a}{(-1+x)(1+x)(de-cf+fx)}-\frac{b\coth\cdots}{(-1+x)(1+x\cdots}\right.\right.}{f}\\
&= -\frac{\left(a+b\coth^{-1}(c+dx)\right)^2}{f(e+fx)}-\frac{(2abd)\operatorname{Subst}\left(\int \frac{1}{(-1+x)(1+x)(de-cf+fx)}\,dx,x,c+dx\right)\cdots}{f}\\
&= -\frac{\left(a+b\coth^{-1}(c+dx)\right)^2}{f(e+fx)}-\frac{(2abd)\operatorname{Subst}\left(\int\left(\frac{1}{2(de+f-cf)(-1+x)}+\frac{1}{2(-de+(1+c)f)(1+\cdots}\right.\right.}{f}\\
&= -\frac{\left(a+b\coth^{-1}(c+dx)\right)^2}{f(e+fx)}-\frac{abd\log(1-c-dx)}{f(de+f-cf)}+\frac{abd\log(1+c+dx)}{f(de-f-cf)}-\frac{\cdots}{(de\cdots}\\
&= -\frac{\left(a+b\coth^{-1}(c+dx)\right)^2}{f(e+fx)}+\frac{b^2d\coth^{-1}(c+dx)\log\left(\frac{2}{1-c-dx}\right)}{f(de+f-cf)}-\frac{abd\log(1-c-\cdots}{f(de+f-c\cdots}\\
&= -\frac{\left(a+b\coth^{-1}(c+dx)\right)^2}{f(e+fx)}+\frac{b^2d\coth^{-1}(c+dx)\log\left(\frac{2}{1-c-dx}\right)}{f(de+f-cf)}-\frac{abd\log(1-c-\cdots}{f(de+f-c\cdots}\\
&= -\frac{\left(a+b\coth^{-1}(c+dx)\right)^2}{f(e+fx)}+\frac{b^2d\coth^{-1}(c+dx)\log\left(\frac{2}{1-c-dx}\right)}{f(de+f-cf)}-\frac{abd\log(1-c-\cdots}{f(de+f-c\cdots}
\end{aligned}
$$

**Mathematica** [C] time = 8.90, size = 470, normalized size = 0.98

$$
\frac{-\frac{a^2}{f}+\frac{2ab\left(\coth^{-1}(c+dx)\left(c^2(-f)+cd(e-fx)+d^2ex+f\right)-d(e+fx)\log\left(-\frac{d(e+fx)}{(c+dx)\sqrt{1-\frac{1}{(c+dx)^2}}}\right)\right)}{(-cf+de+f)(de-(c+1)f)}+\frac{b^2d\left(1-(c+dx)^2\right)(e+fx)\left(\frac{f\left(-\mathrm{Li}_2\left(\exp\left(-2\left(\coth^{-1}(c+dx)+\cdots\right.\right.\right.\right.}{\cdots}\right.}{\cdots}}{\cdots}
$$

Warning: Unable to verify antiderivative.

```
[In] Integrate[(a + b*ArcCoth[c + d*x])^2/(e + f*x)^2,x]
```

```
[Out] (-(a^2/f) + (2*a*b*((f - c^2*f + d^2*e*x + c*d*(e - f*x))*ArcCoth[c + d*x]
- d*(e + f*x)*Log[-((d*(e + f*x))/((c + d*x)*Sqrt[1 - (c + d*x)^(-2)]))]))/
((d*e + f - c*f)*(d*e - (1 + c)*f)) + (b^2*d*(e + f*x)*(1 - (c + d*x)^2)*((
E^ArcTanh[f/(-(d*e) + c*f)]*ArcCoth[c + d*x]^2)/((-(d*e) + c*f)*Sqrt[1 - f^
2/(d*e - c*f)^2]) + ArcCoth[c + d*x]^2/(d*e + d*f*x) + (f*((-I)*Pi*Log[1 +
E^(2*ArcCoth[c + d*x])] - 2*ArcTanh[f/(-(d*e) + c*f)]*Log[1 - E^(-2*(ArcCot
h[c + d*x] + ArcTanh[f/(d*e - c*f)]))] + ArcCoth[c + d*x]*(I*Pi + 2*ArcTanh
[f/(d*e - c*f)] + 2*Log[1 - E^(-2*(ArcCoth[c + d*x] + ArcTanh[f/(d*e - c*f)
]))]) + I*Pi*Log[1/Sqrt[1 - (c + d*x)^(-2)]] + 2*ArcTanh[f/(-(d*e) + c*f)]*
Log[I*Sinh[ArcCoth[c + d*x] + ArcTanh[f/(d*e - c*f)]]] - PolyLog[2, E^(-2*(
ArcCoth[c + d*x] + ArcTanh[f/(d*e - c*f)]))]))/(d^2*e^2 - 2*c*d*e*f + (-1 +
 c^2)*f^2)))/((c + d*x)^2*(f - f/(c + d*x)^2)))/(e + f*x)
```

**fricas [F]** time = 0.53, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{b^2\operatorname{arcoth}(dx+c)^2+2\,ab\operatorname{arcoth}(dx+c)+a^2}{f^2x^2+2\,efx+e^2},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccoth(d*x+c))^2/(f*x+e)^2,x, algorithm="fricas")
```

```
[Out] integral((b^2*arccoth(d*x + c)^2 + 2*a*b*arccoth(d*x + c) + a^2)/(f^2*x^2 +
 2*e*f*x + e^2), x)
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int\frac{(b\operatorname{arcoth}(dx+c)+a)^2}{(fx+e)^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccoth(d*x+c))^2/(f*x+e)^2,x, algorithm="giac")
```

```
[Out] integrate((b*arccoth(d*x + c) + a)^2/(f*x + e)^2, x)
```

**maple [A]** time = 0.08, size = 783, normalized size = 1.63

$$-\frac{d\,a^2}{(dfx+de)\,f}-\frac{d\,b^2\operatorname{arccoth}(dx+c)^2}{(dfx+de)\,f}-\frac{2d\,b^2\operatorname{arccoth}(dx+c)\ln\left((dx+c)\,f-cf+de\right)}{(cf-de-f)\,(cf-de+f)}+\frac{2d\,b^2\operatorname{arccoth}(dx+c)\ln}{f\,(2cf-2de-2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a+b*arccoth(d*x+c))^2/(f*x+e)^2,x)
```

```
[Out] -d*a^2/(d*f*x+d*e)/f-d*b^2/(d*f*x+d*e)/f*arccoth(d*x+c)^2-2*d*b^2*arccoth(d
*x+c)/(c*f-d*e-f)/(c*f-d*e+f)*ln((d*x+c)*f-c*f+d*e)+2*d*b^2/f*arccoth(d*x+c
)/(2*c*f-2*d*e-2*f)*ln(d*x+c-1)-2*d*b^2/f*arccoth(d*x+c)/(2*c*f-2*d*e+2*f)*
ln(d*x+c+1)+d*b^2/(c*f-d*e-f)/(c*f-d*e+f)*ln((d*x+c)*f-c*f+d*e)*ln(((d*x+c)
*f+f)/(c*f-d*e+f))+d*b^2/(c*f-d*e-f)/(c*f-d*e+f)*dilog(((d*x+c)*f+f)/(c*f-d
*e+f))-d*b^2/(c*f-d*e-f)/(c*f-d*e+f)*ln((d*x+c)*f-c*f+d*e)*ln(((d*x+c)*f-f)
/(c*f-d*e-f))-d*b^2/(c*f-d*e-f)/(c*f-d*e+f)*dilog(((d*x+c)*f-f)/(c*f-d*e-f)
)+1/4*d*b^2/f/(c*f-d*e-f)*ln(d*x+c-1)^2-1/2*d*b^2/f/(c*f-d*e-f)*dilog(1/2+1
/2*d*x+1/2*c)-1/2*d*b^2/f/(c*f-d*e-f)*ln(d*x+c-1)*ln(1/2+1/2*d*x+1/2*c)+1/4
*d*b^2/f/(c*f-d*e+f)*ln(d*x+c+1)^2+1/2*d*b^2/f/(c*f-d*e+f)*ln(-1/2*d*x-1/2*
c+1/2)*ln(1/2+1/2*d*x+1/2*c)-1/2*d*b^2/f/(c*f-d*e+f)*ln(-1/2*d*x-1/2*c+1/2)
*ln(d*x+c+1)+1/2*d*b^2/f/(c*f-d*e+f)*dilog(1/2+1/2*d*x+1/2*c)-2*d*a*b/(d*f*
x+d*e)/f*arccoth(d*x+c)-2*d*a*b/(c*f-d*e-f)/(c*f-d*e+f)*ln((d*x+c)*f-c*f+d*
e)+2*d*a*b/f/(2*c*f-2*d*e-2*f)*ln(d*x+c-1)-2*d*a*b/f/(2*c*f-2*d*e+2*f)*ln(d
*x+c+1)
```

**maxima [F]** time = 0.00, size = 0, normalized size = 0.00

$$\left(d\left(\frac{\log(dx+c+1)}{def-(c+1)f^2}-\frac{\log(dx+c-1)}{def-(c-1)f^2}-\frac{2\log\left(fx+e\right)}{d^2e^2-2\,cdef+\left(c^2-1\right)f^2}\right)-\frac{2\,\mathrm{arcoth}\,(dx+c)}{f^2x+ef}\right)ab-\frac{1}{4}\,b^2\left(\frac{\log(dx+\cdots}{f^2x+\cdots}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccoth(d*x+c))^2/(f*x+e)^2,x, algorithm="maxima")
```

```
[Out] (d*(log(d*x + c + 1)/(d*e*f - (c + 1)*f^2) - log(d*x + c - 1)/(d*e*f - (c -
 1)*f^2) - 2*log(f*x + e)/(d^2*e^2 - 2*c*d*e*f + (c^2 - 1)*f^2)) - 2*arccot
h(d*x + c)/(f^2*x + e*f))*a*b - 1/4*b^2*(log(d*x + c + 1)^2/(f^2*x + e*f) +
 integrate(-((d*f*x + c*f + f)*log(d*x + c - 1)^2 + 2*(d*f*x + d*e - (d*f*x
 + c*f + f)*log(d*x + c - 1))*log(d*x + c + 1))/(d*f^3*x^3 + c*e^2*f + e^2*
f + (2*d*e*f^2 + c*f^3 + f^3)*x^2 + (d*e^2*f + 2*c*e*f^2 + 2*e*f^2)*x), x))
 - a^2/(f^2*x + e*f)
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.00

$$\int \frac{\left(a+b\,\mathrm{acoth}\left(c+d\,x\right)\right)^2}{\left(e+f\,x\right)^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a + b*acoth(c + d*x))^2/(e + f*x)^2,x)
```

```
[Out] int((a + b*acoth(c + d*x))^2/(e + f*x)^2, x)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\left(a+b\,\mathrm{acoth}\left(c+dx\right)\right)^2}{\left(e+fx\right)^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*acoth(d*x+c))**2/(f*x+e)**2,x)
```

```
[Out] Integral((a + b*acoth(c + d*x))**2/(e + f*x)**2, x)
```

# 3.114 $\int (e+fx)^2 \left(a+b\coth^{-1}(c+dx)\right)^3 \, dx$

**Optimal**. Leaf size=546

$$-\frac{b^2\left(\left(3c^2+1\right)f^2-6cdef+3d^2e^2\right)\text{Li}_2\left(1-\frac{2}{-c-dx+1}\right)\left(a+b\coth^{-1}(c+dx)\right)}{d^3}-\frac{6b^2f(de-cf)\log\left(\frac{2}{-c-dx+1}\right)\left(a+b\,\mathrm{c}\right.}{d^3}$$

```
[Out] a*b^2*f^2*x/d^2+b^3*f^2*(d*x+c)*arccoth(d*x+c)/d^3-1/2*b*f^2*(a+b*arccoth(d
*x+c))^2/d^3+3*b*f*(-c*f+d*e)*(a+b*arccoth(d*x+c))^2/d^3+3*b*f*(-c*f+d*e)*(
d*x+c)*(a+b*arccoth(d*x+c))^2/d^3+1/2*b*f^2*(d*x+c)^2*(a+b*arccoth(d*x+c))^
2/d^3-1/3*(-c*f+d*e)*(d^2*e^2-2*c*d*e*f+(c^2+3)*f^2)*(a+b*arccoth(d*x+c))^3
/d^3/f+1/3*(3*d^2*e^2-6*c*d*e*f+(3*c^2+1)*f^2)*(a+b*arccoth(d*x+c))^3/d^3+1
/3*(f*x+e)^3*(a+b*arccoth(d*x+c))^3/f-6*b^2*f*(-c*f+d*e)*(a+b*arccoth(d*x+c
))*ln(2/(-d*x-c+1))/d^3-b*(3*d^2*e^2-6*c*d*e*f+(3*c^2+1)*f^2)*(a+b*arccoth(
d*x+c))^2*ln(2/(-d*x-c+1))/d^3+1/2*b^3*f^2*ln(1-(d*x+c)^2)/d^3-3*b^3*f*(-c*
f+d*e)*polylog(2,(-d*x-c-1)/(-d*x-c+1))/d^3-b^2*(3*d^2*e^2-6*c*d*e*f+(3*c^2
+1)*f^2)*(a+b*arccoth(d*x+c))*polylog(2,1-2/(-d*x-c+1))/d^3+1/2*b^3*(3*d^2*
e^2-6*c*d*e*f+(3*c^2+1)*f^2)*polylog(3,1-2/(-d*x-c+1))/d^3
```

**Rubi [A]** time = 1.04, antiderivative size = 546, normalized size of antiderivative = 1.00, number of steps used = 21, number of rules used = 14, integrand size = 20, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.700, Rules used = {6112, 5929, 5911, 5985, 5919, 2402, 2315, 5917, 5981, 260, 5949, 6049, 6059, 6610}

$$-\frac{b^2\left(\left(3c^2+1\right)f^2-6cdef+3d^2e^2\right)\text{PolyLog}\left(2,1-\frac{2}{-c-dx+1}\right)\left(a+b\coth^{-1}(c+dx)\right)}{d^3}+\frac{b^3\left(\left(3c^2+1\right)f^2-6cdef+\ldots\right.}{}$$

Antiderivative was successfully verified.

```
[In] Int[(e + f*x)^2*(a + b*ArcCoth[c + d*x])^3,x]
```

```
[Out] (a*b^2*f^2*x)/d^2 + (b^3*f^2*(c + d*x)*ArcCoth[c + d*x])/d^3 - (b*f^2*(a +
b*ArcCoth[c + d*x])^2)/(2*d^3) + (3*b*f*(d*e - c*f)*(a + b*ArcCoth[c + d*x]
)^2)/d^3 + (3*b*f*(d*e - c*f)*(c + d*x)*(a + b*ArcCoth[c + d*x])^2)/d^3 + (
b*f^2*(c + d*x)^2*(a + b*ArcCoth[c + d*x])^2)/(2*d^3) - ((d*e - c*f)*(d^2*e
^2 - 2*c*d*e*f + (3 + c^2)*f^2)*(a + b*ArcCoth[c + d*x])^3)/(3*d^3*f) + ((3
*d^2*e^2 - 6*c*d*e*f + (1 + 3*c^2)*f^2)*(a + b*ArcCoth[c + d*x])^3)/(3*d^3)
 + ((e + f*x)^3*(a + b*ArcCoth[c + d*x])^3)/(3*f) - (6*b^2*f*(d*e - c*f)*(a
 + b*ArcCoth[c + d*x])*Log[2/(1 - c - d*x)])/d^3 - (b*(3*d^2*e^2 - 6*c*d*e*
f + (1 + 3*c^2)*f^2)*(a + b*ArcCoth[c + d*x])^2*Log[2/(1 - c - d*x)])/d^3 +
 (b^3*f^2*Log[1 - (c + d*x)^2])/(2*d^3) - (3*b^3*f*(d*e - c*f)*PolyLog[2, -
((1 + c + d*x)/(1 - c - d*x))])/d^3 - (b^2*(3*d^2*e^2 - 6*c*d*e*f + (1 + 3*
c^2)*f^2)*(a + b*ArcCoth[c + d*x])*PolyLog[2, 1 - 2/(1 - c - d*x)])/d^3 + (
b^3*(3*d^2*e^2 - 6*c*d*e*f + (1 + 3*c^2)*f^2)*PolyLog[3, 1 - 2/(1 - c - d*x
)])/(2*d^3)
```

Rule 260

```
Int[(x_)^(m_.)/((a_) + (b_.)*(x_)^(n_)), x_Symbol] :> Simp[Log[RemoveConten
t[a + b*x^n, x]]/(b*n), x] /; FreeQ[{a, b, m, n}, x] && EqQ[m, n - 1]
```

Rule 2315

```
Int[Log[(c_.)*(x_)]/((d_) + (e_.)*(x_)), x_Symbol] :> -Simp[PolyLog[2, 1 -
c*x]/e, x] /; FreeQ[{c, d, e}, x] && EqQ[e + c*d, 0]
```

Rule 2402

```
Int[Log[(c_.)/((d_) + (e_.)*(x_))]/((f_) + (g_.)*(x_)^2), x_Symbol] :> -Dis
t[e/g, Subst[Int[Log[2*d*x]/(1 - 2*d*x), x], x, 1/(d + e*x)], x] /; FreeQ[{
c, d, e, f, g}, x] && EqQ[c, 2*d] && EqQ[e^2*f + d^2*g, 0]
```

Rule 5911

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.), x_Symbol] :> Simp[x*(a + b*A
rcCoth[c*x])^p, x] - Dist[b*c*p, Int[(x*(a + b*ArcCoth[c*x])^(p - 1))/(1 -
c^2*x^2), x], x] /; FreeQ[{a, b, c}, x] && IGtQ[p, 0]
```

Rule 5917

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)*((d_.)*(x_))^(m_.), x_Symbol]
 :> Simp[((d*x)^(m + 1)*(a + b*ArcCoth[c*x])^p)/(d*(m + 1)), x] - Dist[(b*c
*p)/(d*(m + 1)), Int[((d*x)^(m + 1)*(a + b*ArcCoth[c*x])^(p - 1))/(1 - c^2*
x^2), x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[p, 0] && (EqQ[p, 1] || In
tegerQ[m]) && NeQ[m, -1]
```

Rule 5919

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)/((d_) + (e_.)*(x_)), x_Symbol
] :> -Simp[((a + b*ArcCoth[c*x])^p*Log[2/(1 + (e*x)/d)])/e, x] + Dist[(b*c*
p)/e, Int[((a + b*ArcCoth[c*x])^(p - 1)*Log[2/(1 + (e*x)/d)])/(1 - c^2*x^2)
, x], x] /; FreeQ[{a, b, c, d, e}, x] && IGtQ[p, 0] && EqQ[c^2*d^2 - e^2, 0
]
```

Rule 5929

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_)*((d_) + (e_.)*(x_))^(q_.), x_S
ymbol] :> Simp[((d + e*x)^(q + 1)*(a + b*ArcCoth[c*x])^p)/(e*(q + 1)), x] -
 Dist[(b*c*p)/(e*(q + 1)), Int[ExpandIntegrand[(a + b*ArcCoth[c*x])^(p - 1)
, (d + e*x)^(q + 1)/(1 - c^2*x^2), x], x], x] /; FreeQ[{a, b, c, d, e}, x]
&& IGtQ[p, 1] && IntegerQ[q] && NeQ[q, -1]
```

Rule 5949

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)/((d_) + (e_.)*(x_)^2), x_Symb
ol] :> Simp[(a + b*ArcCoth[c*x])^(p + 1)/(b*c*d*(p + 1)), x] /; FreeQ[{a, b
, c, d, e, p}, x] && EqQ[c^2*d + e, 0] && NeQ[p, -1]
```

Rule 5981

```
Int[(((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)*((f_.)*(x_))^(m_))/((d_) + (
e_.)*(x_)^2), x_Symbol] :> Dist[f^2/e, Int[(f*x)^(m - 2)*(a + b*ArcCoth[c*x
])^p, x], x] - Dist[(d*f^2)/e, Int[((f*x)^(m - 2)*(a + b*ArcCoth[c*x])^p)/(
d + e*x^2), x], x] /; FreeQ[{a, b, c, d, e, f}, x] && GtQ[p, 0] && GtQ[m, 1
]
```

Rule 5985

```
Int[(((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)*(x_))/((d_) + (e_.)*(x_)^2),
 x_Symbol] :> Simp[(a + b*ArcCoth[c*x])^(p + 1)/(b*e*(p + 1)), x] + Dist[1/
(c*d), Int[(a + b*ArcCoth[c*x])^p/(1 - c*x), x], x] /; FreeQ[{a, b, c, d, e
}, x] && EqQ[c^2*d + e, 0] && IGtQ[p, 0]
```

Rule 6049

```
Int[(((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)*((f_) + (g_.)*(x_))^(m_.))/(
(d_) + (e_.)*(x_)^2), x_Symbol] :> Int[ExpandIntegrand[(a + b*ArcCoth[c*x])
```

```
^p/(d + e*x^2), (f + g*x)^m, x], x] /; FreeQ[{a, b, c, d, e, f, g}, x] && I
GtQ[p, 0] && EqQ[c^2*d + e, 0] && IGtQ[m, 0]
```

Rule 6059

```
Int[(Log[u_]*((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.))/((d_) + (e_.)*(x_)^
2), x_Symbol] :> -Simp[((a + b*ArcCoth[c*x])^p*PolyLog[2, 1 - u])/(2*c*d),
x] + Dist[(b*p)/2, Int[((a + b*ArcCoth[c*x])^(p - 1)*PolyLog[2, 1 - u])/(d
+ e*x^2), x], x] /; FreeQ[{a, b, c, d, e}, x] && IGtQ[p, 0] && EqQ[c^2*d +
e, 0] && EqQ[(1 - u)^2 - (1 - 2/(1 - c*x))^2, 0]
```

Rule 6112

```
Int[((a_.) + ArcCoth[(c_) + (d_.)*(x_)]*(b_.))^(p_.)*((e_.) + (f_.)*(x_))^(
m_.), x_Symbol] :> Dist[1/d, Subst[Int[((d*e - c*f)/d + (f*x)/d)^m*(a + b*A
rcCoth[x])^p, x], x, c + d*x], x] /; FreeQ[{a, b, c, d, e, f, m}, x] && IGt
Q[p, 0]
```

Rule 6610

```
Int[(u_)*PolyLog[n_, v_], x_Symbol] :> With[{w = DerivativeDivides[v, u*v,
x]}, Simp[w*PolyLog[n + 1, v], x] /;  !FalseQ[w]] /; FreeQ[n, x]
```

Rubi steps

$$\int (e+fx)^2\left(a+b\coth^{-1}(c+dx)\right)^3\,dx = \frac{\text{Subst}\left(\int\left(\frac{de-cf}{d}+\frac{fx}{d}\right)^2\left(a+b\coth^{-1}(x)\right)^3\,dx,x,c+dx\right)}{d}$$

$$= \frac{(e+fx)^3\left(a+b\coth^{-1}(c+dx)\right)^3}{3f} - \frac{b\,\text{Subst}\left(\int\left(-\frac{3f^2(de-cf)\left(a+b\coth^{-1}\right.}{d^3}\right.\right.}{}$$

$$= \frac{(e+fx)^3\left(a+b\coth^{-1}(c+dx)\right)^3}{3f} - \frac{b\,\text{Subst}\left(\int\frac{\left((de-cf)\left(d^2e^2-2cdef+3f^2\right.\right.}{}\right.}{}$$

$$= \frac{3bf(de-cf)(c+dx)\left(a+b\coth^{-1}(c+dx)\right)^2}{d^3} + \frac{bf^2(c+dx)^2\left(a+b\right.}{2d^3}$$

$$= \frac{3bf(de-cf)\left(a+b\coth^{-1}(c+dx)\right)^2}{d^3} + \frac{3bf(de-cf)(c+dx)\left(a+b\right.}{d^3}$$

$$= \frac{ab^2f^2x}{d^2} - \frac{bf^2\left(a+b\coth^{-1}(c+dx)\right)^2}{2d^3} + \frac{3bf(de-cf)\left(a+b\coth^{-1}\right.}{d^3}$$

$$= \frac{ab^2f^2x}{d^2} + \frac{b^3f^2(c+dx)\coth^{-1}(c+dx)}{d^3} - \frac{bf^2\left(a+b\coth^{-1}(c+dx)\right)^2}{2d^3}$$

$$= \frac{ab^2f^2x}{d^2} + \frac{b^3f^2(c+dx)\coth^{-1}(c+dx)}{d^3} - \frac{bf^2\left(a+b\coth^{-1}(c+dx)\right)^2}{2d^3}$$

$$= \frac{ab^2f^2x}{d^2} + \frac{b^3f^2(c+dx)\coth^{-1}(c+dx)}{d^3} - \frac{bf^2\left(a+b\coth^{-1}(c+dx)\right)^2}{2d^3}$$

**Mathematica [C]** time = 10.60, size = 2594, normalized size = 4.75

Result too large to show

Warning: Unable to verify antiderivative.

```
[In] Integrate[(e + f*x)^2*(a + b*ArcCoth[c + d*x])^3,x]
```

```
[Out] (a^2*(a*d^2*e^2 + 3*b*d*e*f - 2*b*c*f^2)*x)/d^2 + (a^2*f*(2*a*d*e + b*f)*x^
2)/(2*d) + (a^3*f^2*x^3)/3 + a^2*b*x*(3*e^2 + 3*e*f*x + f^2*x^2)*ArcCoth[c
+ d*x] + ((3*a^2*b*d^2*e^2 - 3*a^2*b*c*d^2*e^2 + 3*a^2*b*d*e*f - 6*a^2*b*c*
d*e*f + 3*a^2*b*c^2*d*e*f + a^2*b*f^2 - 3*a^2*b*c*f^2 + 3*a^2*b*c^2*f^2 - a
^2*b*c^3*f^2)*Log[1 - c - d*x])/(2*d^3) + ((3*a^2*b*d^2*e^2 + 3*a^2*b*c*d^2
*e^2 - 3*a^2*b*d*e*f - 6*a^2*b*c*d*e*f - 3*a^2*b*c^2*d*e*f + a^2*b*f^2 + 3*
a^2*b*c*f^2 + 3*a^2*b*c^2*f^2 + a^2*b*c^3*f^2)*Log[1 + c + d*x])/(2*d^3) +
(3*a*b^2*e^2*(1 - (c + d*x)^2)*(ArcCoth[c + d*x]*(ArcCoth[c + d*x] - (c + d
*x)*ArcCoth[c + d*x] + 2*Log[1 - E^(-2*ArcCoth[c + d*x])]) - PolyLog[2, E^(
-2*ArcCoth[c + d*x])]))/(d*(c + d*x)^2*(1 - (c + d*x)^(-2))) - (3*a*b^2*e*f
*(1 - (c + d*x)^2)*(2*c*ArcCoth[c + d*x]^2 + (c + d*x)^2*(1 - (c + d*x)^(-2
))*ArcCoth[c + d*x]^2 - 2*(c + d*x)*ArcCoth[c + d*x]*(-1 + c*ArcCoth[c + d*
x]) + 4*c*ArcCoth[c + d*x]*Log[1 - E^(-2*ArcCoth[c + d*x])] - 2*Log[1/((c +
 d*x)*Sqrt[1 - (c + d*x)^(-2)])] - 2*c*PolyLog[2, E^(-2*ArcCoth[c + d*x])])
```

```
)/(d^2*(c + d*x)^2*(1 - (c + d*x)^(-2))) + (b^3*e^2*(1 - (c + d*x)^2)*((I/8
)*Pi^3 - ArcCoth[c + d*x]^3 - (c + d*x)*ArcCoth[c + d*x]^3 + 3*ArcCoth[c +
d*x]^2*Log[1 - E^(2*ArcCoth[c + d*x])] + 3*ArcCoth[c + d*x]*PolyLog[2, E^(2
*ArcCoth[c + d*x])] - (3*PolyLog[3, E^(2*ArcCoth[c + d*x])])/2))/(d*(c + d*
x)^2*(1 - (c + d*x)^(-2))) - (b^3*e*f*(1 - (c + d*x)^2)*(I*c*Pi^3 - 12*ArcC
oth[c + d*x]^2 + 12*(c + d*x)*ArcCoth[c + d*x]^2 - 8*c*ArcCoth[c + d*x]^3 -
 8*c*(c + d*x)*ArcCoth[c + d*x]^3 + 4*(c + d*x)^2*(1 - (c + d*x)^(-2))*ArcC
oth[c + d*x]^3 - 24*ArcCoth[c + d*x]*Log[1 - E^(-2*ArcCoth[c + d*x])] + 24*
c*ArcCoth[c + d*x]^2*Log[1 - E^(2*ArcCoth[c + d*x])] + 12*PolyLog[2, E^(-2*
ArcCoth[c + d*x])] + 24*c*ArcCoth[c + d*x]*PolyLog[2, E^(2*ArcCoth[c + d*x]
)] - 12*c*PolyLog[3, E^(2*ArcCoth[c + d*x])]))/(4*d^2*(c + d*x)^2*(1 - (c +
 d*x)^(-2))) - (a*b^2*f^2*(c + d*x)*Sqrt[1 - (c + d*x)^(-2)]*(1 - (c + d*x)
^2)*((4*ArcCoth[c + d*x])/((c + d*x)*Sqrt[1 - (c + d*x)^(-2)]) + (3*ArcCoth
[c + d*x]^2)/((c + d*x)*Sqrt[1 - (c + d*x)^(-2)]) - (12*c*ArcCoth[c + d*x]^
2)/((c + d*x)*Sqrt[1 - (c + d*x)^(-2)]) + (9*c^2*ArcCoth[c + d*x]^2)/((c +
d*x)*Sqrt[1 - (c + d*x)^(-2)]) + (-1 + 6*c*ArcCoth[c + d*x] + 3*ArcCoth[c +
 d*x]^2 - 3*c^2*ArcCoth[c + d*x]^2)/Sqrt[1 - (c + d*x)^(-2)] + Cosh[3*ArcCo
th[c + d*x]] - 6*c*ArcCoth[c + d*x]*Cosh[3*ArcCoth[c + d*x]] + ArcCoth[c +
d*x]^2*Cosh[3*ArcCoth[c + d*x]] + 3*c^2*ArcCoth[c + d*x]^2*Cosh[3*ArcCoth[c
 + d*x]] + (6*ArcCoth[c + d*x]*Log[1 - E^(-2*ArcCoth[c + d*x])])/((c + d*x)
*Sqrt[1 - (c + d*x)^(-2)]) + (18*c^2*ArcCoth[c + d*x]*Log[1 - E^(-2*ArcCoth
[c + d*x])])/((c + d*x)*Sqrt[1 - (c + d*x)^(-2)]) - (18*c*Log[1/((c + d*x)*
Sqrt[1 - (c + d*x)^(-2)])])/((c + d*x)*Sqrt[1 - (c + d*x)^(-2)]) + (4*(1 +
3*c^2)*PolyLog[2, E^(-2*ArcCoth[c + d*x])])/((c + d*x)^3*(1 - (c + d*x)^(-2
))^(3/2)) - ArcCoth[c + d*x]^2*Sinh[3*ArcCoth[c + d*x]] - 3*c^2*ArcCoth[c +
 d*x]^2*Sinh[3*ArcCoth[c + d*x]] - 2*ArcCoth[c + d*x]*Log[1 - E^(-2*ArcCoth
[c + d*x])]*Sinh[3*ArcCoth[c + d*x]] - 6*c^2*ArcCoth[c + d*x]*Log[1 - E^(-2
*ArcCoth[c + d*x])]*Sinh[3*ArcCoth[c + d*x]] + 6*c*Log[1/((c + d*x)*Sqrt[1
- (c + d*x)^(-2)])]*Sinh[3*ArcCoth[c + d*x]]))/(4*d^3) + (b^3*f^2*(1 - (c +
 d*x)^2)*(3*c*PolyLog[2, E^(-2*ArcCoth[c + d*x])] + ((c + d*x)^3*(1 - (c +
d*x)^(-2))^(3/2)*(((-3*I)*Pi^3)/((c + d*x)*Sqrt[1 - (c + d*x)^(-2)]) - ((9*
I)*c^2*Pi^3)/((c + d*x)*Sqrt[1 - (c + d*x)^(-2)]) + (24*ArcCoth[c + d*x])/S
qrt[1 - (c + d*x)^(-2)] - (72*c*ArcCoth[c + d*x]^2)/Sqrt[1 - (c + d*x)^(-2)
] - (48*ArcCoth[c + d*x]^2)/((c + d*x)*Sqrt[1 - (c + d*x)^(-2)]) + (216*c*A
rcCoth[c + d*x]^2)/((c + d*x)*Sqrt[1 - (c + d*x)^(-2)]) - (24*ArcCoth[c + d
*x]^3)/Sqrt[1 - (c + d*x)^(-2)] + (24*c^2*ArcCoth[c + d*x]^3)/Sqrt[1 - (c +
 d*x)^(-2)] + (24*ArcCoth[c + d*x]^3)/((c + d*x)*Sqrt[1 - (c + d*x)^(-2)])
+ (96*c*ArcCoth[c + d*x]^3)/((c + d*x)*Sqrt[1 - (c + d*x)^(-2)]) + (72*c^2*
ArcCoth[c + d*x]^3)/((c + d*x)*Sqrt[1 - (c + d*x)^(-2)]) - 24*ArcCoth[c + d
*x]*Cosh[3*ArcCoth[c + d*x]] + 72*c*ArcCoth[c + d*x]^2*Cosh[3*ArcCoth[c + d
*x]] - 8*ArcCoth[c + d*x]^3*Cosh[3*ArcCoth[c + d*x]] - 24*c^2*ArcCoth[c + d
*x]^3*Cosh[3*ArcCoth[c + d*x]] + (432*c*ArcCoth[c + d*x]*Log[1 - E^(-2*ArcC
oth[c + d*x])])/((c + d*x)*Sqrt[1 - (c + d*x)^(-2)]) - (72*ArcCoth[c + d*x]
^2*Log[1 - E^(2*ArcCoth[c + d*x])])/((c + d*x)*Sqrt[1 - (c + d*x)^(-2)]) -
(216*c^2*ArcCoth[c + d*x]^2*Log[1 - E^(2*ArcCoth[c + d*x])])/((c + d*x)*Sqr
t[1 - (c + d*x)^(-2)]) - (72*Log[1/((c + d*x)*Sqrt[1 - (c + d*x)^(-2)])])/(
(c + d*x)*Sqrt[1 - (c + d*x)^(-2)]) + (96*(1 + 3*c^2)*ArcCoth[c + d*x]*Poly
Log[2, E^(2*ArcCoth[c + d*x])])/((c + d*x)^3*(1 - (c + d*x)^(-2))^(3/2)) -
(48*(1 + 3*c^2)*PolyLog[3, E^(2*ArcCoth[c + d*x])])/((c + d*x)^3*(1 - (c +
d*x)^(-2))^(3/2)) + I*Pi^3*Sinh[3*ArcCoth[c + d*x]] + (3*I)*c^2*Pi^3*Sinh[3
*ArcCoth[c + d*x]] - 72*c*ArcCoth[c + d*x]^2*Sinh[3*ArcCoth[c + d*x]] - 8*A
rcCoth[c + d*x]^3*Sinh[3*ArcCoth[c + d*x]] - 24*c^2*ArcCoth[c + d*x]^3*Sinh
[3*ArcCoth[c + d*x]] - 144*c*ArcCoth[c + d*x]*Log[1 - E^(-2*ArcCoth[c + d*x
])]*Sinh[3*ArcCoth[c + d*x]] + 24*ArcCoth[c + d*x]^2*Log[1 - E^(2*ArcCoth[c
 + d*x])]*Sinh[3*ArcCoth[c + d*x]] + 72*c^2*ArcCoth[c + d*x]^2*Log[1 - E^(2
*ArcCoth[c + d*x])]*Sinh[3*ArcCoth[c + d*x]] + 24*Log[1/((c + d*x)*Sqrt[1 -
 (c + d*x)^(-2)])]*Sinh[3*ArcCoth[c + d*x]]))/96))/(d^3*(c + d*x)^2*(1 - (c
 + d*x)^(-2)))
```

**fricas [F]** time = 0.44, size = 0, normalized size = 0.00

integral $\left(a^3 f^2 x^2 + 2\, a^3 e f x + a^3 e^2 + \left(b^3 f^2 x^2 + 2\, b^3 e f x + b^3 e^2\right) \operatorname{arcoth}\left(dx + c\right)^3 + 3\, \left(a b^2 f^2 x^2 + 2\, a b^2 e f x + ab\right.\right.$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((f*x+e)^2*(a+b*arccoth(d*x+c))^3,x, algorithm="fricas")
```

```
[Out] integral(a^3*f^2*x^2 + 2*a^3*e*f*x + a^3*e^2 + (b^3*f^2*x^2 + 2*b^3*e*f*x +
 b^3*e^2)*arccoth(d*x + c)^3 + 3*(a*b^2*f^2*x^2 + 2*a*b^2*e*f*x + a*b^2*e^2
)*arccoth(d*x + c)^2 + 3*(a^2*b*f^2*x^2 + 2*a^2*b*e*f*x + a^2*b*e^2)*arccot
h(d*x + c), x)
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \left(fx + e\right)^2 (b \operatorname{arcoth}\left(dx + c\right) + a)^3 \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((f*x+e)^2*(a+b*arccoth(d*x+c))^3,x, algorithm="giac")
```

```
[Out] integrate((f*x + e)^2*(b*arccoth(d*x + c) + a)^3, x)
```

**maple [C]** time = 16.59, size = 10477, normalized size = 19.19

output too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((f*x+e)^2*(a+b*arccoth(d*x+c))^3,x)
```

```
[Out] result too large to display
```

**maxima [F]** time = 0.00, size = 0, normalized size = 0.00

result too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((f*x+e)^2*(a+b*arccoth(d*x+c))^3,x, algorithm="maxima")
```

```
[Out] 1/3*a^3*f^2*x^3 + a^3*e*f*x^2 + 3/2*(2*x^2*arccoth(d*x + c) + d*(2*x/d^2 -
(c^2 + 2*c + 1)*log(d*x + c + 1)/d^3 + (c^2 - 2*c + 1)*log(d*x + c - 1)/d^3
))*a^2*b*e*f + 1/2*(2*x^3*arccoth(d*x + c) + d*((d*x^2 - 4*c*x)/d^3 + (c^3
+ 3*c^2 + 3*c + 1)*log(d*x + c + 1)/d^4 - (c^3 - 3*c^2 + 3*c - 1)*log(d*x +
 c - 1)/d^4))*a^2*b*f^2 + a^3*e^2*x + 3/2*(2*(d*x + c)*arccoth(d*x + c) + l
og(-(d*x + c)^2 + 1))*a^2*b*e^2/d + 1/24*((b^3*d^3*f^2*x^3 + 3*b^3*d^3*e*f*
x^2 + 3*b^3*d^3*e^2*x + (c^3*f^2 + 3*d^2*e^2 - 3*(d*e*f - f^2)*c^2 - 3*d*e*
f + 3*(d^2*e^2 - 2*d*e*f + f^2)*c + f^2)*b^3)*log(d*x + c + 1)^3 + 3*(2*a*b
^2*d^3*f^2*x^3 + (6*a*b^2*d^3*e*f + b^3*d^2*f^2)*x^2 + 2*(3*a*b^2*d^3*e^2 +
 (3*d^2*e*f - 2*c*d*f^2)*b^3)*x - (b^3*d^3*f^2*x^3 + 3*b^3*d^3*e*f*x^2 + 3*
b^3*d^3*e^2*x + (c^3*f^2 - 3*d^2*e^2 - 3*(d*e*f + f^2)*c^2 - 3*d*e*f + 3*(d
^2*e^2 + 2*d*e*f + f^2)*c - f^2)*b^3)*log(d*x + c - 1))*log(d*x + c + 1)^2)
/d^3 + integrate(-1/8*((b^3*d^3*f^2*x^3 + (2*d^3*e*f + c*d^2*f^2 + d^2*f^2)
*b^3*x^2 + (d^3*e^2 + 2*c*d^2*e*f + 2*d^2*e*f)*b^3*x + (c*d^2*e^2 + d^2*e^2
)*b^3)*log(d*x + c - 1)^3 - 6*(a*b^2*d^3*f^2*x^3 + (2*d^3*e*f + c*d^2*f^2 +
 d^2*f^2)*a*b^2*x^2 + (d^3*e^2 + 2*c*d^2*e*f + 2*d^2*e*f)*a*b^2*x + (c*d^2*
e^2 + d^2*e^2)*a*b^2)*log(d*x + c - 1)^2 + (4*a*b^2*d^3*f^2*x^3 + 2*(6*a*b^
2*d^3*e*f + b^3*d^2*f^2)*x^2 - 3*(b^3*d^3*f^2*x^3 + (2*d^3*e*f + c*d^2*f^2
+ d^2*f^2)*b^3*x^2 + (d^3*e^2 + 2*c*d^2*e*f + 2*d^2*e*f)*b^3*x + (c*d^2*e^2
 + d^2*e^2)*b^3)*log(d*x + c - 1)^2 + 4*(3*a*b^2*d^3*e^2 + (3*d^2*e*f - 2*c
*d*f^2)*b^3)*x + 2*(6*(c*d^2*e^2 + d^2*e^2)*a*b^2 - (c^3*f^2 - 3*d^2*e^2 -
```

```
3*(d*e*f + f^2)*c^2 - 3*d*e*f + 3*(d^2*e^2 + 2*d*e*f + f^2)*c - f^2)*b^3 +
(6*a*b^2*d^3*f^2 - b^3*d^3*f^2)*x^3 - 3*(b^3*d^3*e*f - 2*(2*d^3*e*f + c*d^2
*f^2 + d^2*f^2)*a*b^2)*x^2 - 3*(b^3*d^3*e^2 - 2*(d^3*e^2 + 2*c*d^2*e*f + 2*
d^2*e*f)*a*b^2)*x)*log(d*x + c - 1))*log(d*x + c + 1))/(d^3*x + c*d^2 + d^2
), x)
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.00

$$\int \left(e+f\,x\right)^2\,{\left(a+b\,\mathrm{acoth}\left(c+d\,x\right)\right)}^3 \,d x$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((e + f*x)^2*(a + b*acoth(c + d*x))^3,x)
[Out] int((e + f*x)^2*(a + b*acoth(c + d*x))^3, x)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \left(a + b \operatorname{acoth}{\left(c + dx \right)}\right)^{3} \left(e + fx\right)^{2}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((f*x+e)**2*(a+b*acoth(d*x+c))**3,x)
[Out] Integral((a + b*acoth(c + d*x))**3*(e + f*x)**2, x)
```

## 3.115 $\int (e+fx)\left(a+b\coth^{-1}(c+dx)\right)^3\,dx$

**Optimal**. Leaf size=326

$$-\frac{3b^2(de-cf)\text{Li}_2\left(1-\frac{2}{-c-dx+1}\right)\left(a+b\coth^{-1}(c+dx)\right)}{d^2}-\frac{3b^2f\log\left(\frac{2}{-c-dx+1}\right)\left(a+b\coth^{-1}(c+dx)\right)}{d^2}-\frac{\left(\left(c^2+1\right)f\right.}{}$$

```
[Out] 3/2*b*f*(a+b*arccoth(d*x+c))^2/d^2+3/2*b*f*(d*x+c)*(a+b*arccoth(d*x+c))^2/d
^2+(-c*f+d*e)*(a+b*arccoth(d*x+c))^3/d^2-1/2*(d^2*e^2-2*c*d*e*f+(c^2+1)*f^2
)*(a+b*arccoth(d*x+c))^3/d^2/f+1/2*(f*x+e)^2*(a+b*arccoth(d*x+c))^3/f-3*b^2
*f*(a+b*arccoth(d*x+c))*ln(2/(-d*x-c+1))/d^2-3*b*(-c*f+d*e)*(a+b*arccoth(d*
x+c))^2*ln(2/(-d*x-c+1))/d^2-3/2*b^3*f*polylog(2,(-d*x-c-1)/(-d*x-c+1))/d^2
-3*b^2*(-c*f+d*e)*(a+b*arccoth(d*x+c))*polylog(2,1-2/(-d*x-c+1))/d^2+3/2*b^
3*(-c*f+d*e)*polylog(3,1-2/(-d*x-c+1))/d^2
```

**Rubi [A]** time = 0.72, antiderivative size = 325, normalized size of antiderivative = 1.00, number of steps used = 15, number of rules used = 11, integrand size = 18, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.611, Rules used = {6112, 5929, 5911, 5985, 5919, 2402, 2315, 6049, 5949, 6059, 6610}

$$-\frac{3b^2(de-cf)\text{PolyLog}\left(2,1-\frac{2}{-c-dx+1}\right)\left(a+b\coth^{-1}(c+dx)\right)}{d^2}+\frac{3b^3(de-cf)\text{PolyLog}\left(3,1-\frac{2}{-c-dx+1}\right)}{2d^2}-\frac{3b^3f\text{P}}{}$$

Antiderivative was successfully verified.

```
[In] Int[(e + f*x)*(a + b*ArcCoth[c + d*x])^3,x]
```

```
[Out] (3*b*f*(a + b*ArcCoth[c + d*x])^2)/(2*d^2) + (3*b*f*(c + d*x)*(a + b*ArcCot
h[c + d*x])^2)/(2*d^2) + ((d*e - c*f)*(a + b*ArcCoth[c + d*x])^3)/d^2 + ((2
*c*e - (d*e^2)/f - ((1 + c^2)*f)/d)*(a + b*ArcCoth[c + d*x])^3)/(2*d) + ((e
 + f*x)^2*(a + b*ArcCoth[c + d*x])^3)/(2*f) - (3*b^2*f*(a + b*ArcCoth[c + d
*x])*Log[2/(1 - c - d*x)])/d^2 - (3*b*(d*e - c*f)*(a + b*ArcCoth[c + d*x])^
2*Log[2/(1 - c - d*x)])/d^2 - (3*b^3*f*PolyLog[2, -((1 + c + d*x)/(1 - c -
d*x))])/(2*d^2) - (3*b^2*(d*e - c*f)*(a + b*ArcCoth[c + d*x])*PolyLog[2, 1
- 2/(1 - c - d*x)])/d^2 + (3*b^3*(d*e - c*f)*PolyLog[3, 1 - 2/(1 - c - d*x)
])/(2*d^2)
```

Rule 2315

```
Int[Log[(c_.)*(x_)]/((d_) + (e_.)*(x_)), x_Symbol] :> -Simp[PolyLog[2, 1 -
c*x]/e, x] /; FreeQ[{c, d, e}, x] && EqQ[e + c*d, 0]
```

Rule 2402

```
Int[Log[(c_.)/((d_) + (e_.)*(x_))]/((f_) + (g_.)*(x_)^2), x_Symbol] :> -Dis
t[e/g, Subst[Int[Log[2*d*x]/(1 - 2*d*x), x], x, 1/(d + e*x)], x] /; FreeQ[{
c, d, e, f, g}, x] && EqQ[c, 2*d] && EqQ[e^2*f + d^2*g, 0]
```

Rule 5911

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.), x_Symbol] :> Simp[x*(a + b*A
rcCoth[c*x])^p, x] - Dist[b*c*p, Int[(x*(a + b*ArcCoth[c*x])^(p - 1))/(1 -
c^2*x^2), x], x] /; FreeQ[{a, b, c}, x] && IGtQ[p, 0]
```

Rule 5919

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)/((d_) + (e_.)*(x_)), x_Symbol
] :> -Simp[(a + b*ArcCoth[c*x])^p*Log[2/(1 + (e*x)/d)])/e, x] + Dist[(b*c*
```

```
p)/e, Int[((a + b*ArcCoth[c*x])^(p - 1)*Log[2/(1 + (e*x)/d)])/(1 - c^2*x^2)
, x], x] /; FreeQ[{a, b, c, d, e}, x] && IGtQ[p, 0] && EqQ[c^2*d^2 - e^2, 0
]
```

Rule 5929

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_)*((d_) + (e_.)*(x_))^(q_.), x_S
ymbol] :> Simp[((d + e*x)^(q + 1)*(a + b*ArcCoth[c*x])^p)/(e*(q + 1)), x] -
 Dist[(b*c*p)/(e*(q + 1)), Int[ExpandIntegrand[(a + b*ArcCoth[c*x])^(p - 1)
, (d + e*x)^(q + 1)/(1 - c^2*x^2), x], x], x] /; FreeQ[{a, b, c, d, e}, x]
&& IGtQ[p, 1] && IntegerQ[q] && NeQ[q, -1]
```

Rule 5949

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)/((d_) + (e_.)*(x_)^2), x_Symb
ol] :> Simp[(a + b*ArcCoth[c*x])^(p + 1)/(b*c*d*(p + 1)), x] /; FreeQ[{a, b
, c, d, e, p}, x] && EqQ[c^2*d + e, 0] && NeQ[p, -1]
```

Rule 5985

```
Int[(((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)*(x_))/((d_) + (e_.)*(x_)^2),
 x_Symbol] :> Simp[(a + b*ArcCoth[c*x])^(p + 1)/(b*e*(p + 1)), x] + Dist[1/
(c*d), Int[(a + b*ArcCoth[c*x])^p/(1 - c*x), x], x] /; FreeQ[{a, b, c, d, e
}, x] && EqQ[c^2*d + e, 0] && IGtQ[p, 0]
```

Rule 6049

```
Int[(((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)*((f_) + (g_.)*(x_))^(m_.))/(
(d_) + (e_.)*(x_)^2), x_Symbol] :> Int[ExpandIntegrand[(a + b*ArcCoth[c*x])
^p/(d + e*x^2), (f + g*x)^m, x], x] /; FreeQ[{a, b, c, d, e, f, g}, x] && I
GtQ[p, 0] && EqQ[c^2*d + e, 0] && IGtQ[m, 0]
```

Rule 6059

```
Int[(Log[u_]*((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.))/((d_) + (e_.)*(x_)^
2), x_Symbol] :> -Simp[((a + b*ArcCoth[c*x])^p*PolyLog[2, 1 - u])/(2*c*d),
x] + Dist[(b*p)/2, Int[((a + b*ArcCoth[c*x])^(p - 1)*PolyLog[2, 1 - u])/(d
+ e*x^2), x], x] /; FreeQ[{a, b, c, d, e}, x] && IGtQ[p, 0] && EqQ[c^2*d +
e, 0] && EqQ[(1 - u)^2 - (1 - 2/(1 - c*x))^2, 0]
```

Rule 6112

```
Int[((a_.) + ArcCoth[(c_) + (d_.)*(x_)]*(b_.))^(p_.)*((e_.) + (f_.)*(x_))^(
m_.), x_Symbol] :> Dist[1/d, Subst[Int[((d*e - c*f)/d + (f*x)/d)^m*(a + b*A
rcCoth[x])^p, x], x, c + d*x], x] /; FreeQ[{a, b, c, d, e, f, m}, x] && IGt
Q[p, 0]
```

Rule 6610

```
Int[(u_)*PolyLog[n_, v_], x_Symbol] :> With[{w = DerivativeDivides[v, u*v,
x]}, Simp[w*PolyLog[n + 1, v], x] /;  !FalseQ[w]] /; FreeQ[n, x]
```

Rubi steps

$$\int (e+fx)\left(a+b\coth^{-1}(c+dx)\right)^3 dx = \frac{\text{Subst}\left(\int \left(\frac{de-cf}{d}+\frac{fx}{d}\right)\left(a+b\coth^{-1}(x)\right)^3 dx, x, c+dx\right)}{d}$$

$$= \frac{(e+fx)^2\left(a+b\coth^{-1}(c+dx)\right)^3}{2f} - \frac{(3b)\,\text{Subst}\left(\int\left(-\frac{f^2\left(a+b\coth^{-1}(x)\right)^2}{d^2}\right.\right.}{}$$

$$= \frac{(e+fx)^2\left(a+b\coth^{-1}(c+dx)\right)^3}{2f} - \frac{(3b)\,\text{Subst}\left(\int \frac{\left(d^2e^2-2cdef+\left(1+c^2\right)f^2+\right.}{}\right.}{2}$$

$$= \frac{3bf(c+dx)\left(a+b\coth^{-1}(c+dx)\right)^2}{2d^2} + \frac{(e+fx)^2\left(a+b\coth^{-1}(c+dx\right.}{2f}$$

$$= \frac{3bf\left(a+b\coth^{-1}(c+dx)\right)^2}{2d^2} + \frac{3bf(c+dx)\left(a+b\coth^{-1}(c+dx)\right)^2}{2d^2} +$$

$$= \frac{3bf\left(a+b\coth^{-1}(c+dx)\right)^2}{2d^2} + \frac{3bf(c+dx)\left(a+b\coth^{-1}(c+dx)\right)^2}{2d^2} +$$

$$= \frac{3bf\left(a+b\coth^{-1}(c+dx)\right)^2}{2d^2} + \frac{3bf(c+dx)\left(a+b\coth^{-1}(c+dx)\right)^2}{2d^2} +$$

$$= \frac{3bf\left(a+b\coth^{-1}(c+dx)\right)^2}{2d^2} + \frac{3bf(c+dx)\left(a+b\coth^{-1}(c+dx)\right)^2}{2d^2} +$$

$$= \frac{3bf\left(a+b\coth^{-1}(c+dx)\right)^2}{2d^2} + \frac{3bf(c+dx)\left(a+b\coth^{-1}(c+dx)\right)^2}{2d^2} +$$

**Mathematica [C]** time = 1.46, size = 600, normalized size = 1.84

$$\frac{2a^3f(c+dx)^2+2a^2(c+dx)(-2acf+2ade+3bf)+3a^2b(-2cf+2de+f)\log(-c-dx+1)+3a^2b(2de-(2c}{}$$

Warning: Unable to verify antiderivative.

```
[In] Integrate[(e + f*x)*(a + b*ArcCoth[c + d*x])^3,x]
```

```
[Out] (2*a^2*(2*a*d*e + 3*b*f - 2*a*c*f)*(c + d*x) + 2*a^3*f*(c + d*x)^2 - 6*a^2*
b*(c + d*x)*(c*f - d*(2*e + f*x))*ArcCoth[c + d*x] + 3*a^2*b*(2*d*e + f - 2
*c*f)*Log[1 - c - d*x] + 3*a^2*b*(2*d*e - (1 + 2*c)*f)*Log[1 + c + d*x] + 1
2*a*b^2*f*((c + d*x)*ArcCoth[c + d*x] + ((-1 + (c + d*x)^2)*ArcCoth[c + d*x
]^2)/2 - Log[1/((c + d*x)*Sqrt[1 - (c + d*x)^(-2)])]) + 12*a*b^2*d*e*(ArcCo
th[c + d*x]*((-1 + c + d*x)*ArcCoth[c + d*x] - 2*Log[1 - E^(-2*ArcCoth[c +
d*x])]) + PolyLog[2, E^(-2*ArcCoth[c + d*x])]) - 12*a*b^2*c*f*(ArcCoth[c +
d*x]*((-1 + c + d*x)*ArcCoth[c + d*x] - 2*Log[1 - E^(-2*ArcCoth[c + d*x])])
 + PolyLog[2, E^(-2*ArcCoth[c + d*x])]) + 2*b^3*f*(ArcCoth[c + d*x]*(3*(-1
+ c + d*x)*ArcCoth[c + d*x] + (-1 + c^2 + 2*c*d*x + d^2*x^2)*ArcCoth[c + d*
```

```
x]^2 - 6*Log[1 - E^(-2*ArcCoth[c + d*x])]) + 3*PolyLog[2, E^(-2*ArcCoth[c +
 d*x])]) + 4*b^3*d*e*((-1/8*I)*Pi^3 + ArcCoth[c + d*x]^3 + (c + d*x)*ArcCot
h[c + d*x]^3 - 3*ArcCoth[c + d*x]^2*Log[1 - E^(2*ArcCoth[c + d*x])] - 3*Arc
Coth[c + d*x]*PolyLog[2, E^(2*ArcCoth[c + d*x])] + (3*PolyLog[3, E^(2*ArcCo
th[c + d*x])])/2) - 4*b^3*c*f*((-1/8*I)*Pi^3 + ArcCoth[c + d*x]^3 + (c + d*
x)*ArcCoth[c + d*x]^3 - 3*ArcCoth[c + d*x]^2*Log[1 - E^(2*ArcCoth[c + d*x])
] - 3*ArcCoth[c + d*x]*PolyLog[2, E^(2*ArcCoth[c + d*x])] + (3*PolyLog[3, E
^(2*ArcCoth[c + d*x])])/2))/(4*d^2)
```

**fricas [F]** time = 0.65, size = 0, normalized size = 0.00

$$\text{integral}\left(a^3fx + a^3e + \left(b^3fx + b^3e\right)\operatorname{arcoth}\left(dx + c\right)^3 + 3\left(ab^2fx + ab^2e\right)\operatorname{arcoth}\left(dx + c\right)^2 + 3\left(a^2bfx + a^2be\right)\operatorname{arc}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((f*x+e)*(a+b*arccoth(d*x+c))^3,x, algorithm="fricas")
```

```
[Out] integral(a^3*f*x + a^3*e + (b^3*f*x + b^3*e)*arccoth(d*x + c)^3 + 3*(a*b^2*
f*x + a*b^2*e)*arccoth(d*x + c)^2 + 3*(a^2*b*f*x + a^2*b*e)*arccoth(d*x + c
), x)
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \left(fx + e\right)\left(b\operatorname{arcoth}\left(dx + c\right) + a\right)^3 dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((f*x+e)*(a+b*arccoth(d*x+c))^3,x, algorithm="giac")
```

```
[Out] integrate((f*x + e)*(b*arccoth(d*x + c) + a)^3, x)
```

**maple [C]** time = 1.42, size = 12285, normalized size = 37.68

output too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((f*x+e)*(a+b*arccoth(d*x+c))^3,x)
```

```
[Out] result too large to display
```

**maxima [F]** time = 0.00, size = 0, normalized size = 0.00

$$\frac{1}{2}a^3fx^2 + \frac{3}{4}\left(2x^2\operatorname{arcoth}\left(dx + c\right) + d\left(\frac{2x}{d^2} - \frac{\left(c^2 + 2c + 1\right)\log\left(dx + c + 1\right)}{d^3} + \frac{\left(c^2 - 2c + 1\right)\log\left(dx + c - 1\right)}{d^3}\right)\right)a^2bf$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((f*x+e)*(a+b*arccoth(d*x+c))^3,x, algorithm="maxima")
```

```
[Out] 1/2*a^3*f*x^2 + 3/4*(2*x^2*arccoth(d*x + c) + d*(2*x/d^2 - (c^2 + 2*c + 1)*
log(d*x + c + 1)/d^3 + (c^2 - 2*c + 1)*log(d*x + c - 1)/d^3))*a^2*b*f + a^3
*e*x + 3/2*(2*(d*x + c)*arccoth(d*x + c) + log(-(d*x + c)^2 + 1))*a^2*b*e/d
 + 1/16*((b^3*d^2*f*x^2 + 2*b^3*d^2*e*x - (c^2*f - 2*(d*e - f)*c - 2*d*e +
f)*b^3)*log(d*x + c + 1)^3 + 3*(2*a*b^2*d^2*f*x^2 + 2*(2*a*b^2*d^2*e + b^3*
d*f)*x - (b^3*d^2*f*x^2 + 2*b^3*d^2*e*x - (c^2*f - 2*(d*e + f)*c + 2*d*e +
f)*b^3)*log(d*x + c - 1))*log(d*x + c + 1)^2)/d^2 + integrate(-1/8*((b^3*d^
2*f*x^2 + (d^2*e + c*d*f + d*f)*b^3*x + (c*d*e + d*e)*b^3)*log(d*x + c - 1)
^3 - 6*(a*b^2*d^2*f*x^2 + (d^2*e + c*d*f + d*f)*a*b^2*x + (c*d*e + d*e)*a*b
^2)*log(d*x + c - 1)^2 + 3*(2*a*b^2*d^2*f*x^2 - (b^3*d^2*f*x^2 + (d^2*e + c
*d*f + d*f)*b^3*x + (c*d*e + d*e)*b^3)*log(d*x + c - 1)^2 + 2*(2*a*b^2*d^2*
e + b^3*d*f)*x + (4*(c*d*e + d*e)*a*b^2 + (c^2*f - 2*(d*e + f)*c + 2*d*e +
```

```
f)*b^3 + (4*a*b^2*d^2*f - b^3*d^2*f)*x^2 - 2*(b^3*d^2*e - 2*(d^2*e + c*d*f
+ d*f)*a*b^2)*x)*log(d*x + c - 1))*log(d*x + c + 1))/(d^2*x + c*d + d), x)
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.00

$$\int \left(e+f\,x\right)\,{\left(a+b\,\mathrm{acoth}\left(c+d\,x\right)\right)}^3 \,d x$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((e + f*x)*(a + b*acoth(c + d*x))^3,x)
[Out] int((e + f*x)*(a + b*acoth(c + d*x))^3, x)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int (a + b \operatorname{acoth}{(c + dx)})^{3} \left(e + f x\right)\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((f*x+e)*(a+b*acoth(d*x+c))**3,x)
[Out] Integral((a + b*acoth(c + d*x))**3*(e + f*x), x)
```

# 3.116 $\int \left(a+b\coth^{-1}(c+dx)\right)^3\,dx$

**Optimal**. Leaf size=132

$$-\frac{3b^2\text{Li}_2\left(1-\frac{2}{-c-dx+1}\right)\left(a+b\coth^{-1}(c+dx)\right)}{d}+\frac{(c+dx)\left(a+b\coth^{-1}(c+dx)\right)^3}{d}+\frac{\left(a+b\coth^{-1}(c+dx)\right)^3}{d}-\frac{3b\log}{}$$

```
[Out] (a+b*arccoth(d*x+c))^3/d+(d*x+c)*(a+b*arccoth(d*x+c))^3/d-3*b*(a+b*arccoth(
d*x+c))^2*ln(2/(-d*x-c+1))/d-3*b^2*(a+b*arccoth(d*x+c))*polylog(2,1-2/(-d*x
-c+1))/d+3/2*b^3*polylog(3,1-2/(-d*x-c+1))/d
```

**Rubi [A]** time = 0.23, antiderivative size = 132, normalized size of antiderivative = 1.00, number of steps used = 6, number of rules used = 7, integrand size = 12, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.583, Rules used = {6104, 5911, 5985, 5919, 5949, 6059, 6610}

$$-\frac{3b^2\text{PolyLog}\left(2,1-\frac{2}{-c-dx+1}\right)\left(a+b\coth^{-1}(c+dx)\right)}{d}+\frac{3b^3\text{PolyLog}\left(3,1-\frac{2}{-c-dx+1}\right)}{2d}+\frac{(c+dx)\left(a+b\coth^{-1}(c+\right.}{d}$$

Antiderivative was successfully verified.

```
[In] Int[(a + b*ArcCoth[c + d*x])^3,x]
```

```
[Out] (a + b*ArcCoth[c + d*x])^3/d + ((c + d*x)*(a + b*ArcCoth[c + d*x])^3)/d - (
3*b*(a + b*ArcCoth[c + d*x])^2*Log[2/(1 - c - d*x)])/d - (3*b^2*(a + b*ArcC
oth[c + d*x])*PolyLog[2, 1 - 2/(1 - c - d*x)])/d + (3*b^3*PolyLog[3, 1 - 2/
(1 - c - d*x)])/(2*d)
```

Rule 5911

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.), x_Symbol] :> Simp[x*(a + b*A
rcCoth[c*x])^p, x] - Dist[b*c*p, Int[(x*(a + b*ArcCoth[c*x])^(p - 1))/(1 -
c^2*x^2), x], x] /; FreeQ[{a, b, c}, x] && IGtQ[p, 0]
```

Rule 5919

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)/((d_) + (e_.)*(x_)), x_Symbol
] :> -Simp[((a + b*ArcCoth[c*x])^p*Log[2/(1 + (e*x)/d)])/e, x] + Dist[(b*c*
p)/e, Int[((a + b*ArcCoth[c*x])^(p - 1)*Log[2/(1 + (e*x)/d)])/(1 - c^2*x^2)
, x], x] /; FreeQ[{a, b, c, d, e}, x] && IGtQ[p, 0] && EqQ[c^2*d^2 - e^2, 0
]
```

Rule 5949

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)/((d_) + (e_.)*(x_)^2), x_Symb
ol] :> Simp[(a + b*ArcCoth[c*x])^(p + 1)/(b*c*d*(p + 1)), x] /; FreeQ[{a, b
, c, d, e, p}, x] && EqQ[c^2*d + e, 0] && NeQ[p, -1]
```

Rule 5985

```
Int[(((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)*(x_))/((d_) + (e_.)*(x_)^2),
 x_Symbol] :> Simp[(a + b*ArcCoth[c*x])^(p + 1)/(b*e*(p + 1)), x] + Dist[1/
(c*d), Int[(a + b*ArcCoth[c*x])^p/(1 - c*x), x], x] /; FreeQ[{a, b, c, d, e
}, x] && EqQ[c^2*d + e, 0] && IGtQ[p, 0]
```

Rule 6059

```
Int[(Log[u_]*((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.))/((d_) + (e_.)*(x_)^
2), x_Symbol] :> -Simp[((a + b*ArcCoth[c*x])^p*PolyLog[2, 1 - u])/(2*c*d),
x] + Dist[(b*p)/2, Int[((a + b*ArcCoth[c*x])^(p - 1)*PolyLog[2, 1 - u])/(d
```

```
+ e*x^2), x], x] /; FreeQ[{a, b, c, d, e}, x] && IGtQ[p, 0] && EqQ[c^2*d +
e, 0] && EqQ[(1 - u)^2 - (1 - 2/(1 - c*x))^2, 0]
```

Rule 6104

```
Int[((a_.) + ArcCoth[(c_) + (d_.)*(x_)]*(b_.))^(p_.), x_Symbol] :> Dist[1/d
, Subst[Int[(a + b*ArcCoth[x])^p, x], x, c + d*x], x] /; FreeQ[{a, b, c, d}
, x] && IGtQ[p, 0]
```

Rule 6610

```
Int[(u_)*PolyLog[n_, v_], x_Symbol] :> With[{w = DerivativeDivides[v, u*v,
x]}, Simp[w*PolyLog[n + 1, v], x] /;  !FalseQ[w]] /; FreeQ[n, x]
```

Rubi steps

$$\int \left(a+b\coth^{-1}(c+dx)\right)^3\,dx=\frac{\text{Subst}\left(\int \left(a+b\coth^{-1}(x)\right)^3\,dx,x,c+dx\right)}{d}$$

$$=\frac{(c+dx)\left(a+b\coth^{-1}(c+dx)\right)^3}{d}-\frac{(3b)\,\text{Subst}\left(\int \frac{x\left(a+b\coth^{-1}(x)\right)^2}{1-x^2}\,dx,x,c+dx\right)}{d}$$

$$=\frac{\left(a+b\coth^{-1}(c+dx)\right)^3}{d}+\frac{(c+dx)\left(a+b\coth^{-1}(c+dx)\right)^3}{d}-\frac{(3b)\,\text{Subst}\left(\int \frac{(a}{}\right.}{}$$

$$=\frac{\left(a+b\coth^{-1}(c+dx)\right)^3}{d}+\frac{(c+dx)\left(a+b\coth^{-1}(c+dx)\right)^3}{d}-\frac{3b\left(a+b\coth^{-1}\right.}{}$$

$$=\frac{\left(a+b\coth^{-1}(c+dx)\right)^3}{d}+\frac{(c+dx)\left(a+b\coth^{-1}(c+dx)\right)^3}{d}-\frac{3b\left(a+b\coth^{-1}\right.}{}$$

$$=\frac{\left(a+b\coth^{-1}(c+dx)\right)^3}{d}+\frac{(c+dx)\left(a+b\coth^{-1}(c+dx)\right)^3}{d}-\frac{3b\left(a+b\coth^{-1}\right.}{}$$

**Mathematica [C]** time = 0.33, size = 208, normalized size = 1.58

$$\frac{2a^3(c+dx)+3a^2b\log\left(1-(c+dx)^2\right)+6a^2b(c+dx)\coth^{-1}(c+dx)+6ab^2\left(\text{Li}_2\left(e^{-2\coth^{-1}(c+dx)}\right)+\coth^{-1}(c+\right.}{}$$

Warning: Unable to verify antiderivative.

```
[In] Integrate[(a + b*ArcCoth[c + d*x])^3,x]
```

```
[Out] (2*a^3*(c + d*x) + 6*a^2*b*(c + d*x)*ArcCoth[c + d*x] + 3*a^2*b*Log[1 - (c
+ d*x)^2] + 6*a*b^2*(ArcCoth[c + d*x]*((-1 + c + d*x)*ArcCoth[c + d*x] - 2*
Log[1 - E^(-2*ArcCoth[c + d*x])]) + PolyLog[2, E^(-2*ArcCoth[c + d*x])]) +
2*b^3*((-1/8*I)*Pi^3 + ArcCoth[c + d*x]^3 + (c + d*x)*ArcCoth[c + d*x]^3 -
3*ArcCoth[c + d*x]^2*Log[1 - E^(2*ArcCoth[c + d*x])] - 3*ArcCoth[c + d*x]*P
olyLog[2, E^(2*ArcCoth[c + d*x])] + (3*PolyLog[3, E^(2*ArcCoth[c + d*x])])/
2))/(2*d)
```

**fricas [F]** time = 0.59, size = 0, normalized size = 0.00

$$\text{integral}\left(b^3\,\text{arcoth}\,(dx+c)^3+3\,ab^2\,\text{arcoth}\,(dx+c)^2+3\,a^2b\,\text{arcoth}\,(dx+c)+a^3,x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccoth(d*x+c))^3,x, algorithm="fricas")
```

```
[Out] integral(b^3*arccoth(d*x + c)^3 + 3*a*b^2*arccoth(d*x + c)^2 + 3*a^2*b*arcc
oth(d*x + c) + a^3, x)
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int (b\,\mathrm{arcoth}\,(dx+c)+a)^3\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccoth(d*x+c))^3,x, algorithm="giac")
```

```
[Out] integrate((b*arccoth(d*x + c) + a)^3, x)
```

**maple [B]** time = 0.30, size = 485, normalized size = 3.67

$$a^3x+\frac{a^3c}{d}+\mathrm{arccoth}\,(dx+c)^3\,x\,b^3+\frac{\mathrm{arccoth}\,(dx+c)^3\,b^3c}{d}+\frac{b^3\mathrm{arccoth}\,(dx+c)^3}{d}-\frac{3\mathrm{arccoth}\,(dx+c)^2\ln\left(1+\frac{1}{\sqrt{\frac{dx+c-1}{dx+c+1}}}\right.}{d}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a+b*arccoth(d*x+c))^3,x)
```

```
[Out] a^3*x+1/d*a^3*c+arccoth(d*x+c)^3*x*b^3+1/d*arccoth(d*x+c)^3*b^3*c+1/d*b^3*a
rccoth(d*x+c)^3-3/d*arccoth(d*x+c)^2*ln(1+1/((d*x+c-1)/(d*x+c+1))^(1/2))*b^
3-3/d*arccoth(d*x+c)^2*ln(1-1/((d*x+c-1)/(d*x+c+1))^(1/2))*b^3-6/d*arccoth(
d*x+c)*polylog(2,-1/((d*x+c-1)/(d*x+c+1))^(1/2))*b^3-6/d*arccoth(d*x+c)*pol
ylog(2,1/((d*x+c-1)/(d*x+c+1))^(1/2))*b^3+6/d*polylog(3,-1/((d*x+c-1)/(d*x+
c+1))^(1/2))*b^3+6/d*polylog(3,1/((d*x+c-1)/(d*x+c+1))^(1/2))*b^3+3*arccoth
(d*x+c)^2*x*a*b^2+3/d*arccoth(d*x+c)^2*a*b^2*c+3/d*a*b^2*arccoth(d*x+c)^2-6
/d*arccoth(d*x+c)*ln(1+1/((d*x+c-1)/(d*x+c+1))^(1/2))*a*b^2-6/d*arccoth(d*x
+c)*ln(1-1/((d*x+c-1)/(d*x+c+1))^(1/2))*a*b^2-6/d*polylog(2,-1/((d*x+c-1)/(
d*x+c+1))^(1/2))*a*b^2-6/d*polylog(2,1/((d*x+c-1)/(d*x+c+1))^(1/2))*a*b^2+3
*arccoth(d*x+c)*x*a^2*b+3/d*arccoth(d*x+c)*a^2*b*c+3/2/d*a^2*b*ln((d*x+c)^2
-1)
```

**maxima [F]** time = 0.00, size = 0, normalized size = 0.00

$$a^3x+\frac{3\left(2\,(dx+c)\,\mathrm{arcoth}\,(dx+c)+\log\left(-(dx+c)^2+1\right)\right)a^2b}{2\,d}+\frac{\left(b^3dx+b^3(c+1)\right)\log\,(dx+c+1)^3+3\left(2\,ab^2dx-\right.}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccoth(d*x+c))^3,x, algorithm="maxima")
```

```
[Out] a^3*x + 3/2*(2*(d*x + c)*arccoth(d*x + c) + log(-(d*x + c)^2 + 1))*a^2*b/d
+ 1/8*((b^3*d*x + b^3*(c + 1))*log(d*x + c + 1)^3 + 3*(2*a*b^2*d*x - (b^3*d
*x + b^3*(c - 1))*log(d*x + c - 1))*log(d*x + c + 1)^2)/d + integrate(-1/8*
((b^3*d*x + b^3*(c + 1))*log(d*x + c - 1)^3 - 6*(a*b^2*d*x + a*b^2*(c + 1))
*log(d*x + c - 1)^2 + 3*(4*a*b^2*d*x - (b^3*d*x + b^3*(c + 1))*log(d*x + c
- 1)^2 + 2*(2*a*b^2*(c + 1) - b^3*(c - 1) + (2*a*b^2*d - b^3*d)*x)*log(d*x
+ c - 1))*log(d*x + c + 1))/(d*x + c + 1), x)
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.01

$$\int (a+b\,\mathrm{acoth}\,(c+d\,x))^3\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a + b*acoth(c + d*x))^3,x)
```

```
[Out] int((a + b*acoth(c + d*x))^3, x)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int (a + b \operatorname{acoth}(c + dx))^3 \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*acoth(d*x+c))**3,x)
```

```
[Out] Integral((a + b*acoth(c + d*x))**3, x)
```

# 3.117 $\int \frac{\left(a+b\coth^{-1}(c+dx)\right)^3}{e+fx}\,dx$

**Optimal**. Leaf size=308

$$-\frac{3b^2\left(a+b\coth^{-1}(c+dx)\right)\text{Li}_3\left(1-\frac{2d(e+fx)}{(de-cf+f)(c+dx+1)}\right)}{2f}+\frac{3b^2\text{Li}_3\left(1-\frac{2}{c+dx+1}\right)\left(a+b\coth^{-1}(c+dx)\right)}{2f}-\frac{3b\left(a+b\coth\right.}{}$$

```
[Out] -(a+b*arccoth(d*x+c))^3*ln(2/(d*x+c+1))/f+(a+b*arccoth(d*x+c))^3*ln(2*d*(f*
x+e)/(-c*f+d*e+f)/(d*x+c+1))/f+3/2*b*(a+b*arccoth(d*x+c))^2*polylog(2,1-2/(
d*x+c+1))/f-3/2*b*(a+b*arccoth(d*x+c))^2*polylog(2,1-2*d*(f*x+e)/(-c*f+d*e+
f)/(d*x+c+1))/f+3/2*b^2*(a+b*arccoth(d*x+c))*polylog(3,1-2/(d*x+c+1))/f-3/2
*b^2*(a+b*arccoth(d*x+c))*polylog(3,1-2*d*(f*x+e)/(-c*f+d*e+f)/(d*x+c+1))/f
+3/4*b^3*polylog(4,1-2/(d*x+c+1))/f-3/4*b^3*polylog(4,1-2*d*(f*x+e)/(-c*f+d
*e+f)/(d*x+c+1))/f
```

**Rubi [A]** time = 0.19, antiderivative size = 308, normalized size of antiderivative = 1.00, number of steps used = 2, number of rules used = 2, integrand size = 20, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.100, Rules used = {6112, 5925}

$$-\frac{3b^2\left(a+b\coth^{-1}(c+dx)\right)\text{PolyLog}\left(3,1-\frac{2d(e+fx)}{(c+dx+1)(-cf+de+f)}\right)}{2f}+\frac{3b^2\text{PolyLog}\left(3,1-\frac{2}{c+dx+1}\right)\left(a+b\coth^{-1}(c+d\right.}{2f}$$

Antiderivative was successfully verified.

```
[In] Int[(a + b*ArcCoth[c + d*x])^3/(e + f*x),x]
```

```
[Out] -(((a + b*ArcCoth[c + d*x])^3*Log[2/(1 + c + d*x)])/f) + ((a + b*ArcCoth[c
+ d*x])^3*Log[(2*d*(e + f*x))/((d*e + f - c*f)*(1 + c + d*x))])/f + (3*b*(a
 + b*ArcCoth[c + d*x])^2*PolyLog[2, 1 - 2/(1 + c + d*x)])/(2*f) - (3*b*(a +
 b*ArcCoth[c + d*x])^2*PolyLog[2, 1 - (2*d*(e + f*x))/((d*e + f - c*f)*(1 +
 c + d*x))])/(2*f) + (3*b^2*(a + b*ArcCoth[c + d*x])*PolyLog[3, 1 - 2/(1 +
c + d*x)])/(2*f) - (3*b^2*(a + b*ArcCoth[c + d*x])*PolyLog[3, 1 - (2*d*(e +
 f*x))/((d*e + f - c*f)*(1 + c + d*x))])/(2*f) + (3*b^3*PolyLog[4, 1 - 2/(1
 + c + d*x)])/(4*f) - (3*b^3*PolyLog[4, 1 - (2*d*(e + f*x))/((d*e + f - c*f
)*(1 + c + d*x))])/(4*f)
```

Rule 5925

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^3/((d_) + (e_.)*(x_)), x_Symbol] :>
 -Simp[((a + b*ArcCoth[c*x])^3*Log[2/(1 + c*x)])/e, x] + (Simp[((a + b*ArcC
oth[c*x])^3*Log[(2*c*(d + e*x))/((c*d + e)*(1 + c*x))])/e, x] + Simp[(3*b*(
a + b*ArcCoth[c*x])^2*PolyLog[2, 1 - 2/(1 + c*x)])/(2*e), x] - Simp[(3*b*(a
 + b*ArcCoth[c*x])^2*PolyLog[2, 1 - (2*c*(d + e*x))/((c*d + e)*(1 + c*x))])
/(2*e), x] + Simp[(3*b^2*(a + b*ArcCoth[c*x])*PolyLog[3, 1 - 2/(1 + c*x)])/
(2*e), x] - Simp[(3*b^2*(a + b*ArcCoth[c*x])*PolyLog[3, 1 - (2*c*(d + e*x))
/((c*d + e)*(1 + c*x))])/(2*e), x] + Simp[(3*b^3*PolyLog[4, 1 - 2/(1 + c*x)
])/(4*e), x] - Simp[(3*b^3*PolyLog[4, 1 - (2*c*(d + e*x))/((c*d + e)*(1 + c
*x))])/(4*e), x]) /; FreeQ[{a, b, c, d, e}, x] && NeQ[c^2*d^2 - e^2, 0]
```

Rule 6112

```
Int[((a_.) + ArcCoth[(c_) + (d_.)*(x_)]*(b_.))^(p_.)*((e_.) + (f_.)*(x_))^(
m_.), x_Symbol] :> Dist[1/d, Subst[Int[((d*e - c*f)/d + (f*x)/d)^m*(a + b*A
rcCoth[x])^p, x], x, c + d*x], x] /; FreeQ[{a, b, c, d, e, f, m}, x] && IGt
Q[p, 0]
```

Rubi steps

$$\int \frac{\left(a+b\coth^{-1}(c+dx)\right)^3}{e+fx}\,dx = \frac{\text{Subst}\left(\int \frac{\left(a+b\coth^{-1}(x)\right)^3}{\frac{de-cf}{d}+\frac{fx}{d}}\,dx, x, c+dx\right)}{d}$$
$$= -\frac{\left(a+b\coth^{-1}(c+dx)\right)^3 \log\left(\frac{2}{1+c+dx}\right)}{f} + \frac{\left(a+b\coth^{-1}(c+dx)\right)^3 \log\left(\frac{2d(\ldots}{(de+f-c\ldots}\right.}{f}$$

**Mathematica [F]** time = 28.57, size = 0, normalized size = 0.00

$$\int \frac{\left(a+b\coth^{-1}(c+dx)\right)^3}{e+fx}\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[(a + b*ArcCoth[c + d*x])^3/(e + f*x),x]
[Out] Integrate[(a + b*ArcCoth[c + d*x])^3/(e + f*x), x]
```

**fricas [F]** time = 0.67, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{b^3\,\text{arcoth}\,(dx+c)^3 + 3\,ab^2\,\text{arcoth}\,(dx+c)^2 + 3\,a^2b\,\text{arcoth}\,(dx+c) + a^3}{fx+e}, x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccoth(d*x+c))^3/(f*x+e),x, algorithm="fricas")
[Out] integral((b^3*arccoth(d*x + c)^3 + 3*a*b^2*arccoth(d*x + c)^2 + 3*a^2*b*arc
coth(d*x + c) + a^3)/(f*x + e), x)
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\left(b\,\text{arcoth}\,(dx+c)+a\right)^3}{fx+e}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccoth(d*x+c))^3/(f*x+e),x, algorithm="giac")
[Out] integrate((b*arccoth(d*x + c) + a)^3/(f*x + e), x)
```

**maple [C]** time = 1.55, size = 3796, normalized size = 12.32

output too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a+b*arccoth(d*x+c))^3/(f*x+e),x)
[Out] 6*a*b^2/f*polylog(3,-1/((d*x+c-1)/(d*x+c+1))^(1/2))+3/2*a*b^2/(c*f-d*e-f)*p
olylog(3,(c*f-d*e-f)*(d*x+c+1)/(d*x+c-1)/(c*f-d*e+f))+3/4*b^3*c/(c*f-d*e-f)
*polylog(4,(c*f-d*e-f)*(d*x+c+1)/(d*x+c-1)/(c*f-d*e+f))+6*a*b^2/f*polylog(3
,1/((d*x+c-1)/(d*x+c+1))^(1/2))+3/2*b^3/(c*f-d*e-f)*arccoth(d*x+c)*polylog(
3,(c*f-d*e-f)*(d*x+c+1)/(d*x+c-1)/(c*f-d*e+f))-3/2*b^3/(c*f-d*e-f)*arccoth(
d*x+c)^2*polylog(2,(c*f-d*e-f)*(d*x+c+1)/(d*x+c-1)/(c*f-d*e+f))-3*b^3/f*arc
coth(d*x+c)^2*polylog(2,-1/((d*x+c-1)/(d*x+c+1))^(1/2))-b^3/f*arccoth(d*x+c
)^3*ln(((d*x+c+1)/(d*x+c-1)-1)*c*f+(1-(d*x+c+1)/(d*x+c-1))*e*d+(-(d*x+c+1)/
(d*x+c-1)-1)*f)+b^3/f*arccoth(d*x+c)^3*ln((d*x+c+1)/(d*x+c-1)-1)+6*b^3/f*ar
```

```
ccoth(d*x+c)*polylog(3,-1/((d*x+c-1)/(d*x+c+1))^(1/2))-b^3/f*arccoth(d*x+c)
^3*ln(1-1/((d*x+c-1)/(d*x+c+1))^(1/2))-b^3/f*arccoth(d*x+c)^3*ln(1+1/((d*x+
c-1)/(d*x+c+1))^(1/2))-3*b^3/f*arccoth(d*x+c)^2*polylog(2,1/((d*x+c-1)/(d*x
+c+1))^(1/2))+6*b^3/f*arccoth(d*x+c)*polylog(3,1/((d*x+c-1)/(d*x+c+1))^(1/2
))+b^3*ln((d*x+c)*f-c*f+d*e)/f*arccoth(d*x+c)^3-b^3/(c*f-d*e-f)*arccoth(d*x
+c)^3*ln(1-(c*f-d*e-f)*(d*x+c+1)/(d*x+c-1)/(c*f-d*e+f))+3/2*a^2*b/f*ln((d*x
+c)*f-c*f+d*e)*ln(((d*x+c)*f-f)/(c*f-d*e-f))-3/2*a^2*b/f*ln((d*x+c)*f-c*f+d
*e)*ln(((d*x+c)*f+f)/(c*f-d*e+f))-6*b^3/f*polylog(4,1/((d*x+c-1)/(d*x+c+1))
^(1/2))-6*b^3/f*polylog(4,-1/((d*x+c-1)/(d*x+c+1))^(1/2))-3/4*b^3/(c*f-d*e-
f)*polylog(4,(c*f-d*e-f)*(d*x+c+1)/(d*x+c-1)/(c*f-d*e+f))+a^3*ln((d*x+c)*f-
c*f+d*e)/f+3/2*a^2*b/f*dilog(((d*x+c)*f-f)/(c*f-d*e-f))-3/2*a^2*b/f*dilog((
(d*x+c)*f+f)/(c*f-d*e+f))+3/2*d*b^3/f*e/(c*f-d*e-f)*arccoth(d*x+c)*polylog(
3,(c*f-d*e-f)*(d*x+c+1)/(d*x+c-1)/(c*f-d*e+f))-3/2*d*b^3/f*e/(c*f-d*e-f)*ar
ccoth(d*x+c)^2*polylog(2,(c*f-d*e-f)*(d*x+c+1)/(d*x+c-1)/(c*f-d*e+f))-d*b^3
/f*e/(c*f-d*e-f)*arccoth(d*x+c)^3*ln(1-(c*f-d*e-f)*(d*x+c+1)/(d*x+c-1)/(c*f
-d*e+f))+3/2*d*a*b^2/f*e/(c*f-d*e-f)*polylog(3,(c*f-d*e-f)*(d*x+c+1)/(d*x+c
-1)/(c*f-d*e+f))-1/2*I*b^3/f*Pi*arccoth(d*x+c)^3*csgn(I*(((d*x+c+1)/(d*x+c-
1)-1)*c*f+(1-(d*x+c+1)/(d*x+c-1))*e*d+(-(d*x+c+1)/(d*x+c-1)-1)*f))*csgn(I*(
((d*x+c+1)/(d*x+c-1)-1)*c*f+(1-(d*x+c+1)/(d*x+c-1))*e*d+(-(d*x+c+1)/(d*x+c-
1)-1)*f)/((d*x+c+1)/(d*x+c-1)-1))^2-1/2*I*b^3/f*Pi*arccoth(d*x+c)^3*csgn(I/
((d*x+c+1)/(d*x+c-1)-1))*csgn(I*(((d*x+c+1)/(d*x+c-1)-1)*c*f+(1-(d*x+c+1)/(
d*x+c-1))*e*d+(-(d*x+c+1)/(d*x+c-1)-1)*f)/((d*x+c+1)/(d*x+c-1)-1))^2-3/2*b^
3*c/(c*f-d*e-f)*arccoth(d*x+c)*polylog(3,(c*f-d*e-f)*(d*x+c+1)/(d*x+c-1)/(c
*f-d*e+f))+3/2*b^3*c/(c*f-d*e-f)*arccoth(d*x+c)^2*polylog(2,(c*f-d*e-f)*(d*
x+c+1)/(d*x+c-1)/(c*f-d*e+f))+b^3*c/(c*f-d*e-f)*arccoth(d*x+c)^3*ln(1-(c*f-
d*e-f)*(d*x+c+1)/(d*x+c-1)/(c*f-d*e+f))+3*a*b^2*ln((d*x+c)*f-c*f+d*e)/f*arc
coth(d*x+c)^2-I*b^3/f*Pi*arccoth(d*x+c)^3-3/2*a*b^2*c/(c*f-d*e-f)*polylog(3
,(c*f-d*e-f)*(d*x+c+1)/(d*x+c-1)/(c*f-d*e+f))-3*a*b^2/f*arccoth(d*x+c)^2*ln
(1+1/((d*x+c-1)/(d*x+c+1))^(1/2))-6*a*b^2/f*arccoth(d*x+c)*polylog(2,-1/((d
*x+c-1)/(d*x+c+1))^(1/2))-3*a*b^2/f*arccoth(d*x+c)^2*ln(1-1/((d*x+c-1)/(d*x
+c+1))^(1/2))-6*a*b^2/f*arccoth(d*x+c)*polylog(2,1/((d*x+c-1)/(d*x+c+1))^(1
/2))+3*a*b^2/f*arccoth(d*x+c)^2*ln((d*x+c+1)/(d*x+c-1)-1)-3*a*b^2/(c*f-d*e-
f)*arccoth(d*x+c)^2*ln(1-(c*f-d*e-f)*(d*x+c+1)/(d*x+c-1)/(c*f-d*e+f))-3*a*b
^2/(c*f-d*e-f)*arccoth(d*x+c)*polylog(2,(c*f-d*e-f)*(d*x+c+1)/(d*x+c-1)/(c*
f-d*e+f))-3*a*b^2/f*arccoth(d*x+c)^2*ln(((d*x+c+1)/(d*x+c-1)-1)*c*f+(1-(d*x
+c+1)/(d*x+c-1))*e*d+(-(d*x+c+1)/(d*x+c-1)-1)*f)+3*a^2*b*ln((d*x+c)*f-c*f+d
*e)/f*arccoth(d*x+c)-3*d*a*b^2/f*e/(c*f-d*e-f)*arccoth(d*x+c)^2*ln(1-(c*f-d
*e-f)*(d*x+c+1)/(d*x+c-1)/(c*f-d*e+f))-3*d*a*b^2/f*e/(c*f-d*e-f)*arccoth(d*
x+c)*polylog(2,(c*f-d*e-f)*(d*x+c+1)/(d*x+c-1)/(c*f-d*e+f))+1/2*I*b^3/f*Pi*
arccoth(d*x+c)^3*csgn(I/((d*x+c+1)/(d*x+c-1)-1))*csgn(I*(((d*x+c+1)/(d*x+c-
1)-1)*c*f+(1-(d*x+c+1)/(d*x+c-1))*e*d+(-(d*x+c+1)/(d*x+c-1)-1)*f))*csgn(I*(
((d*x+c+1)/(d*x+c-1)-1)*c*f+(1-(d*x+c+1)/(d*x+c-1))*e*d+(-(d*x+c+1)/(d*x+c-
1)-1)*f)/((d*x+c+1)/(d*x+c-1)-1))-3/2*I*a*b^2/f*Pi*arccoth(d*x+c)^2*csgn(I/
((d*x+c+1)/(d*x+c-1)-1))*csgn(I*(((d*x+c+1)/(d*x+c-1)-1)*c*f+(1-(d*x+c+1)/(
d*x+c-1))*e*d+(-(d*x+c+1)/(d*x+c-1)-1)*f)/((d*x+c+1)/(d*x+c-1)-1))^2-3/2*I*
a*b^2/f*Pi*arccoth(d*x+c)^2*csgn(I*(((d*x+c+1)/(d*x+c-1)-1)*c*f+(1-(d*x+c+1
)/(d*x+c-1))*e*d+(-(d*x+c+1)/(d*x+c-1)-1)*f))*csgn(I*(((d*x+c+1)/(d*x+c-1)-
1)*c*f+(1-(d*x+c+1)/(d*x+c-1))*e*d+(-(d*x+c+1)/(d*x+c-1)-1)*f)/((d*x+c+1)/(
d*x+c-1)-1))^2+3/2*I*a*b^2/f*Pi*arccoth(d*x+c)^2*csgn(I/((d*x+c+1)/(d*x+c-1
)-1))*csgn(I*(((d*x+c+1)/(d*x+c-1)-1)*c*f+(1-(d*x+c+1)/(d*x+c-1))*e*d+(-(d*
x+c+1)/(d*x+c-1)-1)*f))*csgn(I*(((d*x+c+1)/(d*x+c-1)-1)*c*f+(1-(d*x+c+1)/(d
*x+c-1))*e*d+(-(d*x+c+1)/(d*x+c-1)-1)*f)/((d*x+c+1)/(d*x+c-1)-1))-3/2*I*a*b
^2/f*Pi*arccoth(d*x+c)^2*csgn(I*(((d*x+c+1)/(d*x+c-1)-1)*c*f+(1-(d*x+c+1)/(
d*x+c-1))*e*d+(-(d*x+c+1)/(d*x+c-1)-1)*f)/((d*x+c+1)/(d*x+c-1)-1))^3+3*I*a*
b^2/f*Pi*arccoth(d*x+c)^2*csgn(I*(((d*x+c+1)/(d*x+c-1)-1)*c*f+(1-(d*x+c+1)/
(d*x+c-1))*e*d+(-(d*x+c+1)/(d*x+c-1)-1)*f)/((d*x+c+1)/(d*x+c-1)-1))^2+I*b^3
/f*Pi*arccoth(d*x+c)^3*csgn(I*(((d*x+c+1)/(d*x+c-1)-1)*c*f+(1-(d*x+c+1)/(d*
x+c-1))*e*d+(-(d*x+c+1)/(d*x+c-1)-1)*f)/((d*x+c+1)/(d*x+c-1)-1))^2+3*a*b^2*
c/(c*f-d*e-f)*arccoth(d*x+c)^2*ln(1-(c*f-d*e-f)*(d*x+c+1)/(d*x+c-1)/(c*f-d*
```

```
e+f))+3*a*b^2*c/(c*f-d*e-f)*arccoth(d*x+c)*polylog(2,(c*f-d*e-f)*(d*x+c+1)/
(d*x+c-1)/(c*f-d*e+f))-3/4*d*b^3/f*e/(c*f-d*e-f)*polylog(4,(c*f-d*e-f)*(d*x
+c+1)/(d*x+c-1)/(c*f-d*e+f))-1/2*I*b^3/f*Pi*arccoth(d*x+c)^3*csgn(I*(((d*x+
c+1)/(d*x+c-1)-1)*c*f+(1-(d*x+c+1)/(d*x+c-1))*e*d+(-(d*x+c+1)/(d*x+c-1)-1)*
f)/((d*x+c+1)/(d*x+c-1)-1))^3-3*I*a*b^2/f*Pi*arccoth(d*x+c)^2
```

**maxima [F]** time = 0.00, size = 0, normalized size = 0.00

$$\frac{a^3\log\left(fx+e\right)}{f}+\int\frac{b^3\left(\log\left(\frac{1}{dx+c}+1\right)-\log\left(-\frac{1}{dx+c}+1\right)\right)^3}{8\left(fx+e\right)}+\frac{3\,ab^2\left(\log\left(\frac{1}{dx+c}+1\right)-\log\left(-\frac{1}{dx+c}+1\right)\right)^2}{4\left(fx+e\right)}+\frac{3\,a^2b\left(1\right.}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccoth(d*x+c))^3/(f*x+e),x, algorithm="maxima")
```

```
[Out] a^3*log(f*x + e)/f + integrate(1/8*b^3*(log(1/(d*x + c) + 1) - log(-1/(d*x
+ c) + 1))^3/(f*x + e) + 3/4*a*b^2*(log(1/(d*x + c) + 1) - log(-1/(d*x + c)
 + 1))^2/(f*x + e) + 3/2*a^2*b*(log(1/(d*x + c) + 1) - log(-1/(d*x + c) + 1
))/(f*x + e), x)
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.00

$$\int\frac{{\left(a+b\,\mathrm{acoth}\left(c+d\,x\right)\right)}^3}{e+f\,x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a + b*acoth(c + d*x))^3/(e + f*x),x)
```

```
[Out] int((a + b*acoth(c + d*x))^3/(e + f*x), x)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int\frac{\left(a+b\operatorname{acoth}\left(c+dx\right)\right)^3}{e+fx}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*acoth(d*x+c))**3/(f*x+e),x)
```

```
[Out] Integral((a + b*acoth(c + d*x))**3/(e + f*x), x)
```

## 3.118 $\int \frac{\left(a+b\coth^{-1}(c+dx)\right)^3}{(e+fx)^2}\,dx$

**Optimal**. Leaf size=1089

$$\frac{3d\coth^{-1}(c+dx)^2\log\left(\frac{2}{-c-dx+1}\right)b^3}{2f(de-cf+f)}-\frac{3d\coth^{-1}(c+dx)^2\log\left(\frac{2}{c+dx+1}\right)b^3}{2f(de-cf-f)}+\frac{3d\coth^{-1}(c+dx)^2\log\left(\frac{2}{c+dx+1}\right)b^3}{(de-cf+f)(de-(c+1)f)}-\frac{3d}{}$$

```
[Out] -(a+b*arccoth(d*x+c))^3/f/(f*x+e)+3*a*b^2*d*arccoth(d*x+c)*ln(2/(-d*x-c+1))
/f/(-c*f+d*e+f)+3/2*b^3*d*arccoth(d*x+c)^2*ln(2/(-d*x-c+1))/f/(-c*f+d*e+f)-
3/2*a^2*b*d*ln(-d*x-c+1)/f/(-c*f+d*e+f)-3*a*b^2*d*arccoth(d*x+c)*ln(2/(d*x+
c+1))/f/(-c*f+d*e-f)+6*a*b^2*d*arccoth(d*x+c)*ln(2/(d*x+c+1))/(-c*f+d*e-f)/
(-c*f+d*e+f)-3/2*b^3*d*arccoth(d*x+c)^2*ln(2/(d*x+c+1))/f/(-c*f+d*e-f)+3*b^
3*d*arccoth(d*x+c)^2*ln(2/(d*x+c+1))/(-c*f+d*e-f)/(-c*f+d*e+f)+3/2*a^2*b*d*
ln(d*x+c+1)/f/(-c*f+d*e-f)+3*a^2*b*d*ln(f*x+e)/(f^2-(-c*f+d*e)^2)-6*a*b^2*d
*arccoth(d*x+c)*ln(2*d*(f*x+e)/(-c*f+d*e+f)/(d*x+c+1))/(-c*f+d*e-f)/(-c*f+d
*e+f)-3*b^3*d*arccoth(d*x+c)^2*ln(2*d*(f*x+e)/(-c*f+d*e+f)/(d*x+c+1))/(-c*f
+d*e-f)/(-c*f+d*e+f)+3/2*a*b^2*d*polylog(2,(-d*x-c-1)/(-d*x-c+1))/f/(-c*f+d
*e+f)+3/2*b^3*d*arccoth(d*x+c)*polylog(2,1-2/(-d*x-c+1))/f/(-c*f+d*e+f)+3/2
*a*b^2*d*polylog(2,1-2/(d*x+c+1))/f/(-c*f+d*e-f)-3*a*b^2*d*polylog(2,1-2/(d
*x+c+1))/(-c*f+d*e-f)/(-c*f+d*e+f)+3/2*b^3*d*arccoth(d*x+c)*polylog(2,1-2/(
d*x+c+1))/f/(-c*f+d*e-f)-3*b^3*d*arccoth(d*x+c)*polylog(2,1-2/(d*x+c+1))/(-
c*f+d*e-f)/(-c*f+d*e+f)+3*a*b^2*d*polylog(2,1-2*d*(f*x+e)/(-c*f+d*e+f)/(d*x
+c+1))/(-c*f+d*e-f)/(-c*f+d*e+f)+3*b^3*d*arccoth(d*x+c)*polylog(2,1-2*d*(f*
x+e)/(-c*f+d*e+f)/(d*x+c+1))/(-c*f+d*e-f)/(-c*f+d*e+f)-3/4*b^3*d*polylog(3,
1-2/(-d*x-c+1))/f/(-c*f+d*e+f)+3/4*b^3*d*polylog(3,1-2/(d*x+c+1))/f/(-c*f+d
*e-f)-3/2*b^3*d*polylog(3,1-2/(d*x+c+1))/(-c*f+d*e-f)/(-c*f+d*e+f)+3/2*b^3*
d*polylog(3,1-2*d*(f*x+e)/(-c*f+d*e+f)/(d*x+c+1))/(-c*f+d*e-f)/(-c*f+d*e+f)
```

**Rubi [A]** time = 2.78, antiderivative size = 1094, normalized size of antiderivative = 1.00, number of steps used = 30, number of rules used = 18, integrand size = 20, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.900, Rules used = {6110, 6741, 6122, 6688, 12, 6725, 72, 6742, 5919, 2402, 2315, 5921, 2447, 5949, 6059, 6610, 6057, 5923}

$$\frac{3d\coth^{-1}(c+dx)^2\log\left(\frac{2}{-c-dx+1}\right)b^3}{2f(de-cf+f)}-\frac{3d\coth^{-1}(c+dx)^2\log\left(\frac{2}{c+dx+1}\right)b^3}{2f(de-cf-f)}+\frac{3d\coth^{-1}(c+dx)^2\log\left(\frac{2}{c+dx+1}\right)b^3}{(de-cf+f)(de-(c+1)f)}-\frac{3d}{}$$

Antiderivative was successfully verified.

```
[In] Int[(a + b*ArcCoth[c + d*x])^3/(e + f*x)^2,x]
```

```
[Out] -((a + b*ArcCoth[c + d*x])^3/(f*(e + f*x))) + (3*a*b^2*d*ArcCoth[c + d*x]*L
og[2/(1 - c - d*x)])/(f*(d*e + f - c*f)) + (3*b^3*d*ArcCoth[c + d*x]^2*Log[
2/(1 - c - d*x)])/(2*f*(d*e + f - c*f)) - (3*a^2*b*d*Log[1 - c - d*x])/(2*f
*(d*e + f - c*f)) - (3*a*b^2*d*ArcCoth[c + d*x]*Log[2/(1 + c + d*x)])/(f*(d
*e - f - c*f)) + (6*a*b^2*d*ArcCoth[c + d*x]*Log[2/(1 + c + d*x)])/((d*e +
f - c*f)*(d*e - (1 + c)*f)) - (3*b^3*d*ArcCoth[c + d*x]^2*Log[2/(1 + c + d*
x)])/(2*f*(d*e - f - c*f)) + (3*b^3*d*ArcCoth[c + d*x]^2*Log[2/(1 + c + d*x
)])/((d*e + f - c*f)*(d*e - (1 + c)*f)) + (3*a^2*b*d*Log[1 + c + d*x])/(2*f
*(d*e - f - c*f)) - (3*a^2*b*d*Log[e + f*x])/((d*e + f - c*f)*(d*e - (1 + c
)*f)) - (6*a*b^2*d*ArcCoth[c + d*x]*Log[(2*d*(e + f*x))/((d*e + f - c*f)*(1
 + c + d*x))])/((d*e + f - c*f)*(d*e - (1 + c)*f)) - (3*b^3*d*ArcCoth[c + d
*x]^2*Log[(2*d*(e + f*x))/((d*e + f - c*f)*(1 + c + d*x))])/((d*e + f - c*f
)*(d*e - (1 + c)*f)) + (3*a*b^2*d*PolyLog[2, -((1 + c + d*x)/(1 - c - d*x))
])/(2*f*(d*e + f - c*f)) + (3*b^3*d*ArcCoth[c + d*x]*PolyLog[2, 1 - 2/(1 -
c - d*x)])/(2*f*(d*e + f - c*f)) + (3*a*b^2*d*PolyLog[2, 1 - 2/(1 + c + d*x
)])/(2*f*(d*e - f - c*f)) - (3*a*b^2*d*PolyLog[2, 1 - 2/(1 + c + d*x)])/((d
*e + f - c*f)*(d*e - (1 + c)*f)) + (3*b^3*d*ArcCoth[c + d*x]*PolyLog[2, 1 -
```

```
 2/(1 + c + d*x)])/(2*f*(d*e - f - c*f)) - (3*b^3*d*ArcCoth[c + d*x]*PolyLo
g[2, 1 - 2/(1 + c + d*x)])/((d*e + f - c*f)*(d*e - (1 + c)*f)) + (3*a*b^2*d
*PolyLog[2, 1 - (2*d*(e + f*x))/((d*e + f - c*f)*(1 + c + d*x))])/((d*e + f
 - c*f)*(d*e - (1 + c)*f)) + (3*b^3*d*ArcCoth[c + d*x]*PolyLog[2, 1 - (2*d*
(e + f*x))/((d*e + f - c*f)*(1 + c + d*x))])/((d*e + f - c*f)*(d*e - (1 + c
)*f)) - (3*b^3*d*PolyLog[3, 1 - 2/(1 - c - d*x)])/(4*f*(d*e + f - c*f)) + (
3*b^3*d*PolyLog[3, 1 - 2/(1 + c + d*x)])/(4*f*(d*e - f - c*f)) - (3*b^3*d*P
olyLog[3, 1 - 2/(1 + c + d*x)])/(2*(d*e + f - c*f)*(d*e - (1 + c)*f)) + (3*
b^3*d*PolyLog[3, 1 - (2*d*(e + f*x))/((d*e + f - c*f)*(1 + c + d*x))])/(2*(
d*e + f - c*f)*(d*e - (1 + c)*f))
```

Rule 12

```
Int[(a_)*(u_), x_Symbol] :> Dist[a, Int[u, x], x] /; FreeQ[a, x] &&  !Match
Q[u, (b_)*(v_) /; FreeQ[b, x]]
```

Rule 72

```
Int[((e_.) + (f_.)*(x_))^(p_.)/(((a_.) + (b_.)*(x_))*((c_.) + (d_.)*(x_))),
 x_Symbol] :> Int[ExpandIntegrand[(e + f*x)^p/((a + b*x)*(c + d*x)), x], x]
 /; FreeQ[{a, b, c, d, e, f}, x] && IntegerQ[p]
```

Rule 2315

```
Int[Log[(c_.)*(x_)]/((d_) + (e_.)*(x_)), x_Symbol] :> -Simp[PolyLog[2, 1 -
c*x]/e, x] /; FreeQ[{c, d, e}, x] && EqQ[e + c*d, 0]
```

Rule 2402

```
Int[Log[(c_.)/((d_) + (e_.)*(x_))]/((f_) + (g_.)*(x_)^2), x_Symbol] :> -Dis
t[e/g, Subst[Int[Log[2*d*x]/(1 - 2*d*x), x], x, 1/(d + e*x)], x] /; FreeQ[{
c, d, e, f, g}, x] && EqQ[c, 2*d] && EqQ[e^2*f + d^2*g, 0]
```

Rule 2447

```
Int[Log[u_]*(Pq_)^(m_.), x_Symbol] :> With[{C = FullSimplify[(Pq^m*(1 - u))
/D[u, x]]}, Simp[C*PolyLog[2, 1 - u], x] /; FreeQ[C, x]] /; IntegerQ[m] &&
PolyQ[Pq, x] && RationalFunctionQ[u, x] && LeQ[RationalFunctionExponents[u,
 x][[2]], Expon[Pq, x]]
```

Rule 5919

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)/((d_) + (e_.)*(x_)), x_Symbol
] :> -Simp[((a + b*ArcCoth[c*x])^p*Log[2/(1 + (e*x)/d)])/e, x] + Dist[(b*c*
p)/e, Int[((a + b*ArcCoth[c*x])^(p - 1)*Log[2/(1 + (e*x)/d)])/(1 - c^2*x^2)
, x], x] /; FreeQ[{a, b, c, d, e}, x] && IGtQ[p, 0] && EqQ[c^2*d^2 - e^2, 0
]
```

Rule 5921

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))/((d_) + (e_.)*(x_)), x_Symbol] :> -
Simp[((a + b*ArcCoth[c*x])*Log[2/(1 + c*x)])/e, x] + (Dist[(b*c)/e, Int[Log
[2/(1 + c*x)]/(1 - c^2*x^2), x], x] - Dist[(b*c)/e, Int[Log[(2*c*(d + e*x))
/((c*d + e)*(1 + c*x))]/(1 - c^2*x^2), x], x] + Simp[((a + b*ArcCoth[c*x])*
Log[(2*c*(d + e*x))/((c*d + e)*(1 + c*x))])/e, x]) /; FreeQ[{a, b, c, d, e}
, x] && NeQ[c^2*d^2 - e^2, 0]
```

Rule 5923

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^2/((d_) + (e_.)*(x_)), x_Symbol] :>
```

```
-Simp[((a + b*ArcCoth[c*x])^2*Log[2/(1 + c*x)])/e, x] + (Simp[((a + b*ArcC
oth[c*x])^2*Log[(2*c*(d + e*x))/((c*d + e)*(1 + c*x))])/e, x] + Simp[(b*(a
+ b*ArcCoth[c*x])*PolyLog[2, 1 - 2/(1 + c*x)])/e, x] - Simp[(b*(a + b*ArcCo
th[c*x])*PolyLog[2, 1 - (2*c*(d + e*x))/((c*d + e)*(1 + c*x))])/e, x] + Sim
p[(b^2*PolyLog[3, 1 - 2/(1 + c*x)])/(2*e), x] - Simp[(b^2*PolyLog[3, 1 - (2
*c*(d + e*x))/((c*d + e)*(1 + c*x))])/(2*e), x]) /; FreeQ[{a, b, c, d, e},
x] && NeQ[c^2*d^2 - e^2, 0]
```

Rule 5949

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)/((d_) + (e_.)*(x_)^2), x_Symb
ol] :> Simp[(a + b*ArcCoth[c*x])^(p + 1)/(b*c*d*(p + 1)), x] /; FreeQ[{a, b
, c, d, e, p}, x] && EqQ[c^2*d + e, 0] && NeQ[p, -1]
```

Rule 6057

```
Int[(Log[u_]*((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.))/((d_) + (e_.)*(x_)^
2), x_Symbol] :> Simp[((a + b*ArcCoth[c*x])^p*PolyLog[2, 1 - u])/(2*c*d), x
] - Dist[(b*p)/2, Int[((a + b*ArcCoth[c*x])^(p - 1)*PolyLog[2, 1 - u])/(d +
 e*x^2), x], x] /; FreeQ[{a, b, c, d, e}, x] && IGtQ[p, 0] && EqQ[c^2*d + e
, 0] && EqQ[(1 - u)^2 - (1 - 2/(1 + c*x))^2, 0]
```

Rule 6059

```
Int[(Log[u_]*((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.))/((d_) + (e_.)*(x_)^
2), x_Symbol] :> -Simp[((a + b*ArcCoth[c*x])^p*PolyLog[2, 1 - u])/(2*c*d),
x] + Dist[(b*p)/2, Int[((a + b*ArcCoth[c*x])^(p - 1)*PolyLog[2, 1 - u])/(d
+ e*x^2), x], x] /; FreeQ[{a, b, c, d, e}, x] && IGtQ[p, 0] && EqQ[c^2*d +
e, 0] && EqQ[(1 - u)^2 - (1 - 2/(1 - c*x))^2, 0]
```

Rule 6110

```
Int[((a_.) + ArcCoth[(c_) + (d_.)*(x_)]*(b_.))^(p_.)*((e_.) + (f_.)*(x_))^(
m_), x_Symbol] :> Simp[((e + f*x)^(m + 1)*(a + b*ArcCoth[c + d*x])^p)/(f*(m
 + 1)), x] - Dist[(b*d*p)/(f*(m + 1)), Int[((e + f*x)^(m + 1)*(a + b*ArcCot
h[c + d*x])^(p - 1))/(1 - (c + d*x)^2), x], x] /; FreeQ[{a, b, c, d, e, f},
 x] && IGtQ[p, 0] && ILtQ[m, -1]
```

Rule 6122

```
Int[((a_.) + ArcCoth[(c_) + (d_.)*(x_)]*(b_.))^(p_.)*((e_.) + (f_.)*(x_))^(
m_.)*((A_.) + (B_.)*(x_) + (C_.)*(x_)^2)^(q_.), x_Symbol] :> Dist[1/d, Subs
t[Int[((d*e - c*f)/d + (f*x)/d)^m*(-(C/d^2) + (C*x^2)/d^2)^q*(a + b*ArcCoth
[x])^p, x], x, c + d*x], x] /; FreeQ[{a, b, c, d, e, f, A, B, C, m, p, q},
x] && EqQ[B*(1 - c^2) + 2*A*c*d, 0] && EqQ[2*c*C - B*d, 0]
```

Rule 6610

```
Int[(u_)*PolyLog[n_, v_], x_Symbol] :> With[{w = DerivativeDivides[v, u*v,
x]}, Simp[w*PolyLog[n + 1, v], x] /;  !FalseQ[w]] /; FreeQ[n, x]
```

Rule 6688

```
Int[u_, x_Symbol] :> With[{v = SimplifyIntegrand[u, x]}, Int[v, x] /; Simpl
erIntegrandQ[v, u, x]]
```

Rule 6725

```
Int[(u_)/((a_) + (b_.)*(x_)^(n_)), x_Symbol] :> With[{v = RationalFunctionE
```

```
xpand[u/(a + b*x^n), x]}, Int[v, x] /; SumQ[v]] /; FreeQ[{a, b}, x] && IGtQ
[n, 0]
```

Rule 6741

```
Int[u_, x_Symbol] :> With[{v = NormalizeIntegrand[u, x]}, Int[v, x] /; v =!
= u]
```

Rule 6742

```
Int[u_, x_Symbol] :> With[{v = ExpandIntegrand[u, x]}, Int[v, x] /; SumQ[v]
]
```

Rubi steps

$$\int \frac{\left(a+b\coth^{-1}(c+dx)\right)^3}{(e+fx)^2}\,dx = -\frac{\left(a+b\coth^{-1}(c+dx)\right)^3}{f(e+fx)} + \frac{(3bd)\int \frac{\left(a+b\coth^{-1}(c+dx)\right)^2}{(e+fx)\left(1-(c+dx)^2\right)}\,dx}{f}$$

$$= -\frac{\left(a+b\coth^{-1}(c+dx)\right)^3}{f(e+fx)} + \frac{(3bd)\int \frac{\left(a+b\coth^{-1}(c+dx)\right)^2}{(e+fx)\left(1-c^2-2cdx-d^2x^2\right)}\,dx}{f}$$

$$= -\frac{\left(a+b\coth^{-1}(c+dx)\right)^3}{f(e+fx)} + \frac{(3b)\,\text{Subst}\left(\int \frac{\left(a+b\coth^{-1}(x)\right)^2}{\left(\frac{de-cf}{d}+\frac{fx}{d}\right)(1-x^2)}\,dx, x, c+dx\right)}{f}$$

$$= -\frac{\left(a+b\coth^{-1}(c+dx)\right)^3}{f(e+fx)} + \frac{(3b)\,\text{Subst}\left(\int \frac{d\left(a+b\coth^{-1}(x)\right)^2}{(de-cf+fx)(1-x^2)}\,dx, x, c+dx\right)}{f}$$

$$= -\frac{\left(a+b\coth^{-1}(c+dx)\right)^3}{f(e+fx)} + \frac{(3bd)\,\text{Subst}\left(\int \frac{\left(a+b\coth^{-1}(x)\right)^2}{(de-cf+fx)(1-x^2)}\,dx, x, c+dx\right)}{f}$$

$$= -\frac{\left(a+b\coth^{-1}(c+dx)\right)^3}{f(e+fx)} + \frac{(3bd)\,\text{Subst}\left(\int \left(-\frac{a^2}{(-1+x)(1+x)(de-cf+fx)} - \frac{2ab\coth^{-1}}{(-1+x)(1+x)(de}\right.\right.}{f}$$

$$= -\frac{\left(a+b\coth^{-1}(c+dx)\right)^3}{f(e+fx)} - \frac{\left(3a^2bd\right)\text{Subst}\left(\int \frac{1}{(-1+x)(1+x)(de-cf+fx)}\,dx, x, c+dx\right)}{f} -$$

$$= -\frac{\left(a+b\coth^{-1}(c+dx)\right)^3}{f(e+fx)} - \frac{\left(3a^2bd\right)\text{Subst}\left(\int \left(\frac{1}{2(de+f-cf)(-1+x)} + \frac{1}{2(-de+(1+c)f)(1+x}\right.\right.}{f}$$

$$= -\frac{\left(a+b\coth^{-1}(c+dx)\right)^3}{f(e+fx)} - \frac{3a^2bd\log(1-c-dx)}{2f(de+f-cf)} + \frac{3a^2bd\log(1+c+dx)}{2f(de-f-cf)} - \frac{}{(de}$$

$$= -\frac{\left(a+b\coth^{-1}(c+dx)\right)^3}{f(e+fx)} + \frac{3ab^2d\coth^{-1}(c+dx)\log\left(\frac{2}{1-c-dx}\right)}{f(de+f-cf)} + \frac{3b^3d\coth^{-1}(c}{2f(de}$$

$$= -\frac{\left(a+b\coth^{-1}(c+dx)\right)^3}{f(e+fx)} + \frac{3ab^2d\coth^{-1}(c+dx)\log\left(\frac{2}{1-c-dx}\right)}{f(de+f-cf)} + \frac{3b^3d\coth^{-1}(c}{2f(de}$$

$$= -\frac{\left(a+b\coth^{-1}(c+dx)\right)^3}{f(e+fx)} + \frac{3ab^2d\coth^{-1}(c+dx)\log\left(\frac{2}{1-c-dx}\right)}{f(de+f-cf)} + \frac{3b^3d\coth^{-1}(c}{2f(de}$$

**Mathematica [C]** time = 31.31, size = 3937, normalized size = 3.62

Result too large to show

Warning: Unable to verify antiderivative.

```
[In] Integrate[(a + b*ArcCoth[c + d*x])^3/(e + f*x)^2,x]
```

```
[Out] -(a^3/(f*(e + f*x))) - (3*a^2*b*ArcCoth[c + d*x])/(f*(e + f*x)) + (3*a^2*b*
d*Log[1 - c - d*x])/(2*f*(-(d*e) - f + c*f)) - (3*a^2*b*d*Log[1 + c + d*x])
/(2*f*(-(d*e) + f + c*f)) - (3*a^2*b*d*Log[e + f*x])/(d^2*e^2 - 2*c*d*e*f -
 f^2 + c^2*f^2) + (3*a*b^2*(1 - (c + d*x)^2)*(f/Sqrt[1 - (c + d*x)^(-2)] +
(d*e - c*f)/((c + d*x)*Sqrt[1 - (c + d*x)^(-2)]))^2*((E^ArcTanh[f/(-(d*e) +
```

```
 c*f)]*ArcCoth[c + d*x]^2)/((-(d*e) + c*f)*Sqrt[1 - f^2/(d*e - c*f)^2]) + A
rcCoth[c + d*x]^2/((c + d*x)*Sqrt[1 - (c + d*x)^(-2)]*(f/Sqrt[1 - (c + d*x)
^(-2)] + (d*e - c*f)/((c + d*x)*Sqrt[1 - (c + d*x)^(-2)])))) + (f*(I*Pi*ArcC
oth[c + d*x] + 2*ArcCoth[c + d*x]*ArcTanh[f/(d*e - c*f)] - I*Pi*Log[1 + E^(
2*ArcCoth[c + d*x])] + 2*ArcCoth[c + d*x]*Log[1 - E^(-2*(ArcCoth[c + d*x] +
 ArcTanh[f/(d*e - c*f)]))] - 2*ArcTanh[f/(-(d*e) + c*f)]*Log[1 - E^(-2*(Arc
Coth[c + d*x] + ArcTanh[f/(d*e - c*f)]))] + I*Pi*Log[1/Sqrt[1 - (c + d*x)^(
-2)]] + 2*ArcTanh[f/(-(d*e) + c*f)]*Log[I*Sinh[ArcCoth[c + d*x] + ArcTanh[f
/(d*e - c*f)]]] - PolyLog[2, E^(-2*(ArcCoth[c + d*x] + ArcTanh[f/(d*e - c*f
)]))]))/(d^2*e^2 - 2*c*d*e*f + (-1 + c^2)*f^2)))/(d*f*(e + f*x)^2) - (b^3*(
1 - (c + d*x)^2)*(f/Sqrt[1 - (c + d*x)^(-2)] + (d*e - c*f)/((c + d*x)*Sqrt[
1 - (c + d*x)^(-2)]))^2*((d*ArcCoth[c + d*x]^3)/(f*(c + d*x)*Sqrt[1 - (c +
d*x)^(-2)]*(-(f/Sqrt[1 - (c + d*x)^(-2)]) - (d*e)/((c + d*x)*Sqrt[1 - (c +
d*x)^(-2)]) + (c*f)/((c + d*x)*Sqrt[1 - (c + d*x)^(-2)]))) - (d*(2*d^2*e^2*
ArcCoth[c + d*x]^3 - 8*d*e*f*ArcCoth[c + d*x]^3 - 4*c*d*e*f*ArcCoth[c + d*x
]^3 + 4*d*e*E^(2*ArcTanh[f/(d*e - c*f)])*f*ArcCoth[c + d*x]^3 - 10*f^2*ArcC
oth[c + d*x]^3 + 8*c*f^2*ArcCoth[c + d*x]^3 + 2*c^2*f^2*ArcCoth[c + d*x]^3
- 4*E^(2*ArcTanh[f/(d*e - c*f)])*f^2*ArcCoth[c + d*x]^3 - 4*c*E^(2*ArcTanh[
f/(d*e - c*f)])*f^2*ArcCoth[c + d*x]^3 - (4*d^2*e^2*Sqrt[(d^2*e^2 - 2*c*d*e
*f + (-1 + c^2)*f^2)/(d*e - c*f)^2]*ArcCoth[c + d*x]^3)/E^ArcTanh[f/(d*e -
c*f)] - (4*d*e*f*Sqrt[(d^2*e^2 - 2*c*d*e*f + (-1 + c^2)*f^2)/(d*e - c*f)^2]
*ArcCoth[c + d*x]^3)/E^ArcTanh[f/(d*e - c*f)] + (8*c*d*e*f*Sqrt[(d^2*e^2 -
2*c*d*e*f + (-1 + c^2)*f^2)/(d*e - c*f)^2]*ArcCoth[c + d*x]^3)/E^ArcTanh[f/
(d*e - c*f)] + (4*c*f^2*Sqrt[(d^2*e^2 - 2*c*d*e*f + (-1 + c^2)*f^2)/(d*e -
c*f)^2]*ArcCoth[c + d*x]^3)/E^ArcTanh[f/(d*e - c*f)] - (4*c^2*f^2*Sqrt[(d^2
*e^2 - 2*c*d*e*f + (-1 + c^2)*f^2)/(d*e - c*f)^2]*ArcCoth[c + d*x]^3)/E^Arc
Tanh[f/(d*e - c*f)] + (6*I)*d*e*f*Pi*ArcCoth[c + d*x]*Log[2] + (6*I)*f^2*Pi
*ArcCoth[c + d*x]*Log[2] - (6*I)*c*f^2*Pi*ArcCoth[c + d*x]*Log[2] - d*e*f*A
rcCoth[c + d*x]^2*Log[64] - f^2*ArcCoth[c + d*x]^2*Log[64] + c*f^2*ArcCoth[
c + d*x]^2*Log[64] - (6*I)*d*e*f*Pi*ArcCoth[c + d*x]*Log[E^(-ArcCoth[c + d*
x]) + E^ArcCoth[c + d*x]] - (6*I)*f^2*Pi*ArcCoth[c + d*x]*Log[E^(-ArcCoth[c
 + d*x]) + E^ArcCoth[c + d*x]] + (6*I)*c*f^2*Pi*ArcCoth[c + d*x]*Log[E^(-Ar
cCoth[c + d*x]) + E^ArcCoth[c + d*x]] + 6*d*e*f*ArcCoth[c + d*x]^2*Log[1 -
E^(2*(ArcCoth[c + d*x] + ArcTanh[f/(d*e - c*f)]))] - 6*d*e*E^(2*ArcTanh[f/(
d*e - c*f)])*f*ArcCoth[c + d*x]^2*Log[1 - E^(2*(ArcCoth[c + d*x] + ArcTanh[
f/(d*e - c*f)]))] + 6*f^2*ArcCoth[c + d*x]^2*Log[1 - E^(2*(ArcCoth[c + d*x]
 + ArcTanh[f/(d*e - c*f)]))] - 6*c*f^2*ArcCoth[c + d*x]^2*Log[1 - E^(2*(Arc
Coth[c + d*x] + ArcTanh[f/(d*e - c*f)]))] + 6*E^(2*ArcTanh[f/(d*e - c*f)])*
f^2*ArcCoth[c + d*x]^2*Log[1 - E^(2*(ArcCoth[c + d*x] + ArcTanh[f/(d*e - c*
f)]))] + 6*c*E^(2*ArcTanh[f/(d*e - c*f)])*f^2*ArcCoth[c + d*x]^2*Log[1 - E^
(2*(ArcCoth[c + d*x] + ArcTanh[f/(d*e - c*f)]))] + 12*d*e*f*ArcCoth[c + d*x
]*ArcTanh[f/(d*e - c*f)]*Log[(I/2)*E^(-ArcCoth[c + d*x] - ArcTanh[f/(d*e -
c*f)])*(-1 + E^(2*(ArcCoth[c + d*x] + ArcTanh[f/(d*e - c*f)])))] + 12*f^2*A
rcCoth[c + d*x]*ArcTanh[f/(d*e - c*f)]*Log[(I/2)*E^(-ArcCoth[c + d*x] - Arc
Tanh[f/(d*e - c*f)])*(-1 + E^(2*(ArcCoth[c + d*x] + ArcTanh[f/(d*e - c*f)])
))] - 12*c*f^2*ArcCoth[c + d*x]*ArcTanh[f/(d*e - c*f)]*Log[(I/2)*E^(-ArcCot
h[c + d*x] - ArcTanh[f/(d*e - c*f)])*(-1 + E^(2*(ArcCoth[c + d*x] + ArcTanh
[f/(d*e - c*f)])))] + 6*d*e*f*ArcCoth[c + d*x]^2*Log[-((d*e*(-1 + E^(2*ArcC
oth[c + d*x])) + (1 + c + E^(2*ArcCoth[c + d*x]) - c*E^(2*ArcCoth[c + d*x])
)*f)/E^ArcCoth[c + d*x])] + 6*f^2*ArcCoth[c + d*x]^2*Log[-((d*e*(-1 + E^(2*
ArcCoth[c + d*x])) + (1 + c + E^(2*ArcCoth[c + d*x]) - c*E^(2*ArcCoth[c + d
*x]))*f)/E^ArcCoth[c + d*x])] - 6*c*f^2*ArcCoth[c + d*x]^2*Log[-((d*e*(-1 +
 E^(2*ArcCoth[c + d*x])) + (1 + c + E^(2*ArcCoth[c + d*x]) - c*E^(2*ArcCoth
[c + d*x]))*f)/E^ArcCoth[c + d*x])] + 6*d*e*f*ArcCoth[c + d*x]^2*Log[1 - (E
^ArcCoth[c + d*x]*Sqrt[d*e + f - c*f])/Sqrt[d*e - (1 + c)*f]] + 6*f^2*ArcCo
th[c + d*x]^2*Log[1 - (E^ArcCoth[c + d*x]*Sqrt[d*e + f - c*f])/Sqrt[d*e - (
1 + c)*f]] - 6*c*f^2*ArcCoth[c + d*x]^2*Log[1 - (E^ArcCoth[c + d*x]*Sqrt[d*
e + f - c*f])/Sqrt[d*e - (1 + c)*f]] + 6*d*e*f*ArcCoth[c + d*x]^2*Log[1 + (
E^ArcCoth[c + d*x]*Sqrt[d*e + f - c*f])/Sqrt[d*e - (1 + c)*f]] + 6*f^2*ArcC
```

```
oth[c + d*x]^2*Log[1 + (E^ArcCoth[c + d*x]*Sqrt[d*e + f - c*f])/Sqrt[d*e -
(1 + c)*f]] - 6*c*f^2*ArcCoth[c + d*x]^2*Log[1 + (E^ArcCoth[c + d*x]*Sqrt[d
*e + f - c*f])/Sqrt[d*e - (1 + c)*f]] + (6*I)*d*e*f*Pi*ArcCoth[c + d*x]*Log
[1/Sqrt[1 - (c + d*x)^(-2)]] + (6*I)*f^2*Pi*ArcCoth[c + d*x]*Log[1/Sqrt[1 -
 (c + d*x)^(-2)]] - (6*I)*c*f^2*Pi*ArcCoth[c + d*x]*Log[1/Sqrt[1 - (c + d*x
)^(-2)]] - 6*d*e*f*ArcCoth[c + d*x]^2*Log[-(f/Sqrt[1 - (c + d*x)^(-2)]) - (
d*e)/((c + d*x)*Sqrt[1 - (c + d*x)^(-2)]) + (c*f)/((c + d*x)*Sqrt[1 - (c +
d*x)^(-2)])] - 6*f^2*ArcCoth[c + d*x]^2*Log[-(f/Sqrt[1 - (c + d*x)^(-2)]) -
 (d*e)/((c + d*x)*Sqrt[1 - (c + d*x)^(-2)]) + (c*f)/((c + d*x)*Sqrt[1 - (c
+ d*x)^(-2)])] + 6*c*f^2*ArcCoth[c + d*x]^2*Log[-(f/Sqrt[1 - (c + d*x)^(-2)
]) - (d*e)/((c + d*x)*Sqrt[1 - (c + d*x)^(-2)]) + (c*f)/((c + d*x)*Sqrt[1 -
 (c + d*x)^(-2)])] - 12*d*e*f*ArcCoth[c + d*x]*ArcTanh[f/(d*e - c*f)]*Log[I
*Sinh[ArcCoth[c + d*x] + ArcTanh[f/(d*e - c*f)]]] - 12*f^2*ArcCoth[c + d*x]
*ArcTanh[f/(d*e - c*f)]*Log[I*Sinh[ArcCoth[c + d*x] + ArcTanh[f/(d*e - c*f)
]]] + 12*c*f^2*ArcCoth[c + d*x]*ArcTanh[f/(d*e - c*f)]*Log[I*Sinh[ArcCoth[c
 + d*x] + ArcTanh[f/(d*e - c*f)]]] + 6*f*(-(d*e*(-1 + E^(2*ArcTanh[f/(d*e -
 c*f)]))) + (1 + E^(2*ArcTanh[f/(d*e - c*f)]) + c*(-1 + E^(2*ArcTanh[f/(d*e
 - c*f)])))*f)*ArcCoth[c + d*x]*PolyLog[2, E^(2*(ArcCoth[c + d*x] + ArcTanh
[f/(d*e - c*f)]))] + 12*f*(d*e + f - c*f)*ArcCoth[c + d*x]*PolyLog[2, -((E^
ArcCoth[c + d*x]*Sqrt[d*e + f - c*f])/Sqrt[d*e - (1 + c)*f])] + 12*d*e*f*Ar
cCoth[c + d*x]*PolyLog[2, (E^ArcCoth[c + d*x]*Sqrt[d*e + f - c*f])/Sqrt[d*e
 - (1 + c)*f]] + 12*f^2*ArcCoth[c + d*x]*PolyLog[2, (E^ArcCoth[c + d*x]*Sqr
t[d*e + f - c*f])/Sqrt[d*e - (1 + c)*f]] - 12*c*f^2*ArcCoth[c + d*x]*PolyLo
g[2, (E^ArcCoth[c + d*x]*Sqrt[d*e + f - c*f])/Sqrt[d*e - (1 + c)*f]] - 3*d*
e*f*PolyLog[3, E^(2*(ArcCoth[c + d*x] + ArcTanh[f/(d*e - c*f)]))] + 3*d*e*E
^(2*ArcTanh[f/(d*e - c*f)])*f*PolyLog[3, E^(2*(ArcCoth[c + d*x] + ArcTanh[f
/(d*e - c*f)]))] - 3*f^2*PolyLog[3, E^(2*(ArcCoth[c + d*x] + ArcTanh[f/(d*e
 - c*f)]))] + 3*c*f^2*PolyLog[3, E^(2*(ArcCoth[c + d*x] + ArcTanh[f/(d*e -
c*f)]))] - 3*E^(2*ArcTanh[f/(d*e - c*f)])*f^2*PolyLog[3, E^(2*(ArcCoth[c +
d*x] + ArcTanh[f/(d*e - c*f)]))] - 3*c*E^(2*ArcTanh[f/(d*e - c*f)])*f^2*Pol
yLog[3, E^(2*(ArcCoth[c + d*x] + ArcTanh[f/(d*e - c*f)]))] - 12*d*e*f*PolyL
og[3, -((E^ArcCoth[c + d*x]*Sqrt[d*e + f - c*f])/Sqrt[d*e - (1 + c)*f])] -
12*f^2*PolyLog[3, -((E^ArcCoth[c + d*x]*Sqrt[d*e + f - c*f])/Sqrt[d*e - (1
+ c)*f])] + 12*c*f^2*PolyLog[3, -((E^ArcCoth[c + d*x]*Sqrt[d*e + f - c*f])/
Sqrt[d*e - (1 + c)*f])] - 12*d*e*f*PolyLog[3, (E^ArcCoth[c + d*x]*Sqrt[d*e
+ f - c*f])/Sqrt[d*e - (1 + c)*f]] - 12*f^2*PolyLog[3, (E^ArcCoth[c + d*x]*
Sqrt[d*e + f - c*f])/Sqrt[d*e - (1 + c)*f]] + 12*c*f^2*PolyLog[3, (E^ArcCot
h[c + d*x]*Sqrt[d*e + f - c*f])/Sqrt[d*e - (1 + c)*f]]))/(2*f*(d*e + f - c*
f)^2*(d*e - (1 + c)*f))))/(d^2*(e + f*x)^2)
```

**fricas [F]** time = 0.56, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{b^3\operatorname{arcoth}(dx+c)^3+3\,ab^2\operatorname{arcoth}(dx+c)^2+3\,a^2b\operatorname{arcoth}(dx+c)+a^3}{f^2x^2+2\,efx+e^2},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccoth(d*x+c))^3/(f*x+e)^2,x, algorithm="fricas")
```

```
[Out] integral((b^3*arccoth(d*x + c)^3 + 3*a*b^2*arccoth(d*x + c)^2 + 3*a^2*b*arc
coth(d*x + c) + a^3)/(f^2*x^2 + 2*e*f*x + e^2), x)
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int\frac{(b\operatorname{arcoth}(dx+c)+a)^3}{(fx+e)^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccoth(d*x+c))^3/(f*x+e)^2,x, algorithm="giac")
```

```
[Out] integrate((b*arccoth(d*x + c) + a)^3/(f*x + e)^2, x)
```

**maple [C]** time = 1.32, size = 4619, normalized size = 4.24

output too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a+b*arccoth(d*x+c))^3/(f*x+e)^2,x)
```

```
[Out] -3/4*I*d*b^3/(c*f-d*e-f)/(c*f-d*e+f)*arccoth(d*x+c)^2*Pi*c*csgn(I*(d*x+c+1)
/(d*x+c-1))*csgn(I/((d*x+c+1)/(d*x+c-1)-1))*csgn(I*(d*x+c+1)/(d*x+c-1)/((d*
x+c+1)/(d*x+c-1)-1))-3/4*I*d^2*b^3/f/(c*f-d*e-f)/(c*f-d*e+f)*arccoth(d*x+c)
^2*Pi*e*csgn(I*(d*x+c+1)/(d*x+c-1))*csgn(I*(d*x+c+1)/(d*x+c-1)/((d*x+c+1)/(
d*x+c-1)-1))^2-3/2*I*d^2*b^3/f/(c*f-d*e-f)/(c*f-d*e+f)*arccoth(d*x+c)^2*Pi*
e*csgn(I/((d*x+c-1)/(d*x+c+1))^(1/2))*csgn(I*(d*x+c+1)/(d*x+c-1))^2-3/4*I*d
^2*b^3/f/(c*f-d*e-f)/(c*f-d*e+f)*arccoth(d*x+c)^2*Pi*e*csgn(I/((d*x+c+1)/(d
*x+c-1)-1))*csgn(I*(d*x+c+1)/(d*x+c-1)/((d*x+c+1)/(d*x+c-1)-1))^2+3/4*I*d^2
*b^3/f/(c*f-d*e-f)/(c*f-d*e+f)*arccoth(d*x+c)^2*Pi*e*csgn(I/((d*x+c-1)/(d*x
+c+1))^(1/2))^2*csgn(I*(d*x+c+1)/(d*x+c-1))-d*a^3/(d*f*x+d*e)/f+3/4*I*d*b^3
/(c*f-d*e-f)/(c*f-d*e+f)*arccoth(d*x+c)^2*Pi*csgn(I/((d*x+c-1)/(d*x+c+1))^(
1/2))^2*csgn(I*(d*x+c+1)/(d*x+c-1))+3/2*I*d*b^3/(c*f-d*e-f)/(c*f-d*e+f)*arc
coth(d*x+c)^2*Pi*csgn(I/((d*x+c+1)/(d*x+c-1)-1))*csgn(I*(((d*x+c+1)/(d*x+c-
1)-1)*c*f+(1-(d*x+c+1)/(d*x+c-1))*e*d+(-(d*x+c+1)/(d*x+c-1)-1)*f)/((d*x+c+1
)/(d*x+c-1)-1))^2-3/4*I*d*b^3/(c*f-d*e-f)/(c*f-d*e+f)*arccoth(d*x+c)^2*Pi*c
sgn(I*(d*x+c+1)/(d*x+c-1))*csgn(I*(d*x+c+1)/(d*x+c-1)/((d*x+c+1)/(d*x+c-1)-
1))^2-3/2*I*d*b^3/(c*f-d*e-f)/(c*f-d*e+f)*arccoth(d*x+c)^2*Pi*csgn(I/((d*x+
c-1)/(d*x+c+1))^(1/2))*csgn(I*(d*x+c+1)/(d*x+c-1))^2-3/4*I*d*b^3/(c*f-d*e-f
)/(c*f-d*e+f)*arccoth(d*x+c)^2*Pi*csgn(I/((d*x+c+1)/(d*x+c-1)-1))*csgn(I*(d
*x+c+1)/(d*x+c-1)/((d*x+c+1)/(d*x+c-1)-1))^2+3/2*I*d*b^3/(c*f-d*e-f)/(c*f-d
*e+f)*arccoth(d*x+c)^2*Pi*csgn(I*(((d*x+c+1)/(d*x+c-1)-1)*c*f+(1-(d*x+c+1)/
(d*x+c-1))*e*d+(-(d*x+c+1)/(d*x+c-1)-1)*f))*csgn(I*(((d*x+c+1)/(d*x+c-1)-1)
*c*f+(1-(d*x+c+1)/(d*x+c-1))*e*d+(-(d*x+c+1)/(d*x+c-1)-1)*f)/((d*x+c+1)/(d*
x+c-1)-1))^2-3/4*I*d*b^3/(c*f-d*e-f)/(c*f-d*e+f)*arccoth(d*x+c)^2*Pi*c*csgn
(I*(d*x+c+1)/(d*x+c-1))^3-3/4*I*d*b^3/(c*f-d*e-f)/(c*f-d*e+f)*arccoth(d*x+c
)^2*Pi*c*csgn(I*(d*x+c+1)/(d*x+c-1)/((d*x+c+1)/(d*x+c-1)-1))^3+3/4*I*d*b^3/
(c*f-d*e-f)/(c*f-d*e+f)*arccoth(d*x+c)^2*Pi*csgn(I*(d*x+c+1)/(d*x+c-1))*csg
n(I/((d*x+c+1)/(d*x+c-1)-1))*csgn(I*(d*x+c+1)/(d*x+c-1)/((d*x+c+1)/(d*x+c-1
)-1))+3/4*I*d*b^3/(c*f-d*e-f)/(c*f-d*e+f)*arccoth(d*x+c)^2*Pi*c*csgn(I*(d*x
+c+1)/(d*x+c-1))*csgn(I*(d*x+c+1)/(d*x+c-1)/((d*x+c+1)/(d*x+c-1)-1))^2-3/4*
I*d*b^3/(c*f-d*e-f)/(c*f-d*e+f)*arccoth(d*x+c)^2*Pi*c*csgn(I/((d*x+c-1)/(d*
x+c+1))^(1/2))^2*csgn(I*(d*x+c+1)/(d*x+c-1))+3/4*I*d^2*b^3/f/(c*f-d*e-f)/(c
*f-d*e+f)*arccoth(d*x+c)^2*Pi*e*csgn(I*(d*x+c+1)/(d*x+c-1))^3+3/2*I*d*b^3/(
c*f-d*e-f)/(c*f-d*e+f)*arccoth(d*x+c)^2*Pi*c*csgn(I/((d*x+c-1)/(d*x+c+1))^(
1/2))*csgn(I*(d*x+c+1)/(d*x+c-1))^2+3/4*I*d*b^3/(c*f-d*e-f)/(c*f-d*e+f)*arc
coth(d*x+c)^2*Pi*c*csgn(I/((d*x+c+1)/(d*x+c-1)-1))*csgn(I*(d*x+c+1)/(d*x+c-
1)/((d*x+c+1)/(d*x+c-1)-1))^2-3/2*I*d*b^3/(c*f-d*e-f)/(c*f-d*e+f)*arccoth(d
*x+c)^2*Pi*csgn(I/((d*x+c+1)/(d*x+c-1)-1))*csgn(I*(((d*x+c+1)/(d*x+c-1)-1)*
c*f+(1-(d*x+c+1)/(d*x+c-1))*e*d+(-(d*x+c+1)/(d*x+c-1)-1)*f))*csgn(I*(((d*x+
c+1)/(d*x+c-1)-1)*c*f+(1-(d*x+c+1)/(d*x+c-1))*e*d+(-(d*x+c+1)/(d*x+c-1)-1)*
f)/((d*x+c+1)/(d*x+c-1)-1))+3/4*I*d^2*b^3/f/(c*f-d*e-f)/(c*f-d*e+f)*arccoth
(d*x+c)^2*Pi*e*csgn(I*(d*x+c+1)/(d*x+c-1)/((d*x+c+1)/(d*x+c-1)-1))^3-3*d*a*
b^2/(c*f-d*e-f)/(c*f-d*e+f)*dilog(((d*x+c)*f-f)/(c*f-d*e-f))+3/4*d*a*b^2/f/
(c*f-d*e-f)*ln(d*x+c-1)^2-3/2*d*a*b^2/f/(c*f-d*e-f)*dilog(1/2+1/2*d*x+1/2*c
)+3/4*d*a*b^2/f/(c*f-d*e+f)*ln(d*x+c+1)^2+3/2*d*a*b^2/f/(c*f-d*e+f)*dilog(1
/2+1/2*d*x+1/2*c)-3/2*d*b^3*f/(c*f-d*e-f)^2/(c*f-d*e+f)*polylog(3,(c*f-d*e-
f)*(d*x+c+1)/(d*x+c-1)/(c*f-d*e+f))+3/4*I*d^2*b^3/f/(c*f-d*e-f)/(c*f-d*e+f)
*arccoth(d*x+c)^2*Pi*e*csgn(I*(d*x+c+1)/(d*x+c-1))*csgn(I/((d*x+c+1)/(d*x+c
-1)-1))*csgn(I*(d*x+c+1)/(d*x+c-1)/((d*x+c+1)/(d*x+c-1)-1))-3/2*d*a*b^2/f/(
c*f-d*e-f)*ln(d*x+c-1)*ln(1/2+1/2*d*x+1/2*c)-3/2*d*a*b^2/f/(c*f-d*e+f)*ln(-
1/2*d*x-1/2*c+1/2)*ln(d*x+c+1)+3/2*d*a*b^2/f/(c*f-d*e+f)*ln(-1/2*d*x-1/2*c+
```

```
1/2)*ln(1/2+1/2*d*x+1/2*c)+3*d^2*b^3/(c*f-d*e-f)^2/(c*f-d*e+f)*e*arccoth(d*
x+c)^2*ln(1-(c*f-d*e-f)*(d*x+c+1)/(d*x+c-1)/(c*f-d*e+f))+3*d^2*b^3/(c*f-d*e
-f)^2/(c*f-d*e+f)*e*arccoth(d*x+c)*polylog(2,(c*f-d*e-f)*(d*x+c+1)/(d*x+c-1
)/(c*f-d*e+f))+3*d*b^3*f/(c*f-d*e-f)^2/(c*f-d*e+f)*arccoth(d*x+c)^2*ln(1-(c
*f-d*e-f)*(d*x+c+1)/(d*x+c-1)/(c*f-d*e+f))+3*d*b^3*f/(c*f-d*e-f)^2/(c*f-d*e
+f)*arccoth(d*x+c)*polylog(2,(c*f-d*e-f)*(d*x+c+1)/(d*x+c-1)/(c*f-d*e+f))+3
*I*d*b^3/(c*f-d*e-f)/(c*f-d*e+f)*arccoth(d*x+c)^2*Pi+3/2*d*b^3*f/(c*f-d*e-f
)^2/(c*f-d*e+f)*c*polylog(3,(c*f-d*e-f)*(d*x+c+1)/(d*x+c-1)/(c*f-d*e+f))-6*
d*a*b^2*arccoth(d*x+c)/(c*f-d*e-f)/(c*f-d*e+f)*ln((d*x+c)*f-c*f+d*e)-3/2*d^
2*b^3/(c*f-d*e-f)^2/(c*f-d*e+f)*e*polylog(3,(c*f-d*e-f)*(d*x+c+1)/(d*x+c-1)
/(c*f-d*e+f))-3*d*b^3/(c*f-d*e-f)/(c*f-d*e+f)*arccoth(d*x+c)^2*ln(2)-3*d*a^
2*b/(c*f-d*e-f)/(c*f-d*e+f)*ln((d*x+c)*f-c*f+d*e)+3*d*a^2*b/f/(2*c*f-2*d*e-
2*f)*ln(d*x+c-1)-3*d*a^2*b/f/(2*c*f-2*d*e+2*f)*ln(d*x+c+1)+3*d*b^3/(c*f-d*e
-f)/(c*f-d*e+f)*arccoth(d*x+c)^2*ln(((d*x+c+1)/(d*x+c-1)-1)*c*f+(1-(d*x+c+1
)/(d*x+c-1))*e*d+(-(d*x+c+1)/(d*x+c-1)-1)*f)-3/2*d*b^3/f*arccoth(d*x+c)^2/(
c*f-d*e+f)*ln((d*x+c-1)/(d*x+c+1))+3*d*b^3/f*arccoth(d*x+c)^2/(2*c*f-2*d*e-
2*f)*ln(d*x+c-1)-3*d*b^3/f*arccoth(d*x+c)^2/(2*c*f-2*d*e+2*f)*ln(d*x+c+1)-3
*d*b^3*arccoth(d*x+c)^2/(c*f-d*e-f)/(c*f-d*e+f)*ln((d*x+c)*f-c*f+d*e)-3*d*a
*b^2/(d*f*x+d*e)/f*arccoth(d*x+c)^2-3*d*a^2*b/(d*f*x+d*e)/f*arccoth(d*x+c)+
3*d*a*b^2/(c*f-d*e-f)/(c*f-d*e+f)*dilog(((d*x+c)*f+f)/(c*f-d*e+f))+6*d*a*b^
2/f*arccoth(d*x+c)/(2*c*f-2*d*e-2*f)*ln(d*x+c-1)-6*d*a*b^2/f*arccoth(d*x+c)
/(2*c*f-2*d*e+2*f)*ln(d*x+c+1)+3*d*a*b^2/(c*f-d*e-f)/(c*f-d*e+f)*ln((d*x+c)
*f-c*f+d*e)*ln(((d*x+c)*f+f)/(c*f-d*e+f))-3*d*a*b^2/(c*f-d*e-f)/(c*f-d*e+f)
*ln((d*x+c)*f-c*f+d*e)*ln(((d*x+c)*f-f)/(c*f-d*e-f))-d*b^3/(d*f*x+d*e)/f*ar
ccoth(d*x+c)^3-d*b^3/f*arccoth(d*x+c)^3/(c*f-d*e+f)-3*d*b^3*f/(c*f-d*e-f)^2
/(c*f-d*e+f)*c*arccoth(d*x+c)^2*ln(1-(c*f-d*e-f)*(d*x+c+1)/(d*x+c-1)/(c*f-d
*e+f))-3*d*b^3*f/(c*f-d*e-f)^2/(c*f-d*e+f)*c*arccoth(d*x+c)*polylog(2,(c*f-
d*e-f)*(d*x+c+1)/(d*x+c-1)/(c*f-d*e+f))+3/4*I*d*b^3/(c*f-d*e-f)/(c*f-d*e+f)
*arccoth(d*x+c)^2*Pi*csgn(I*(d*x+c+1)/(d*x+c-1)/((d*x+c+1)/(d*x+c-1)-1))^3-
3*I*d*b^3/(c*f-d*e-f)/(c*f-d*e+f)*arccoth(d*x+c)^2*Pi*csgn(I*(((d*x+c+1)/(d
*x+c-1)-1)*c*f+(1-(d*x+c+1)/(d*x+c-1))*e*d+(-(d*x+c+1)/(d*x+c-1)-1)*f)/((d*
x+c+1)/(d*x+c-1)-1))^2+3/2*I*d*b^3/(c*f-d*e-f)/(c*f-d*e+f)*arccoth(d*x+c)^2
*Pi*csgn(I*(((d*x+c+1)/(d*x+c-1)-1)*c*f+(1-(d*x+c+1)/(d*x+c-1))*e*d+(-(d*x+
c+1)/(d*x+c-1)-1)*f)/((d*x+c+1)/(d*x+c-1)-1))^3+3/4*I*d*b^3/(c*f-d*e-f)/(c*
f-d*e+f)*arccoth(d*x+c)^2*Pi*csgn(I*(d*x+c+1)/(d*x+c-1))^3
```

**maxima [F]** time = 0.00, size = 0, normalized size = 0.00

$$\frac{3}{2}\left(d\left(\frac{\log(dx+c+1)}{def-(c+1)f^2}-\frac{\log(dx+c-1)}{def-(c-1)f^2}-\frac{2\log\left(fx+e\right)}{d^2e^2-2\,cdef+\left(c^2-1\right)f^2}\right)-\frac{2\,\mathrm{arcoth}\,(dx+c)}{f^2x+ef}\right)a^2b-\frac{a^3}{f^2x+ef}+\frac{\left(\left(d^2\right.\right.}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccoth(d*x+c))^3/(f*x+e)^2,x, algorithm="maxima")
```

```
[Out] 3/2*(d*(log(d*x + c + 1)/(d*e*f - (c + 1)*f^2) - log(d*x + c - 1)/(d*e*f -
(c - 1)*f^2) - 2*log(f*x + e)/(d^2*e^2 - 2*c*d*e*f + (c^2 - 1)*f^2)) - 2*ar
ccoth(d*x + c)/(f^2*x + e*f))*a^2*b - a^3/(f^2*x + e*f) + 1/8*(((d^2*e*f -
c*d*f^2 + d*f^2)*b^3*x + (c*d*e*f - c^2*f^2 + d*e*f + f^2)*b^3)*log(d*x + c
 + 1)^3 - 3*(2*(d^2*e^2 - 2*c*d*e*f + c^2*f^2 - f^2)*a*b^2 + ((d^2*e*f - c*
d*f^2 - d*f^2)*b^3*x + (c*d*e*f - c^2*f^2 - d*e*f + f^2)*b^3)*log(d*x + c -
 1))*log(d*x + c + 1)^2)/(d^2*e^3*f - 2*c*d*e^2*f^2 + c^2*e*f^3 - e*f^3 + (
d^2*e^2*f^2 - 2*c*d*e*f^3 + c^2*f^4 - f^4)*x) + integrate(-1/8*(((d^2*e*f -
 c*d*f^2 + d*f^2)*b^3*x + (c*d*e*f - c^2*f^2 + d*e*f + f^2)*b^3)*log(d*x +
c - 1)^3 - 6*((d^2*e*f - c*d*f^2 + d*f^2)*a*b^2*x + (c*d*e*f - c^2*f^2 + d*
e*f + f^2)*a*b^2)*log(d*x + c - 1)^2 - 3*(4*(d^2*e*f - c*d*f^2 + d*f^2)*a*b
^2*x + 4*(d^2*e^2 - c*d*e*f + d*e*f)*a*b^2 + ((d^2*e*f - c*d*f^2 + d*f^2)*b
^3*x + (c*d*e*f - c^2*f^2 + d*e*f + f^2)*b^3)*log(d*x + c - 1)^2 + 2*(b^3*d
^2*f^2*x^2 - 2*(c*d*e*f - c^2*f^2 + d*e*f + f^2)*a*b^2 + (c*d*e*f - d*e*f)*
b^3 - (2*(d^2*e*f - c*d*f^2 + d*f^2)*a*b^2 - (d^2*e*f + c*d*f^2 - d*f^2)*b^
```

```
3)*x)*log(d*x + c - 1))*log(d*x + c + 1))/(c*d*e^3*f - c^2*e^2*f^2 + d*e^3*
f + e^2*f^2 + (d^2*e*f^3 - c*d*f^4 + d*f^4)*x^3 + (2*d^2*e^2*f^2 - c*d*e*f^
3 - c^2*f^4 + 3*d*e*f^3 + f^4)*x^2 + (d^2*e^3*f + c*d*e^2*f^2 - 2*c^2*e*f^3
 + 3*d*e^2*f^2 + 2*e*f^3)*x), x)
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.00

$$\int \frac{(a+b\,\mathrm{acoth}\,(c+d\,x))^3}{\left(e+f\,x\right)^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a + b*acoth(c + d*x))^3/(e + f*x)^2,x)
```

```
[Out] int((a + b*acoth(c + d*x))^3/(e + f*x)^2, x)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{(a+b\,\mathrm{acoth}\,(c+dx))^3}{\left(e+fx\right)^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*acoth(d*x+c))**3/(f*x+e)**2,x)
```

```
[Out] Integral((a + b*acoth(c + d*x))**3/(e + f*x)**2, x)
```

# 3.119 $\int (e+fx)^m \left(a+b\coth^{-1}(c+dx)\right)\,dx$

**Optimal**. Leaf size=162

$$\frac{(e+fx)^{m+1}\left(a+b\coth^{-1}(c+dx)\right)}{f(m+1)}+\frac{bd(e+fx)^{m+2}\,{}_2F_1\left(1,m+2;m+3;\frac{d(e+fx)}{de-cf-f}\right)}{2f(m+1)(m+2)(de-(c+1)f)}-\frac{bd(e+fx)^{m+2}\,{}_2F_1\left(1,m+2;m\right.}{2f(m+1)(m+2)(-cf+}$$

```
[Out] (f*x+e)^(1+m)*(a+b*arccoth(d*x+c))/f/(1+m)+1/2*b*d*(f*x+e)^(2+m)*hypergeom(
[1, 2+m],[3+m],d*(f*x+e)/(-c*f+d*e-f))/f/(d*e-(1+c)*f)/(1+m)/(2+m)-1/2*b*d*
(f*x+e)^(2+m)*hypergeom([1, 2+m],[3+m],d*(f*x+e)/(-c*f+d*e+f))/f/(-c*f+d*e+
f)/(1+m)/(2+m)
```

**Rubi [A]** time = 0.25, antiderivative size = 162, normalized size of antiderivative = 1.00, number of steps used = 6, number of rules used = 4, integrand size = 18, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.222, Rules used = {6112, 5927, 712, 68}

$$\frac{(e+fx)^{m+1}\left(a+b\coth^{-1}(c+dx)\right)}{f(m+1)}+\frac{bd(e+fx)^{m+2}\,{}_2F_1\left(1,m+2;m+3;\frac{d(e+fx)}{de-cf-f}\right)}{2f(m+1)(m+2)(de-(c+1)f)}-\frac{bd(e+fx)^{m+2}\,{}_2F_1\left(1,m+2;m\right.}{2f(m+1)(m+2)(-cf+}$$

Antiderivative was successfully verified.

```
[In] Int[(e + f*x)^m*(a + b*ArcCoth[c + d*x]),x]
```

```
[Out] ((e + f*x)^(1 + m)*(a + b*ArcCoth[c + d*x]))/(f*(1 + m)) + (b*d*(e + f*x)^(
2 + m)*Hypergeometric2F1[1, 2 + m, 3 + m, (d*(e + f*x))/(d*e - f - c*f)])/(
2*f*(d*e - (1 + c)*f)*(1 + m)*(2 + m)) - (b*d*(e + f*x)^(2 + m)*Hypergeomet
ric2F1[1, 2 + m, 3 + m, (d*(e + f*x))/(d*e + f - c*f)])/(2*f*(d*e + f - c*f
)*(1 + m)*(2 + m))
```

Rule 68

```
Int[((a_) + (b_.)*(x_))^(m_)*((c_) + (d_.)*(x_))^(n_), x_Symbol] :> Simp[((
b*c - a*d)^n*(a + b*x)^(m + 1)*Hypergeometric2F1[-n, m + 1, m + 2, -((d*(a
+ b*x))/(b*c - a*d))])/(b^(n + 1)*(m + 1)), x] /; FreeQ[{a, b, c, d, m}, x]
 && NeQ[b*c - a*d, 0] &&  !IntegerQ[m] && IntegerQ[n]
```

Rule 712

```
Int[((d_) + (e_.)*(x_))^(m_)/((a_) + (c_.)*(x_)^2), x_Symbol] :> Int[Expand
Integrand[(d + e*x)^m, 1/(a + c*x^2), x], x] /; FreeQ[{a, c, d, e, m}, x] &
& NeQ[c*d^2 + a*e^2, 0] &&  !IntegerQ[m]
```

Rule 5927

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))*((d_) + (e_.)*(x_))^(q_.), x_Symbol
] :> Simp[((d + e*x)^(q + 1)*(a + b*ArcCoth[c*x]))/(e*(q + 1)), x] - Dist[(
b*c)/(e*(q + 1)), Int[(d + e*x)^(q + 1)/(1 - c^2*x^2), x], x] /; FreeQ[{a,
b, c, d, e, q}, x] && NeQ[q, -1]
```

Rule 6112

```
Int[((a_.) + ArcCoth[(c_) + (d_.)*(x_)]*(b_.))^(p_.)*((e_.) + (f_.)*(x_))^(
m_.), x_Symbol] :> Dist[1/d, Subst[Int[((d*e - c*f)/d + (f*x)/d)^m*(a + b*A
rcCoth[x])^p, x], x, c + d*x], x] /; FreeQ[{a, b, c, d, e, f, m}, x] && IGt
Q[p, 0]
```

Rubi steps

$$\int (e+fx)^m \left(a+b\coth^{-1}(c+dx)\right) dx = \frac{\text{Subst}\left(\int \left(\frac{de-cf}{d}+\frac{fx}{d}\right)^m \left(a+b\coth^{-1}(x)\right) dx, x, c+dx\right)}{d}$$

$$= \frac{(e+fx)^{1+m}\left(a+b\coth^{-1}(c+dx)\right)}{f(1+m)} - \frac{b\,\text{Subst}\left(\int \frac{\left(\frac{de-cf}{d}+\frac{fx}{d}\right)^{1+m}}{1-x^2} dx, x, c \ldots}{f(1+m)}$$

$$= \frac{(e+fx)^{1+m}\left(a+b\coth^{-1}(c+dx)\right)}{f(1+m)} - \frac{b\,\text{Subst}\left(\int \left(\frac{\left(\frac{de-cf}{d}+\frac{fx}{d}\right)^{1+m}}{2(1-x)} + \frac{\left(\frac{de-}{\ldots}\right.}{\ldots}\right.\right.}{f(1+m\ldots}$$

$$= \frac{(e+fx)^{1+m}\left(a+b\coth^{-1}(c+dx)\right)}{f(1+m)} - \frac{b\,\text{Subst}\left(\int \frac{\left(\frac{de-cf}{d}+\frac{fx}{d}\right)^{1+m}}{1-x} dx, x, c \ldots}{2f(1+m)}$$

$$= \frac{(e+fx)^{1+m}\left(a+b\coth^{-1}(c+dx)\right)}{f(1+m)} + \frac{bd(e+fx)^{2+m}\,{}_2F_1\left(1,2+m;3 \ldots\right.}{2f(de-(1+c)f)(1+m)\ldots}$$

**Mathematica [F]** time = 2.53, size = 0, normalized size = 0.00

$$\int (e+fx)^m \left(a+b\coth^{-1}(c+dx)\right) dx$$

Verification is Not applicable to the result.

```
[In] Integrate[(e + f*x)^m*(a + b*ArcCoth[c + d*x]),x]
[Out] Integrate[(e + f*x)^m*(a + b*ArcCoth[c + d*x]), x]
```

**fricas [F]** time = 0.39, size = 0, normalized size = 0.00

$$\text{integral}\left((b \operatorname{arcoth}(dx+c)+a)\left(fx+e\right)^m, x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((f*x+e)^m*(a+b*arccoth(d*x+c)),x, algorithm="fricas")
[Out] integral((b*arccoth(d*x + c) + a)*(f*x + e)^m, x)
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int (b \operatorname{arcoth}(dx+c)+a)\left(fx+e\right)^m dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((f*x+e)^m*(a+b*arccoth(d*x+c)),x, algorithm="giac")
[Out] integrate((b*arccoth(d*x + c) + a)*(f*x + e)^m, x)
```

**maple [F]** time = 1.93, size = 0, normalized size = 0.00

$$\int \left(fx+e\right)^m (a+b \operatorname{arccoth}(dx+c))\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((f*x+e)^m*(a+b*arccoth(d*x+c)),x)
```

```
[Out] int((f*x+e)^m*(a+b*arccoth(d*x+c)),x)
```

**maxima [F]** time = 0.00, size = 0, normalized size = 0.00

$$\frac{1}{2}b\left(\frac{(fx+e)(fx+e)^m\log(dx+c+1)}{f(m+1)} - \int \frac{\left(dfx+de+\left(df(m+1)x+cf(m+1)+f(m+1)\right)\log(dx+c-1)\right)(}{df(m+1)x+cf(m+1)+f(m+1)}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((f*x+e)^m*(a+b*arccoth(d*x+c)),x, algorithm="maxima")
```

```
[Out] 1/2*b*((f*x + e)*(f*x + e)^m*log(d*x + c + 1)/(f*(m + 1)) - integrate((d*f*
x + d*e + (d*f*(m + 1)*x + c*f*(m + 1) + f*(m + 1))*log(d*x + c - 1))*(f*x
+ e)^m/(d*f*(m + 1)*x + c*f*(m + 1) + f*(m + 1)), x)) + (f*x + e)^(m + 1)*a
/(f*(m + 1))
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.01

$$\int {\left(e+f\,x\right)}^m\,\left(a+b\,\mathrm{acoth}\left(c+d\,x\right)\right) \,d x$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((e + f*x)^m*(a + b*acoth(c + d*x)),x)
```

```
[Out] int((e + f*x)^m*(a + b*acoth(c + d*x)), x)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \left(a + b \operatorname{acoth}{\left(c + dx \right)}\right) \left(e + fx\right)^{m}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((f*x+e)**m*(a+b*acoth(d*x+c)),x)
```

```
[Out] Integral((a + b*acoth(c + d*x))*(e + f*x)**m, x)
```

# 3.120 $\int (e+fx)^m \left(a+b\coth^{-1}(c+dx)\right)^2 dx$

**Optimal**. Leaf size=23

$$\text{Int}\left((e+fx)^m \left(a+b\coth^{-1}(c+dx)\right)^2,x\right)$$

```
[Out] Unintegrable((f*x+e)^m*(a+b*arccoth(d*x+c))^2,x)
```

**Rubi** [A] time = 0.07, antiderivative size = 0, normalized size of antiderivative = 0.00, number of steps used = 0, number of rules used = 0, integrand size = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int (e+fx)^m \left(a+b\coth^{-1}(c+dx)\right)^2 dx$$

Verification is Not applicable to the result.

```
[In] Int[(e + f*x)^m*(a + b*ArcCoth[c + d*x])^2,x]
```

```
[Out] Defer[Subst][Defer[Int][((d*e - c*f)/d + (f*x)/d)^m*(a + b*ArcCoth[x])^2, x
], x, c + d*x]/d
```

Rubi steps

$$\int (e+fx)^m \left(a+b\coth^{-1}(c+dx)\right)^2 dx = \frac{\text{Subst}\left(\int \left(\frac{de-cf}{d}+\frac{fx}{d}\right)^m \left(a+b\coth^{-1}(x)\right)^2 dx,x,c+dx\right)}{d}$$

**Mathematica** [A] time = 2.65, size = 0, normalized size = 0.00

$$\int (e+fx)^m \left(a+b\coth^{-1}(c+dx)\right)^2 dx$$

Verification is Not applicable to the result.

```
[In] Integrate[(e + f*x)^m*(a + b*ArcCoth[c + d*x])^2,x]
```

```
[Out] Integrate[(e + f*x)^m*(a + b*ArcCoth[c + d*x])^2, x]
```

**fricas** [A] time = 0.48, size = 0, normalized size = 0.00

$$\text{integral}\left(\left(b^2 \operatorname{arcoth}(dx+c)^2 + 2\,ab \operatorname{arcoth}(dx+c) + a^2\right)\left(fx+e\right)^m,x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((f*x+e)^m*(a+b*arccoth(d*x+c))^2,x, algorithm="fricas")
```

```
[Out] integral((b^2*arccoth(d*x + c)^2 + 2*a*b*arccoth(d*x + c) + a^2)*(f*x + e)^
m, x)
```

**giac** [A] time = 0.00, size = 0, normalized size = 0.00

$$\int (b \operatorname{arcoth}(dx+c)+a)^2 \left(fx+e\right)^m dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((f*x+e)^m*(a+b*arccoth(d*x+c))^2,x, algorithm="giac")
```

```
[Out] integrate((b*arccoth(d*x + c) + a)^2*(f*x + e)^m, x)
```

**maple [A]** time = 1.79, size = 0, normalized size = 0.00

$$\int \left(fx+e\right)^{m} \left(a+b\,\mathrm{arccoth}\left(dx+c\right)\right)^{2}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((f*x+e)^m*(a+b*arccoth(d*x+c))^2,x)
```

```
[Out] int((f*x+e)^m*(a+b*arccoth(d*x+c))^2,x)
```

**maxima [A]** time = 0.00, size = 0, normalized size = 0.00

$$\frac{\left(b^{2} fx+b^{2} e\right)\left(fx+e\right)^{m} \log\left(dx+c+1\right)^{2}}{4\,f(m+1)}+\frac{\left(fx+e\right)^{m+1} a^{2}}{f(m+1)}-\int -\frac{\left(\left(b^{2} df(m+1)x+\left(cf(m+1)+f(m+1)\right)b^{2}\right)\log\left(\right.}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((f*x+e)^m*(a+b*arccoth(d*x+c))^2,x, algorithm="maxima")
```

```
[Out] 1/4*(b^2*f*x + b^2*e)*(f*x + e)^m*log(d*x + c + 1)^2/(f*(m + 1)) + (f*x + e
)^(m + 1)*a^2/(f*(m + 1)) - integrate(-1/4*((b^2*d*f*(m + 1)*x + (c*f*(m +
1) + f*(m + 1))*b^2)*log(d*x + c - 1)^2 - 2*(b^2*d*e - 2*(c*f*(m + 1) + f*(
m + 1))*a*b - (2*a*b*d*f*(m + 1) - b^2*d*f)*x + (b^2*d*f*(m + 1)*x + (c*f*(
m + 1) + f*(m + 1))*b^2)*log(d*x + c - 1))*log(d*x + c + 1) - 4*(a*b*d*f*(m
 + 1)*x + (c*f*(m + 1) + f*(m + 1))*a*b)*log(d*x + c - 1))*(f*x + e)^m/(d*f
*(m + 1)*x + c*f*(m + 1) + f*(m + 1)), x)
```

**mupad [A]** time = 0.00, size = -1, normalized size = -0.04

$$\int {\left(e+f\,x\right)}^m\,{\left(a+b\,\mathrm{acoth}\left(c+d\,x\right)\right)}^2 \,d x$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((e + f*x)^m*(a + b*acoth(c + d*x))^2,x)
```

```
[Out] int((e + f*x)^m*(a + b*acoth(c + d*x))^2, x)
```

**sympy [F(-1)]** time = 0.00, size = 0, normalized size = 0.00

Timed out

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((f*x+e)**m*(a+b*acoth(d*x+c))**2,x)
```

```
[Out] Timed out
```

# 3.121 $\int (e+fx)^m \left(a+b\coth^{-1}(c+dx)\right)^3 \, dx$

**Optimal**. Leaf size=23

$$\text{Int}\left((e+fx)^m \left(a+b\coth^{-1}(c+dx)\right)^3,x\right)$$

```
[Out] Unintegrable((f*x+e)^m*(a+b*arccoth(d*x+c))^3,x)
```

**Rubi [A]** time = 0.07, antiderivative size = 0, normalized size of antiderivative = 0.00, number of steps used = 0, number of rules used = 0, integrand size = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int (e+fx)^m \left(a+b\coth^{-1}(c+dx)\right)^3 \, dx$$

Verification is Not applicable to the result.

```
[In] Int[(e + f*x)^m*(a + b*ArcCoth[c + d*x])^3,x]
```

```
[Out] Defer[Subst][Defer[Int][((d*e - c*f)/d + (f*x)/d)^m*(a + b*ArcCoth[x])^3, x
], x, c + d*x]/d
```

Rubi steps

$$\int (e+fx)^m \left(a+b\coth^{-1}(c+dx)\right)^3 \, dx = \frac{\text{Subst}\left(\int \left(\frac{de-cf}{d}+\frac{fx}{d}\right)^m \left(a+b\coth^{-1}(x)\right)^3 \, dx,x,c+dx\right)}{d}$$

**Mathematica [A]** time = 0.35, size = 0, normalized size = 0.00

$$\int (e+fx)^m \left(a+b\coth^{-1}(c+dx)\right)^3 \, dx$$

Verification is Not applicable to the result.

```
[In] Integrate[(e + f*x)^m*(a + b*ArcCoth[c + d*x])^3,x]
```

```
[Out] Integrate[(e + f*x)^m*(a + b*ArcCoth[c + d*x])^3, x]
```

**fricas [A]** time = 0.62, size = 0, normalized size = 0.00

$$\text{integral}\left(\left(b^3\,\text{arcoth}\left(dx+c\right)^3+3\,ab^2\,\text{arcoth}\left(dx+c\right)^2+3\,a^2b\,\text{arcoth}\left(dx+c\right)+a^3\right)\left(fx+e\right)^m,x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((f*x+e)^m*(a+b*arccoth(d*x+c))^3,x, algorithm="fricas")
```

```
[Out] integral((b^3*arccoth(d*x + c)^3 + 3*a*b^2*arccoth(d*x + c)^2 + 3*a^2*b*arc
coth(d*x + c) + a^3)*(f*x + e)^m, x)
```

**giac [A]** time = 0.00, size = 0, normalized size = 0.00

$$\int \left(b\,\text{arcoth}\left(dx+c\right)+a\right)^3\left(fx+e\right)^m \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((f*x+e)^m*(a+b*arccoth(d*x+c))^3,x, algorithm="giac")
```

```
[Out] integrate((b*arccoth(d*x + c) + a)^3*(f*x + e)^m, x)
```

**maple [A]** time = 2.06, size = 0, normalized size = 0.00

$$\int \left(fx+e\right)^{m} \left(a+b\,\mathrm{arccoth}\left(dx+c\right)\right)^{3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((f*x+e)^m*(a+b*arccoth(d*x+c))^3,x)
```

```
[Out] int((f*x+e)^m*(a+b*arccoth(d*x+c))^3,x)
```

**maxima [A]** time = 0.00, size = 0, normalized size = 0.00

$$\frac{\left(b^{3} fx+b^{3} e\right)\left(fx+e\right)^{m} \log\left(dx+c+1\right)^{3}}{8\,f(m+1)}+\frac{\left(fx+e\right)^{m+1} a^{3}}{f(m+1)}-\int \frac{\left(\left(b^{3} df(m+1)x+\left(cf(m+1)+f(m+1)\right)b^{3}\right)\log\left(d\right.}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((f*x+e)^m*(a+b*arccoth(d*x+c))^3,x, algorithm="maxima")
```

```
[Out] 1/8*(b^3*f*x + b^3*e)*(f*x + e)^m*log(d*x + c + 1)^3/(f*(m + 1)) + (f*x + e
)^(m + 1)*a^3/(f*(m + 1)) - integrate(1/8*((b^3*d*f*(m + 1)*x + (c*f*(m + 1
) + f*(m + 1))*b^3)*log(d*x + c - 1)^3 + 3*(b^3*d*e - 2*(c*f*(m + 1) + f*(m
 + 1))*a*b^2 - (2*a*b^2*d*f*(m + 1) - b^3*d*f)*x + (b^3*d*f*(m + 1)*x + (c*
f*(m + 1) + f*(m + 1))*b^3)*log(d*x + c - 1))*log(d*x + c + 1)^2 - 6*(a*b^2
*d*f*(m + 1)*x + (c*f*(m + 1) + f*(m + 1))*a*b^2)*log(d*x + c - 1)^2 - 3*(4
*a^2*b*d*f*(m + 1)*x + 4*(c*f*(m + 1) + f*(m + 1))*a^2*b + (b^3*d*f*(m + 1)
*x + (c*f*(m + 1) + f*(m + 1))*b^3)*log(d*x + c - 1)^2 - 4*(a*b^2*d*f*(m +
1)*x + (c*f*(m + 1) + f*(m + 1))*a*b^2)*log(d*x + c - 1))*log(d*x + c + 1)
+ 12*(a^2*b*d*f*(m + 1)*x + (c*f*(m + 1) + f*(m + 1))*a^2*b)*log(d*x + c -
1))*(f*x + e)^m/(d*f*(m + 1)*x + c*f*(m + 1) + f*(m + 1)), x)
```

**mupad [A]** time = 0.00, size = -1, normalized size = -0.04

$$\int {\left(e+f\,x\right)}^m\,{\left(a+b\,\mathrm{acoth}\left(c+d\,x\right)\right)}^3\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((e + f*x)^m*(a + b*acoth(c + d*x))^3,x)
```

```
[Out] int((e + f*x)^m*(a + b*acoth(c + d*x))^3, x)
```

**sympy [F(-1)]** time = 0.00, size = 0, normalized size = 0.00

Timed out

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((f*x+e)**m*(a+b*acoth(d*x+c))**3,x)
```

```
[Out] Timed out
```

## 3.122 $\int \frac{\left(a+b\coth^{-1}\left(\frac{\sqrt{1-cx}}{\sqrt{1+cx}}\right)\right)^n}{1-c^2x^2}\,dx$

**Optimal**. Leaf size=43

$$\operatorname{Int}\left(\frac{\left(a+b\coth^{-1}\left(\frac{\sqrt{1-cx}}{\sqrt{cx+1}}\right)\right)^n}{1-c^2x^2},x\right)$$

```
[Out] Unintegrable((a+b*arccoth((-c*x+1)^(1/2)/(c*x+1)^(1/2)))^n/(-c^2*x^2+1),x)
```

**Rubi [A]** time = 0.05, antiderivative size = 0, normalized size of antiderivative = 0.00, number of steps used = 0, number of rules used = 0, integrand size = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int \frac{\left(a+b\coth^{-1}\left(\frac{\sqrt{1-cx}}{\sqrt{1+cx}}\right)\right)^n}{1-c^2x^2}\,dx$$

Verification is Not applicable to the result.

```
[In] Int[(a + b*ArcCoth[Sqrt[1 - c*x]/Sqrt[1 + c*x]])^n/(1 - c^2*x^2),x]
[Out] Defer[Int][(a + b*ArcCoth[Sqrt[1 - c*x]/Sqrt[1 + c*x]])^n/(1 - c^2*x^2), x]
```

Rubi steps

$$\int \frac{\left(a+b\coth^{-1}\left(\frac{\sqrt{1-cx}}{\sqrt{1+cx}}\right)\right)^n}{1-c^2x^2}\,dx = \int \frac{\left(a+b\coth^{-1}\left(\frac{\sqrt{1-cx}}{\sqrt{1+cx}}\right)\right)^n}{1-c^2x^2}\,dx$$

**Mathematica [A]** time = 0.10, size = 0, normalized size = 0.00

$$\int \frac{\left(a+b\coth^{-1}\left(\frac{\sqrt{1-cx}}{\sqrt{1+cx}}\right)\right)^n}{1-c^2x^2}\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[(a + b*ArcCoth[Sqrt[1 - c*x]/Sqrt[1 + c*x]])^n/(1 - c^2*x^2),x]
[Out] Integrate[(a + b*ArcCoth[Sqrt[1 - c*x]/Sqrt[1 + c*x]])^n/(1 - c^2*x^2), x]
```

**fricas [A]** time = 0.84, size = 0, normalized size = 0.00

$$\operatorname{integral}\left(-\frac{\left(b\operatorname{arcoth}\left(\frac{\sqrt{-cx+1}}{\sqrt{cx+1}}\right)+a\right)^n}{c^2x^2-1},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccoth((-c*x+1)^(1/2)/(c*x+1)^(1/2)))^n/(-c^2*x^2+1),x, alg
orithm="fricas")
[Out] integral(-(b*arccoth(sqrt(-c*x + 1)/sqrt(c*x + 1)) + a)^n/(c^2*x^2 - 1), x)
```

**giac [A]** time = 0.00, size = 0, normalized size = 0.00

$$\int -\frac{\left(b\operatorname{arcoth}\left(\frac{\sqrt{-cx+1}}{\sqrt{cx+1}}\right)+a\right)^n}{c^2x^2-1}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccoth((-c*x+1)^(1/2)/(c*x+1)^(1/2)))^n/(-c^2*x^2+1),x, alg
orithm="giac")
```

```
[Out] integrate(-(b*arccoth(sqrt(-c*x + 1)/sqrt(c*x + 1)) + a)^n/(c^2*x^2 - 1), x
)
```

**maple** [A] time = 1.02, size = 0, normalized size = 0.00

$$\int \frac{\left(a+b\,\mathrm{arccoth}\left(\frac{\sqrt{-cx+1}}{\sqrt{cx+1}}\right)\right)^{n}}{-c^{2}x^{2}+1}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a+b*arccoth((-c*x+1)^(1/2)/(c*x+1)^(1/2)))^n/(-c^2*x^2+1),x)
```

```
[Out] int((a+b*arccoth((-c*x+1)^(1/2)/(c*x+1)^(1/2)))^n/(-c^2*x^2+1),x)
```

**maxima** [A] time = 0.00, size = 0, normalized size = 0.00

$$-\int \frac{\left(b\,\mathrm{arcoth}\left(\frac{\sqrt{-cx+1}}{\sqrt{cx+1}}\right)+a\right)^{n}}{c^{2}x^{2}-1}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccoth((-c*x+1)^(1/2)/(c*x+1)^(1/2)))^n/(-c^2*x^2+1),x, alg
orithm="maxima")
```

```
[Out] -integrate((b*arccoth(sqrt(-c*x + 1)/sqrt(c*x + 1)) + a)^n/(c^2*x^2 - 1), x
)
```

**mupad** [A] time = 0.00, size = -1, normalized size = -0.02

$$-\int \frac{\left(a+b\,\mathrm{acoth}\left(\frac{\sqrt{1-c\,x}}{\sqrt{c\,x+1}}\right)\right)^{n}}{c^{2}\,x^{2}-1}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(-(a + b*acoth((1 - c*x)^(1/2)/(c*x + 1)^(1/2)))^n/(c^2*x^2 - 1),x)
```

```
[Out] -int((a + b*acoth((1 - c*x)^(1/2)/(c*x + 1)^(1/2)))^n/(c^2*x^2 - 1), x)
```

**sympy** [A] time = 0.00, size = 0, normalized size = 0.00

$$-\int \frac{\left(a+b\,\mathrm{acoth}\left(\frac{\sqrt{-cx+1}}{\sqrt{cx+1}}\right)\right)^{n}}{c^{2}x^{2}-1}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*acoth((-c*x+1)**(1/2)/(c*x+1)**(1/2)))**n/(-c**2*x**2+1),x)
```

```
[Out] -Integral((a + b*acoth(sqrt(-c*x + 1)/sqrt(c*x + 1)))**n/(c**2*x**2 - 1), x
)
```

### 3.123 $\int \frac{\left(a+b\coth^{-1}\left(\frac{\sqrt{1-cx}}{\sqrt{1+cx}}\right)\right)^3}{1-c^2x^2}\,dx$

**Optimal**. Leaf size=460

$$-\frac{3b^2\text{Li}_3\left(1-\frac{2}{\frac{\sqrt{1-cx}}{\sqrt{cx+1}}+1}\right)\left(a+b\coth^{-1}\left(\frac{\sqrt{1-cx}}{\sqrt{cx+1}}\right)\right)}{2c}+\frac{3b^2\text{Li}_3\left(1-\frac{2\sqrt{1-cx}}{\sqrt{cx+1}\left(\frac{\sqrt{1-cx}}{\sqrt{cx+1}}+1\right)}\right)\left(a+b\coth^{-1}\left(\frac{\sqrt{1-cx}}{\sqrt{cx+1}}\right)\right)}{2c}-\frac{3b\,\text{Li}_2\left(1\cdots\right.}{\cdots}$$

```
[Out] -2*arccoth(1-2/(1-(-c*x+1)^(1/2)/(c*x+1)^(1/2)))*(a+b*arccoth((-c*x+1)^(1/2
)/(c*x+1)^(1/2)))^3/c-3/2*b*(a+b*arccoth((-c*x+1)^(1/2)/(c*x+1)^(1/2)))^2*p
olylog(2,1-2/((-c*x+1)^(1/2)/(c*x+1)^(1/2)+1))/c+3/2*b*(a+b*arccoth((-c*x+1
)^(1/2)/(c*x+1)^(1/2)))^2*polylog(2,1-2*(-c*x+1)^(1/2)/((-c*x+1)^(1/2)/(c*x
+1)^(1/2)+1)/(c*x+1)^(1/2))/c-3/2*b^2*(a+b*arccoth((-c*x+1)^(1/2)/(c*x+1)^(
1/2)))*polylog(3,1-2/((-c*x+1)^(1/2)/(c*x+1)^(1/2)+1))/c+3/2*b^2*(a+b*arcco
th((-c*x+1)^(1/2)/(c*x+1)^(1/2)))*polylog(3,1-2*(-c*x+1)^(1/2)/((-c*x+1)^(1
/2)/(c*x+1)^(1/2)+1)/(c*x+1)^(1/2))/c-3/4*b^3*polylog(4,1-2/((-c*x+1)^(1/2)
/(c*x+1)^(1/2)+1))/c+3/4*b^3*polylog(4,1-2*(-c*x+1)^(1/2)/((-c*x+1)^(1/2)/(
c*x+1)^(1/2)+1)/(c*x+1)^(1/2))/c
```

**Rubi** [A] time = 0.60, antiderivative size = 460, normalized size of antiderivative = 1.00, number of steps used = 9, number of rules used = 7, integrand size = 40, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.175, Rules used = {6681, 5915, 6053, 5949, 6057, 6061, 6610}

$$-\frac{3b^2\text{PolyLog}\left(3,1-\frac{2}{\frac{\sqrt{1-cx}}{\sqrt{cx+1}}+1}\right)\left(a+b\coth^{-1}\left(\frac{\sqrt{1-cx}}{\sqrt{cx+1}}\right)\right)}{2c}+\frac{3b^2\text{PolyLog}\left(3,1-\frac{2\sqrt{1-cx}}{\sqrt{cx+1}\left(\frac{\sqrt{1-cx}}{\sqrt{cx+1}}+1\right)}\right)\left(a+b\coth^{-1}\left(\cdots\right.\right.}{2c}$$

Antiderivative was successfully verified.

```
[In] Int[(a + b*ArcCoth[Sqrt[1 - c*x]/Sqrt[1 + c*x]])^3/(1 - c^2*x^2),x]
```

```
[Out] (-2*(a + b*ArcCoth[Sqrt[1 - c*x]/Sqrt[1 + c*x]])^3*ArcCoth[1 - 2/(1 - Sqrt[
1 - c*x]/Sqrt[1 + c*x])])/c - (3*b*(a + b*ArcCoth[Sqrt[1 - c*x]/Sqrt[1 + c*
x]])^2*PolyLog[2, 1 - 2/(1 + Sqrt[1 - c*x]/Sqrt[1 + c*x])])/(2*c) + (3*b*(a
 + b*ArcCoth[Sqrt[1 - c*x]/Sqrt[1 + c*x]])^2*PolyLog[2, 1 - (2*Sqrt[1 - c*x
])/(Sqrt[1 + c*x]*(1 + Sqrt[1 - c*x]/Sqrt[1 + c*x]))])/(2*c) - (3*b^2*(a +
b*ArcCoth[Sqrt[1 - c*x]/Sqrt[1 + c*x]])*PolyLog[3, 1 - 2/(1 + Sqrt[1 - c*x]
/Sqrt[1 + c*x])])/(2*c) + (3*b^2*(a + b*ArcCoth[Sqrt[1 - c*x]/Sqrt[1 + c*x]
])*PolyLog[3, 1 - (2*Sqrt[1 - c*x])/(Sqrt[1 + c*x]*(1 + Sqrt[1 - c*x]/Sqrt[
1 + c*x]))])/(2*c) - (3*b^3*PolyLog[4, 1 - 2/(1 + Sqrt[1 - c*x]/Sqrt[1 + c*
x])])/(4*c) + (3*b^3*PolyLog[4, 1 - (2*Sqrt[1 - c*x])/(Sqrt[1 + c*x]*(1 + S
qrt[1 - c*x]/Sqrt[1 + c*x]))])/(4*c)
```

Rule 5915

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_)/(x_), x_Symbol] :> Simp[2*(a +
 b*ArcCoth[c*x])^p*ArcCoth[1 - 2/(1 - c*x)], x] - Dist[2*b*c*p, Int[((a + b
*ArcCoth[c*x])^(p - 1)*ArcCoth[1 - 2/(1 - c*x)])/(1 - c^2*x^2), x], x] /; F
reeQ[{a, b, c}, x] && IGtQ[p, 1]
```

Rule 5949

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)/((d_) + (e_.)*(x_)^2), x_Symb
ol] :> Simp[(a + b*ArcCoth[c*x])^(p + 1)/(b*c*d*(p + 1)), x] /; FreeQ[{a, b
, c, d, e, p}, x] && EqQ[c^2*d + e, 0] && NeQ[p, -1]
```

Rule 6053

```
Int[(ArcCoth[u_]*((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.))/((d_) + (e_.)*(
x_)^2), x_Symbol] :> Dist[1/2, Int[(Log[SimplifyIntegrand[1 + 1/u, x]]*(a +
 b*ArcCoth[c*x])^p)/(d + e*x^2), x], x] - Dist[1/2, Int[(Log[SimplifyIntegr
and[1 - 1/u, x]]*(a + b*ArcCoth[c*x])^p)/(d + e*x^2), x], x] /; FreeQ[{a, b
, c, d, e}, x] && IGtQ[p, 0] && EqQ[c^2*d + e, 0] && EqQ[u^2 - (1 - 2/(1 -
c*x))^2, 0]
```

Rule 6057

```
Int[(Log[u_]*((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.))/((d_) + (e_.)*(x_)^
2), x_Symbol] :> Simp[((a + b*ArcCoth[c*x])^p*PolyLog[2, 1 - u])/(2*c*d), x
] - Dist[(b*p)/2, Int[((a + b*ArcCoth[c*x])^(p - 1)*PolyLog[2, 1 - u])/(d +
 e*x^2), x], x] /; FreeQ[{a, b, c, d, e}, x] && IGtQ[p, 0] && EqQ[c^2*d + e
, 0] && EqQ[(1 - u)^2 - (1 - 2/(1 + c*x))^2, 0]
```

Rule 6061

```
Int[(((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)*PolyLog[k_, u_])/((d_) + (e_
.)*(x_)^2), x_Symbol] :> -Simp[((a + b*ArcCoth[c*x])^p*PolyLog[k + 1, u])/(
2*c*d), x] + Dist[(b*p)/2, Int[((a + b*ArcCoth[c*x])^(p - 1)*PolyLog[k + 1,
 u])/(d + e*x^2), x], x] /; FreeQ[{a, b, c, d, e, k}, x] && IGtQ[p, 0] && E
qQ[c^2*d + e, 0] && EqQ[u^2 - (1 - 2/(1 + c*x))^2, 0]
```

Rule 6610

```
Int[(u_)*PolyLog[n_, v_], x_Symbol] :> With[{w = DerivativeDivides[v, u*v,
x]}, Simp[w*PolyLog[n + 1, v], x] /;  !FalseQ[w]] /; FreeQ[n, x]
```

Rule 6681

```
Int[((a_.) + (b_.)*(F_)[((c_.)*Sqrt[(d_.) + (e_.)*(x_)])/Sqrt[(f_.) + (g_.)
*(x_)]])^(n_.)/((A_.) + (C_.)*(x_)^2), x_Symbol] :> Dist[(2*e*g)/(C*(e*f -
d*g)), Subst[Int[(a + b*F[c*x])^n/x, x], x, Sqrt[d + e*x]/Sqrt[f + g*x]], x
] /; FreeQ[{a, b, c, d, e, f, g, A, C, F}, x] && EqQ[C*d*f - A*e*g, 0] && E
qQ[e*f + d*g, 0] && IGtQ[n, 0]
```

Rubi steps

$$\int \frac{\left(a+b\coth^{-1}\left(\frac{\sqrt{1-cx}}{\sqrt{1+cx}}\right)\right)^3}{1-c^2x^2}\,dx = -\frac{\text{Subst}\left(\int \frac{(a+b\coth^{-1}(x))^3}{x}dx, x, \frac{\sqrt{1-cx}}{\sqrt{1+cx}}\right)}{c}$$

$$= -\frac{2\left(a+b\coth^{-1}\left(\frac{\sqrt{1-cx}}{\sqrt{1+cx}}\right)\right)^3 \coth^{-1}\left(1-\frac{2}{1-\frac{\sqrt{1-cx}}{\sqrt{1+cx}}}\right)}{c} + \frac{(6b)\,\text{Subst}\left(\int \frac{\coth^{-1}\left(1-\frac{2}{1-\cdots}\right.}{\cdots}\right.}{\cdots}$$

$$= -\frac{2\left(a+b\coth^{-1}\left(\frac{\sqrt{1-cx}}{\sqrt{1+cx}}\right)\right)^3 \coth^{-1}\left(1-\frac{2}{1-\frac{\sqrt{1-cx}}{\sqrt{1+cx}}}\right)}{c} - \frac{(3b)\,\text{Subst}\left(\int \frac{(a+b\coth^{-1}(\cdots}{1-\cdots}\right.}{c\cdots}$$

$$= -\frac{2\left(a+b\coth^{-1}\left(\frac{\sqrt{1-cx}}{\sqrt{1+cx}}\right)\right)^3 \coth^{-1}\left(1-\frac{2}{1-\frac{\sqrt{1-cx}}{\sqrt{1+cx}}}\right)}{c} - \frac{3b\left(a+b\coth^{-1}\left(\frac{\sqrt{1-cx}}{\sqrt{1+cx}}\right.\right.\cdots}{2c}$$

$$= -\frac{2\left(a+b\coth^{-1}\left(\frac{\sqrt{1-cx}}{\sqrt{1+cx}}\right)\right)^3 \coth^{-1}\left(1-\frac{2}{1-\frac{\sqrt{1-cx}}{\sqrt{1+cx}}}\right)}{c} - \frac{3b\left(a+b\coth^{-1}\left(\frac{\sqrt{1-cx}}{\sqrt{1+cx}}\right.\right.\cdots}{2c}$$

$$= -\frac{2\left(a+b\coth^{-1}\left(\frac{\sqrt{1-cx}}{\sqrt{1+cx}}\right)\right)^3 \coth^{-1}\left(1-\frac{2}{1-\frac{\sqrt{1-cx}}{\sqrt{1+cx}}}\right)}{c} - \frac{3b\left(a+b\coth^{-1}\left(\frac{\sqrt{1-cx}}{\sqrt{1+cx}}\right.\right.\cdots}{2c}$$

**Mathematica [F]** time = 0.29, size = 0, normalized size = 0.00

$$\int \frac{\left(a+b\coth^{-1}\left(\frac{\sqrt{1-cx}}{\sqrt{1+cx}}\right)\right)^3}{1-c^2x^2}\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[(a + b*ArcCoth[Sqrt[1 - c*x]/Sqrt[1 + c*x]])^3/(1 - c^2*x^2),x]
[Out] Integrate[(a + b*ArcCoth[Sqrt[1 - c*x]/Sqrt[1 + c*x]])^3/(1 - c^2*x^2), x]
```

**fricas [F]** time = 0.44, size = 0, normalized size = 0.00

$$\text{integral}\left(-\frac{b^3\,\text{arcoth}\left(\frac{\sqrt{-cx+1}}{\sqrt{cx+1}}\right)^3 + 3\,ab^2\,\text{arcoth}\left(\frac{\sqrt{-cx+1}}{\sqrt{cx+1}}\right)^2 + 3\,a^2b\,\text{arcoth}\left(\frac{\sqrt{-cx+1}}{\sqrt{cx+1}}\right) + a^3}{c^2x^2-1}, x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccoth((-c*x+1)^(1/2)/(c*x+1)^(1/2)))^3/(-c^2*x^2+1),x, alg
orithm="fricas")
[Out] integral(-(b^3*arccoth(sqrt(-c*x + 1)/sqrt(c*x + 1))^3 + 3*a*b^2*arccoth(sq
rt(-c*x + 1)/sqrt(c*x + 1))^2 + 3*a^2*b*arccoth(sqrt(-c*x + 1)/sqrt(c*x + 1
)) + a^3)/(c^2*x^2 - 1), x)
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int -\frac{\left(b\,\text{arcoth}\left(\frac{\sqrt{-cx+1}}{\sqrt{cx+1}}\right)+a\right)^3}{c^2x^2-1}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccoth((-c*x+1)^(1/2)/(c*x+1)^(1/2)))^3/(-c^2*x^2+1),x, alg
orithm="giac")
```

```
[Out] integrate(-(b*arccoth(sqrt(-c*x + 1)/sqrt(c*x + 1)) + a)^3/(c^2*x^2 - 1), x
)
```

**maple [B]** time = 1.67, size = 1492, normalized size = 3.24

result too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a+b*arccoth((-c*x+1)^(1/2)/(c*x+1)^(1/2)))^3/(-c^2*x^2+1),x)
```

```
[Out] 3*a*b^2/c*arccoth((-c*x+1)^(1/2)/(c*x+1)^(1/2))^2*ln(1+1/(((-c*x+1)^(1/2)/(
c*x+1)^(1/2)-1)/((-c*x+1)^(1/2)/(c*x+1)^(1/2)+1))^(1/2))+6*a*b^2/c*arccoth(
(-c*x+1)^(1/2)/(c*x+1)^(1/2))*polylog(2,-1/(((-c*x+1)^(1/2)/(c*x+1)^(1/2)-1
)/((-c*x+1)^(1/2)/(c*x+1)^(1/2)+1))^(1/2))-3/4*b^3/c*polylog(4,-1/((-c*x+1)
^(1/2)/(c*x+1)^(1/2)-1)*((-c*x+1)^(1/2)/(c*x+1)^(1/2)+1))+6*b^3/c*polylog(4
,1/(((-c*x+1)^(1/2)/(c*x+1)^(1/2)-1)/((-c*x+1)^(1/2)/(c*x+1)^(1/2)+1))^(1/2
))+6*b^3/c*polylog(4,-1/(((-c*x+1)^(1/2)/(c*x+1)^(1/2)-1)/((-c*x+1)^(1/2)/(
c*x+1)^(1/2)+1))^(1/2))+1/2*a^3/c*ln(c*x+1)-1/2*a^3/c*ln(c*x-1)+3*a*b^2/c*a
rccoth((-c*x+1)^(1/2)/(c*x+1)^(1/2))^2*ln(1-1/(((-c*x+1)^(1/2)/(c*x+1)^(1/2
)-1)/((-c*x+1)^(1/2)/(c*x+1)^(1/2)+1))^(1/2))+6*a*b^2/c*arccoth((-c*x+1)^(1
/2)/(c*x+1)^(1/2))*polylog(2,1/(((-c*x+1)^(1/2)/(c*x+1)^(1/2)-1)/((-c*x+1)^
(1/2)/(c*x+1)^(1/2)+1))^(1/2))-3*a*b^2/c*arccoth((-c*x+1)^(1/2)/(c*x+1)^(1/
2))^2*ln(1+1/((-c*x+1)^(1/2)/(c*x+1)^(1/2)-1)*((-c*x+1)^(1/2)/(c*x+1)^(1/2)
+1))-3*a*b^2/c*arccoth((-c*x+1)^(1/2)/(c*x+1)^(1/2))*polylog(2,-1/((-c*x+1)
^(1/2)/(c*x+1)^(1/2)-1)*((-c*x+1)^(1/2)/(c*x+1)^(1/2)+1))+3/2*a*b^2/c*polyl
og(3,-1/((-c*x+1)^(1/2)/(c*x+1)^(1/2)-1)*((-c*x+1)^(1/2)/(c*x+1)^(1/2)+1))-
6*a*b^2/c*polylog(3,-1/(((-c*x+1)^(1/2)/(c*x+1)^(1/2)-1)/((-c*x+1)^(1/2)/(c
*x+1)^(1/2)+1))^(1/2))-6*a*b^2/c*polylog(3,1/(((-c*x+1)^(1/2)/(c*x+1)^(1/2)
-1)/((-c*x+1)^(1/2)/(c*x+1)^(1/2)+1))^(1/2))-b^3/c*arccoth((-c*x+1)^(1/2)/(
c*x+1)^(1/2))^3*ln(1+1/((-c*x+1)^(1/2)/(c*x+1)^(1/2)-1)*((-c*x+1)^(1/2)/(c*
x+1)^(1/2)+1))-3/2*b^3/c*arccoth((-c*x+1)^(1/2)/(c*x+1)^(1/2))^2*polylog(2,
-1/((-c*x+1)^(1/2)/(c*x+1)^(1/2)-1)*((-c*x+1)^(1/2)/(c*x+1)^(1/2)+1))+3/2*b
^3/c*arccoth((-c*x+1)^(1/2)/(c*x+1)^(1/2))*polylog(3,-1/((-c*x+1)^(1/2)/(c*
x+1)^(1/2)-1)*((-c*x+1)^(1/2)/(c*x+1)^(1/2)+1))+b^3/c*arccoth((-c*x+1)^(1/2
)/(c*x+1)^(1/2))^3*ln(1-1/(((-c*x+1)^(1/2)/(c*x+1)^(1/2)-1)/((-c*x+1)^(1/2)
/(c*x+1)^(1/2)+1))^(1/2))+3*a^2*b/c*dilog(((-c*x+1)^(1/2)/(c*x+1)^(1/2)-1)/
((-c*x+1)^(1/2)/(c*x+1)^(1/2)+1))-3/4*a^2*b/c*dilog(((-c*x+1)^(1/2)/(c*x+1)
^(1/2)-1)^2/((-c*x+1)^(1/2)/(c*x+1)^(1/2)+1)^2)+3*b^3/c*arccoth((-c*x+1)^(1
/2)/(c*x+1)^(1/2))^2*polylog(2,1/(((-c*x+1)^(1/2)/(c*x+1)^(1/2)-1)/((-c*x+1
)^(1/2)/(c*x+1)^(1/2)+1))^(1/2))-6*b^3/c*arccoth((-c*x+1)^(1/2)/(c*x+1)^(1/
2))*polylog(3,1/(((-c*x+1)^(1/2)/(c*x+1)^(1/2)-1)/((-c*x+1)^(1/2)/(c*x+1)^(
1/2)+1))^(1/2))+b^3/c*arccoth((-c*x+1)^(1/2)/(c*x+1)^(1/2))^3*ln(1+1/(((-c*
x+1)^(1/2)/(c*x+1)^(1/2)-1)/((-c*x+1)^(1/2)/(c*x+1)^(1/2)+1))^(1/2))+3*b^3/
c*arccoth((-c*x+1)^(1/2)/(c*x+1)^(1/2))^2*polylog(2,-1/(((-c*x+1)^(1/2)/(c*
x+1)^(1/2)-1)/((-c*x+1)^(1/2)/(c*x+1)^(1/2)+1))^(1/2))-6*b^3/c*arccoth((-c*
x+1)^(1/2)/(c*x+1)^(1/2))*polylog(3,-1/(((-c*x+1)^(1/2)/(c*x+1)^(1/2)-1)/((
-c*x+1)^(1/2)/(c*x+1)^(1/2)+1))^(1/2))
```

**maxima [F]** time = 0.00, size = 0, normalized size = 0.00

$$\frac{1}{2}a^3\left(\frac{\log(cx+1)}{c}-\frac{\log(cx-1)}{c}\right)-\frac{\left(b^3\log(cx+1)-b^3\log(-cx+1)\right)\log\left(-\sqrt{cx+1}+\sqrt{-cx+1}\right)^3}{16c}-\int\frac{4\left(\sqrt{cx\right.}}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccoth((-c*x+1)^(1/2)/(c*x+1)^(1/2)))^3/(-c^2*x^2+1),x, alg
orithm="maxima")
```

```
[Out] 1/2*a^3*(log(c*x + 1)/c - log(c*x - 1)/c) - 1/16*(b^3*log(c*x + 1) - b^3*lo
g(-c*x + 1))*log(-sqrt(c*x + 1) + sqrt(-c*x + 1))^3/c - integrate(1/32*(4*(
sqrt(c*x + 1)*b^3 - sqrt(-c*x + 1)*b^3)*log(sqrt(c*x + 1) + sqrt(-c*x + 1))
^3 + 24*(sqrt(c*x + 1)*a*b^2 - sqrt(-c*x + 1)*a*b^2)*log(sqrt(c*x + 1) + sq
rt(-c*x + 1))^2 + 3*(4*(sqrt(c*x + 1)*b^3 - sqrt(-c*x + 1)*b^3)*log(sqrt(c*
x + 1) + sqrt(-c*x + 1)) + (8*a*b^2 - (b^3*c*x - b^3)*log(c*x + 1) + (b^3*c
*x - b^3)*log(-c*x + 1))*sqrt(c*x + 1) - (8*a*b^2 - (b^3*c*x + b^3)*log(c*x
 + 1) + (b^3*c*x + b^3)*log(-c*x + 1))*sqrt(-c*x + 1))*log(-sqrt(c*x + 1) +
 sqrt(-c*x + 1))^2 + 48*(sqrt(c*x + 1)*a^2*b - sqrt(-c*x + 1)*a^2*b)*log(sq
rt(c*x + 1) + sqrt(-c*x + 1)) - 12*(4*sqrt(c*x + 1)*a^2*b - 4*sqrt(-c*x + 1
)*a^2*b + (sqrt(c*x + 1)*b^3 - sqrt(-c*x + 1)*b^3)*log(sqrt(c*x + 1) + sqrt
(-c*x + 1))^2 + 4*(sqrt(c*x + 1)*a*b^2 - sqrt(-c*x + 1)*a*b^2)*log(sqrt(c*x
 + 1) + sqrt(-c*x + 1)))*log(-sqrt(c*x + 1) + sqrt(-c*x + 1)))/((c^2*x^2 -
1)*sqrt(c*x + 1) - (c^2*x^2 - 1)*sqrt(-c*x + 1)), x)
```

**mupad** **[F]** time = 0.00, size = -1, normalized size = -0.00

$$\int -\frac{\left(a+b\,\mathrm{acoth}\left(\frac{\sqrt{1-c\,x}}{\sqrt{c\,x+1}}\right)\right)^3}{c^2\,x^2-1}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(-(a + b*acoth((1 - c*x)^(1/2)/(c*x + 1)^(1/2)))^3/(c^2*x^2 - 1),x)
```

```
[Out] int(-(a + b*acoth((1 - c*x)^(1/2)/(c*x + 1)^(1/2)))^3/(c^2*x^2 - 1), x)
```

**sympy** **[F]** time = 0.00, size = 0, normalized size = 0.00

$$-\int \frac{a^3}{c^2x^2-1}\,dx-\int \frac{b^3\operatorname{acoth}^3\left(\frac{\sqrt{-cx+1}}{\sqrt{cx+1}}\right)}{c^2x^2-1}\,dx-\int \frac{3ab^2\operatorname{acoth}^2\left(\frac{\sqrt{-cx+1}}{\sqrt{cx+1}}\right)}{c^2x^2-1}\,dx-\int \frac{3a^2b\operatorname{acoth}\left(\frac{\sqrt{-cx+1}}{\sqrt{cx+1}}\right)}{c^2x^2-1}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*acoth((-c*x+1)**(1/2)/(c*x+1)**(1/2)))**3/(-c**2*x**2+1),x)
```

```
[Out] -Integral(a**3/(c**2*x**2 - 1), x) - Integral(b**3*acoth(sqrt(-c*x + 1)/sqr
t(c*x + 1))**3/(c**2*x**2 - 1), x) - Integral(3*a*b**2*acoth(sqrt(-c*x + 1)
/sqrt(c*x + 1))**2/(c**2*x**2 - 1), x) - Integral(3*a**2*b*acoth(sqrt(-c*x
+ 1)/sqrt(c*x + 1))/(c**2*x**2 - 1), x)
```

## 3.124 $\int \frac{\left(a+b\coth^{-1}\left(\frac{\sqrt{1-cx}}{\sqrt{1+cx}}\right)\right)^2}{1-c^2x^2}\,dx$

**Optimal**. Leaf size=302

$$-\frac{b\text{Li}_2\left(1-\frac{2}{\frac{\sqrt{1-cx}}{\sqrt{cx+1}}+1}\right)\left(a+b\coth^{-1}\left(\frac{\sqrt{1-cx}}{\sqrt{cx+1}}\right)\right)}{c}+\frac{b\text{Li}_2\left(1-\frac{2\sqrt{1-cx}}{\sqrt{cx+1}\left(\frac{\sqrt{1-cx}}{\sqrt{cx+1}}+1\right)}\right)\left(a+b\coth^{-1}\left(\frac{\sqrt{1-cx}}{\sqrt{cx+1}}\right)\right)}{c}-\frac{2\coth^{-1}\left(1-\frac{}{1-}\right.}{}$$

```
[Out] -2*arccoth(1-2/(1-(-c*x+1)^(1/2)/(c*x+1)^(1/2)))*(a+b*arccoth((-c*x+1)^(1/2
)/(c*x+1)^(1/2)))^2/c-b*(a+b*arccoth((-c*x+1)^(1/2)/(c*x+1)^(1/2)))*polylog
(2,1-2/((-c*x+1)^(1/2)/(c*x+1)^(1/2)+1))/c+b*(a+b*arccoth((-c*x+1)^(1/2)/(c
*x+1)^(1/2)))*polylog(2,1-2*(-c*x+1)^(1/2)/((-c*x+1)^(1/2)/(c*x+1)^(1/2)+1)
/(c*x+1)^(1/2))/c-1/2*b^2*polylog(3,1-2/((-c*x+1)^(1/2)/(c*x+1)^(1/2)+1))/c
+1/2*b^2*polylog(3,1-2*(-c*x+1)^(1/2)/((-c*x+1)^(1/2)/(c*x+1)^(1/2)+1)/(c*x
+1)^(1/2))/c
```

**Rubi [A]** time = 0.35, antiderivative size = 302, normalized size of antiderivative = 1.00, number of steps used = 7, number of rules used = 6, integrand size = 40, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.150, Rules used = {6681, 5915, 6053, 5949, 6057, 6610}

$$-\frac{b\text{PolyLog}\left(2,1-\frac{2}{\frac{\sqrt{1-cx}}{\sqrt{cx+1}}+1}\right)\left(a+b\coth^{-1}\left(\frac{\sqrt{1-cx}}{\sqrt{cx+1}}\right)\right)}{c}+\frac{b\text{PolyLog}\left(2,1-\frac{2\sqrt{1-cx}}{\sqrt{cx+1}\left(\frac{\sqrt{1-cx}}{\sqrt{cx+1}}+1\right)}\right)\left(a+b\coth^{-1}\left(\frac{\sqrt{1-cx}}{\sqrt{cx+1}}\right)\right)}{c}-$$

Antiderivative was successfully verified.

```
[In] Int[(a + b*ArcCoth[Sqrt[1 - c*x]/Sqrt[1 + c*x]])^2/(1 - c^2*x^2),x]
```

```
[Out] (-2*(a + b*ArcCoth[Sqrt[1 - c*x]/Sqrt[1 + c*x]])^2*ArcCoth[1 - 2/(1 - Sqrt[
1 - c*x]/Sqrt[1 + c*x])])/c - (b*(a + b*ArcCoth[Sqrt[1 - c*x]/Sqrt[1 + c*x]
])*PolyLog[2, 1 - 2/(1 + Sqrt[1 - c*x]/Sqrt[1 + c*x])])/c + (b*(a + b*ArcCo
th[Sqrt[1 - c*x]/Sqrt[1 + c*x]])*PolyLog[2, 1 - (2*Sqrt[1 - c*x])/(Sqrt[1 +
 c*x]*(1 + Sqrt[1 - c*x]/Sqrt[1 + c*x]))])/c - (b^2*PolyLog[3, 1 - 2/(1 + S
qrt[1 - c*x]/Sqrt[1 + c*x])])/(2*c) + (b^2*PolyLog[3, 1 - (2*Sqrt[1 - c*x])
/(Sqrt[1 + c*x]*(1 + Sqrt[1 - c*x]/Sqrt[1 + c*x]))])/(2*c)
```

Rule 5915

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_)/(x_), x_Symbol] :> Simp[2*(a +
 b*ArcCoth[c*x])^p*ArcCoth[1 - 2/(1 - c*x)], x] - Dist[2*b*c*p, Int[((a + b
*ArcCoth[c*x])^(p - 1)*ArcCoth[1 - 2/(1 - c*x)])/(1 - c^2*x^2), x], x] /; F
reeQ[{a, b, c}, x] && IGtQ[p, 1]
```

Rule 5949

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)/((d_) + (e_.)*(x_)^2), x_Symb
ol] :> Simp[(a + b*ArcCoth[c*x])^(p + 1)/(b*c*d*(p + 1)), x] /; FreeQ[{a, b
, c, d, e, p}, x] && EqQ[c^2*d + e, 0] && NeQ[p, -1]
```

Rule 6053

```
Int[(ArcCoth[u_]*((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.))/((d_) + (e_.)*(
x_)^2), x_Symbol] :> Dist[1/2, Int[(Log[SimplifyIntegrand[1 + 1/u, x]]*(a +
 b*ArcCoth[c*x])^p)/(d + e*x^2), x], x] - Dist[1/2, Int[(Log[SimplifyIntegr
and[1 - 1/u, x]]*(a + b*ArcCoth[c*x])^p)/(d + e*x^2), x], x] /; FreeQ[{a, b
, c, d, e}, x] && IGtQ[p, 0] && EqQ[c^2*d + e, 0] && EqQ[u^2 - (1 - 2/(1 -
```

```
c*x))^2, 0]
```

Rule 6057

```
Int[(Log[u_]*((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.))/((d_) + (e_.)*(x_)^
2), x_Symbol] :> Simp[((a + b*ArcCoth[c*x])^p*PolyLog[2, 1 - u])/(2*c*d), x
] - Dist[(b*p)/2, Int[((a + b*ArcCoth[c*x])^(p - 1)*PolyLog[2, 1 - u])/(d +
 e*x^2), x], x] /; FreeQ[{a, b, c, d, e}, x] && IGtQ[p, 0] && EqQ[c^2*d + e
, 0] && EqQ[(1 - u)^2 - (1 - 2/(1 + c*x))^2, 0]
```

Rule 6610

```
Int[(u_)*PolyLog[n_, v_], x_Symbol] :> With[{w = DerivativeDivides[v, u*v,
x]}, Simp[w*PolyLog[n + 1, v], x] /;  !FalseQ[w]] /; FreeQ[n, x]
```

Rule 6681

```
Int[((a_.) + (b_.)*(F_)[((c_.)*Sqrt[(d_.) + (e_.)*(x_)])/Sqrt[(f_.) + (g_.)
*(x_)]])^(n_.)/((A_.) + (C_.)*(x_)^2), x_Symbol] :> Dist[(2*e*g)/(C*(e*f -
d*g)), Subst[Int[(a + b*F[c*x])^n/x, x], x, Sqrt[d + e*x]/Sqrt[f + g*x]], x
] /; FreeQ[{a, b, c, d, e, f, g, A, C, F}, x] && EqQ[C*d*f - A*e*g, 0] && E
qQ[e*f + d*g, 0] && IGtQ[n, 0]
```

Rubi steps

$$\int \frac{\left(a+b\coth^{-1}\left(\frac{\sqrt{1-cx}}{\sqrt{1+cx}}\right)\right)^2}{1-c^2x^2}\,dx = -\frac{\text{Subst}\left(\int \frac{\left(a+b\coth^{-1}(x)\right)^2}{x}\,dx, x, \frac{\sqrt{1-cx}}{\sqrt{1+cx}}\right)}{c}$$

$$= -\frac{2\left(a+b\coth^{-1}\left(\frac{\sqrt{1-cx}}{\sqrt{1+cx}}\right)\right)^2\coth^{-1}\left(1-\frac{2}{1-\frac{\sqrt{1-cx}}{\sqrt{1+cx}}}\right)}{c} + \frac{(4b)\,\text{Subst}\left(\int \frac{\coth^{-1}\left(1-\frac{2}{1-\dots}\right)\dots}{\dots}\right)}{\dots}$$

$$= -\frac{2\left(a+b\coth^{-1}\left(\frac{\sqrt{1-cx}}{\sqrt{1+cx}}\right)\right)^2\coth^{-1}\left(1-\frac{2}{1-\frac{\sqrt{1-cx}}{\sqrt{1+cx}}}\right)}{c} - \frac{(2b)\,\text{Subst}\left(\int \frac{\left(a+b\coth^{-1}(\dots\right)}{1-\dots}\right)}{c}$$

$$= -\frac{2\left(a+b\coth^{-1}\left(\frac{\sqrt{1-cx}}{\sqrt{1+cx}}\right)\right)^2\coth^{-1}\left(1-\frac{2}{1-\frac{\sqrt{1-cx}}{\sqrt{1+cx}}}\right)}{c} - \frac{b\left(a+b\coth^{-1}\left(\frac{\sqrt{1-cx}}{\sqrt{1+cx}}\right)\right)\dots}{c}$$

$$= -\frac{2\left(a+b\coth^{-1}\left(\frac{\sqrt{1-cx}}{\sqrt{1+cx}}\right)\right)^2\coth^{-1}\left(1-\frac{2}{1-\frac{\sqrt{1-cx}}{\sqrt{1+cx}}}\right)}{c} - \frac{b\left(a+b\coth^{-1}\left(\frac{\sqrt{1-cx}}{\sqrt{1+cx}}\right)\right)\dots}{c}$$

**Mathematica [F]** time = 0.54, size = 0, normalized size = 0.00

$$\int \frac{\left(a+b\coth^{-1}\left(\frac{\sqrt{1-cx}}{\sqrt{1+cx}}\right)\right)^2}{1-c^2x^2}\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[(a + b*ArcCoth[Sqrt[1 - c*x]/Sqrt[1 + c*x]])^2/(1 - c^2*x^2),x]
```

```
[Out] Integrate[(a + b*ArcCoth[Sqrt[1 - c*x]/Sqrt[1 + c*x]])^2/(1 - c^2*x^2), x]
```

**fricas [F]** time = 0.62, size = 0, normalized size = 0.00

$$\text{integral}\left(-\frac{b^2 \operatorname{arcoth}\left(\frac{\sqrt{-cx+1}}{\sqrt{cx+1}}\right)^2 + 2\,ab \operatorname{arcoth}\left(\frac{\sqrt{-cx+1}}{\sqrt{cx+1}}\right) + a^2}{c^2x^2 - 1}, x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccoth((-c*x+1)^(1/2)/(c*x+1)^(1/2)))^2/(-c^2*x^2+1),x, alg
orithm="fricas")
```

```
[Out] integral(-(b^2*arccoth(sqrt(-c*x + 1)/sqrt(c*x + 1))^2 + 2*a*b*arccoth(sqrt
(-c*x + 1)/sqrt(c*x + 1)) + a^2)/(c^2*x^2 - 1), x)
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int -\frac{\left(b \operatorname{arcoth}\left(\frac{\sqrt{-cx+1}}{\sqrt{cx+1}}\right) + a\right)^2}{c^2x^2 - 1}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccoth((-c*x+1)^(1/2)/(c*x+1)^(1/2)))^2/(-c^2*x^2+1),x, alg
orithm="giac")
```

```
[Out] integrate(-(b*arccoth(sqrt(-c*x + 1)/sqrt(c*x + 1)) + a)^2/(c^2*x^2 - 1), x
)
```

**maple [B]** time = 0.73, size = 696, normalized size = 2.30

$$\frac{a^2 \ln(cx+1)}{2c} - \frac{a^2 \ln(cx-1)}{2c} + \frac{b^2 \operatorname{arccoth}\left(\frac{\sqrt{-cx+1}}{\sqrt{cx+1}}\right)^2 \ln\left(1 + \frac{1}{\sqrt{\frac{\frac{\sqrt{-cx+1}}{\sqrt{cx+1}}-1}{\frac{\sqrt{-cx+1}}{\sqrt{cx+1}}+1}}}\right)}{c} + \frac{2b^2 \operatorname{arccoth}\left(\frac{\sqrt{-cx+1}}{\sqrt{cx+1}}\right) \operatorname{polylog}\left(2, -\frac{}{\sqrt{}}\right.}{c}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a+b*arccoth((-c*x+1)^(1/2)/(c*x+1)^(1/2)))^2/(-c^2*x^2+1),x)
```

```
[Out] 1/2*a^2/c*ln(c*x+1)-1/2*a^2/c*ln(c*x-1)+b^2/c*arccoth((-c*x+1)^(1/2)/(c*x+1
)^(1/2))^2*ln(1+1/(((-c*x+1)^(1/2)/(c*x+1)^(1/2)-1)/((-c*x+1)^(1/2)/(c*x+1)
^(1/2)+1))^(1/2))+2*b^2/c*arccoth((-c*x+1)^(1/2)/(c*x+1)^(1/2))*polylog(2,-
1/(((-c*x+1)^(1/2)/(c*x+1)^(1/2)-1)/((-c*x+1)^(1/2)/(c*x+1)^(1/2)+1))^(1/2)
)-2*b^2/c*polylog(3,-1/(((-c*x+1)^(1/2)/(c*x+1)^(1/2)-1)/((-c*x+1)^(1/2)/(c
*x+1)^(1/2)+1))^(1/2))+b^2/c*arccoth((-c*x+1)^(1/2)/(c*x+1)^(1/2))^2*ln(1-1
/(((-c*x+1)^(1/2)/(c*x+1)^(1/2)-1)/((-c*x+1)^(1/2)/(c*x+1)^(1/2)+1))^(1/2))
+2*b^2/c*arccoth((-c*x+1)^(1/2)/(c*x+1)^(1/2))*polylog(2,1/(((-c*x+1)^(1/2)
/(c*x+1)^(1/2)-1)/((-c*x+1)^(1/2)/(c*x+1)^(1/2)+1))^(1/2))-2*b^2/c*polylog(
3,1/(((-c*x+1)^(1/2)/(c*x+1)^(1/2)-1)/((-c*x+1)^(1/2)/(c*x+1)^(1/2)+1))^(1/
2))-b^2/c*arccoth((-c*x+1)^(1/2)/(c*x+1)^(1/2))^2*ln(1+1/((-c*x+1)^(1/2)/(c
*x+1)^(1/2)-1)*((-c*x+1)^(1/2)/(c*x+1)^(1/2)+1))-b^2/c*arccoth((-c*x+1)^(1/
2)/(c*x+1)^(1/2))*polylog(2,-1/((-c*x+1)^(1/2)/(c*x+1)^(1/2)-1)*((-c*x+1)^(
1/2)/(c*x+1)^(1/2)+1))+1/2*b^2/c*polylog(3,-1/((-c*x+1)^(1/2)/(c*x+1)^(1/2)
-1)*((-c*x+1)^(1/2)/(c*x+1)^(1/2)+1))+2*a*b/c*dilog(((-c*x+1)^(1/2)/(c*x+1)
^(1/2)-1)/((-c*x+1)^(1/2)/(c*x+1)^(1/2)+1))-1/2*a*b/c*dilog(((-c*x+1)^(1/2)
/(c*x+1)^(1/2)-1)^2/((-c*x+1)^(1/2)/(c*x+1)^(1/2)+1)^2)
```

**maxima [F]** time = 0.00, size = 0, normalized size = 0.00

$$\frac{1}{2}a^2\left(\frac{\log(cx+1)}{c}-\frac{\log(cx-1)}{c}\right)+\frac{\left(b^2\log(cx+1)-b^2\log(-cx+1)\right)\log\left(-\sqrt{cx+1}+\sqrt{-cx+1}\right)^2}{8c}+\int-\frac{2(\cdot}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccoth((-c*x+1)^(1/2)/(c*x+1)^(1/2)))^2/(-c^2*x^2+1),x, alg
orithm="maxima")
```

```
[Out] 1/2*a^2*(log(c*x + 1)/c - log(c*x - 1)/c) + 1/8*(b^2*log(c*x + 1) - b^2*log
(-c*x + 1))*log(-sqrt(c*x + 1) + sqrt(-c*x + 1))^2/c + integrate(-1/8*(2*(s
qrt(c*x + 1)*b^2 - sqrt(-c*x + 1)*b^2)*log(sqrt(c*x + 1) + sqrt(-c*x + 1))^
2 + 8*(sqrt(c*x + 1)*a*b - sqrt(-c*x + 1)*a*b)*log(sqrt(c*x + 1) + sqrt(-c*
x + 1)) - (4*(sqrt(c*x + 1)*b^2 - sqrt(-c*x + 1)*b^2)*log(sqrt(c*x + 1) + s
qrt(-c*x + 1)) + (8*a*b - (b^2*c*x - b^2)*log(c*x + 1) + (b^2*c*x - b^2)*lo
g(-c*x + 1))*sqrt(c*x + 1) - (8*a*b - (b^2*c*x + b^2)*log(c*x + 1) + (b^2*c
*x + b^2)*log(-c*x + 1))*sqrt(-c*x + 1))*log(-sqrt(c*x + 1) + sqrt(-c*x + 1
)))/((c^2*x^2 - 1)*sqrt(c*x + 1) - (c^2*x^2 - 1)*sqrt(-c*x + 1)), x)
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.00

$$\int-\frac{\left(a+b\,\mathrm{acoth}\left(\frac{\sqrt{1-c\,x}}{\sqrt{c\,x+1}}\right)\right)^2}{c^2\,x^2-1}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(-(a + b*acoth((1 - c*x)^(1/2)/(c*x + 1)^(1/2)))^2/(c^2*x^2 - 1),x)
```

```
[Out] int(-(a + b*acoth((1 - c*x)^(1/2)/(c*x + 1)^(1/2)))^2/(c^2*x^2 - 1), x)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$-\int\frac{a^2}{c^2x^2-1}\,dx-\int\frac{b^2\,\mathrm{acoth}^2\left(\frac{\sqrt{-cx+1}}{\sqrt{cx+1}}\right)}{c^2x^2-1}\,dx-\int\frac{2ab\,\mathrm{acoth}\left(\frac{\sqrt{-cx+1}}{\sqrt{cx+1}}\right)}{c^2x^2-1}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*acoth((-c*x+1)**(1/2)/(c*x+1)**(1/2)))**2/(-c**2*x**2+1),x)
```

```
[Out] -Integral(a**2/(c**2*x**2 - 1), x) - Integral(b**2*acoth(sqrt(-c*x + 1)/sqr
t(c*x + 1))**2/(c**2*x**2 - 1), x) - Integral(2*a*b*acoth(sqrt(-c*x + 1)/sq
rt(c*x + 1))/(c**2*x**2 - 1), x)
```

## 3.125 $\int \frac{a+b\coth^{-1}\left(\frac{\sqrt{1-cx}}{\sqrt{1+cx}}\right)}{1-c^2x^2}\,dx$

**Optimal**. Leaf size=89

$$-\frac{a\log\left(\frac{\sqrt{1-cx}}{\sqrt{cx+1}}\right)}{c}-\frac{b\text{Li}_2\left(-\frac{\sqrt{cx+1}}{\sqrt{1-cx}}\right)}{2c}+\frac{b\text{Li}_2\left(\frac{\sqrt{cx+1}}{\sqrt{1-cx}}\right)}{2c}$$

```
[Out] -a*ln((-c*x+1)^(1/2)/(c*x+1)^(1/2))/c-1/2*b*polylog(2,-(c*x+1)^(1/2)/(-c*x+
1)^(1/2))/c+1/2*b*polylog(2,(c*x+1)^(1/2)/(-c*x+1)^(1/2))/c
```

**Rubi [A]** time = 0.06, antiderivative size = 89, normalized size of antiderivative = 1.00, number of steps used = 2, number of rules used = 3, integrand size = 38, $\frac{\text{number of rules}}{\text{integrand size}}=0.079$, Rules used = {206, 6681, 5913}

$$-\frac{b\text{PolyLog}\left(2,-\frac{\sqrt{cx+1}}{\sqrt{1-cx}}\right)}{2c}+\frac{b\text{PolyLog}\left(2,\frac{\sqrt{cx+1}}{\sqrt{1-cx}}\right)}{2c}-\frac{a\log\left(\frac{\sqrt{1-cx}}{\sqrt{cx+1}}\right)}{c}$$

Antiderivative was successfully verified.

```
[In] Int[(a + b*ArcCoth[Sqrt[1 - c*x]/Sqrt[1 + c*x]])/(1 - c^2*x^2),x]
```

```
[Out] -((a*Log[Sqrt[1 - c*x]/Sqrt[1 + c*x]])/c) - (b*PolyLog[2, -(Sqrt[1 + c*x]/S
qrt[1 - c*x])])/(2*c) + (b*PolyLog[2, Sqrt[1 + c*x]/Sqrt[1 - c*x]])/(2*c)
```

Rule 206

```
Int[((a_) + (b_.)*(x_)^2)^(-1), x_Symbol] :> Simp[(1*ArcTanh[(Rt[-b, 2]*x)/
Rt[a, 2]])/(Rt[a, 2]*Rt[-b, 2]), x] /; FreeQ[{a, b}, x] && NegQ[a/b] && (Gt
Q[a, 0] || LtQ[b, 0])
```

Rule 5913

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))/(x_), x_Symbol] :> Simp[a*Log[x], x
] + (Simp[(b*PolyLog[2, -(c*x)^(-1)])/2, x] - Simp[(b*PolyLog[2, 1/(c*x)])/
2, x]) /; FreeQ[{a, b, c}, x]
```

Rule 6681

```
Int[((a_.) + (b_.)*(F_)[((c_.)*Sqrt[(d_.) + (e_.)*(x_)])/Sqrt[(f_.) + (g_.)
*(x_)]])^(n_.)/((A_.) + (C_.)*(x_)^2), x_Symbol] :> Dist[(2*e*g)/(C*(e*f -
d*g)), Subst[Int[(a + b*F[c*x])^n/x, x], x, Sqrt[d + e*x]/Sqrt[f + g*x]], x
] /; FreeQ[{a, b, c, d, e, f, g, A, C, F}, x] && EqQ[C*d*f - A*e*g, 0] && E
qQ[e*f + d*g, 0] && IGtQ[n, 0]
```

Rubi steps

$$\begin{aligned}\int \frac{a+b\coth^{-1}\left(\frac{\sqrt{1-cx}}{\sqrt{1+cx}}\right)}{1-c^2x^2}\,dx &= -\frac{\text{Subst}\left(\int \frac{a+b\coth^{-1}(x)}{x}\,dx, x, \frac{\sqrt{1-cx}}{\sqrt{1+cx}}\right)}{c}\\ &= -\frac{a\log\left(\frac{\sqrt{1-cx}}{\sqrt{1+cx}}\right)}{c}-\frac{b\text{Li}_2\left(-\frac{\sqrt{1+cx}}{\sqrt{1-cx}}\right)}{2c}+\frac{b\text{Li}_2\left(\frac{\sqrt{1+cx}}{\sqrt{1-cx}}\right)}{2c}\end{aligned}$$

**Mathematica [A]** time = 0.40, size = 98, normalized size = 1.10

$$\frac{a\tanh^{-1}(cx)}{c}+\frac{b\left(\text{Li}_2\left(-e^{-\tanh^{-1}(cx)}\right)-\text{Li}_2\left(e^{-\tanh^{-1}(cx)}\right)+\tanh^{-1}(cx)\left(2\coth^{-1}\left(\frac{\sqrt{1-cx}}{\sqrt{cx+1}}\right)+\log\left(1-e^{-\tanh^{-1}(cx)}\right)-\right.\right.}{2c}$$

Warning: Unable to verify antiderivative.

```
[In] Integrate[(a + b*ArcCoth[Sqrt[1 - c*x]/Sqrt[1 + c*x]])/(1 - c^2*x^2),x]
```

```
[Out] (a*ArcTanh[c*x])/c + (b*(ArcTanh[c*x]*(2*ArcCoth[Sqrt[1 - c*x]/Sqrt[1 + c*x
]] + Log[1 - E^(-ArcTanh[c*x])] - Log[1 + E^(-ArcTanh[c*x])]) + PolyLog[2,
-E^(-ArcTanh[c*x])] - PolyLog[2, E^(-ArcTanh[c*x])]))/(2*c)
```

**fricas [F]** time = 0.71, size = 0, normalized size = 0.00

$$\text{integral}\left(-\frac{b \operatorname{arcoth}\left(\frac{\sqrt{-cx+1}}{\sqrt{cx+1}}\right) + a}{c^2x^2 - 1}, x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccoth((-c*x+1)^(1/2)/(c*x+1)^(1/2)))/(-c^2*x^2+1),x, algor
ithm="fricas")
```

```
[Out] integral(-(b*arccoth(sqrt(-c*x + 1)/sqrt(c*x + 1)) + a)/(c^2*x^2 - 1), x)
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int -\frac{b \operatorname{arcoth}\left(\frac{\sqrt{-cx+1}}{\sqrt{cx+1}}\right) + a}{c^2x^2 - 1}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccoth((-c*x+1)^(1/2)/(c*x+1)^(1/2)))/(-c^2*x^2+1),x, algor
ithm="giac")
```

```
[Out] integrate(-(b*arccoth(sqrt(-c*x + 1)/sqrt(c*x + 1)) + a)/(c^2*x^2 - 1), x)
```

**maple [A]** time = 0.72, size = 119, normalized size = 1.34

$$\frac{a \ln(cx+1)}{2c} - \frac{a \ln(cx-1)}{2c} + \frac{b \operatorname{dilog}\left(\frac{\frac{\sqrt{-cx+1}}{\sqrt{cx+1}} - 1}{\frac{\sqrt{-cx+1}}{\sqrt{cx+1}} + 1}\right)}{c} - \frac{b \operatorname{dilog}\left(\frac{\left(\frac{\sqrt{-cx+1}}{\sqrt{cx+1}} - 1\right)^2}{\left(\frac{\sqrt{-cx+1}}{\sqrt{cx+1}} + 1\right)^2}\right)}{4c}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a+b*arccoth((-c*x+1)^(1/2)/(c*x+1)^(1/2)))/(-c^2*x^2+1),x)
```

```
[Out] 1/2*a/c*ln(c*x+1)-1/2*a/c*ln(c*x-1)+b/c*dilog(((-c*x+1)^(1/2)/(c*x+1)^(1/2)
-1)/((-c*x+1)^(1/2)/(c*x+1)^(1/2)+1))-1/4*b/c*dilog(((-c*x+1)^(1/2)/(c*x+1)
^(1/2)-1)^2/((-c*x+1)^(1/2)/(c*x+1)^(1/2)+1)^2)
```

**maxima [F]** time = 0.00, size = 0, normalized size = 0.00

$$\frac{1}{4} b\left(\frac{\left(\log(cx+1) - \log(-cx+1)\right) \log\left(\sqrt{cx+1} + \sqrt{-cx+1}\right) - \left(\log(cx+1) - \log(-cx+1)\right) \log\left(-\sqrt{cx+1}\right.}{c}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccoth((-c*x+1)^(1/2)/(c*x+1)^(1/2)))/(-c^2*x^2+1),x, algor
ithm="maxima")
```

```
[Out] 1/4*b*(((log(c*x + 1) - log(-c*x + 1))*log(sqrt(c*x + 1) + sqrt(-c*x + 1))
- (log(c*x + 1) - log(-c*x + 1))*log(-sqrt(c*x + 1) + sqrt(-c*x + 1)))/c -
2*integrate(-1/2*sqrt(c*x + 1)*(log(c*x + 1) - log(-c*x + 1))/((c^2*x^2 - 1
```

```
)*sqrt(c*x + 1) + (c^2*x^2 - 1)*sqrt(-c*x + 1)), x) - 2*integrate(1/2*sqrt(
c*x + 1)*(log(c*x + 1) - log(-c*x + 1))/((c^2*x^2 - 1)*sqrt(c*x + 1) - (c^2
*x^2 - 1)*sqrt(-c*x + 1)), x)) + 1/2*a*(log(c*x + 1)/c - log(c*x - 1)/c)
```

**mupad** [F] time = 0.00, size = -1, normalized size = -0.01

$$\int -\frac{a + b\,\mathrm{acoth}\left(\frac{\sqrt{1-c\,x}}{\sqrt{c\,x+1}}\right)}{c^2\,x^2-1}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(-(a + b*acoth((1 - c*x)^(1/2)/(c*x + 1)^(1/2)))/(c^2*x^2 - 1),x)
```

```
[Out] int(-(a + b*acoth((1 - c*x)^(1/2)/(c*x + 1)^(1/2)))/(c^2*x^2 - 1), x)
```

**sympy** [F] time = 0.00, size = 0, normalized size = 0.00

$$-\int \frac{a}{c^2x^2-1}\,dx - \int \frac{b\,\mathrm{acoth}\left(\frac{\sqrt{-cx+1}}{\sqrt{cx+1}}\right)}{c^2x^2-1}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*acoth((-c*x+1)**(1/2)/(c*x+1)**(1/2)))/(-c**2*x**2+1),x)
```

```
[Out] -Integral(a/(c**2*x**2 - 1), x) - Integral(b*acoth(sqrt(-c*x + 1)/sqrt(c*x
+ 1))/(c**2*x**2 - 1), x)
```

# 3.126 $\int \frac{1}{(1-c^2x^2)\left(a+b\coth^{-1}\left(\frac{\sqrt{1-cx}}{\sqrt{1+cx}}\right)\right)}\,dx$

**Optimal**. Leaf size=43

$$\operatorname{Int}\left(\frac{1}{(1-c^2x^2)\left(a+b\coth^{-1}\left(\frac{\sqrt{1-cx}}{\sqrt{cx+1}}\right)\right)},x\right)$$

```
[Out] Unintegrable(1/(-c^2*x^2+1)/(a+b*arccoth((-c*x+1)^(1/2)/(c*x+1)^(1/2))),x)
```

**Rubi** [A] time = 0.04, antiderivative size = 0, normalized size of antiderivative = 0.00, number of steps used = 0, number of rules used = 0, integrand size = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int \frac{1}{(1-c^2x^2)\left(a+b\coth^{-1}\left(\frac{\sqrt{1-cx}}{\sqrt{1+cx}}\right)\right)}\,dx$$

Verification is Not applicable to the result.

```
[In] Int[1/((1 - c^2*x^2)*(a + b*ArcCoth[Sqrt[1 - c*x]/Sqrt[1 + c*x]])),x]
```

```
[Out] Defer[Int][1/((1 - c^2*x^2)*(a + b*ArcCoth[Sqrt[1 - c*x]/Sqrt[1 + c*x]])),
x]
```

Rubi steps

$$\int \frac{1}{(1-c^2x^2)\left(a+b\coth^{-1}\left(\frac{\sqrt{1-cx}}{\sqrt{1+cx}}\right)\right)}\,dx=\int \frac{1}{(1-c^2x^2)\left(a+b\coth^{-1}\left(\frac{\sqrt{1-cx}}{\sqrt{1+cx}}\right)\right)}\,dx$$

**Mathematica** [A] time = 0.10, size = 0, normalized size = 0.00

$$\int \frac{1}{(1-c^2x^2)\left(a+b\coth^{-1}\left(\frac{\sqrt{1-cx}}{\sqrt{1+cx}}\right)\right)}\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[1/((1 - c^2*x^2)*(a + b*ArcCoth[Sqrt[1 - c*x]/Sqrt[1 + c*x]])),x]
```

```
[Out] Integrate[1/((1 - c^2*x^2)*(a + b*ArcCoth[Sqrt[1 - c*x]/Sqrt[1 + c*x]])), x
]
```

**fricas** [A] time = 0.56, size = 0, normalized size = 0.00

$$\operatorname{integral}\left(-\frac{1}{ac^2x^2+(bc^2x^2-b)\operatorname{arcoth}\left(\frac{\sqrt{-cx+1}}{\sqrt{cx+1}}\right)-a},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(-c^2*x^2+1)/(a+b*arccoth((-c*x+1)^(1/2)/(c*x+1)^(1/2))),x, alg
orithm="fricas")
```

```
[Out] integral(-1/(a*c^2*x^2 + (b*c^2*x^2 - b)*arccoth(sqrt(-c*x + 1)/sqrt(c*x +
1)) - a), x)
```

**giac** [A] time = 0.00, size = 0, normalized size = 0.00

$$\int -\frac{1}{\left(c^2x^2-1\right)\left(b\,\mathrm{arcoth}\left(\frac{\sqrt{-cx+1}}{\sqrt{cx+1}}\right)+a\right)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(-c^2*x^2+1)/(a+b*arccoth((-c*x+1)^(1/2)/(c*x+1)^(1/2))),x, alg
orithm="giac")
```

```
[Out] integrate(-1/((c^2*x^2 - 1)*(b*arccoth(sqrt(-c*x + 1)/sqrt(c*x + 1)) + a)),
 x)
```

**maple** [A] time = 0.99, size = 0, normalized size = 0.00

$$\int \frac{1}{\left(-c^2x^2+1\right)\left(a+b\,\mathrm{arccoth}\left(\frac{\sqrt{-cx+1}}{\sqrt{cx+1}}\right)\right)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(1/(-c^2*x^2+1)/(a+b*arccoth((-c*x+1)^(1/2)/(c*x+1)^(1/2))),x)
```

```
[Out] int(1/(-c^2*x^2+1)/(a+b*arccoth((-c*x+1)^(1/2)/(c*x+1)^(1/2))),x)
```

**maxima** [A] time = 0.00, size = 0, normalized size = 0.00

$$-\int \frac{1}{\left(c^2x^2-1\right)\left(b\,\mathrm{arcoth}\left(\frac{\sqrt{-cx+1}}{\sqrt{cx+1}}\right)+a\right)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(-c^2*x^2+1)/(a+b*arccoth((-c*x+1)^(1/2)/(c*x+1)^(1/2))),x, alg
orithm="maxima")
```

```
[Out] -integrate(1/((c^2*x^2 - 1)*(b*arccoth(sqrt(-c*x + 1)/sqrt(c*x + 1)) + a)),
 x)
```

**mupad** [A] time = 0.00, size = -1, normalized size = -0.02

$$-\int \frac{1}{\left(a+b\,\mathrm{acoth}\left(\frac{\sqrt{1-c\,x}}{\sqrt{c\,x+1}}\right)\right)\left(c^2\,x^2-1\right)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(-1/((a + b*acoth((1 - c*x)^(1/2)/(c*x + 1)^(1/2)))*(c^2*x^2 - 1)),x)
```

```
[Out] -int(1/((a + b*acoth((1 - c*x)^(1/2)/(c*x + 1)^(1/2)))*(c^2*x^2 - 1)), x)
```

**sympy** [A] time = 0.00, size = 0, normalized size = 0.00

$$-\int \frac{1}{ac^2x^2-a+bc^2x^2\,\mathrm{acoth}\left(\frac{\sqrt{-cx+1}}{\sqrt{cx+1}}\right)-b\,\mathrm{acoth}\left(\frac{\sqrt{-cx+1}}{\sqrt{cx+1}}\right)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(-c**2*x**2+1)/(a+b*acoth((-c*x+1)**(1/2)/(c*x+1)**(1/2))),x)
```

```
[Out] -Integral(1/(a*c**2*x**2 - a + b*c**2*x**2*acoth(sqrt(-c*x + 1)/sqrt(c*x +
1)) - b*acoth(sqrt(-c*x + 1)/sqrt(c*x + 1))), x)
```

## 3.127 $\int \frac{1}{(1-c^2x^2)\left(a+b\coth^{-1}\left(\frac{\sqrt{1-cx}}{\sqrt{1+cx}}\right)\right)^2}\,dx$

**Optimal**. Leaf size=43

$$\text{Int}\left(\frac{1}{(1-c^2x^2)\left(a+b\coth^{-1}\left(\frac{\sqrt{1-cx}}{\sqrt{cx+1}}\right)\right)^2},x\right)$$

```
[Out] Unintegrable(1/(-c^2*x^2+1)/(a+b*arccoth((-c*x+1)^(1/2)/(c*x+1)^(1/2)))^2,x
)
```

**Rubi [A]** time = 0.04, antiderivative size = 0, normalized size of antiderivative = 0.00, number of steps used = 0, number of rules used = 0, integrand size = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int \frac{1}{(1-c^2x^2)\left(a+b\coth^{-1}\left(\frac{\sqrt{1-cx}}{\sqrt{1+cx}}\right)\right)^2}\,dx$$

Verification is Not applicable to the result.

```
[In] Int[1/((1 - c^2*x^2)*(a + b*ArcCoth[Sqrt[1 - c*x]/Sqrt[1 + c*x]])^2),x]
```

```
[Out] Defer[Int][1/((1 - c^2*x^2)*(a + b*ArcCoth[Sqrt[1 - c*x]/Sqrt[1 + c*x]])^2)
, x]
```

Rubi steps

$$\int \frac{1}{(1-c^2x^2)\left(a+b\coth^{-1}\left(\frac{\sqrt{1-cx}}{\sqrt{1+cx}}\right)\right)^2}\,dx=\int \frac{1}{(1-c^2x^2)\left(a+b\coth^{-1}\left(\frac{\sqrt{1-cx}}{\sqrt{1+cx}}\right)\right)^2}\,dx$$

**Mathematica [A]** time = 0.79, size = 0, normalized size = 0.00

$$\int \frac{1}{(1-c^2x^2)\left(a+b\coth^{-1}\left(\frac{\sqrt{1-cx}}{\sqrt{1+cx}}\right)\right)^2}\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[1/((1 - c^2*x^2)*(a + b*ArcCoth[Sqrt[1 - c*x]/Sqrt[1 + c*x]])^2),
x]
```

```
[Out] Integrate[1/((1 - c^2*x^2)*(a + b*ArcCoth[Sqrt[1 - c*x]/Sqrt[1 + c*x]])^2),
 x]
```

**fricas [A]** time = 0.48, size = 0, normalized size = 0.00

$$\text{integral}\left(-\frac{1}{a^2c^2x^2+\left(b^2c^2x^2-b^2\right)\text{arcoth}\left(\frac{\sqrt{-cx+1}}{\sqrt{cx+1}}\right)^2-a^2+2\left(abc^2x^2-ab\right)\text{arcoth}\left(\frac{\sqrt{-cx+1}}{\sqrt{cx+1}}\right)},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(-c^2*x^2+1)/(a+b*arccoth((-c*x+1)^(1/2)/(c*x+1)^(1/2)))^2,x, a
lgorithm="fricas")
```

```
[Out] integral(-1/(a^2*c^2*x^2 + (b^2*c^2*x^2 - b^2)*arccoth(sqrt(-c*x + 1)/sqrt(
c*x + 1))^2 - a^2 + 2*(a*b*c^2*x^2 - a*b)*arccoth(sqrt(-c*x + 1)/sqrt(c*x +
 1))), x)
```

**giac** [A] time = 0.00, size = 0, normalized size = 0.00

$$\int -\frac{1}{\left(c^2x^2-1\right)\left(b\,\mathrm{arcoth}\left(\frac{\sqrt{-cx+1}}{\sqrt{cx+1}}\right)+a\right)^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(-c^2*x^2+1)/(a+b*arccoth((-c*x+1)^(1/2)/(c*x+1)^(1/2)))^2,x, a
lgorithm="giac")
```

```
[Out] integrate(-1/((c^2*x^2 - 1)*(b*arccoth(sqrt(-c*x + 1)/sqrt(c*x + 1)) + a)^2
), x)
```

**maple** [A] time = 1.07, size = 0, normalized size = 0.00

$$\int \frac{1}{\left(-c^2x^2+1\right)\left(a+b\,\mathrm{arccoth}\left(\frac{\sqrt{-cx+1}}{\sqrt{cx+1}}\right)\right)^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(1/(-c^2*x^2+1)/(a+b*arccoth((-c*x+1)^(1/2)/(c*x+1)^(1/2)))^2,x)
```

```
[Out] int(1/(-c^2*x^2+1)/(a+b*arccoth((-c*x+1)^(1/2)/(c*x+1)^(1/2)))^2,x)
```

**maxima** [A] time = 0.00, size = 0, normalized size = 0.00

$$\frac{4\,cx}{\sqrt{cx+1}\,\sqrt{-cx+1}\,b^2c\log\left(\sqrt{cx+1}+\sqrt{-cx+1}\right)-\sqrt{cx+1}\,\sqrt{-cx+1}\,b^2c\log\left(-\sqrt{cx+1}+\sqrt{-cx+1}\right)+2\,\sqrt{cx+}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(-c^2*x^2+1)/(a+b*arccoth((-c*x+1)^(1/2)/(c*x+1)^(1/2)))^2,x, a
lgorithm="maxima")
```

```
[Out] 4*c*x/(sqrt(c*x + 1)*sqrt(-c*x + 1)*b^2*c*log(sqrt(c*x + 1) + sqrt(-c*x + 1
)) - sqrt(c*x + 1)*sqrt(-c*x + 1)*b^2*c*log(-sqrt(c*x + 1) + sqrt(-c*x + 1)
) + 2*sqrt(c*x + 1)*sqrt(-c*x + 1)*a*b*c) - integrate(-4/((b^2*c^2*x^2 - b^
2)*sqrt(c*x + 1)*sqrt(-c*x + 1)*log(sqrt(c*x + 1) + sqrt(-c*x + 1)) - (b^2*
c^2*x^2 - b^2)*sqrt(c*x + 1)*sqrt(-c*x + 1)*log(-sqrt(c*x + 1) + sqrt(-c*x
+ 1)) + 2*(a*b*c^2*x^2 - a*b)*sqrt(c*x + 1)*sqrt(-c*x + 1)), x)
```

**mupad** [A] time = 0.00, size = -1, normalized size = -0.02

$$-\int \frac{1}{{\left(a+b\,\mathrm{acoth}\left(\frac{\sqrt{1-c\,x}}{\sqrt{c\,x+1}}\right)\right)}^2\,\left(c^2\,x^2-1\right)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(-1/((a + b*acoth((1 - c*x)^(1/2)/(c*x + 1)^(1/2)))^2*(c^2*x^2 - 1)),x)
```

```
[Out] -int(1/((a + b*acoth((1 - c*x)^(1/2)/(c*x + 1)^(1/2)))^2*(c^2*x^2 - 1)), x)
```

**sympy [A]** time = 0.00, size = 0, normalized size = 0.00

$$-\int \frac{1}{a^2c^2x^2 - a^2 + 2abc^2x^2\operatorname{acoth}\left(\frac{\sqrt{-cx+1}}{\sqrt{cx+1}}\right) - 2ab\operatorname{acoth}\left(\frac{\sqrt{-cx+1}}{\sqrt{cx+1}}\right) + b^2c^2x^2\operatorname{acoth}^2\left(\frac{\sqrt{-cx+1}}{\sqrt{cx+1}}\right) - b^2\operatorname{acoth}^2\left(\frac{\sqrt{-cx+1}}{\sqrt{cx+1}}\right)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(-c**2*x**2+1)/(a+b*acoth((-c*x+1)**(1/2)/(c*x+1)**(1/2)))**2,x
)
```

```
[Out] -Integral(1/(a**2*c**2*x**2 - a**2 + 2*a*b*c**2*x**2*acoth(sqrt(-c*x + 1)/s
qrt(c*x + 1)) - 2*a*b*acoth(sqrt(-c*x + 1)/sqrt(c*x + 1)) + b**2*c**2*x**2*
acoth(sqrt(-c*x + 1)/sqrt(c*x + 1))**2 - b**2*acoth(sqrt(-c*x + 1)/sqrt(c*x
 + 1))**2), x)
```

# 3.128 $\int x^m \coth^{-1}(\tanh(a+bx))\,dx$

**Optimal**. Leaf size=37

$$\frac{x^{m+1}\coth^{-1}(\tanh(a+bx))}{m+1}-\frac{bx^{m+2}}{m^2+3m+2}$$

[Out] -b*x^(2+m)/(m^2+3*m+2)+x^(1+m)*arccoth(tanh(b*x+a))/(1+m)

**Rubi [A]** time = 0.03, antiderivative size = 37, normalized size of antiderivative = 1.00, number of steps used = 2, number of rules used = 2, integrand size = 11, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.182, Rules used = {2168, 30}

$$\frac{x^{m+1}\coth^{-1}(\tanh(a+bx))}{m+1}-\frac{bx^{m+2}}{m^2+3m+2}$$

Antiderivative was successfully verified.

[In] Int[x^m*ArcCoth[Tanh[a + b*x]],x]

[Out] -((b*x^(2 + m))/(2 + 3*m + m^2)) + (x^(1 + m)*ArcCoth[Tanh[a + b*x]])/(1 + m)

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 2168

```
Int[(u_)^(m_)*(v_)^(n_.), x_Symbol] :> With[{a = Simplify[D[u, x]], b = Sim
plify[D[v, x]]}, Simp[(u^(m + 1)*v^n)/(a*(m + 1)), x] - Dist[(b*n)/(a*(m +
1)), Int[u^(m + 1)*v^(n - 1), x], x] /; NeQ[b*u - a*v, 0]] /; FreeQ[{m, n},
 x] && PiecewiseLinearQ[u, v, x] && NeQ[m, -1] && ((LtQ[m, -1] && GtQ[n, 0]
 && !(ILtQ[m + n, -2] && (FractionQ[m] || GeQ[2*n + m + 1, 0]))) || (IGtQ[
n, 0] && IGtQ[m, 0] && LeQ[n, m]) || (IGtQ[n, 0] && !IntegerQ[m]) || (ILtQ
[m, 0] && !IntegerQ[n]))
```

Rubi steps

$$\begin{aligned}\int x^m \coth^{-1}(\tanh(a+bx))\,dx &= \frac{x^{1+m}\coth^{-1}(\tanh(a+bx))}{1+m}-\frac{b\int x^{1+m}\,dx}{1+m}\\ &= -\frac{bx^{2+m}}{2+3m+m^2}+\frac{x^{1+m}\coth^{-1}(\tanh(a+bx))}{1+m}\end{aligned}$$

**Mathematica [A]** time = 0.06, size = 34, normalized size = 0.92

$$x^m\left(\frac{x\left(\coth^{-1}(\tanh(a+bx))-bx\right)}{m+1}+\frac{bx^2}{m+2}\right)$$

Antiderivative was successfully verified.

[In] Integrate[x^m*ArcCoth[Tanh[a + b*x]],x]

[Out] x^m*((b*x^2)/(2 + m) + (x*(-(b*x) + ArcCoth[Tanh[a + b*x]]))/(1 + m))

**fricas** [A] time = 0.54, size = 33, normalized size = 0.89

$$\frac{\left((bm+b)x^2+(am+2\,a)x\right)x^m}{m^2+3\,m+2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^m*arccoth(tanh(b*x+a)),x, algorithm="fricas")
[Out] ((b*m + b)*x^2 + (a*m + 2*a)*x)*x^m/(m^2 + 3*m + 2)
```

**giac** [F] time = 0.00, size = 0, normalized size = 0.00

$$\int x^m \operatorname{arcoth}(\tanh(bx+a))\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^m*arccoth(tanh(b*x+a)),x, algorithm="giac")
[Out] integrate(x^m*arccoth(tanh(b*x + a)), x)
```

**maple** [C] time = 0.16, size = 676, normalized size = 18.27

$$\frac{x\,x^m\ln\left(e^{bx+a}\right)}{1+m}-\frac{x\left(-2i\pi\,\mathrm{csgn}\left(\frac{i}{e^{2bx+2a}+1}\right)\mathrm{csgn}\left(\frac{ie^{2bx+2a}}{e^{2bx+2a}+1}\right)^2-i\pi\,\mathrm{csgn}\left(\frac{i}{e^{2bx+2a}+1}\right)\mathrm{csgn}\left(\frac{ie^{2bx+2a}}{e^{2bx+2a}+1}\right)^2 m+4i\pi\mathrm{csgn}\right.}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^m*arccoth(tanh(b*x+a)),x)
[Out] 1/(1+m)*x*x^m*ln(exp(b*x+a))-1/4*x*(-2*I*Pi*csgn(I/(exp(2*b*x+2*a)+1))*csgn
(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2-I*Pi*csgn(I/(exp(2*b*x+2*a)+1))*csg
n(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2*m+4*I*Pi*csgn(I/(exp(2*b*x+2*a)+1)
)^3+I*Pi*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x
+2*a)/(exp(2*b*x+2*a)+1))*m-2*I*Pi*csgn(I*exp(b*x+a))*csgn(I*exp(2*b*x+2*a)
)^2*m+4*I*Pi+2*I*Pi*m+2*I*Pi*csgn(I/(exp(2*b*x+2*a)+1))^3*m+I*Pi*csgn(I*exp
(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^3*m-I*Pi*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(
2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2*m+I*Pi*csgn(I*exp(b*x+a))^2*csgn(I*exp(2*b
*x+2*a))*m-4*I*Pi*csgn(I*exp(b*x+a))*csgn(I*exp(2*b*x+2*a))^2+I*Pi*csgn(I*e
xp(2*b*x+2*a))^3*m-4*I*Pi*csgn(I/(exp(2*b*x+2*a)+1))^2+2*I*Pi*csgn(I*exp(2*
b*x+2*a)/(exp(2*b*x+2*a)+1))^3-2*I*Pi*csgn(I/(exp(2*b*x+2*a)+1))^2*m+2*I*Pi
*csgn(I*exp(b*x+a))^2*csgn(I*exp(2*b*x+2*a))+4*b*x+2*I*Pi*csgn(I/(exp(2*b*x
+2*a)+1))*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))-
2*I*Pi*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2+2
*I*Pi*csgn(I*exp(2*b*x+2*a))^3)/(1+m)/(2+m)*x^m
```

**maxima** [A] time = 0.34, size = 38, normalized size = 1.03

$$-\frac{bx^2x^m}{(m+2)(m+1)}+\frac{x^{m+1}\operatorname{arcoth}(\tanh(bx+a))}{m+1}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^m*arccoth(tanh(b*x+a)),x, algorithm="maxima")
[Out] -b*x^2*x^m/((m + 2)*(m + 1)) + x^(m + 1)*arccoth(tanh(b*x + a))/(m + 1)
```

**mupad** [B] time = 1.61, size = 96, normalized size = 2.59

$$\frac{2\,b\,x^m\,x^2\,(m+1)}{2\,m^2+6\,m+4}-\frac{x\,x^m\,(m+2)\,\left(\ln\left(-\frac{2}{e^{2\,a}\,e^{2\,b\,x}-1}\right)-\ln\left(\frac{2\,e^{2\,a}\,e^{2\,b\,x}}{e^{2\,a}\,e^{2\,b\,x}-1}\right)+2\,b\,x\right)}{2\,m^2+6\,m+4}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^m*acoth(tanh(a + b*x)),x)
```

```
[Out] (2*b*x^m*x^2*(m + 1))/(6*m + 2*m^2 + 4) - (x*x^m*(m + 2)*(log(-2/(exp(2*a)*
exp(2*b*x) - 1)) - log((2*exp(2*a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x) - 1)) +
 2*b*x))/(6*m + 2*m^2 + 4)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\begin{cases} b \log(x) - \frac{\operatorname{acoth}(\tanh(a+bx))}{x} & \text{for } m = -2 \\ \int \frac{\operatorname{acoth}(\tanh(a+bx))}{x}\, dx & \text{for } m = -1 \\ -\frac{bx^2x^m}{m^2+3m+2} + \frac{mxx^m \operatorname{acoth}(\tanh(a+bx))}{m^2+3m+2} + \frac{2xx^m \operatorname{acoth}(\tanh(a+bx))}{m^2+3m+2} & \text{otherwise} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**m*acoth(tanh(b*x+a)),x)
```

```
[Out] Piecewise((b*log(x) - acoth(tanh(a + b*x))/x, Eq(m, -2)), (Integral(acoth(t
anh(a + b*x))/x, x), Eq(m, -1)), (-b*x**2*x**m/(m**2 + 3*m + 2) + m*x*x**m*
acoth(tanh(a + b*x))/(m**2 + 3*m + 2) + 2*x*x**m*acoth(tanh(a + b*x))/(m**2
 + 3*m + 2), True))
```

# 3.129 $\int x^2 \coth^{-1}(\tanh(a+bx))\,dx$

**Optimal**. Leaf size=23

$$\frac{1}{3}x^3\coth^{-1}(\tanh(a+bx))-\frac{bx^4}{12}$$

```
[Out] -1/12*b*x^4+1/3*x^3*arccoth(tanh(b*x+a))
```

**Rubi** [A] time = 0.01, antiderivative size = 23, normalized size of antiderivative = 1.00, number of steps used = 2, number of rules used = 2, integrand size = 11, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.182, Rules used = {2168, 30}

$$\frac{1}{3}x^3\coth^{-1}(\tanh(a+bx))-\frac{bx^4}{12}$$

Antiderivative was successfully verified.

```
[In] Int[x^2*ArcCoth[Tanh[a + b*x]],x]
```

```
[Out] -(b*x^4)/12 + (x^3*ArcCoth[Tanh[a + b*x]])/3
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 2168

```
Int[(u_)^(m_)*(v_)^(n_.), x_Symbol] :> With[{a = Simplify[D[u, x]], b = Sim
plify[D[v, x]]}, Simp[(u^(m + 1)*v^n)/(a*(m + 1)), x] - Dist[(b*n)/(a*(m +
1)), Int[u^(m + 1)*v^(n - 1), x], x] /; NeQ[b*u - a*v, 0]] /; FreeQ[{m, n},
 x] && PiecewiseLinearQ[u, v, x] && NeQ[m, -1] && ((LtQ[m, -1] && GtQ[n, 0]
 &&  !(ILtQ[m + n, -2] && (FractionQ[m] || GeQ[2*n + m + 1, 0]))) || (IGtQ[
n, 0] && IGtQ[m, 0] && LeQ[n, m]) || (IGtQ[n, 0] &&  !IntegerQ[m]) || (ILtQ
[m, 0] &&  !IntegerQ[n]))
```

Rubi steps

$$\begin{aligned}\int x^2\coth^{-1}(\tanh(a+bx))\,dx &= \frac{1}{3}x^3\coth^{-1}(\tanh(a+bx))-\frac{1}{3}b\int x^3\,dx\\ &= -\frac{bx^4}{12}+\frac{1}{3}x^3\coth^{-1}(\tanh(a+bx))\end{aligned}$$

**Mathematica** [A] time = 0.02, size = 20, normalized size = 0.87

$$-\frac{1}{12}x^3\left(bx-4\coth^{-1}(\tanh(a+bx))\right)$$

Antiderivative was successfully verified.

```
[In] Integrate[x^2*ArcCoth[Tanh[a + b*x]],x]
```

```
[Out] -1/12*(x^3*(b*x - 4*ArcCoth[Tanh[a + b*x]]))
```

**fricas** [A] time = 0.64, size = 13, normalized size = 0.57

$$\frac{1}{4}bx^4+\frac{1}{3}ax^3$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*arccoth(tanh(b*x+a)),x, algorithm="fricas")
[Out] 1/4*b*x^4 + 1/3*a*x^3
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int x^2 \operatorname{arcoth}(\tanh(bx+a))\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*arccoth(tanh(b*x+a)),x, algorithm="giac")
[Out] integrate(x^2*arccoth(tanh(b*x + a)), x)
```

**maple [B]** time = 0.38, size = 59, normalized size = 2.57

$$\frac{x^3 \operatorname{arccoth}(\tanh(bx+a))}{3} + \frac{-\frac{(bx+a)^4}{4} + (bx+a)^3 a - \frac{3a^2(bx+a)^2}{2} + (bx+a)a^3}{3b^3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^2*arccoth(tanh(b*x+a)),x)
[Out] 1/3*x^3*arccoth(tanh(b*x+a))+1/3/b^3*(-1/4*(b*x+a)^4+(b*x+a)^3*a-3/2*a^2*(b
*x+a)^2+(b*x+a)*a^3)
```

**maxima [A]** time = 0.38, size = 19, normalized size = 0.83

$$-\frac{1}{12}bx^4 + \frac{1}{3}x^3 \operatorname{arcoth}(\tanh(bx+a))$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*arccoth(tanh(b*x+a)),x, algorithm="maxima")
[Out] -1/12*b*x^4 + 1/3*x^3*arccoth(tanh(b*x + a))
```

**mupad [B]** time = 0.09, size = 19, normalized size = 0.83

$$\frac{x^3 \operatorname{acoth}(\tanh(a+b\,x))}{3} - \frac{b\,x^4}{12}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^2*acoth(tanh(a + b*x)),x)
[Out] (x^3*acoth(tanh(a + b*x)))/3 - (b*x^4)/12
```

**sympy [A]** time = 0.40, size = 19, normalized size = 0.83

$$-\frac{bx^4}{12} + \frac{x^3 \operatorname{acoth}(\tanh(a+bx))}{3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**2*acoth(tanh(b*x+a)),x)
[Out] -b*x**4/12 + x**3*acoth(tanh(a + b*x))/3
```

# 3.130 $\int x \coth^{-1}(\tanh(a+bx))\,dx$

**Optimal**. Leaf size=23

$$\frac{1}{2}x^2\coth^{-1}(\tanh(a+bx))-\frac{bx^3}{6}$$

```
[Out] -1/6*b*x^3+1/2*x^2*arccoth(tanh(b*x+a))
```

**Rubi** [A] time = 0.01, antiderivative size = 23, normalized size of antiderivative = 1.00, number of steps used = 2, number of rules used = 2, integrand size = 9, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.222, Rules used = {6240, 30}

$$\frac{1}{2}x^2\coth^{-1}(\tanh(a+bx))-\frac{bx^3}{6}$$

Antiderivative was successfully verified.

```
[In] Int[x*ArcCoth[Tanh[a + b*x]],x]
```

```
[Out] -(b*x^3)/6 + (x^2*ArcCoth[Tanh[a + b*x]])/2
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 6240

```
Int[ArcCoth[(c_.) + (d_.)*Tanh[(a_.) + (b_.)*(x_)]]*((e_.) + (f_.)*(x_))^(m
_.), x_Symbol] :> Simp[((e + f*x)^(m + 1)*ArcCoth[c + d*Tanh[a + b*x]])/(f*
(m + 1)), x] + Dist[b/(f*(m + 1)), Int[(e + f*x)^(m + 1)/(c - d + c*E^(2*a
+ 2*b*x)), x], x] /; FreeQ[{a, b, c, d, e, f}, x] && IGtQ[m, 0] && EqQ[(c -
 d)^2, 1]
```

Rubi steps

$$\begin{aligned}\int x\coth^{-1}(\tanh(a+bx))\,dx &= \frac{1}{2}x^2\coth^{-1}(\tanh(a+bx))-\frac{1}{2}b\int x^2\,dx\\ &= -\frac{bx^3}{6}+\frac{1}{2}x^2\coth^{-1}(\tanh(a+bx))\end{aligned}$$

**Mathematica** [A] time = 0.02, size = 20, normalized size = 0.87

$$-\frac{1}{6}x^2\left(bx-3\coth^{-1}(\tanh(a+bx))\right)$$

Antiderivative was successfully verified.

```
[In] Integrate[x*ArcCoth[Tanh[a + b*x]],x]
```

```
[Out] -1/6*(x^2*(b*x - 3*ArcCoth[Tanh[a + b*x]]))
```

**fricas** [A] time = 0.45, size = 13, normalized size = 0.57

$$\frac{1}{3}bx^3+\frac{1}{2}ax^2$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*arccoth(tanh(b*x+a)),x, algorithm="fricas")
```

```
[Out] 1/3*b*x^3 + 1/2*a*x^2
```

**giac** [F] time = 0.00, size = 0, normalized size = 0.00

$$\int x \operatorname{arcoth}(\tanh(bx+a))\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*arccoth(tanh(b*x+a)),x, algorithm="giac")
```

```
[Out] integrate(x*arccoth(tanh(b*x + a)), x)
```

**maple** [B] time = 0.38, size = 48, normalized size = 2.09

$$\frac{x^2 \operatorname{arccoth}(\tanh(bx+a))}{2} + \frac{-\frac{(bx+a)^3}{3} + (bx+a)^2 a - a^2 (bx+a)}{2b^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x*arccoth(tanh(b*x+a)),x)
```

```
[Out] 1/2*x^2*arccoth(tanh(b*x+a))+1/2/b^2*(-1/3*(b*x+a)^3+(b*x+a)^2*a-a^2*(b*x+a
))
```

**maxima** [A] time = 0.38, size = 19, normalized size = 0.83

$$-\frac{1}{6}bx^3 + \frac{1}{2}x^2 \operatorname{arcoth}(\tanh(bx+a))$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*arccoth(tanh(b*x+a)),x, algorithm="maxima")
```

```
[Out] -1/6*b*x^3 + 1/2*x^2*arccoth(tanh(b*x + a))
```

**mupad** [B] time = 1.13, size = 19, normalized size = 0.83

$$\frac{x^2 \operatorname{acoth}(\tanh(a+b\,x))}{2} - \frac{b\,x^3}{6}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x*acoth(tanh(a + b*x)),x)
```

```
[Out] (x^2*acoth(tanh(a + b*x)))/2 - (b*x^3)/6
```

**sympy** [A] time = 0.23, size = 19, normalized size = 0.83

$$-\frac{bx^3}{6} + \frac{x^2 \operatorname{acoth}(\tanh(a+bx))}{2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*acoth(tanh(b*x+a)),x)
```

```
[Out] -b*x**3/6 + x**2*acoth(tanh(a + b*x))/2
```

# 3.131 $\int \coth^{-1}(\tanh(a+bx))\,dx$

**Optimal**. Leaf size=16

$$\frac{\coth^{-1}(\tanh(a+bx))^2}{2b}$$

```
[Out] 1/2*arccoth(tanh(b*x+a))^2/b
```

**Rubi [A]** time = 0.00, antiderivative size = 16, normalized size of antiderivative = 1.00, number of steps used = 2, number of rules used = 2, integrand size = 7, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.286, Rules used = {2157, 30}

$$\frac{\coth^{-1}(\tanh(a+bx))^2}{2b}$$

Antiderivative was successfully verified.

```
[In] Int[ArcCoth[Tanh[a + b*x]],x]
[Out] ArcCoth[Tanh[a + b*x]]^2/(2*b)
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 2157

```
Int[(u_)^(m_.), x_Symbol] :> With[{c = Simplify[D[u, x]]}, Dist[1/c, Subst[
Int[x^m, x], x, u], x]] /; FreeQ[m, x] && PiecewiseLinearQ[u, x]
```

Rubi steps

$$\begin{aligned}\int \coth^{-1}(\tanh(a+bx))\,dx &= \frac{\text{Subst}\left(\int x\,dx, x, \coth^{-1}(\tanh(a+bx))\right)}{b}\\ &= \frac{\coth^{-1}(\tanh(a+bx))^2}{2b}\end{aligned}$$

**Mathematica [A]** time = 0.01, size = 18, normalized size = 1.12

$$x\coth^{-1}(\tanh(a+bx))-\frac{bx^2}{2}$$

Antiderivative was successfully verified.

```
[In] Integrate[ArcCoth[Tanh[a + b*x]],x]
[Out] -1/2*(b*x^2) + x*ArcCoth[Tanh[a + b*x]]
```

**fricas [A]** time = 0.43, size = 10, normalized size = 0.62

$$\frac{1}{2}bx^2+ax$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(tanh(b*x+a)),x, algorithm="fricas")
[Out] 1/2*b*x^2 + a*x
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \operatorname{arcoth}(\tanh(bx + a))\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(tanh(b*x+a)),x, algorithm="giac")
[Out] integrate(arccoth(tanh(b*x + a)), x)
```

**maple [B]** time = 0.06, size = 32, normalized size = 2.00

$$\frac{\operatorname{arctanh}(\tanh(bx + a)) \operatorname{arccoth}(\tanh(bx + a)) - \frac{\operatorname{arctanh}(\tanh(bx+a))^2}{2}}{b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(arccoth(tanh(b*x+a)),x)
[Out] 1/b*(arctanh(tanh(b*x+a))*arccoth(tanh(b*x+a))-1/2*arctanh(tanh(b*x+a))^2)
```

**maxima [A]** time = 0.38, size = 16, normalized size = 1.00

$$-\frac{1}{2}\, bx^2 + x \operatorname{arcoth}(\tanh(bx + a))$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(tanh(b*x+a)),x, algorithm="maxima")
[Out] -1/2*b*x^2 + x*arccoth(tanh(b*x + a))
```

**mupad [B]** time = 1.12, size = 16, normalized size = 1.00

$$x \operatorname{acoth}(\tanh(a + b\, x)) - \frac{b\, x^2}{2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(tanh(a + b*x)),x)
[Out] x*acoth(tanh(a + b*x)) - (b*x^2)/2
```

**sympy [A]** time = 0.16, size = 19, normalized size = 1.19

$$\begin{cases} \frac{\operatorname{acoth}^2(\tanh(a+bx))}{2b} & \text{for } b \neq 0 \\ x \operatorname{acoth}(\tanh(a)) & \text{otherwise} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(tanh(b*x+a)),x)
[Out] Piecewise((acoth(tanh(a + b*x))**2/(2*b), Ne(b, 0)), (x*acoth(tanh(a)), Tru
e))
```

## 3.132 $\int \frac{\coth^{-1}(\tanh(a+bx))}{x} dx$

**Optimal**. Leaf size=21

$$bx - \log(x)\left(bx - \coth^{-1}(\tanh(a+bx))\right)$$

```
[Out] b*x-(b*x-arccoth(tanh(b*x+a)))*ln(x)
```

**Rubi [A]** time = 0.04, antiderivative size = 21, normalized size of antiderivative = 1.00, number of steps used = 2, number of rules used = 2, integrand size = 11, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.182, Rules used = {2158, 29}

$$bx - \log(x)\left(bx - \coth^{-1}(\tanh(a+bx))\right)$$

Antiderivative was successfully verified.

```
[In] Int[ArcCoth[Tanh[a + b*x]]/x,x]
[Out] b*x - (b*x - ArcCoth[Tanh[a + b*x]])*Log[x]
```

Rule 29

```
Int[(x_)^(-1), x_Symbol] :> Simp[Log[x], x]
```

Rule 2158

```
Int[(v_)/(u_), x_Symbol] :> With[{a = Simplify[D[u, x]], b = Simplify[D[v,
x]]}, Simp[(b*x)/a, x] - Dist[(b*u - a*v)/a, Int[1/u, x], x] /; NeQ[b*u - a
*v, 0]] /; PiecewiseLinearQ[u, v, x]
```

Rubi steps

$$\begin{aligned}\int \frac{\coth^{-1}(\tanh(a+bx))}{x} dx &= bx - \left(bx - \coth^{-1}(\tanh(a+bx))\right)\int \frac{1}{x} dx\\ &= bx - \left(bx - \coth^{-1}(\tanh(a+bx))\right)\log(x)\end{aligned}$$

**Mathematica [A]** time = 0.01, size = 19, normalized size = 0.90

$$\log(x)\left(\coth^{-1}(\tanh(a+bx)) - bx\right) + bx$$

Antiderivative was successfully verified.

```
[In] Integrate[ArcCoth[Tanh[a + b*x]]/x,x]
[Out] b*x + (-(b*x) + ArcCoth[Tanh[a + b*x]])*Log[x]
```

**fricas [A]** time = 0.48, size = 8, normalized size = 0.38

$$bx + a\log(x)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(tanh(b*x+a))/x,x, algorithm="fricas")
[Out] b*x + a*log(x)
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{arcoth}\left(\tanh\left(bx+a\right)\right)}{x}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(tanh(b*x+a))/x,x, algorithm="giac")
```

```
[Out] integrate(arccoth(tanh(b*x + a))/x, x)
```

**maple [C]** time = 0.42, size = 354, normalized size = 16.86

$$\ln(x)\ln\left(e^{bx+a}\right)-\ln(x)xb+bx-\frac{i\ln(x)\pi\operatorname{csgn}\left(\frac{i}{e^{2bx+2a}+1}\right)^{3}}{2}+\frac{i\ln(x)\pi\operatorname{csgn}\left(\frac{i}{e^{2bx+2a}+1}\right)\operatorname{csgn}\left(\frac{ie^{2bx+2a}}{e^{2bx+2a}+1}\right)^{2}}{4}+\frac{i\ln(x)\pi\operatorname{csgn}}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(arccoth(tanh(b*x+a))/x,x)
```

```
[Out] ln(x)*ln(exp(b*x+a))-ln(x)*x*b+b*x-1/2*I*ln(x)*Pi*csgn(I/(exp(2*b*x+2*a)+1)
)^3+1/4*I*ln(x)*Pi*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(2*b*x+2*a)/(exp(2*
b*x+2*a)+1))^2+1/4*I*ln(x)*Pi*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/
(exp(2*b*x+2*a)+1))^2-1/4*I*ln(x)*Pi*csgn(I*exp(b*x+a))^2*csgn(I*exp(2*b*x+
2*a))-1/2*I*Pi*ln(x)-1/4*I*ln(x)*Pi*csgn(I*exp(2*b*x+2*a))^3+1/2*I*ln(x)*Pi
*csgn(I/(exp(2*b*x+2*a)+1))^2+1/2*I*ln(x)*Pi*csgn(I*exp(b*x+a))*csgn(I*exp(
2*b*x+2*a))^2-1/4*I*ln(x)*Pi*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^3-1/
4*I*ln(x)*Pi*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2
*b*x+2*a)/(exp(2*b*x+2*a)+1))
```

**maxima [A]** time = 0.33, size = 34, normalized size = 1.62

$$-b\left(x+\frac{a}{b}\right)\log(x)+b\left(x+\frac{a\log(x)}{b}\right)+\operatorname{arcoth}\left(\tanh\left(bx+a\right)\right)\log(x)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(tanh(b*x+a))/x,x, algorithm="maxima")
```

```
[Out] -b*(x + a/b)*log(x) + b*(x + a*log(x)/b) + arccoth(tanh(b*x + a))*log(x)
```

**mupad [B]** time = 0.18, size = 59, normalized size = 2.81

$$b\,x-\ln(x)\,\left(\frac{\ln\left(-\frac{2}{e^{2\,a}\,e^{2\,b\,x}-1}\right)}{2}-\frac{\ln\left(\frac{2\,e^{2\,a}\,e^{2\,b\,x}}{e^{2\,a}\,e^{2\,b\,x}-1}\right)}{2}+b\,x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(tanh(a + b*x))/x,x)
```

```
[Out] b*x - log(x)*(log(-2/(exp(2*a)*exp(2*b*x) - 1))/2 - log((2*exp(2*a)*exp(2*b
*x))/(exp(2*a)*exp(2*b*x) - 1))/2 + b*x)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int\frac{\operatorname{acoth}\left(\tanh\left(a+bx\right)\right)}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(tanh(b*x+a))/x,x)
```

```
[Out] Integral(acoth(tanh(a + b*x))/x, x)
```

## 3.133 $\int \frac{\coth^{-1}(\tanh(a+bx))}{x^2}\,dx$

**Optimal**. Leaf size=17

$$b\log(x)-\frac{\coth^{-1}(\tanh(a+bx))}{x}$$

```
[Out] -arccoth(tanh(b*x+a))/x+b*ln(x)
```

**Rubi [A]** time = 0.01, antiderivative size = 17, normalized size of antiderivative = 1.00, number of steps used = 2, number of rules used = 2, integrand size = 11, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.182, Rules used = {2168, 29}

$$b\log(x)-\frac{\coth^{-1}(\tanh(a+bx))}{x}$$

Antiderivative was successfully verified.

```
[In] Int[ArcCoth[Tanh[a + b*x]]/x^2,x]
```

```
[Out] -(ArcCoth[Tanh[a + b*x]]/x) + b*Log[x]
```

Rule 29

```
Int[(x_)^(-1), x_Symbol] :> Simp[Log[x], x]
```

Rule 2168

```
Int[(u_)^(m_)*(v_)^(n_.), x_Symbol] :> With[{a = Simplify[D[u, x]], b = Sim
plify[D[v, x]]}, Simp[(u^(m + 1)*v^n)/(a*(m + 1)), x] - Dist[(b*n)/(a*(m +
1)), Int[u^(m + 1)*v^(n - 1), x], x] /; NeQ[b*u - a*v, 0]] /; FreeQ[{m, n},
 x] && PiecewiseLinearQ[u, v, x] && NeQ[m, -1] && ((LtQ[m, -1] && GtQ[n, 0]
 && !(ILtQ[m + n, -2] && (FractionQ[m] || GeQ[2*n + m + 1, 0]))) || (IGtQ[
n, 0] && IGtQ[m, 0] && LeQ[n, m]) || (IGtQ[n, 0] && !IntegerQ[m]) || (ILtQ
[m, 0] && !IntegerQ[n]))
```

Rubi steps

$$\begin{aligned}\int \frac{\coth^{-1}(\tanh(a+bx))}{x^2}\,dx &= -\frac{\coth^{-1}(\tanh(a+bx))}{x}+b\int \frac{1}{x}\,dx\\ &= -\frac{\coth^{-1}(\tanh(a+bx))}{x}+b\log(x)\end{aligned}$$

**Mathematica [A]** time = 0.02, size = 18, normalized size = 1.06

$$-\frac{\coth^{-1}(\tanh(a+bx))}{x}+b\log(x)+b$$

Antiderivative was successfully verified.

```
[In] Integrate[ArcCoth[Tanh[a + b*x]]/x^2,x]
```

```
[Out] b - ArcCoth[Tanh[a + b*x]]/x + b*Log[x]
```

**fricas [A]** time = 0.94, size = 13, normalized size = 0.76

$$\frac{bx\log(x)-a}{x}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(tanh(b*x+a))/x^2,x, algorithm="fricas")
```

```
[Out] (b*x*log(x) - a)/x
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{arcoth}(\tanh(bx+a))}{x^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(tanh(b*x+a))/x^2,x, algorithm="giac")
```

```
[Out] integrate(arccoth(tanh(b*x + a))/x^2, x)
```

**maple [A]** time = 0.38, size = 20, normalized size = 1.18

$$-\frac{\operatorname{arccoth}(\tanh(bx+a))}{x} + b\ln(bx)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(arccoth(tanh(b*x+a))/x^2,x)
```

```
[Out] -arccoth(tanh(b*x+a))/x+b*ln(b*x)
```

**maxima [A]** time = 0.39, size = 17, normalized size = 1.00

$$b\log(x) - \frac{\operatorname{arcoth}(\tanh(bx+a))}{x}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(tanh(b*x+a))/x^2,x, algorithm="maxima")
```

```
[Out] b*log(x) - arccoth(tanh(b*x + a))/x
```

**mupad [B]** time = 0.09, size = 17, normalized size = 1.00

$$b\ \ln(x) - \frac{\operatorname{acoth}(\tanh(a+b\,x))}{x}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(tanh(a + b*x))/x^2,x)
```

```
[Out] b*log(x) - acoth(tanh(a + b*x))/x
```

**sympy [A]** time = 0.25, size = 14, normalized size = 0.82

$$b\log(x) - \frac{\operatorname{acoth}(\tanh(a+bx))}{x}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(tanh(b*x+a))/x**2,x)
```

```
[Out] b*log(x) - acoth(tanh(a + b*x))/x
```

## 3.134 $\int \frac{\coth^{-1}(\tanh(a+bx))}{x^3} dx$

**Optimal**. Leaf size=23

$$-\frac{\coth^{-1}(\tanh(a+bx))}{2x^2}-\frac{b}{2x}$$

```
[Out] -1/2*b/x-1/2*arccoth(tanh(b*x+a))/x^2
```

**Rubi [A]** time = 0.01, antiderivative size = 23, normalized size of antiderivative = 1.00, number of steps used = 2, number of rules used = 2, integrand size = 11, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.182, Rules used = {2168, 30}

$$-\frac{\coth^{-1}(\tanh(a+bx))}{2x^2}-\frac{b}{2x}$$

Antiderivative was successfully verified.

```
[In] Int[ArcCoth[Tanh[a + b*x]]/x^3,x]
```

```
[Out] -b/(2*x) - ArcCoth[Tanh[a + b*x]]/(2*x^2)
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 2168

```
Int[(u_)^(m_)*(v_)^(n_.), x_Symbol] :> With[{a = Simplify[D[u, x]], b = Sim
plify[D[v, x]]}, Simp[(u^(m + 1)*v^n)/(a*(m + 1)), x] - Dist[(b*n)/(a*(m +
1)), Int[u^(m + 1)*v^(n - 1), x], x] /; NeQ[b*u - a*v, 0]] /; FreeQ[{m, n},
 x] && PiecewiseLinearQ[u, v, x] && NeQ[m, -1] && ((LtQ[m, -1] && GtQ[n, 0]
 && !(ILtQ[m + n, -2] && (FractionQ[m] || GeQ[2*n + m + 1, 0]))) || (IGtQ[
n, 0] && IGtQ[m, 0] && LeQ[n, m]) || (IGtQ[n, 0] && !IntegerQ[m]) || (ILtQ
[m, 0] && !IntegerQ[n]))
```

Rubi steps

$$\begin{aligned}\int \frac{\coth^{-1}(\tanh(a+bx))}{x^3} dx &= -\frac{\coth^{-1}(\tanh(a+bx))}{2x^2}+\frac{1}{2}b\int \frac{1}{x^2} dx\\ &= -\frac{b}{2x}-\frac{\coth^{-1}(\tanh(a+bx))}{2x^2}\end{aligned}$$

**Mathematica [A]** time = 0.01, size = 18, normalized size = 0.78

$$-\frac{\coth^{-1}(\tanh(a+bx))+bx}{2x^2}$$

Antiderivative was successfully verified.

```
[In] Integrate[ArcCoth[Tanh[a + b*x]]/x^3,x]
```

```
[Out] -1/2*(b*x + ArcCoth[Tanh[a + b*x]])/x^2
```

**fricas [A]** time = 1.21, size = 11, normalized size = 0.48

$$-\frac{2\,bx+a}{2\,x^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(tanh(b*x+a))/x^3,x, algorithm="fricas")
```

```
[Out] -1/2*(2*b*x + a)/x^2
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{arcoth}(\tanh(bx+a))}{x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(tanh(b*x+a))/x^3,x, algorithm="giac")
```

```
[Out] integrate(arccoth(tanh(b*x + a))/x^3, x)
```

**maple [A]** time = 0.39, size = 20, normalized size = 0.87

$$-\frac{b}{2x}-\frac{\operatorname{arccoth}(\tanh(bx+a))}{2x^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(arccoth(tanh(b*x+a))/x^3,x)
```

```
[Out] -1/2*b/x-1/2*arccoth(tanh(b*x+a))/x^2
```

**maxima [A]** time = 0.38, size = 19, normalized size = 0.83

$$-\frac{b}{2\,x}-\frac{\operatorname{arcoth}(\tanh(bx+a))}{2\,x^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(tanh(b*x+a))/x^3,x, algorithm="maxima")
```

```
[Out] -1/2*b/x - 1/2*arccoth(tanh(b*x + a))/x^2
```

**mupad [B]** time = 1.14, size = 16, normalized size = 0.70

$$-\frac{\operatorname{acoth}(\tanh(a+b\,x))+b\,x}{2\,x^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(tanh(a + b*x))/x^3,x)
```

```
[Out] -(acoth(tanh(a + b*x)) + b*x)/(2*x^2)
```

**sympy [A]** time = 0.51, size = 19, normalized size = 0.83

$$-\frac{b}{2x}-\frac{\operatorname{acoth}(\tanh(a+bx))}{2x^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(tanh(b*x+a))/x**3,x)
```

```
[Out] -b/(2*x) - acoth(tanh(a + b*x))/(2*x**2)
```

## 3.135 $\int \frac{\coth^{-1}(\tanh(a+bx))}{x^4}\,dx$

**Optimal**. Leaf size=23

$$-\frac{\coth^{-1}(\tanh(a+bx))}{3x^3}-\frac{b}{6x^2}$$

```
[Out] -1/6*b/x^2-1/3*arccoth(tanh(b*x+a))/x^3
```

**Rubi** [A] time = 0.01, antiderivative size = 23, normalized size of antiderivative = 1.00, number of steps used = 2, number of rules used = 2, integrand size = 11, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.182, Rules used = {2168, 30}

$$-\frac{\coth^{-1}(\tanh(a+bx))}{3x^3}-\frac{b}{6x^2}$$

Antiderivative was successfully verified.

```
[In] Int[ArcCoth[Tanh[a + b*x]]/x^4,x]
```

```
[Out] -b/(6*x^2) - ArcCoth[Tanh[a + b*x]]/(3*x^3)
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 2168

```
Int[(u_)^(m_)*(v_)^(n_.), x_Symbol] :> With[{a = Simplify[D[u, x]], b = Sim
plify[D[v, x]]}, Simp[(u^(m + 1)*v^n)/(a*(m + 1)), x] - Dist[(b*n)/(a*(m +
1)), Int[u^(m + 1)*v^(n - 1), x], x] /; NeQ[b*u - a*v, 0]] /; FreeQ[{m, n},
 x] && PiecewiseLinearQ[u, v, x] && NeQ[m, -1] && ((LtQ[m, -1] && GtQ[n, 0]
 && !(ILtQ[m + n, -2] && (FractionQ[m] || GeQ[2*n + m + 1, 0]))) || (IGtQ[
n, 0] && IGtQ[m, 0] && LeQ[n, m]) || (IGtQ[n, 0] && !IntegerQ[m]) || (ILtQ
[m, 0] && !IntegerQ[n]))
```

Rubi steps

$$\begin{aligned}\int \frac{\coth^{-1}(\tanh(a+bx))}{x^4}\,dx &= -\frac{\coth^{-1}(\tanh(a+bx))}{3x^3}+\frac{1}{3}b\int \frac{1}{x^3}\,dx\\ &= -\frac{b}{6x^2}-\frac{\coth^{-1}(\tanh(a+bx))}{3x^3}\end{aligned}$$

**Mathematica** [A] time = 0.02, size = 20, normalized size = 0.87

$$-\frac{2\coth^{-1}(\tanh(a+bx))+bx}{6x^3}$$

Antiderivative was successfully verified.

```
[In] Integrate[ArcCoth[Tanh[a + b*x]]/x^4,x]
```

```
[Out] -1/6*(b*x + 2*ArcCoth[Tanh[a + b*x]])/x^3
```

**fricas** [A] time = 0.57, size = 13, normalized size = 0.57

$$-\frac{3\,bx+2\,a}{6\,x^3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(tanh(b*x+a))/x^4,x, algorithm="fricas")
[Out] -1/6*(3*b*x + 2*a)/x^3
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{arcoth}(\tanh(bx+a))}{x^4}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(tanh(b*x+a))/x^4,x, algorithm="giac")
[Out] integrate(arccoth(tanh(b*x + a))/x^4, x)
```

**maple [A]** time = 0.40, size = 20, normalized size = 0.87

$$-\frac{b}{6x^2} - \frac{\operatorname{arccoth}(\tanh(bx+a))}{3x^3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(arccoth(tanh(b*x+a))/x^4,x)
[Out] -1/6*b/x^2-1/3*arccoth(tanh(b*x+a))/x^3
```

**maxima [A]** time = 0.38, size = 19, normalized size = 0.83

$$-\frac{b}{6\,x^2} - \frac{\operatorname{arcoth}(\tanh(bx+a))}{3\,x^3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(tanh(b*x+a))/x^4,x, algorithm="maxima")
[Out] -1/6*b/x^2 - 1/3*arccoth(tanh(b*x + a))/x^3
```

**mupad [B]** time = 1.12, size = 19, normalized size = 0.83

$$-\frac{\operatorname{acoth}(\tanh(a+b\,x))}{3\,x^3} - \frac{b}{6\,x^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(tanh(a + b*x))/x^4,x)
[Out] - acoth(tanh(a + b*x))/(3*x^3) - b/(6*x^2)
```

**sympy [A]** time = 0.79, size = 20, normalized size = 0.87

$$-\frac{b}{6x^2} - \frac{\operatorname{acoth}(\tanh(a+bx))}{3x^3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(tanh(b*x+a))/x**4,x)
[Out] -b/(6*x**2) - acoth(tanh(a + b*x))/(3*x**3)
```

## 3.136 $\int x^m \coth^{-1}(\tanh(a+bx))^2\,dx$

**Optimal**. Leaf size=71

$$-\frac{2bx^{m+2}\coth^{-1}(\tanh(a+bx))}{m^2+3m+2}+\frac{x^{m+1}\coth^{-1}(\tanh(a+bx))^2}{m+1}+\frac{2b^2x^{m+3}}{m^3+6m^2+11m+6}$$

```
[Out] 2*b^2*x^(3+m)/(m^3+6*m^2+11*m+6)-2*b*x^(2+m)*arccoth(tanh(b*x+a))/(m^2+3*m+
2)+x^(1+m)*arccoth(tanh(b*x+a))^2/(1+m)
```

**Rubi** [A] time = 0.04, antiderivative size = 71, normalized size of antiderivative = 1.00, number of steps used = 3, number of rules used = 2, integrand size = 13, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.154, Rules used = {2168, 30}

$$-\frac{2bx^{m+2}\coth^{-1}(\tanh(a+bx))}{m^2+3m+2}+\frac{x^{m+1}\coth^{-1}(\tanh(a+bx))^2}{m+1}+\frac{2b^2x^{m+3}}{m^3+6m^2+11m+6}$$

Antiderivative was successfully verified.

```
[In] Int[x^m*ArcCoth[Tanh[a + b*x]]^2,x]
```

```
[Out] (2*b^2*x^(3 + m))/(6 + 11*m + 6*m^2 + m^3) - (2*b*x^(2 + m)*ArcCoth[Tanh[a
+ b*x]])/(2 + 3*m + m^2) + (x^(1 + m)*ArcCoth[Tanh[a + b*x]]^2)/(1 + m)
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 2168

```
Int[(u_)^(m_)*(v_)^(n_.), x_Symbol] :> With[{a = Simplify[D[u, x]], b = Sim
plify[D[v, x]]}, Simp[(u^(m + 1)*v^n)/(a*(m + 1)), x] - Dist[(b*n)/(a*(m +
1)), Int[u^(m + 1)*v^(n - 1), x], x] /; NeQ[b*u - a*v, 0]] /; FreeQ[{m, n},
 x] && PiecewiseLinearQ[u, v, x] && NeQ[m, -1] && ((LtQ[m, -1] && GtQ[n, 0]
 &&  !(ILtQ[m + n, -2] && (FractionQ[m] || GeQ[2*n + m + 1, 0]))) || (IGtQ[
n, 0] && IGtQ[m, 0] && LeQ[n, m]) || (IGtQ[n, 0] &&  !IntegerQ[m]) || (ILtQ
[m, 0] &&  !IntegerQ[n]))
```

Rubi steps

$$\begin{aligned}\int x^m \coth^{-1}(\tanh(a+bx))^2\,dx &= \frac{x^{1+m}\coth^{-1}(\tanh(a+bx))^2}{1+m}-\frac{(2b)\int x^{1+m}\coth^{-1}(\tanh(a+bx))\,dx}{1+m}\\ &= -\frac{2bx^{2+m}\coth^{-1}(\tanh(a+bx))}{2+3m+m^2}+\frac{x^{1+m}\coth^{-1}(\tanh(a+bx))^2}{1+m}+\frac{\left(2b^2\right)\int x^2}{2+3m}\\ &= \frac{2b^2x^{3+m}}{6+11m+6m^2+m^3}-\frac{2bx^{2+m}\coth^{-1}(\tanh(a+bx))}{2+3m+m^2}+\frac{x^{1+m}\coth^{-1}(\tanh(}{1+m}\end{aligned}$$

**Mathematica** [A] time = 0.17, size = 62, normalized size = 0.87

$$\frac{x^{m+1}\left(\left(m^2+5m+6\right)\coth^{-1}(\tanh(a+bx))^2-2b(m+3)x\coth^{-1}(\tanh(a+bx))+2b^2x^2\right)}{(m+1)(m+2)(m+3)}$$

Antiderivative was successfully verified.

```
[In] Integrate[x^m*ArcCoth[Tanh[a + b*x]]^2,x]
```

```
[Out] (x^(1 + m)*(2*b^2*x^2 - 2*b*(3 + m)*x*ArcCoth[Tanh[a + b*x]] + (6 + 5*m + m
^2)*ArcCoth[Tanh[a + b*x]]^2))/((1 + m)*(2 + m)*(3 + m))
```

**fricas [A]** time = 0.50, size = 101, normalized size = 1.42

$$\frac{\left(4\left(b^2m^2+3\,b^2m+2\,b^2\right)x^3+8\left(abm^2+4\,abm+3\,ab\right)x^2+\left(4\,a^2m^2-\pi^2\left(m^2+5\,m+6\right)+20\,a^2m+24\,a^2\right)x\right)x^m}{4\left(m^3+6\,m^2+11\,m+6\right)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^m*arccoth(tanh(b*x+a))^2,x, algorithm="fricas")
```

```
[Out] 1/4*(4*(b^2*m^2 + 3*b^2*m + 2*b^2)*x^3 + 8*(a*b*m^2 + 4*a*b*m + 3*a*b)*x^2
+ (4*a^2*m^2 - pi^2*(m^2 + 5*m + 6) + 20*a^2*m + 24*a^2)*x)*x^m/(m^3 + 6*m^
2 + 11*m + 6)
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int x^m \operatorname{arcoth}\left(\tanh\left(bx+a\right)\right)^2\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^m*arccoth(tanh(b*x+a))^2,x, algorithm="giac")
```

```
[Out] integrate(x^m*arccoth(tanh(b*x + a))^2, x)
```

**maple [C]** time = 1.00, size = 9175, normalized size = 129.23

output too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^m*arccoth(tanh(b*x+a))^2,x)
```

```
[Out] result too large to display
```

**maxima [A]** time = 0.39, size = 73, normalized size = 1.03

$$\frac{2\,b^2x^3x^m}{(m+3)(m+2)(m+1)}-\frac{2\,bx^2x^m\operatorname{arcoth}\left(\tanh\left(bx+a\right)\right)}{(m+2)(m+1)}+\frac{x^{m+1}\operatorname{arcoth}\left(\tanh\left(bx+a\right)\right)^2}{m+1}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^m*arccoth(tanh(b*x+a))^2,x, algorithm="maxima")
```

```
[Out] 2*b^2*x^3*x^m/((m + 3)*(m + 2)*(m + 1)) - 2*b*x^2*x^m*arccoth(tanh(b*x + a)
)/((m + 2)*(m + 1)) + x^(m + 1)*arccoth(tanh(b*x + a))^2/(m + 1)
```

**mupad [B]** time = 1.32, size = 203, normalized size = 2.86

$$\frac{4\,b^2\,x^m\,x^3\,\left(m^2+3\,m+2\right)}{4\,m^3+24\,m^2+44\,m+24}+\frac{x\,x^m\,{\left(\ln\left(-\frac{2}{{\mathrm{e}}^{2\,a}\,{\mathrm{e}}^{2\,b\,x}-1}\right)-\ln\left(\frac{2\,{\mathrm{e}}^{2\,a}\,{\mathrm{e}}^{2\,b\,x}}{{\mathrm{e}}^{2\,a}\,{\mathrm{e}}^{2\,b\,x}-1}\right)+2\,b\,x\right)}^2\,\left(m^2+5\,m+6\right)}{4\,m^3+24\,m^2+44\,m+24}-\frac{4\,b\,x^m\,x^2\,\left(\ln\left(-\frac{}{{\mathrm{e}}^{2\,a}}\right.\right.}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^m*acoth(tanh(a + b*x))^2,x)
```

```
[Out] (4*b^2*x^m*x^3*(3*m + m^2 + 2))/(44*m + 24*m^2 + 4*m^3 + 24) + (x*x^m*(log(
-2/(exp(2*a)*exp(2*b*x) - 1)) - log((2*exp(2*a)*exp(2*b*x))/(exp(2*a)*exp(2
*b*x) - 1)) + 2*b*x)^2*(5*m + m^2 + 6))/(44*m + 24*m^2 + 4*m^3 + 24) - (4*b
*x^m*x^2*(log(-2/(exp(2*a)*exp(2*b*x) - 1)) - log((2*exp(2*a)*exp(2*b*x))/(
```

```
exp(2*a)*exp(2*b*x) - 1)) + 2*b*x)*(4*m + m^2 + 3))/(44*m + 24*m^2 + 4*m^3
+ 24)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\begin{cases} b^2\log(x) - \frac{b\,\text{acoth}(\tanh(a+bx))}{x} - \frac{\text{acoth}^2(\tanh(a+bx))}{2x^2} \\ \int \frac{\text{acoth}^2(\tanh(a+bx))}{x^2}\,dx \\ \int \frac{\text{acoth}^2(\tanh(a+bx))}{x}\,dx \\ \frac{2b^2x^3x^m}{m^3+6m^2+11m+6} - \frac{2bmx^2x^m\,\text{acoth}(\tanh(a+bx))}{m^3+6m^2+11m+6} - \frac{6bx^2x^m\,\text{acoth}(\tanh(a+bx))}{m^3+6m^2+11m+6} + \frac{m^2xx^m\,\text{acoth}^2(\tanh(a+bx))}{m^3+6m^2+11m+6} + \frac{5mxx^m\,\text{acoth}^2(\tanh(a+ \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**m*acoth(tanh(b*x+a))**2,x)
```

```
[Out] Piecewise((b**2*log(x) - b*acoth(tanh(a + b*x))/x - acoth(tanh(a + b*x))**2
/(2*x**2), Eq(m, -3)), (Integral(acoth(tanh(a + b*x))**2/x**2, x), Eq(m, -2
)), (Integral(acoth(tanh(a + b*x))**2/x, x), Eq(m, -1)), (2*b**2*x**3*x**m/
(m**3 + 6*m**2 + 11*m + 6) - 2*b*m*x**2*x**m*acoth(tanh(a + b*x))/(m**3 + 6
*m**2 + 11*m + 6) - 6*b*x**2*x**m*acoth(tanh(a + b*x))/(m**3 + 6*m**2 + 11*
m + 6) + m**2*x*x**m*acoth(tanh(a + b*x))**2/(m**3 + 6*m**2 + 11*m + 6) + 5
*m*x*x**m*acoth(tanh(a + b*x))**2/(m**3 + 6*m**2 + 11*m + 6) + 6*x*x**m*aco
th(tanh(a + b*x))**2/(m**3 + 6*m**2 + 11*m + 6), True))
```

# 3.137 $\int x^3 \coth^{-1}(\tanh(a+bx))^2 \, dx$

**Optimal**. Leaf size=42

$$-\frac{1}{10} b x^5 \coth^{-1}(\tanh(a+bx))+\frac{1}{4} x^4 \coth^{-1}(\tanh(a+bx))^2+\frac{b^2 x^6}{60}$$

```
[Out] 1/60*b^2*x^6-1/10*b*x^5*arccoth(tanh(b*x+a))+1/4*x^4*arccoth(tanh(b*x+a))^2
```

**Rubi [A]** time = 0.03, antiderivative size = 42, normalized size of antiderivative = 1.00, number of steps used = 3, number of rules used = 2, integrand size = 13, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.154, Rules used = {2168, 30}

$$-\frac{1}{10} b x^5 \coth^{-1}(\tanh(a+bx))+\frac{1}{4} x^4 \coth^{-1}(\tanh(a+bx))^2+\frac{b^2 x^6}{60}$$

Antiderivative was successfully verified.

```
[In] Int[x^3*ArcCoth[Tanh[a + b*x]]^2,x]
```

```
[Out] (b^2*x^6)/60 - (b*x^5*ArcCoth[Tanh[a + b*x]])/10 + (x^4*ArcCoth[Tanh[a + b*
x]]^2)/4
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 2168

```
Int[(u_)^(m_)*(v_)^(n_.), x_Symbol] :> With[{a = Simplify[D[u, x]], b = Sim
plify[D[v, x]]}, Simp[(u^(m + 1)*v^n)/(a*(m + 1)), x] - Dist[(b*n)/(a*(m +
1)), Int[u^(m + 1)*v^(n - 1), x], x] /; NeQ[b*u - a*v, 0]] /; FreeQ[{m, n},
 x] && PiecewiseLinearQ[u, v, x] && NeQ[m, -1] && ((LtQ[m, -1] && GtQ[n, 0]
 && !(ILtQ[m + n, -2] && (FractionQ[m] || GeQ[2*n + m + 1, 0]))) || (IGtQ[
n, 0] && IGtQ[m, 0] && LeQ[n, m]) || (IGtQ[n, 0] && !IntegerQ[m]) || (ILtQ
[m, 0] && !IntegerQ[n]))
```

Rubi steps

$$\begin{aligned}
\int x^3 \coth^{-1}(\tanh(a+bx))^2 \, dx &= \frac{1}{4} x^4 \coth^{-1}(\tanh(a+bx))^2-\frac{1}{2} b \int x^4 \coth^{-1}(\tanh(a+bx)) \, dx\\
&= -\frac{1}{10} b x^5 \coth^{-1}(\tanh(a+bx))+\frac{1}{4} x^4 \coth^{-1}(\tanh(a+bx))^2+\frac{1}{10} b^2 \int x^5 \, dx\\
&= \frac{b^2 x^6}{60}-\frac{1}{10} b x^5 \coth^{-1}(\tanh(a+bx))+\frac{1}{4} x^4 \coth^{-1}(\tanh(a+bx))^2
\end{aligned}$$

**Mathematica [A]** time = 0.03, size = 37, normalized size = 0.88

$$\frac{1}{60} x^4 \left(-6 b x \coth^{-1}(\tanh(a+bx))+15 \coth^{-1}(\tanh(a+bx))^2+b^2 x^2\right)$$

Antiderivative was successfully verified.

```
[In] Integrate[x^3*ArcCoth[Tanh[a + b*x]]^2,x]
```

```
[Out] (x^4*(b^2*x^2 - 6*b*x*ArcCoth[Tanh[a + b*x]] + 15*ArcCoth[Tanh[a + b*x]]^2)
)/60
```

**fricas [A]** time = 0.58, size = 30, normalized size = 0.71

$$\frac{1}{6}\,b^{2}x^{6}+\frac{2}{5}\,abx^{5}-\frac{1}{16}\,\left(\pi^{2}-4\,a^{2}\right)x^{4}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^3*arccoth(tanh(b*x+a))^2,x, algorithm="fricas")
```

```
[Out] 1/6*b^2*x^6 + 2/5*a*b*x^5 - 1/16*(pi^2 - 4*a^2)*x^4
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int x^{3}\,\mathrm{arcoth}\left(\tanh\left(bx+a\right)\right)^{2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^3*arccoth(tanh(b*x+a))^2,x, algorithm="giac")
```

```
[Out] integrate(x^3*arccoth(tanh(b*x + a))^2, x)
```

**maple [C]** time = 0.39, size = 3418, normalized size = 81.38

output too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^3*arccoth(tanh(b*x+a))^2,x)
```

```
[Out] 1/40*I*Pi*b*x^5*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(2*b*x+2*a))*csgn(I*ex
p(2*b*x+2*a)/(exp(2*b*x+2*a)+1))+1/16*Pi^2*x^4*csgn(I/(exp(2*b*x+2*a)+1))^3
*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2+1/16*Pi
^2*x^4*csgn(I*exp(2*b*x+2*a))^3*csgn(I/(exp(2*b*x+2*a)+1))^2-1/32*Pi^2*x^4*
csgn(I*exp(2*b*x+2*a))^3*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^3-1/64*P
i^2*x^4*csgn(I*exp(2*b*x+2*a))^2*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^
4+1/32*Pi^2*x^4*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a
)+1))^5+1/8*Pi^2*x^4*csgn(I/(exp(2*b*x+2*a)+1))^5+1/8*csgn(I/(exp(2*b*x+2*a
)+1))^2*Pi^2*x^4+(-1/10*b*x^5+1/8*I*Pi*x^4*csgn(I/(exp(2*b*x+2*a)+1))*csgn(
I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2+1/8*I*Pi*x^4*csgn(I*exp(2*b*x+2*a))*
csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2+1/4*I*Pi*x^4*csgn(I/(exp(2*b*x+
2*a)+1))^2-1/4*I*Pi*x^4*csgn(I/(exp(2*b*x+2*a)+1))^3-1/4*I*Pi*x^4-1/8*I*Pi*
x^4*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^3+1/4*I*Pi*x^4*csgn(I*exp(b*x
+a))*csgn(I*exp(2*b*x+2*a))^2-1/8*I*Pi*x^4*csgn(I*exp(b*x+a))^2*csgn(I*exp(
2*b*x+2*a))-1/8*I*Pi*x^4*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(2*b*x+2*a))*
csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))-1/8*I*Pi*x^4*csgn(I*exp(2*b*x+2*a
))^3)*ln(exp(b*x+a))-1/16*csgn(I*exp(2*b*x+2*a))^3*Pi^2*x^4-1/16*Pi^2*x^4*c
sgn(I/(exp(2*b*x+2*a)+1))^6-1/8*csgn(I/(exp(2*b*x+2*a)+1))^3*Pi^2*x^4-1/32*
Pi^2*x^4*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(2*b*x+2*a))^4*csgn(I*exp(2*b
*x+2*a)/(exp(2*b*x+2*a)+1))+1/32*Pi^2*x^4*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I
*exp(2*b*x+2*a))^3*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2+1/32*Pi^2*x^
4*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(2*b*x+2*a))^2*csgn(I*exp(2*b*x+2*a)
/(exp(2*b*x+2*a)+1))^3+1/16*Pi^2*x^4*csgn(I/(exp(2*b*x+2*a)+1))^4*csgn(I*ex
p(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2-1/16*Pi^2*x^4*csgn(I/(exp(2*b*x+2*a)+1))
^3*csgn(I*exp(2*b*x+2*a))^3-1/16*Pi^2*x^4*csgn(I/(exp(2*b*x+2*a)+1))^3*csgn
(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^3+1/32*Pi^2*x^4*csgn(I/(exp(2*b*x+2*a
)+1))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^5-1/64*Pi^2*x^4*csgn(I*exp(
b*x+a))^4*csgn(I*exp(2*b*x+2*a))^2+1/16*Pi^2*x^4*csgn(I*exp(b*x+a))^3*csgn(
I*exp(2*b*x+2*a))^3+1/8*Pi^2*x^4*csgn(I/(exp(2*b*x+2*a)+1))^3*csgn(I*exp(b*
x+a))*csgn(I*exp(2*b*x+2*a))^2-1/32*Pi^2*x^4*csgn(I/(exp(2*b*x+2*a)+1))*csg
n(I*exp(b*x+a))^2*csgn(I*exp(2*b*x+2*a))^2*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x
+2*a)+1))+1/32*Pi^2*x^4*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(b*x+a))^2*csg
```

```
n(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2+1/16*Pi^2*x
^4*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(b*x+a))*csgn(I*exp(2*b*x+2*a))^3*c
sgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))-1/16*Pi^2*x^4*csgn(I/(exp(2*b*x+2*
a)+1))*csgn(I*exp(b*x+a))*csgn(I*exp(2*b*x+2*a))^2*csgn(I*exp(2*b*x+2*a)/(e
xp(2*b*x+2*a)+1))^2-1/16*Pi^2*x^4*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(2*b
*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^4-1/32*Pi^2*x^4*csgn(I*e
xp(b*x+a))^2*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1
))^3-3/32*Pi^2*x^4*csgn(I*exp(b*x+a))^2*csgn(I*exp(2*b*x+2*a))^4+1/16*Pi^2*
x^4*csgn(I*exp(b*x+a))*csgn(I*exp(2*b*x+2*a))^5+1/32*Pi^2*x^4*csgn(I*exp(2*
b*x+2*a))^4*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2-1/16*Pi^2*x^4*csgn(
I*exp(b*x+a))^2*csgn(I*exp(2*b*x+2*a))+1/16*Pi^2*x^4*csgn(I/(exp(2*b*x+2*a)
+1))^3*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))+1/1
6*Pi^2*x^4*csgn(I/(exp(2*b*x+2*a)+1))^2*csgn(I*exp(b*x+a))^2*csgn(I*exp(2*b
*x+2*a))-1/16*Pi^2*x^4*csgn(I*exp(b*x+a))*csgn(I*exp(2*b*x+2*a))^3*csgn(I*e
xp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2-1/20*I*Pi*b*x^5*csgn(I/(exp(2*b*x+2*a)+
1))^2+1/20*I*Pi*b*x^5*csgn(I/(exp(2*b*x+2*a)+1))^3-1/16*Pi^2*x^4-1/64*Pi^2*
x^4*csgn(I*exp(2*b*x+2*a))^6-1/64*Pi^2*x^4*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x
+2*a)+1))^6+1/4*x^4*ln(exp(b*x+a))^2-1/16*Pi^2*x^4*csgn(I/(exp(2*b*x+2*a)+1
))*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))+1/20*I*
Pi*b*x^5-1/16*Pi^2*x^4*csgn(I/(exp(2*b*x+2*a)+1))^4*csgn(I*exp(2*b*x+2*a))*
csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))+1/32*Pi^2*x^4*csgn(I*exp(b*x+a))^
2*csgn(I*exp(2*b*x+2*a))^2*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2-1/40
*I*Pi*b*x^5*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a
)+1))^2+1/40*I*Pi*b*x^5*csgn(I*exp(b*x+a))^2*csgn(I*exp(2*b*x+2*a))-1/20*I*
Pi*b*x^5*csgn(I*exp(b*x+a))*csgn(I*exp(2*b*x+2*a))^2-1/40*I*Pi*b*x^5*csgn(I
*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2-1/16*csgn(I/(e
xp(2*b*x+2*a)+1))^4*Pi^2*x^4-1/16*Pi^2*x^4*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x
+2*a)+1))^3+1/16*Pi^2*x^4*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(2*b*x+2*a)/
(exp(2*b*x+2*a)+1))^2-1/64*Pi^2*x^4*csgn(I/(exp(2*b*x+2*a)+1))^2*csgn(I*exp
(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^4+1/60*b^2*x^6+1/16*Pi^2*x^4*csgn(I*exp(b*x
+a))*csgn(I*exp(2*b*x+2*a))^2*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^3+1
/8*Pi^2*x^4*csgn(I*exp(b*x+a))*csgn(I*exp(2*b*x+2*a))^2+1/16*Pi^2*x^4*csgn(
I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2-1/8*Pi^2*x^4*
csgn(I/(exp(2*b*x+2*a)+1))^2*csgn(I*exp(b*x+a))*csgn(I*exp(2*b*x+2*a))^2-1/
16*Pi^2*x^4*csgn(I/(exp(2*b*x+2*a)+1))^2*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(
2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2-1/64*Pi^2*x^4*csgn(I/(exp(2*b*x+2*a)+1))^2
*csgn(I*exp(2*b*x+2*a))^2*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2+1/32*
Pi^2*x^4*csgn(I/(exp(2*b*x+2*a)+1))^2*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b
*x+2*a)/(exp(2*b*x+2*a)+1))^3-1/16*Pi^2*x^4*csgn(I/(exp(2*b*x+2*a)+1))^3*cs
gn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2+1/16*Pi^2*x^4*csgn(I/(exp(2*b*x+2
*a)+1))^2*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^3-1/16*Pi^2*x^4*csgn(I/
(exp(2*b*x+2*a)+1))^3*csgn(I*exp(b*x+a))^2*csgn(I*exp(2*b*x+2*a))+1/40*I*Pi
*b*x^5*csgn(I*exp(2*b*x+2*a))^3+1/40*I*Pi*b*x^5*csgn(I*exp(2*b*x+2*a)/(exp(
2*b*x+2*a)+1))^3
```

**maxima [A]** time = 0.45, size = 36, normalized size = 0.86

$$\frac{1}{60}\,b^2x^6-\frac{1}{10}\,bx^5\,\mathrm{arcoth}\left(\tanh\left(bx+a\right)\right)+\frac{1}{4}\,x^4\,\mathrm{arcoth}\left(\tanh\left(bx+a\right)\right)^2$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^3*arccoth(tanh(b*x+a))^2,x, algorithm="maxima")
```

```
[Out] 1/60*b^2*x^6 - 1/10*b*x^5*arccoth(tanh(b*x + a)) + 1/4*x^4*arccoth(tanh(b*x
 + a))^2
```

**mupad [B]** time = 1.18, size = 36, normalized size = 0.86

$$\frac{b^2\,x^6}{60}-\frac{b\,x^5\,\mathrm{acoth}\left(\tanh\left(a+b\,x\right)\right)}{10}+\frac{x^4\,\mathrm{acoth}\left(\tanh\left(a+b\,x\right)\right)^2}{4}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^3*acoth(tanh(a + b*x))^2,x)
```

```
[Out] (x^4*acoth(tanh(a + b*x))^2)/4 + (b^2*x^6)/60 - (b*x^5*acoth(tanh(a + b*x))
)/10
```

**sympy** [A] time = 2.62, size = 78, normalized size = 1.86

$$\begin{cases} \frac{x^3 \operatorname{acoth}^3(\tanh(a+bx))}{3b} - \frac{x^2 \operatorname{acoth}^4(\tanh(a+bx))}{4b^2} + \frac{x \operatorname{acoth}^5(\tanh(a+bx))}{10b^3} - \frac{\operatorname{acoth}^6(\tanh(a+bx))}{60b^4} & \text{for } b \neq 0 \\ \frac{x^4 \operatorname{acoth}^2(\tanh(a))}{4} & \text{otherwise} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**3*acoth(tanh(b*x+a))**2,x)
```

```
[Out] Piecewise((x**3*acoth(tanh(a + b*x))**3/(3*b) - x**2*acoth(tanh(a + b*x))**
4/(4*b**2) + x*acoth(tanh(a + b*x))**5/(10*b**3) - acoth(tanh(a + b*x))**6/
(60*b**4), Ne(b, 0)), (x**4*acoth(tanh(a))**2/4, True))
```

# 3.138 $\int x^2 \coth^{-1}(\tanh(a+bx))^2\,dx$

**Optimal**. Leaf size=42

$$-\frac{1}{6}bx^4\coth^{-1}(\tanh(a+bx))+\frac{1}{3}x^3\coth^{-1}(\tanh(a+bx))^2+\frac{b^2x^5}{30}$$

```
[Out] 1/30*b^2*x^5-1/6*b*x^4*arccoth(tanh(b*x+a))+1/3*x^3*arccoth(tanh(b*x+a))^2
```

**Rubi [A]** time = 0.03, antiderivative size = 42, normalized size of antiderivative = 1.00, number of steps used = 3, number of rules used = 2, integrand size = 13, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.154, Rules used = {2168, 30}

$$-\frac{1}{6}bx^4\coth^{-1}(\tanh(a+bx))+\frac{1}{3}x^3\coth^{-1}(\tanh(a+bx))^2+\frac{b^2x^5}{30}$$

Antiderivative was successfully verified.

```
[In] Int[x^2*ArcCoth[Tanh[a + b*x]]^2,x]
```

```
[Out] (b^2*x^5)/30 - (b*x^4*ArcCoth[Tanh[a + b*x]])/6 + (x^3*ArcCoth[Tanh[a + b*x
]]^2)/3
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 2168

```
Int[(u_)^(m_)*(v_)^(n_.), x_Symbol] :> With[{a = Simplify[D[u, x]], b = Sim
plify[D[v, x]]}, Simp[(u^(m + 1)*v^n)/(a*(m + 1)), x] - Dist[(b*n)/(a*(m +
1)), Int[u^(m + 1)*v^(n - 1), x], x] /; NeQ[b*u - a*v, 0]] /; FreeQ[{m, n},
 x] && PiecewiseLinearQ[u, v, x] && NeQ[m, -1] && ((LtQ[m, -1] && GtQ[n, 0]
 &&  !(ILtQ[m + n, -2] && (FractionQ[m] || GeQ[2*n + m + 1, 0]))) || (IGtQ[
n, 0] && IGtQ[m, 0] && LeQ[n, m]) || (IGtQ[n, 0] &&  !IntegerQ[m]) || (ILtQ
[m, 0] &&  !IntegerQ[n]))
```

Rubi steps

$$\begin{aligned}\int x^2\coth^{-1}(\tanh(a+bx))^2\,dx &= \frac{1}{3}x^3\coth^{-1}(\tanh(a+bx))^2-\frac{1}{3}(2b)\int x^3\coth^{-1}(\tanh(a+bx))\,dx\\ &= -\frac{1}{6}bx^4\coth^{-1}(\tanh(a+bx))+\frac{1}{3}x^3\coth^{-1}(\tanh(a+bx))^2+\frac{1}{6}b^2\int x^4\,dx\\ &= \frac{b^2x^5}{30}-\frac{1}{6}bx^4\coth^{-1}(\tanh(a+bx))+\frac{1}{3}x^3\coth^{-1}(\tanh(a+bx))^2\end{aligned}$$

**Mathematica [A]** time = 0.05, size = 37, normalized size = 0.88

$$\frac{1}{30}x^3\left(-5bx\coth^{-1}(\tanh(a+bx))+10\coth^{-1}(\tanh(a+bx))^2+b^2x^2\right)$$

Antiderivative was successfully verified.

```
[In] Integrate[x^2*ArcCoth[Tanh[a + b*x]]^2,x]
```

```
[Out] (x^3*(b^2*x^2 - 5*b*x*ArcCoth[Tanh[a + b*x]] + 10*ArcCoth[Tanh[a + b*x]]^2)
)/30
```

**fricas** [A] time = 0.53, size = 30, normalized size = 0.71

$$\frac{1}{5} b^2 x^5 + \frac{1}{2} abx^4 - \frac{1}{12} \left(\pi^2 - 4 a^2\right) x^3$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*arccoth(tanh(b*x+a))^2,x, algorithm="fricas")
[Out] 1/5*b^2*x^5 + 1/2*a*b*x^4 - 1/12*(pi^2 - 4*a^2)*x^3
```

**giac** [F] time = 0.00, size = 0, normalized size = 0.00

$$\int x^2 \operatorname{arcoth}(\tanh(bx+a))^2 \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*arccoth(tanh(b*x+a))^2,x, algorithm="giac")
[Out] integrate(x^2*arccoth(tanh(b*x + a))^2, x)
```

**maple** [C] time = 0.39, size = 3418, normalized size = 81.38

output too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^2*arccoth(tanh(b*x+a))^2,x)
[Out] -1/6*Pi^2*x^3*csgn(I/(exp(2*b*x+2*a)+1))^3-1/48*Pi^2*x^3*csgn(I*exp(2*b*x+2
*a)/(exp(2*b*x+2*a)+1))^6-1/48*Pi^2*x^3*csgn(I*exp(2*b*x+2*a))^6-1/24*Pi^2*
x^3*csgn(I*exp(2*b*x+2*a))^3*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^3+1/
24*Pi^2*x^3*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1)
)^5-1/12*csgn(I*exp(2*b*x+2*a))^3*Pi^2*x^3+1/6*csgn(I/(exp(2*b*x+2*a)+1))^2
*Pi^2*x^3-1/12*Pi^2*x^3*csgn(I/(exp(2*b*x+2*a)+1))^6-1/48*Pi^2*x^3*csgn(I/(
exp(2*b*x+2*a)+1))^2*csgn(I*exp(2*b*x+2*a))^2*csgn(I*exp(2*b*x+2*a)/(exp(2*
b*x+2*a)+1))^2+1/12*Pi^2*x^3*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^3*cs
gn(I/(exp(2*b*x+2*a)+1))^2-1/12*I*Pi*b*x^4*csgn(I*exp(b*x+a))*csgn(I*exp(2*
b*x+2*a))^2-1/24*I*Pi*b*x^4*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(e
xp(2*b*x+2*a)+1))^2-1/24*I*Pi*b*x^4*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(2
*b*x+2*a)/(exp(2*b*x+2*a)+1))^2-1/24*Pi^2*x^3*csgn(I/(exp(2*b*x+2*a)+1))*cs
gn(I*exp(b*x+a))^2*csgn(I*exp(2*b*x+2*a))^2*csgn(I*exp(2*b*x+2*a)/(exp(2*b*
x+2*a)+1))+1/24*Pi^2*x^3*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(b*x+a))^2*cs
gn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2-1/12*Pi^2*
x^3*csgn(I/(exp(2*b*x+2*a)+1))^3*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^
3-1/12*Pi^2*x^3*csgn(I/(exp(2*b*x+2*a)+1))^3*csgn(I*exp(2*b*x+2*a)/(exp(2*b
*x+2*a)+1))^2+1/12*Pi^2*x^3*csgn(I/(exp(2*b*x+2*a)+1))^2*csgn(I*exp(2*b*x+2
*a))^3+1/24*I*Pi*b*x^4*csgn(I*exp(2*b*x+2*a))^3+1/24*Pi^2*x^3*csgn(I/(exp(2
*b*x+2*a)+1))*csgn(I*exp(2*b*x+2*a))^3*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a
)+1))^2+1/24*Pi^2*x^3*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(2*b*x+2*a))^2*c
sgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^3-1/12*I*Pi*b*x^4*csgn(I/(exp(2*b*
x+2*a)+1))^2+1/12*I*Pi*b*x^4*csgn(I/(exp(2*b*x+2*a)+1))^3-1/12*Pi^2*x^3*csg
n(I/(exp(2*b*x+2*a)+1))^4*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp
(2*b*x+2*a)+1))-1/12*Pi^2*x^3*csgn(I/(exp(2*b*x+2*a)+1))^3*csgn(I*exp(b*x+a
))^2*csgn(I*exp(2*b*x+2*a))+1/12*Pi^2*x^3*csgn(I/(exp(2*b*x+2*a)+1))^3*csgn
(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))-1/12*Pi^2*x^3*
csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^3+1/24*Pi^2*x^3*csgn(I/(exp(2*b*x
+2*a)+1))^2*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1)
)^3-1/24*Pi^2*x^3*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(2*b*x+2*a))^4*csgn(
I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))-1/12*Pi^2*x^3*csgn(I/(exp(2*b*x+2*a)+1
))^4+1/12*I*Pi*b*x^4+1/12*Pi^2*x^3*csgn(I/(exp(2*b*x+2*a)+1))^4*csgn(I*exp(
```

```
2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2+1/6*Pi^2*x^3*csgn(I/(exp(2*b*x+2*a)+1))^5+
1/24*Pi^2*x^3*csgn(I*exp(b*x+a))^2*csgn(I*exp(2*b*x+2*a))^2*csgn(I*exp(2*b*
x+2*a)/(exp(2*b*x+2*a)+1))^2-1/12*Pi^2*x^3*csgn(I*exp(b*x+a))*csgn(I*exp(2*
b*x+2*a))^3*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2+1/6*Pi^2*x^3*csgn(I
/(exp(2*b*x+2*a)+1))^3*csgn(I*exp(b*x+a))*csgn(I*exp(2*b*x+2*a))^2+1/12*Pi^
2*x^3*csgn(I/(exp(2*b*x+2*a)+1))^3*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+
2*a)/(exp(2*b*x+2*a)+1))^2+1/30*b^2*x^5+1/24*I*Pi*b*x^4*csgn(I*exp(2*b*x+2*
a)/(exp(2*b*x+2*a)+1))^3-1/6*Pi^2*x^3*csgn(I*exp(b*x+a))*csgn(I*exp(2*b*x+2
*a))^2*csgn(I/(exp(2*b*x+2*a)+1))^2-1/12*Pi^2*x^3*csgn(I*exp(2*b*x+2*a))*cs
gn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2*csgn(I/(exp(2*b*x+2*a)+1))^2-1/12
*Pi^2*x^3*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*
x+2*a)/(exp(2*b*x+2*a)+1))^4+1/24*Pi^2*x^3*csgn(I*exp(2*b*x+2*a))^4*csgn(I*
exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2-1/12*Pi^2*x^3*csgn(I*exp(2*b*x+2*a))^3
*csgn(I/(exp(2*b*x+2*a)+1))^3-1/48*Pi^2*x^3*csgn(I*exp(2*b*x+2*a))^2*csgn(I
*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^4+1/24*Pi^2*x^3*csgn(I/(exp(2*b*x+2*a)+
1))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^5-1/48*Pi^2*x^3*csgn(I*exp(b*
x+a))^4*csgn(I*exp(2*b*x+2*a))^2+1/12*Pi^2*x^3*csgn(I*exp(b*x+a))^3*csgn(I*
exp(2*b*x+2*a))^3-1/8*Pi^2*x^3*csgn(I*exp(b*x+a))^2*csgn(I*exp(2*b*x+2*a))^
4+1/12*Pi^2*x^3*csgn(I*exp(b*x+a))*csgn(I*exp(2*b*x+2*a))^5+1/12*Pi^2*x^3*c
sgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2-1/48*Pi^2
*x^3*csgn(I/(exp(2*b*x+2*a)+1))^2*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))
^4+1/6*Pi^2*x^3*csgn(I*exp(b*x+a))*csgn(I*exp(2*b*x+2*a))^2-1/12*Pi^2*x^3*c
sgn(I*exp(b*x+a))^2*csgn(I*exp(2*b*x+2*a))+1/12*Pi^2*x^3*csgn(I/(exp(2*b*x+
2*a)+1))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2+1/12*Pi^2*x^3*csgn(I/(
exp(2*b*x+2*a)+1))*csgn(I*exp(b*x+a))*csgn(I*exp(2*b*x+2*a))^3*csgn(I*exp(2
*b*x+2*a)/(exp(2*b*x+2*a)+1))-1/12*Pi^2*x^3*csgn(I/(exp(2*b*x+2*a)+1))*csgn
(I*exp(b*x+a))*csgn(I*exp(2*b*x+2*a))^2*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*
a)+1))^2+1/24*I*Pi*b*x^4*csgn(I*exp(b*x+a))^2*csgn(I*exp(2*b*x+2*a))+1/12*P
i^2*x^3*csgn(I*exp(b*x+a))*csgn(I*exp(2*b*x+2*a))^2*csgn(I*exp(2*b*x+2*a)/(
exp(2*b*x+2*a)+1))^3-1/24*Pi^2*x^3*csgn(I*exp(b*x+a))^2*csgn(I*exp(2*b*x+2*
a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^3-1/12*Pi^2*x^3*csgn(I/(exp(2
*b*x+2*a)+1))*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+
1))+1/12*Pi^2*x^3*csgn(I*exp(b*x+a))^2*csgn(I*exp(2*b*x+2*a))*csgn(I/(exp(2
*b*x+2*a)+1))^2-1/12*Pi^2*x^3+1/3*x^3*ln(exp(b*x+a))^2+1/24*I*Pi*b*x^4*csgn
(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*
b*x+2*a)+1))+(-1/6*b*x^4+1/3*I*Pi*x^3*csgn(I*exp(b*x+a))*csgn(I*exp(2*b*x+2
*a))^2-1/6*I*Pi*x^3*csgn(I*exp(b*x+a))^2*csgn(I*exp(2*b*x+2*a))-1/6*I*Pi*x^
3*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(
exp(2*b*x+2*a)+1))-1/3*I*Pi*x^3+1/6*I*Pi*x^3*csgn(I/(exp(2*b*x+2*a)+1))*csg
n(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2-1/3*I*Pi*x^3*csgn(I/(exp(2*b*x+2*a
)+1))^3+1/6*I*Pi*x^3*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*
x+2*a)+1))^2-1/6*I*Pi*x^3*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^3+1/3*I
*Pi*x^3*csgn(I/(exp(2*b*x+2*a)+1))^2-1/6*I*Pi*x^3*csgn(I*exp(2*b*x+2*a))^3)
*ln(exp(b*x+a))
```

**maxima [A]** time = 0.45, size = 36, normalized size = 0.86

$$\frac{1}{30}\,b^2x^5 - \frac{1}{6}\,bx^4\,\mathrm{arcoth}\,(\tanh\,(bx+a)) + \frac{1}{3}\,x^3\,\mathrm{arcoth}\,(\tanh\,(bx+a))^2$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*arccoth(tanh(b*x+a))^2,x, algorithm="maxima")
```

```
[Out] 1/30*b^2*x^5 - 1/6*b*x^4*arccoth(tanh(b*x + a)) + 1/3*x^3*arccoth(tanh(b*x
+ a))^2
```

**mupad [B]** time = 1.18, size = 36, normalized size = 0.86

$$\frac{b^2\,x^5}{30}-\frac{b\,x^4\,\mathrm{acoth}\left(\tanh\left(a+b\,x\right)\right)}{6}+\frac{x^3\,{\mathrm{acoth}\left(\tanh\left(a+b\,x\right)\right)}^2}{3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^2*acoth(tanh(a + b*x))^2,x)
```

```
[Out] (x^3*acoth(tanh(a + b*x))^2)/3 + (b^2*x^5)/30 - (b*x^4*acoth(tanh(a + b*x))
)/6
```

**sympy [A]** time = 1.26, size = 60, normalized size = 1.43

$$\begin{cases} \frac{x^2 \operatorname{acoth}^3(\tanh(a+bx))}{3b} - \frac{x \operatorname{acoth}^4(\tanh(a+bx))}{6b^2} + \frac{\operatorname{acoth}^5(\tanh(a+bx))}{30b^3} & \text{for } b \neq 0 \\ \frac{x^3 \operatorname{acoth}^2(\tanh(a))}{3} & \text{otherwise} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**2*acoth(tanh(b*x+a))**2,x)
```

```
[Out] Piecewise((x**2*acoth(tanh(a + b*x))**3/(3*b) - x*acoth(tanh(a + b*x))**4/(
6*b**2) + acoth(tanh(a + b*x))**5/(30*b**3), Ne(b, 0)), (x**3*acoth(tanh(a)
)**2/3, True))
```

# 3.139 $\int x \coth^{-1}(\tanh(a+bx))^2 \, dx$

**Optimal**. Leaf size=34

$$\frac{x \coth^{-1}(\tanh(a+bx))^3}{3b} - \frac{\coth^{-1}(\tanh(a+bx))^4}{12b^2}$$

```
[Out] 1/3*x*arccoth(tanh(b*x+a))^3/b-1/12*arccoth(tanh(b*x+a))^4/b^2
```

**Rubi [A]** time = 0.03, antiderivative size = 34, normalized size of antiderivative = 1.00, number of steps used = 3, number of rules used = 3, integrand size = 11, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.273, Rules used = {2168, 2157, 30}

$$\frac{x \coth^{-1}(\tanh(a+bx))^3}{3b} - \frac{\coth^{-1}(\tanh(a+bx))^4}{12b^2}$$

Antiderivative was successfully verified.

```
[In] Int[x*ArcCoth[Tanh[a + b*x]]^2,x]
```

```
[Out] (x*ArcCoth[Tanh[a + b*x]]^3)/(3*b) - ArcCoth[Tanh[a + b*x]]^4/(12*b^2)
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 2157

```
Int[(u_)^(m_.), x_Symbol] :> With[{c = Simplify[D[u, x]]}, Dist[1/c, Subst[
Int[x^m, x], x, u], x]] /; FreeQ[m, x] && PiecewiseLinearQ[u, x]
```

Rule 2168

```
Int[(u_)^(m_)*(v_)^(n_.), x_Symbol] :> With[{a = Simplify[D[u, x]], b = Sim
plify[D[v, x]]}, Simp[(u^(m + 1)*v^n)/(a*(m + 1)), x] - Dist[(b*n)/(a*(m +
1)), Int[u^(m + 1)*v^(n - 1), x], x] /; NeQ[b*u - a*v, 0]] /; FreeQ[{m, n},
 x] && PiecewiseLinearQ[u, v, x] && NeQ[m, -1] && ((LtQ[m, -1] && GtQ[n, 0]
 &&  !(ILtQ[m + n, -2] && (FractionQ[m] || GeQ[2*n + m + 1, 0]))) || (IGtQ[
n, 0] && IGtQ[m, 0] && LeQ[n, m]) || (IGtQ[n, 0] &&  !IntegerQ[m]) || (ILtQ
[m, 0] &&  !IntegerQ[n]))
```

Rubi steps

$$\begin{aligned}
\int x \coth^{-1}(\tanh(a+bx))^2 \, dx &= \frac{x \coth^{-1}(\tanh(a+bx))^3}{3b} - \frac{\int \coth^{-1}(\tanh(a+bx))^3 \, dx}{3b} \\
&= \frac{x \coth^{-1}(\tanh(a+bx))^3}{3b} - \frac{\text{Subst}\left(\int x^3 \, dx, x, \coth^{-1}(\tanh(a+bx))\right)}{3b^2} \\
&= \frac{x \coth^{-1}(\tanh(a+bx))^3}{3b} - \frac{\coth^{-1}(\tanh(a+bx))^4}{12b^2}
\end{aligned}$$

**Mathematica [B]** time = 0.08, size = 74, normalized size = 2.18

$$\frac{(a+bx)\left(4\left(2a^2+abx-b^2x^2\right)\coth^{-1}(\tanh(a+bx))-\left((3a-bx)(a+bx)^2\right)-6(a-bx)\coth^{-1}(\tanh(a+bx))^2\right)}{12b^2}$$

Antiderivative was successfully verified.

```
[In] Integrate[x*ArcCoth[Tanh[a + b*x]]^2,x]
```

```
[Out] ((a + b*x)*(-((3*a - b*x)*(a + b*x)^2) + 4*(2*a^2 + a*b*x - b^2*x^2)*ArcCot
h[Tanh[a + b*x]] - 6*(a - b*x)*ArcCoth[Tanh[a + b*x]]^2))/(12*b^2)
```

**fricas [A]** time = 0.67, size = 30, normalized size = 0.88

$$\frac{1}{4}\,b^2x^4+\frac{2}{3}\,abx^3-\frac{1}{8}\left(\pi^2-4\,a^2\right)x^2$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*arccoth(tanh(b*x+a))^2,x, algorithm="fricas")
```

```
[Out] 1/4*b^2*x^4 + 2/3*a*b*x^3 - 1/8*(pi^2 - 4*a^2)*x^2
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int x\,\mathrm{arcoth}\left(\tanh\left(bx+a\right)\right)^2\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*arccoth(tanh(b*x+a))^2,x, algorithm="giac")
```

```
[Out] integrate(x*arccoth(tanh(b*x + a))^2, x)
```

**maple [C]** time = 0.40, size = 3418, normalized size = 100.53

output too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x*arccoth(tanh(b*x+a))^2,x)
```

```
[Out] 1/12*I*Pi*b*x^3*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(2*b*x+2*a))*csgn(I*ex
p(2*b*x+2*a)/(exp(2*b*x+2*a)+1))-1/8*Pi^2*x^2*csgn(I/(exp(2*b*x+2*a)+1))*cs
gn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^4+1/16*Pi^2*
x^2*csgn(I*exp(b*x+a))^2*csgn(I*exp(2*b*x+2*a))^2*csgn(I*exp(2*b*x+2*a)/(ex
p(2*b*x+2*a)+1))^2+1/16*Pi^2*x^2*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(2*b*
x+2*a))^2*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^3+1/16*Pi^2*x^2*csgn(I/
(exp(2*b*x+2*a)+1))^2*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b
*x+2*a)+1))^3-1/16*Pi^2*x^2*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(2*b*x+2*a
))^4*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))+1/16*Pi^2*x^2*csgn(I/(exp(2*
b*x+2*a)+1))*csgn(I*exp(2*b*x+2*a))^3*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)
+1))^2+1/4*Pi^2*x^2*csgn(I*exp(b*x+a))*csgn(I*exp(2*b*x+2*a))^2*csgn(I/(exp
(2*b*x+2*a)+1))^3-1/8*Pi^2*x^2*csgn(I/(exp(2*b*x+2*a)+1))^2*csgn(I*exp(2*b*
x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2+1/12*I*Pi*b*x^3*csgn(I*
exp(2*b*x+2*a))^3-1/8*Pi^2*x^2*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^3*
csgn(I/(exp(2*b*x+2*a)+1))^3+1/8*Pi^2*x^2*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I
*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2-1/8*csgn(I/(exp(2*b*x+2*a)+1))^4*Pi^2
*x^2-1/16*Pi^2*x^2*csgn(I*exp(b*x+a))^2*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2
*b*x+2*a)/(exp(2*b*x+2*a)+1))^3-1/8*Pi^2*x^2*csgn(I*exp(b*x+a))^2*csgn(I*ex
p(2*b*x+2*a))*csgn(I/(exp(2*b*x+2*a)+1))^3-1/8*Pi^2*x^2*csgn(I*exp(b*x+a))*
csgn(I*exp(2*b*x+2*a))^3*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2+1/16*P
i^2*x^2*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1)
)^5-1/8*Pi^2*x^2*csgn(I*exp(2*b*x+2*a))^3*csgn(I/(exp(2*b*x+2*a)+1))^3-1/32
*Pi^2*x^2*csgn(I*exp(2*b*x+2*a))^2*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1)
)^4-1/8*Pi^2*x^2*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2*csgn(I/(exp(2*
b*x+2*a)+1))^3+1/8*Pi^2*x^2*csgn(I*exp(2*b*x+2*a))^3*csgn(I/(exp(2*b*x+2*a)
+1))^2+1/12*I*Pi*b*x^3*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^3+1/8*Pi^2
*x^2*csgn(I/(exp(2*b*x+2*a)+1))^4*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))
^2+1/16*Pi^2*x^2*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*
```

```
a)+1))^5+1/8*Pi^2*x^2*csgn(I*exp(b*x+a))*csgn(I*exp(2*b*x+2*a))^5+1/16*Pi^2
*x^2*csgn(I*exp(2*b*x+2*a))^4*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2-1
/16*Pi^2*x^2*csgn(I*exp(2*b*x+2*a))^3*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)
+1))^3-1/32*Pi^2*x^2*csgn(I/(exp(2*b*x+2*a)+1))^2*csgn(I*exp(2*b*x+2*a)/(ex
p(2*b*x+2*a)+1))^4+1/8*Pi^2*x^2*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a
)/(exp(2*b*x+2*a)+1))^2*csgn(I/(exp(2*b*x+2*a)+1))^3+1/8*Pi^2*x^2*csgn(I*ex
p(b*x+a))*csgn(I*exp(2*b*x+2*a))^2*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1)
)^3-1/6*I*Pi*b*x^3*csgn(I/(exp(2*b*x+2*a)+1))^2+1/4*Pi^2*x^2*csgn(I/(exp(2*
b*x+2*a)+1))^5-1/8*Pi^2*x^2+1/2*x^2*ln(exp(b*x+a))^2+(-1/3*b*x^3-1/2*I*Pi*x
^2+1/4*I*Pi*x^2*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x
+2*a)+1))^2-1/4*I*Pi*x^2*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^3+1/2*I*
Pi*x^2*csgn(I/(exp(2*b*x+2*a)+1))^2-1/2*I*Pi*x^2*csgn(I/(exp(2*b*x+2*a)+1))
^3+1/2*I*Pi*x^2*csgn(I*exp(b*x+a))*csgn(I*exp(2*b*x+2*a))^2-1/4*I*Pi*x^2*cs
gn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(
2*b*x+2*a)+1))-1/4*I*Pi*x^2*csgn(I*exp(2*b*x+2*a))^3-1/4*I*Pi*x^2*csgn(I*ex
p(b*x+a))^2*csgn(I*exp(2*b*x+2*a))+1/4*I*Pi*x^2*csgn(I*exp(2*b*x+2*a))*csgn
(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2)*ln(exp(b*x+a))-1/8*Pi^2*x^2*csgn(I
/(exp(2*b*x+2*a)+1))^6-1/32*Pi^2*x^2*csgn(I*exp(2*b*x+2*a))^6-1/8*Pi^2*x^2*
csgn(I*exp(2*b*x+2*a))^3+1/4*Pi^2*x^2*csgn(I/(exp(2*b*x+2*a)+1))^2-1/4*csgn
(I/(exp(2*b*x+2*a)+1))^3*Pi^2*x^2-1/8*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)
+1))^3*Pi^2*x^2-1/8*Pi^2*x^2*csgn(I*exp(b*x+a))^2*csgn(I*exp(2*b*x+2*a))-1/
32*Pi^2*x^2*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^6-1/8*Pi^2*x^2*csgn(I
/(exp(2*b*x+2*a)+1))^4*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*
b*x+2*a)+1))+1/6*I*Pi*b*x^3*csgn(I/(exp(2*b*x+2*a)+1))^3+1/8*Pi^2*x^2*csgn(
I/(exp(2*b*x+2*a)+1))^2*csgn(I*exp(b*x+a))^2*csgn(I*exp(2*b*x+2*a))-1/4*Pi^
2*x^2*csgn(I/(exp(2*b*x+2*a)+1))^2*csgn(I*exp(b*x+a))*csgn(I*exp(2*b*x+2*a)
)^2-3/16*Pi^2*x^2*csgn(I*exp(b*x+a))^2*csgn(I*exp(2*b*x+2*a))^4-1/32*Pi^2*x
^2*csgn(I/(exp(2*b*x+2*a)+1))^2*csgn(I*exp(2*b*x+2*a))^2*csgn(I*exp(2*b*x+2
*a)/(exp(2*b*x+2*a)+1))^2+1/8*Pi^2*x^2*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a
)+1))^3*csgn(I/(exp(2*b*x+2*a)+1))^2-1/12*I*Pi*b*x^3*csgn(I*exp(2*b*x+2*a))
*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2+1/8*Pi^2*x^2*csgn(I/(exp(2*b*x
+2*a)+1))*csgn(I*exp(b*x+a))*csgn(I*exp(2*b*x+2*a))^3*csgn(I*exp(2*b*x+2*a)
/(exp(2*b*x+2*a)+1))-1/8*Pi^2*x^2*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(b*x
+a))*csgn(I*exp(2*b*x+2*a))^2*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2-1
/32*Pi^2*x^2*csgn(I*exp(b*x+a))^4*csgn(I*exp(2*b*x+2*a))^2+1/8*Pi^2*x^2*csg
n(I*exp(b*x+a))^3*csgn(I*exp(2*b*x+2*a))^3+1/6*I*Pi*b*x^3+1/8*Pi^2*x^2*csgn
(I/(exp(2*b*x+2*a)+1))^3*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(
2*b*x+2*a)+1))-1/8*Pi^2*x^2*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(2*b*x+2*a
))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))+1/12*b^2*x^4+1/8*csgn(I*exp(2*
b*x+2*a)/(exp(2*b*x+2*a)+1))^2*csgn(I*exp(2*b*x+2*a))*Pi^2*x^2+1/4*csgn(I*e
xp(2*b*x+2*a))^2*csgn(I*exp(b*x+a))*Pi^2*x^2-1/12*I*Pi*b*x^3*csgn(I/(exp(2*
b*x+2*a)+1))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2+1/12*I*Pi*b*x^3*cs
gn(I*exp(b*x+a))^2*csgn(I*exp(2*b*x+2*a))-1/6*I*Pi*b*x^3*csgn(I*exp(b*x+a))
*csgn(I*exp(2*b*x+2*a))^2-1/16*Pi^2*x^2*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*e
xp(b*x+a))^2*csgn(I*exp(2*b*x+2*a))^2*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)
+1))+1/16*Pi^2*x^2*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(b*x+a))^2*csgn(I*e
xp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2
```

**maxima [A]** time = 0.45, size = 36, normalized size = 1.06

$$\frac{1}{12}\,b^2x^4 - \frac{1}{3}\,bx^3\,\mathrm{arcoth}\left(\tanh\left(bx+a\right)\right) + \frac{1}{2}\,x^2\,\mathrm{arcoth}\left(\tanh\left(bx+a\right)\right)^2$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*arccoth(tanh(b*x+a))^2,x, algorithm="maxima")
```

```
[Out] 1/12*b^2*x^4 - 1/3*b*x^3*arccoth(tanh(b*x + a)) + 1/2*x^2*arccoth(tanh(b*x
+ a))^2
```

**mupad [B]** time = 1.15, size = 36, normalized size = 1.06

$$\frac{b^2\,x^4}{12}-\frac{b\,x^3\,\mathrm{acoth}\left(\tanh\left(a+b\,x\right)\right)}{3}+\frac{x^2\,{\mathrm{acoth}\left(\tanh\left(a+b\,x\right)\right)}^2}{2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x*acoth(tanh(a + b*x))^2,x)
```

```
[Out] (x^2*acoth(tanh(a + b*x))^2)/2 + (b^2*x^4)/12 - (b*x^3*acoth(tanh(a + b*x))
)/3
```

**sympy [A]** time = 0.67, size = 41, normalized size = 1.21

$$\begin{cases} \frac{x \operatorname{acoth}^{3}{\left(\tanh{\left(a+bx \right)} \right)}}{3b} - \frac{\operatorname{acoth}^{4}{\left(\tanh{\left(a+bx \right)} \right)}}{12b^{2}} & \text{for}\: b \neq 0 \\ \frac{x^{2} \operatorname{acoth}^{2}{\left(\tanh{\left(a \right)} \right)}}{2} & \text{otherwise} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*acoth(tanh(b*x+a))**2,x)
```

```
[Out] Piecewise((x*acoth(tanh(a + b*x))**3/(3*b) - acoth(tanh(a + b*x))**4/(12*b*
*2), Ne(b, 0)), (x**2*acoth(tanh(a))**2/2, True))
```

# 3.140 $\int \coth^{-1}(\tanh(a+bx))^2 \, dx$

**Optimal**. Leaf size=16

$$\frac{\coth^{-1}(\tanh(a+bx))^3}{3b}$$

[Out] 1/3*arccoth(tanh(b*x+a))^3/b

**Rubi [A]** time = 0.01, antiderivative size = 16, normalized size of antiderivative = 1.00, number of steps used = 2, number of rules used = 2, integrand size = 9, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.222, Rules used = {2157, 30}

$$\frac{\coth^{-1}(\tanh(a+bx))^3}{3b}$$

Antiderivative was successfully verified.

[In] Int[ArcCoth[Tanh[a + b*x]]^2,x]

[Out] ArcCoth[Tanh[a + b*x]]^3/(3*b)

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 2157

```
Int[(u_)^(m_.), x_Symbol] :> With[{c = Simplify[D[u, x]]}, Dist[1/c, Subst[
Int[x^m, x], x, u], x]] /; FreeQ[m, x] && PiecewiseLinearQ[u, x]
```

Rubi steps

$$\begin{aligned}\int \coth^{-1}(\tanh(a+bx))^2 \, dx &= \frac{\text{Subst}\left(\int x^2 \, dx, x, \coth^{-1}(\tanh(a+bx))\right)}{b}\\ &= \frac{\coth^{-1}(\tanh(a+bx))^3}{3b}\end{aligned}$$

**Mathematica [A]** time = 0.01, size = 16, normalized size = 1.00

$$\frac{\coth^{-1}(\tanh(a+bx))^3}{3b}$$

Antiderivative was successfully verified.

[In] Integrate[ArcCoth[Tanh[a + b*x]]^2,x]

[Out] ArcCoth[Tanh[a + b*x]]^3/(3*b)

**fricas [A]** time = 0.63, size = 27, normalized size = 1.69

$$\frac{1}{3}\,b^2x^3 + abx^2 - \frac{1}{4}\left(\pi^2 - 4\,a^2\right)x$$

Verification of antiderivative is not currently implemented for this CAS.

[In] integrate(arccoth(tanh(b*x+a))^2,x, algorithm="fricas")

[Out] 1/3*b^2*x^3 + a*b*x^2 - 1/4*(pi^2 - 4*a^2)*x

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \operatorname{arcoth}\left(\tanh\left(bx+a\right)\right)^{2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(tanh(b*x+a))^2,x, algorithm="giac")
[Out] integrate(arccoth(tanh(b*x + a))^2, x)
```

**maple [A]** time = 0.09, size = 15, normalized size = 0.94

$$\frac{\operatorname{arccoth}\left(\tanh\left(bx+a\right)\right)^{3}}{3b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(arccoth(tanh(b*x+a))^2,x)
[Out] 1/3*arccoth(tanh(b*x+a))^3/b
```

**maxima [B]** time = 0.44, size = 33, normalized size = 2.06

$$\frac{1}{3}\,b^{2}x^{3}-bx^{2}\operatorname{arcoth}\left(\tanh\left(bx+a\right)\right)+x\operatorname{arcoth}\left(\tanh\left(bx+a\right)\right)^{2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(tanh(b*x+a))^2,x, algorithm="maxima")
[Out] 1/3*b^2*x^3 - b*x^2*arccoth(tanh(b*x + a)) + x*arccoth(tanh(b*x + a))^2
```

**mupad [B]** time = 1.12, size = 33, normalized size = 2.06

$$\frac{b^{2}\,x^{3}}{3}-b\,x^{2}\operatorname{acoth}\left(\tanh\left(a+b\,x\right)\right)+x\operatorname{acoth}\left(\tanh\left(a+b\,x\right)\right)^{2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(tanh(a + b*x))^2,x)
[Out] x*acoth(tanh(a + b*x))^2 + (b^2*x^3)/3 - b*x^2*acoth(tanh(a + b*x))
```

**sympy [A]** time = 0.30, size = 20, normalized size = 1.25

$$\begin{cases}\frac{\operatorname{acoth}^{3}\left(\tanh\left(a+bx\right)\right)}{3b} & \text{for}\ b\neq 0\\ x\operatorname{acoth}^{2}\left(\tanh\left(a\right)\right) & \text{otherwise}\end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(tanh(b*x+a))**2,x)
[Out] Piecewise((acoth(tanh(a + b*x))**3/(3*b), Ne(b, 0)), (x*acoth(tanh(a))**2,
True))
```

## 3.141 $\int \frac{\coth^{-1}(\tanh(a+bx))^2}{x}\,dx$

**Optimal**. Leaf size=49

$$-bx\left(bx-\coth^{-1}(\tanh(a+bx))\right)+\frac{1}{2}\coth^{-1}(\tanh(a+bx))^2+\log(x)\left(bx-\coth^{-1}(\tanh(a+bx))\right)^2$$

```
[Out] -b*x*(b*x-arccoth(tanh(b*x+a)))+1/2*arccoth(tanh(b*x+a))^2+(b*x-arccoth(tan
h(b*x+a)))^2*ln(x)
```

**Rubi [A]** time = 0.03, antiderivative size = 49, normalized size of antiderivative = 1.00, number of steps used = 3, number of rules used = 3, integrand size = 13, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.231, Rules used = {2159, 2158, 29}

$$-bx\left(bx-\coth^{-1}(\tanh(a+bx))\right)+\frac{1}{2}\coth^{-1}(\tanh(a+bx))^2+\log(x)\left(bx-\coth^{-1}(\tanh(a+bx))\right)^2$$

Antiderivative was successfully verified.

```
[In] Int[ArcCoth[Tanh[a + b*x]]^2/x,x]
```

```
[Out] -(b*x*(b*x - ArcCoth[Tanh[a + b*x]])) + ArcCoth[Tanh[a + b*x]]^2/2 + (b*x -
 ArcCoth[Tanh[a + b*x]])^2*Log[x]
```

Rule 29

```
Int[(x_)^(-1), x_Symbol] :> Simp[Log[x], x]
```

Rule 2158

```
Int[(v_)/(u_), x_Symbol] :> With[{a = Simplify[D[u, x]], b = Simplify[D[v,
x]]}, Simp[(b*x)/a, x] - Dist[(b*u - a*v)/a, Int[1/u, x], x] /; NeQ[b*u - a
*v, 0]] /; PiecewiseLinearQ[u, v, x]
```

Rule 2159

```
Int[(v_)^(n_)/(u_), x_Symbol] :> With[{a = Simplify[D[u, x]], b = Simplify[
D[v, x]]}, Simp[v^n/(a*n), x] - Dist[(b*u - a*v)/a, Int[v^(n - 1)/u, x], x]
 /; NeQ[b*u - a*v, 0]] /; PiecewiseLinearQ[u, v, x] && GtQ[n, 0] && NeQ[n,
1]
```

Rubi steps

$$\begin{aligned}\int \frac{\coth^{-1}(\tanh(a+bx))^2}{x}\,dx &= \frac{1}{2}\coth^{-1}(\tanh(a+bx))^2-\left(bx-\coth^{-1}(\tanh(a+bx))\right)\int \frac{\coth^{-1}(\tanh(a+bx))}{x}\\ &= -bx\left(bx-\coth^{-1}(\tanh(a+bx))\right)+\frac{1}{2}\coth^{-1}(\tanh(a+bx))^2-\left(\left(bx-\coth^{-1}(\tan\right.\right.\\ &= -bx\left(bx-\coth^{-1}(\tanh(a+bx))\right)+\frac{1}{2}\coth^{-1}(\tanh(a+bx))^2+\left(bx-\coth^{-1}(\tanh\right.\end{aligned}$$

**Mathematica [A]** time = 0.06, size = 53, normalized size = 1.08

$$\frac{1}{2}(a+bx)^2-(a+bx)\left(-2\coth^{-1}(\tanh(a+bx))+a+2bx\right)+\log(bx)\left(\coth^{-1}(\tanh(a+bx))-bx\right)^2$$

Antiderivative was successfully verified.

```
[In] Integrate[ArcCoth[Tanh[a + b*x]]^2/x,x]
```

```
[Out] (a + b*x)^2/2 - (a + b*x)*(a + 2*b*x - 2*ArcCoth[Tanh[a + b*x]]) + (-(b*x)
+ ArcCoth[Tanh[a + b*x]])^2*Log[b*x]
```

**fricas [A]** time = 0.62, size = 27, normalized size = 0.55

$$\frac{1}{2}b^2x^2 + 2\,abx - \frac{1}{4}\left(\pi^2 - 4\,a^2\right)\log(x)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(tanh(b*x+a))^2/x,x, algorithm="fricas")
```

```
[Out] 1/2*b^2*x^2 + 2*a*b*x - 1/4*(pi^2 - 4*a^2)*log(x)
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{arcoth}\left(\tanh\left(bx + a\right)\right)^2}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(tanh(b*x+a))^2/x,x, algorithm="giac")
```

```
[Out] integrate(arccoth(tanh(b*x + a))^2/x, x)
```

**maple [C]** time = 0.33, size = 3774, normalized size = 77.02

output too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(arccoth(tanh(b*x+a))^2/x,x)
```

```
[Out] -3/2*b^2*x^2+ln(x)*ln(exp(b*x+a))^2-1/2*I*Pi*b*x*csgn(I/(exp(2*b*x+2*a)+1))
*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))-1/8*Pi^2*
ln(x)*csgn(I*exp(2*b*x+2*a))^3*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^3+
1/4*Pi^2*ln(x)*csgn(I/(exp(2*b*x+2*a)+1))^4*csgn(I*exp(2*b*x+2*a)/(exp(2*b*
x+2*a)+1))^2+1/8*Pi^2*ln(x)*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(2*b*x+2*a
)/(exp(2*b*x+2*a)+1))^5-1/4*Pi^2*ln(x)*csgn(I/(exp(2*b*x+2*a)+1))^3*csgn(I*
exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2-1/16*Pi^2*ln(x)*csgn(I*exp(2*b*x+2*a))
^2*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^4+1/8*Pi^2*ln(x)*csgn(I*exp(2*
b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^5-1/4*Pi^2*ln(x)*csgn(I
/(exp(2*b*x+2*a)+1))^3*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^3-1/4*Pi^2
*ln(x)*csgn(I/(exp(2*b*x+2*a)+1))^3*csgn(I*exp(2*b*x+2*a))^3+1/4*Pi^2*ln(x)
*csgn(I*exp(2*b*x+2*a))^3*csgn(I/(exp(2*b*x+2*a)+1))^2+1/4*Pi^2*ln(x)*csgn(
I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^3*csgn(I/(exp(2*b*x+2*a)+1))^2+1/4*Pi^
2*ln(x)*csgn(I*exp(b*x+a))*csgn(I*exp(2*b*x+2*a))^5+1/8*Pi^2*ln(x)*csgn(I*e
xp(2*b*x+2*a))^4*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2-3/8*Pi^2*ln(x)
*csgn(I*exp(b*x+a))^2*csgn(I*exp(2*b*x+2*a))^4-1/16*Pi^2*ln(x)*csgn(I*exp(b
*x+a))^4*csgn(I*exp(2*b*x+2*a))^2+1/4*Pi^2*ln(x)*csgn(I*exp(b*x+a))^3*csgn(
I*exp(2*b*x+2*a))^3-1/16*Pi^2*ln(x)*csgn(I/(exp(2*b*x+2*a)+1))^2*csgn(I*exp
(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^4+1/4*Pi^2*ln(x)*csgn(I/(exp(2*b*x+2*a)+1))
*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2-1/2*I*Pi*x*b*csgn(I*exp(2*b*x+
2*a)/(exp(2*b*x+2*a)+1))^3+1/8*Pi^2*ln(x)*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I
*exp(2*b*x+2*a))^2*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^3-1/4*Pi^2*ln(
x)*csgn(I*exp(b*x+a))^2*csgn(I*exp(2*b*x+2*a))*csgn(I/(exp(2*b*x+2*a)+1))^3
-1/4*Pi^2*ln(x)*csgn(I*exp(b*x+a))*csgn(I*exp(2*b*x+2*a))^3*csgn(I*exp(2*b*
x+2*a)/(exp(2*b*x+2*a)+1))^2-1/4*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(b*x+a))^
2*Pi^2*ln(x)+1/2*Pi^2*ln(x)*csgn(I/(exp(2*b*x+2*a)+1))^5-I*Pi*ln(x)*ln(exp(
b*x+a))-I*Pi*x*b-1/2*I*Pi*ln(x)*ln(exp(b*x+a))*csgn(I*exp(2*b*x+2*a))^3-1/2
*I*Pi*ln(x)*ln(exp(b*x+a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^3-1/8*
Pi^2*ln(x)*csgn(I*exp(b*x+a))^2*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a
```

```
)/(exp(2*b*x+2*a)+1))^3-1/16*Pi^2*ln(x)*csgn(I*exp(2*b*x+2*a))^6-1/16*Pi^2*
ln(x)*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^6-1/4*csgn(I*exp(2*b*x+2*a)
)^3*Pi^2*ln(x)+1/4*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2*csgn(I*exp(2
*b*x+2*a))*Pi^2*ln(x)+1/2*csgn(I*exp(2*b*x+2*a))^2*csgn(I*exp(b*x+a))*Pi^2*
ln(x)-1/4*Pi^2*ln(x)*csgn(I/(exp(2*b*x+2*a)+1))^4*csgn(I*exp(2*b*x+2*a))*cs
gn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))+1/2*I*Pi*ln(x)*ln(exp(b*x+a))*csgn(
I/(exp(2*b*x+2*a)+1))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2-1/2*I*Pi*
ln(x)*ln(exp(b*x+a))*csgn(I*exp(b*x+a))^2*csgn(I*exp(2*b*x+2*a))-1/4*Pi^2*l
n(x)*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^3+1/2*csgn(I/(exp(2*b*x+2*a)
+1))^2*Pi^2*ln(x)-1/4*Pi^2*ln(x)-2*b*ln(x)*ln(exp(b*x+a))*x-1/2*Pi^2*ln(x)*
csgn(I/(exp(2*b*x+2*a)+1))^3-1/4*Pi^2*ln(x)*csgn(I/(exp(2*b*x+2*a)+1))^4-1/
4*Pi^2*ln(x)*csgn(I/(exp(2*b*x+2*a)+1))^6+b^2*x^2*ln(x)+2*b*ln(exp(b*x+a))*
x+1/2*I*Pi*ln(x)*x*b*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(2*b*x+2*a))*csgn
(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))-1/2*Pi^2*ln(x)*csgn(I/(exp(2*b*x+2*a)
+1))^2*csgn(I*exp(b*x+a))*csgn(I*exp(2*b*x+2*a))^2+I*Pi*ln(x)*x*b-1/4*Pi^2*
ln(x)*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*
a)/(exp(2*b*x+2*a)+1))+1/8*Pi^2*ln(x)*csgn(I*exp(b*x+a))^2*csgn(I*exp(2*b*x
+2*a))^2*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2-I*Pi*x*b*csgn(I/(exp(2
*b*x+2*a)+1))^3-I*Pi*ln(x)*x*b*csgn(I/(exp(2*b*x+2*a)+1))^2+1/4*Pi^2*ln(x)*
csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(b*x+a))*csgn(I*exp(2*b*x+2*a))^3*csgn
(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))-1/4*Pi^2*ln(x)*csgn(I/(exp(2*b*x+2*a)
+1))*csgn(I*exp(b*x+a))*csgn(I*exp(2*b*x+2*a))^2*csgn(I*exp(2*b*x+2*a)/(exp
(2*b*x+2*a)+1))^2+1/4*Pi^2*ln(x)*csgn(I*exp(b*x+a))*csgn(I*exp(2*b*x+2*a))^
2*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^3+I*Pi*ln(x)*x*b*csgn(I/(exp(2*
b*x+2*a)+1))^3-I*Pi*ln(x)*x*b*csgn(I*exp(b*x+a))*csgn(I*exp(2*b*x+2*a))^2+I
*Pi*ln(x)*ln(exp(b*x+a))*csgn(I*exp(b*x+a))*csgn(I*exp(2*b*x+2*a))^2+I*Pi*x
*b*csgn(I*exp(b*x+a))*csgn(I*exp(2*b*x+2*a))^2+1/2*I*Pi*ln(x)*x*b*csgn(I*ex
p(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^3-1/2*I*Pi*x*b*csgn(I*exp(b*x+a))^2*csgn(I
*exp(2*b*x+2*a))+1/2*Pi^2*ln(x)*csgn(I*exp(b*x+a))*csgn(I*exp(2*b*x+2*a))^2
*csgn(I/(exp(2*b*x+2*a)+1))^3-1/8*Pi^2*ln(x)*csgn(I/(exp(2*b*x+2*a)+1))*csg
n(I*exp(2*b*x+2*a))^4*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))+1/4*Pi^2*ln
(x)*csgn(I/(exp(2*b*x+2*a)+1))^3*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*
a)/(exp(2*b*x+2*a)+1))+1/4*Pi^2*ln(x)*csgn(I/(exp(2*b*x+2*a)+1))^2*csgn(I*e
xp(b*x+a))^2*csgn(I*exp(2*b*x+2*a))-I*Pi*ln(x)*ln(exp(b*x+a))*csgn(I/(exp(2
*b*x+2*a)+1))^3+I*Pi*ln(x)*ln(exp(b*x+a))*csgn(I/(exp(2*b*x+2*a)+1))^2+I*Pi
*x*b*csgn(I/(exp(2*b*x+2*a)+1))^2-1/2*I*Pi*x*b*csgn(I*exp(2*b*x+2*a))^3+1/2
*I*Pi*ln(x)*ln(exp(b*x+a))*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(ex
p(2*b*x+2*a)+1))^2+1/2*I*Pi*x*b*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a
)/(exp(2*b*x+2*a)+1))^2+1/2*I*Pi*b*x*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(
2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2-1/4*Pi^2*ln(x)*csgn(I/(exp(2*b*x+2*a)+1))^
2*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2+1/4*Pi
^2*ln(x)*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2
*csgn(I/(exp(2*b*x+2*a)+1))^3+1/8*Pi^2*ln(x)*csgn(I/(exp(2*b*x+2*a)+1))^2*c
sgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^3+1/8*Pi^2*
ln(x)*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(2*b*x+2*a))^3*csgn(I*exp(2*b*x+
2*a)/(exp(2*b*x+2*a)+1))^2-1/16*Pi^2*ln(x)*csgn(I/(exp(2*b*x+2*a)+1))^2*csg
n(I*exp(2*b*x+2*a))^2*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2-1/2*I*Pi*
ln(x)*ln(exp(b*x+a))*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(2*b*x+2*a))*csgn
(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))+1/2*I*Pi*ln(x)*x*b*csgn(I*exp(b*x+a))
^2*csgn(I*exp(2*b*x+2*a))-1/4*Pi^2*ln(x)*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*
exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^4+1/2*I*Pi*ln(x)*
x*b*csgn(I*exp(2*b*x+2*a))^3+1/8*Pi^2*ln(x)*csgn(I/(exp(2*b*x+2*a)+1))*csgn
(I*exp(b*x+a))^2*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*
a)+1))^2-1/8*Pi^2*ln(x)*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(b*x+a))^2*csg
n(I*exp(2*b*x+2*a))^2*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))-1/2*I*Pi*ln
(x)*x*b*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1)
)^2-1/2*I*Pi*ln(x)*x*b*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*
b*x+2*a)+1))^2
```

**maxima** [C] time = 0.73, size = 38, normalized size = 0.78

$$\frac{1}{2}\,b^2x^2 + \frac{1}{8}\,(-8i\,\pi b + 16\,ab)x - \frac{1}{4}\left(\pi^2 + 4i\,\pi a - 4\,a^2\right)\log(x)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(tanh(b*x+a))^2/x,x, algorithm="maxima")
```

```
[Out] 1/2*b^2*x^2 + 1/8*(-8*I*pi*b + 16*a*b)*x - 1/4*(pi^2 + 4*I*pi*a - 4*a^2)*lo
g(x)
```

**mupad** [B] time = 0.29, size = 183, normalized size = 3.73

$$\ln(x)\left(\frac{\left(2\,a-\ln\left(\frac{2\,e^{2\,a}\,e^{2\,b\,x}}{e^{2\,a}\,e^{2\,b\,x}-1}\right)+\ln\left(-\frac{2}{e^{2\,a}\,e^{2\,b\,x}-1}\right)+2\,b\,x\right)^2}{4}-a\,\left(2\,a-\ln\left(\frac{2\,e^{2\,a}\,e^{2\,b\,x}}{e^{2\,a}\,e^{2\,b\,x}-1}\right)+\ln\left(-\frac{2}{e^{2\,a}\,e^{2\,b\,x}-1}\right)+2\right.\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(tanh(a + b*x))^2/x,x)
```

```
[Out] log(x)*((2*a - log((2*exp(2*a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x) - 1)) + log
(-2/(exp(2*a)*exp(2*b*x) - 1)) + 2*b*x)^2/4 - a*(2*a - log((2*exp(2*a)*exp(
2*b*x))/(exp(2*a)*exp(2*b*x) - 1)) + log(-2/(exp(2*a)*exp(2*b*x) - 1)) + 2*
b*x) + a^2) + (b^2*x^2)/2 - b*x*(log(-2/(exp(2*a)*exp(2*b*x) - 1)) - log((2
*exp(2*a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x) - 1)) + 2*b*x)
```

**sympy** [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{acoth}^2\left(\tanh\left(a + bx\right)\right)}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(tanh(b*x+a))**2/x,x)
```

```
[Out] Integral(acoth(tanh(a + b*x))**2/x, x)
```

## 3.142 $\int \frac{\coth^{-1}(\tanh(a+bx))^2}{x^2} dx$

**Optimal**. Leaf size=39

$$-\frac{\coth^{-1}(\tanh(a+bx))^2}{x} - 2b\log(x)\left(bx - \coth^{-1}(\tanh(a+bx))\right) + 2b^2x$$

```
[Out] 2*b^2*x-arccoth(tanh(b*x+a))^2/x-2*b*(b*x-arccoth(tanh(b*x+a)))*ln(x)
```

**Rubi [A]** time = 0.03, antiderivative size = 39, normalized size of antiderivative = 1.00, number of steps used = 3, number of rules used = 3, integrand size = 13, $\frac{\text{number of rules}}{\text{integrand size}} = 0.231$, Rules used = {2168, 2158, 29}

$$-\frac{\coth^{-1}(\tanh(a+bx))^2}{x} - 2b\log(x)\left(bx - \coth^{-1}(\tanh(a+bx))\right) + 2b^2x$$

Antiderivative was successfully verified.

```
[In] Int[ArcCoth[Tanh[a + b*x]]^2/x^2,x]
```

```
[Out] 2*b^2*x - ArcCoth[Tanh[a + b*x]]^2/x - 2*b*(b*x - ArcCoth[Tanh[a + b*x]])*L
og[x]
```

Rule 29

```
Int[(x_)^(-1), x_Symbol] :> Simp[Log[x], x]
```

Rule 2158

```
Int[(v_)/(u_), x_Symbol] :> With[{a = Simplify[D[u, x]], b = Simplify[D[v,
x]]}, Simp[(b*x)/a, x] - Dist[(b*u - a*v)/a, Int[1/u, x], x] /; NeQ[b*u - a
*v, 0]] /; PiecewiseLinearQ[u, v, x]
```

Rule 2168

```
Int[(u_)^(m_)*(v_)^(n_.), x_Symbol] :> With[{a = Simplify[D[u, x]], b = Sim
plify[D[v, x]]}, Simp[(u^(m + 1)*v^n)/(a*(m + 1)), x] - Dist[(b*n)/(a*(m +
1)), Int[u^(m + 1)*v^(n - 1), x], x] /; NeQ[b*u - a*v, 0]] /; FreeQ[{m, n},
 x] && PiecewiseLinearQ[u, v, x] && NeQ[m, -1] && ((LtQ[m, -1] && GtQ[n, 0]
 && !(ILtQ[m + n, -2] && (FractionQ[m] || GeQ[2*n + m + 1, 0]))) || (IGtQ[
n, 0] && IGtQ[m, 0] && LeQ[n, m]) || (IGtQ[n, 0] && !IntegerQ[m]) || (ILtQ
[m, 0] && !IntegerQ[n]))
```

Rubi steps

$$\begin{aligned}
\int \frac{\coth^{-1}(\tanh(a+bx))^2}{x^2} dx &= -\frac{\coth^{-1}(\tanh(a+bx))^2}{x} + (2b)\int \frac{\coth^{-1}(\tanh(a+bx))}{x} dx \\
&= 2b^2x - \frac{\coth^{-1}(\tanh(a+bx))^2}{x} - \left(2b\left(bx - \coth^{-1}(\tanh(a+bx))\right)\right)\int \frac{1}{x} dx \\
&= 2b^2x - \frac{\coth^{-1}(\tanh(a+bx))^2}{x} - 2b\left(bx - \coth^{-1}(\tanh(a+bx))\right)\log(x)
\end{aligned}$$

**Mathematica [A]** time = 0.05, size = 37, normalized size = 0.95

$$-\frac{\coth^{-1}(\tanh(a+bx))^2}{x} + 2b(\log(x)+1)\coth^{-1}(\tanh(a+bx)) - 2b^2x\log(x)$$

Antiderivative was successfully verified.

```
[In] Integrate[ArcCoth[Tanh[a + b*x]]^2/x^2,x]
```

```
[Out] -(ArcCoth[Tanh[a + b*x]]^2/x) - 2*b^2*x*Log[x] + 2*b*ArcCoth[Tanh[a + b*x]]
*(1 + Log[x])
```

**fricas [A]** time = 0.58, size = 29, normalized size = 0.74

$$\frac{4 b^2 x^2 + 8 abx \log(x) + \pi^2 - 4 a^2}{4 x}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(tanh(b*x+a))^2/x^2,x, algorithm="fricas")
```

```
[Out] 1/4*(4*b^2*x^2 + 8*a*b*x*log(x) + pi^2 - 4*a^2)/x
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{arcoth}(\tanh(bx + a))^2}{x^2} dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(tanh(b*x+a))^2/x^2,x, algorithm="giac")
```

```
[Out] integrate(arccoth(tanh(b*x + a))^2/x^2, x)
```

**maple [C]** time = 0.27, size = 1095, normalized size = 28.08

result too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(arccoth(tanh(b*x+a))^2/x^2,x)
```

```
[Out] 2*b^2*x-I*Pi*ln(exp(b*x+a))/x*csgn(I*exp(b*x+a))*csgn(I*exp(2*b*x+2*a))^2+1
/2*I*Pi*ln(exp(b*x+a))/x*csgn(I*exp(b*x+a))^2*csgn(I*exp(2*b*x+2*a))+I*Pi*l
n(x)*b*csgn(I*exp(b*x+a))*csgn(I*exp(2*b*x+2*a))^2+I*Pi*ln(exp(b*x+a))/x-1/
x*ln(exp(b*x+a))^2+1/2*I*Pi*ln(x)*b*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(2
*b*x+2*a)/(exp(2*b*x+2*a)+1))^2-1/2*I*Pi*ln(x)*b*csgn(I*exp(b*x+a))^2*csgn(
I*exp(2*b*x+2*a))-1/2*I*Pi*ln(exp(b*x+a))/x*csgn(I*exp(2*b*x+2*a))*csgn(I*e
xp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2-2*ln(x)*x*b^2+2*ln(x)*ln(exp(b*x+a))*b+
1/2*I*Pi*ln(x)*b*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*
a)+1))^2-1/2*I*Pi*ln(exp(b*x+a))/x*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(2*
b*x+2*a)/(exp(2*b*x+2*a)+1))^2-1/2*I*Pi*ln(x)*b*csgn(I/(exp(2*b*x+2*a)+1))*
csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))-I*Pi*ln(x)
*b+1/2*I*Pi*ln(exp(b*x+a))/x*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(2*b*x+2*
a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))+1/16*Pi^2*(-2*csgn(I/(exp(2*b
*x+2*a)+1))^2+csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(
2*b*x+2*a)/(exp(2*b*x+2*a)+1))-csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(2*b*x+
2*a)/(exp(2*b*x+2*a)+1))^2+2*csgn(I/(exp(2*b*x+2*a)+1))^3+csgn(I*exp(b*x+a)
)^2*csgn(I*exp(2*b*x+2*a))-2*csgn(I*exp(b*x+a))*csgn(I*exp(2*b*x+2*a))^2+cs
gn(I*exp(2*b*x+2*a))^3-csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*
b*x+2*a)+1))^2+csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^3+2)^2/x+1/2*I*Pi*
ln(exp(b*x+a))/x*csgn(I*exp(2*b*x+2*a))^3+1/2*I*Pi*ln(exp(b*x+a))/x*csgn(I*
exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^3-I*Pi*ln(x)*b*csgn(I/(exp(2*b*x+2*a)+1)
)^3+I*Pi*ln(exp(b*x+a))/x*csgn(I/(exp(2*b*x+2*a)+1))^3-1/2*I*Pi*ln(x)*b*csg
n(I*exp(2*b*x+2*a))^3-I*Pi*ln(exp(b*x+a))/x*csgn(I/(exp(2*b*x+2*a)+1))^2+I*
Pi*ln(x)*b*csgn(I/(exp(2*b*x+2*a)+1))^2-1/2*I*Pi*ln(x)*b*csgn(I*exp(2*b*x+2
*a)/(exp(2*b*x+2*a)+1))^3
```

**maxima** [A] time = 0.38, size = 54, normalized size = 1.38

$$2\,b\,\mathrm{arcoth}\left(\tanh\left(bx+a\right)\right)\log(x) - 2\left(b\left(x+\frac{a}{b}\right)\log(x) - b\left(x+\frac{a\log(x)}{b}\right)\right)b - \frac{\mathrm{arcoth}\left(\tanh\left(bx+a\right)\right)^2}{x}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(tanh(b*x+a))^2/x^2,x, algorithm="maxima")
```

```
[Out] 2*b*arccoth(tanh(b*x + a))*log(x) - 2*(b*(x + a/b)*log(x) - b*(x + a*log(x)
/b))*b - arccoth(tanh(b*x + a))^2/x
```

**mupad** [B] time = 1.25, size = 207, normalized size = 5.31

$$b\,\ln\left(\frac{e^{2\,b\,x}}{e^{2\,a}\,e^{2\,b\,x}-1}\right) - \frac{\ln\left(\frac{2\,e^{2\,a}\,e^{2\,b\,x}}{e^{2\,a}\,e^{2\,b\,x}-1}\right)^2}{4\,x} - b\,\ln\left(\frac{1}{e^{2\,a}\,e^{2\,b\,x}-1}\right) - \frac{\ln\left(-\frac{2}{e^{2\,a}\,e^{2\,b\,x}-1}\right)^2}{4\,x} + b\,\ln\left(\frac{2\,e^{2\,a}\,e^{2\,b\,x}}{e^{2\,a}\,e^{2\,b\,x}-1}\right)\ln(x) - b\,\ln\left(-\frac{}{e}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(tanh(a + b*x))^2/x^2,x)
```

```
[Out] b*log(exp(2*b*x)/(exp(2*a)*exp(2*b*x) - 1)) - log((2*exp(2*a)*exp(2*b*x))/(
exp(2*a)*exp(2*b*x) - 1))^2/(4*x) - b*log(1/(exp(2*a)*exp(2*b*x) - 1)) - lo
g(-2/(exp(2*a)*exp(2*b*x) - 1))^2/(4*x) + b*log((2*exp(2*a)*exp(2*b*x))/(ex
p(2*a)*exp(2*b*x) - 1))*log(x) - b*log(-2/(exp(2*a)*exp(2*b*x) - 1))*log(x)
 + (log((2*exp(2*a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x) - 1))*log(-2/(exp(2*a)
*exp(2*b*x) - 1)))/(2*x) - 2*b^2*x*log(x)
```

**sympy** [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\mathrm{acoth}^2\left(\tanh\left(a+bx\right)\right)}{x^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(tanh(b*x+a))**2/x**2,x)
```

```
[Out] Integral(acoth(tanh(a + b*x))**2/x**2, x)
```

# 3.143 $\int \frac{\coth^{-1}(\tanh(a+bx))^2}{x^3}\,dx$

**Optimal**. Leaf size=36

$$-\frac{\coth^{-1}(\tanh(a+bx))^2}{2x^2}-\frac{b\coth^{-1}(\tanh(a+bx))}{x}+b^2\log(x)$$

```
[Out] -b*arccoth(tanh(b*x+a))/x-1/2*arccoth(tanh(b*x+a))^2/x^2+b^2*ln(x)
```

**Rubi [A]** time = 0.02, antiderivative size = 36, normalized size of antiderivative = 1.00, number of steps used = 3, number of rules used = 2, integrand size = 13, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.154, Rules used = {2168, 29}

$$-\frac{\coth^{-1}(\tanh(a+bx))^2}{2x^2}-\frac{b\coth^{-1}(\tanh(a+bx))}{x}+b^2\log(x)$$

Antiderivative was successfully verified.

```
[In] Int[ArcCoth[Tanh[a + b*x]]^2/x^3,x]
```

```
[Out] -((b*ArcCoth[Tanh[a + b*x]])/x) - ArcCoth[Tanh[a + b*x]]^2/(2*x^2) + b^2*Lo
g[x]
```

Rule 29

```
Int[(x_)^(-1), x_Symbol] :> Simp[Log[x], x]
```

Rule 2168

```
Int[(u_)^(m_)*(v_)^(n_.), x_Symbol] :> With[{a = Simplify[D[u, x]], b = Sim
plify[D[v, x]]}, Simp[(u^(m + 1)*v^n)/(a*(m + 1)), x] - Dist[(b*n)/(a*(m +
1)), Int[u^(m + 1)*v^(n - 1), x], x] /; NeQ[b*u - a*v, 0]] /; FreeQ[{m, n},
 x] && PiecewiseLinearQ[u, v, x] && NeQ[m, -1] && ((LtQ[m, -1] && GtQ[n, 0]
 &&  !(ILtQ[m + n, -2] && (FractionQ[m] || GeQ[2*n + m + 1, 0]))) || (IGtQ[
n, 0] && IGtQ[m, 0] && LeQ[n, m]) || (IGtQ[n, 0] &&  !IntegerQ[m]) || (ILtQ
[m, 0] &&  !IntegerQ[n]))
```

Rubi steps

$$\begin{aligned}\int \frac{\coth^{-1}(\tanh(a+bx))^2}{x^3}\,dx &= -\frac{\coth^{-1}(\tanh(a+bx))^2}{2x^2}+b\int \frac{\coth^{-1}(\tanh(a+bx))}{x^2}\,dx\\ &= -\frac{b\coth^{-1}(\tanh(a+bx))}{x}-\frac{\coth^{-1}(\tanh(a+bx))^2}{2x^2}+b^2\int \frac{1}{x}\,dx\\ &= -\frac{b\coth^{-1}(\tanh(a+bx))}{x}-\frac{\coth^{-1}(\tanh(a+bx))^2}{2x^2}+b^2\log(x)\end{aligned}$$

**Mathematica [A]** time = 0.04, size = 42, normalized size = 1.17

$$-\frac{2bx\coth^{-1}(\tanh(a+bx))+\coth^{-1}(\tanh(a+bx))^2-b^2x^2(2\log(x)+3)}{2x^2}$$

Antiderivative was successfully verified.

```
[In] Integrate[ArcCoth[Tanh[a + b*x]]^2/x^3,x]
```

```
[Out] -1/2*(2*b*x*ArcCoth[Tanh[a + b*x]] + ArcCoth[Tanh[a + b*x]]^2 - b^2*x^2*(3
+ 2*Log[x]))/x^2
```

**fricas [A]** time = 0.42, size = 29, normalized size = 0.81

$$\frac{8\,b^2x^2\log(x) - 16\,abx + \pi^2 - 4\,a^2}{8\,x^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(tanh(b*x+a))^2/x^3,x, algorithm="fricas")
```

```
[Out] 1/8*(8*b^2*x^2*log(x) - 16*a*b*x + pi^2 - 4*a^2)/x^2
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{arcoth}\left(\tanh\left(bx+a\right)\right)^2}{x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(tanh(b*x+a))^2/x^3,x, algorithm="giac")
```

```
[Out] integrate(arccoth(tanh(b*x + a))^2/x^3, x)
```

**maple [C]** time = 0.43, size = 3213, normalized size = 89.25

output too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(arccoth(tanh(b*x+a))^2/x^3,x)
```

```
[Out] -1/2/x^2*ln(exp(b*x+a))^2-1/4*(4*b*x+2*I*Pi*csgn(I/(exp(2*b*x+2*a)+1))^2-I*
Pi*csgn(I*exp(b*x+a))^2*csgn(I*exp(2*b*x+2*a))+2*I*Pi*csgn(I*exp(b*x+a))*cs
gn(I*exp(2*b*x+2*a))^2-2*I*Pi-I*Pi*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1)
)^3+I*Pi*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1
))^2-I*Pi*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*
x+2*a)/(exp(2*b*x+2*a)+1))+I*Pi*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a
)/(exp(2*b*x+2*a)+1))^2-I*Pi*csgn(I*exp(2*b*x+2*a))^3-2*I*Pi*csgn(I/(exp(2*
b*x+2*a)+1))^3)/x^2*ln(exp(b*x+a))+1/32*(4*Pi^2-16*I*Pi*b*x*csgn(I/(exp(2*b
*x+2*a)+1))^2+16*I*Pi*b*x*csgn(I/(exp(2*b*x+2*a)+1))^3-4*Pi^2*csgn(I*exp(b*
x+a))*csgn(I*exp(2*b*x+2*a))^5-8*Pi^2*csgn(I/(exp(2*b*x+2*a)+1))^5-4*Pi^2*c
sgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2+Pi^2*csgn
(I*exp(b*x+a))^4*csgn(I*exp(2*b*x+2*a))^2-4*Pi^2*csgn(I*exp(b*x+a))^3*csgn(
I*exp(2*b*x+2*a))^3+4*csgn(I*exp(2*b*x+2*a))^3*Pi^2+4*Pi^2*csgn(I/(exp(2*b*
x+2*a)+1))^6-8*csgn(I/(exp(2*b*x+2*a)+1))^2*Pi^2+4*csgn(I*exp(2*b*x+2*a)/(e
xp(2*b*x+2*a)+1))^3*Pi^2+2*Pi^2*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(b*x+a
))^2*csgn(I*exp(2*b*x+2*a))^2*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))-4*P
i^2*csgn(I/(exp(2*b*x+2*a)+1))^3*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*
a)/(exp(2*b*x+2*a)+1))+Pi^2*csgn(I*exp(2*b*x+2*a))^6+Pi^2*csgn(I*exp(2*b*x+
2*a)/(exp(2*b*x+2*a)+1))^6-8*Pi^2*csgn(I*exp(b*x+a))*csgn(I*exp(2*b*x+2*a))
^2-4*Pi^2*csgn(I*exp(2*b*x+2*a))^3*csgn(I/(exp(2*b*x+2*a)+1))^2-4*Pi^2*csgn
(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2+8*I*Pi*x
*b*csgn(I*exp(2*b*x+2*a))^3+8*I*Pi*x*b*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a
)+1))^3-2*Pi^2*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)
+1))^5+4*Pi^2*csgn(I*exp(2*b*x+2*a))^3*csgn(I/(exp(2*b*x+2*a)+1))^3+Pi^2*cs
gn(I*exp(2*b*x+2*a))^2*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^4+32*b^2*x
^2*ln(x)-2*Pi^2*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x
+2*a)+1))^5+4*Pi^2*csgn(I/(exp(2*b*x+2*a)+1))^4+4*Pi^2*csgn(I*exp(2*b*x+2*a
)/(exp(2*b*x+2*a)+1))^2*csgn(I/(exp(2*b*x+2*a)+1))^3-4*Pi^2*csgn(I*exp(2*b*
x+2*a)/(exp(2*b*x+2*a)+1))^3*csgn(I/(exp(2*b*x+2*a)+1))^2-4*Pi^2*csgn(I/(ex
p(2*b*x+2*a)+1))^4*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2-8*Pi^2*csgn(
I*exp(b*x+a))*csgn(I*exp(2*b*x+2*a))^2*csgn(I/(exp(2*b*x+2*a)+1))^3-2*Pi^2*
csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(b*x+a))^2*csgn(I*exp(2*b*x+2*a))*csgn
```

```
(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2-4*Pi^2*csgn(I/(exp(2*b*x+2*a)+1))*c
sgn(I*exp(b*x+a))*csgn(I*exp(2*b*x+2*a))^3*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x
+2*a)+1))+4*Pi^2*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(2*b*x+2*a))*csgn(I*e
xp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^4+4*Pi^2*csgn(I*exp(b*x+a))^2*csgn(I*exp(
2*b*x+2*a))+6*Pi^2*csgn(I*exp(b*x+a))^2*csgn(I*exp(2*b*x+2*a))^4+2*Pi^2*csg
n(I*exp(2*b*x+2*a))^3*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^3+Pi^2*csgn
(I/(exp(2*b*x+2*a)+1))^2*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^4-2*Pi^2
*csgn(I*exp(2*b*x+2*a))^4*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2+4*Pi^
2*csgn(I/(exp(2*b*x+2*a)+1))^3*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^3+
8*I*Pi*b*x*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b
*x+2*a)/(exp(2*b*x+2*a)+1))+4*Pi^2*csgn(I/(exp(2*b*x+2*a)+1))^3*csgn(I*exp(
b*x+a))^2*csgn(I*exp(2*b*x+2*a))+16*I*Pi*x*b+2*Pi^2*csgn(I*exp(b*x+a))^2*cs
gn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^3-4*Pi^2*csg
n(I*exp(b*x+a))*csgn(I*exp(2*b*x+2*a))^2*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2
*a)+1))^3+4*Pi^2*csgn(I/(exp(2*b*x+2*a)+1))^4*csgn(I*exp(2*b*x+2*a))*csgn(I
*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))-8*I*Pi*b*x*csgn(I/(exp(2*b*x+2*a)+1))*c
sgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2+8*csgn(I/(exp(2*b*x+2*a)+1))^3*P
i^2-4*Pi^2*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))
^2*csgn(I/(exp(2*b*x+2*a)+1))^3+Pi^2*csgn(I/(exp(2*b*x+2*a)+1))^2*csgn(I*ex
p(2*b*x+2*a))^2*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2-2*Pi^2*csgn(I/(
exp(2*b*x+2*a)+1))*csgn(I*exp(2*b*x+2*a))^3*csgn(I*exp(2*b*x+2*a)/(exp(2*b*
x+2*a)+1))^2-2*Pi^2*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(2*b*x+2*a))^2*csg
n(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^3+4*Pi^2*csgn(I/(exp(2*b*x+2*a)+1))*
csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))-4*Pi^2*csg
n(I*exp(b*x+a))^2*csgn(I*exp(2*b*x+2*a))*csgn(I/(exp(2*b*x+2*a)+1))^2+4*Pi^
2*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2*csgn(I
/(exp(2*b*x+2*a)+1))^2+8*Pi^2*csgn(I*exp(b*x+a))*csgn(I*exp(2*b*x+2*a))^2*c
sgn(I/(exp(2*b*x+2*a)+1))^2-2*Pi^2*csgn(I*exp(b*x+a))^2*csgn(I*exp(2*b*x+2*
a))^2*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2+4*Pi^2*csgn(I*exp(b*x+a))
*csgn(I*exp(2*b*x+2*a))^3*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2-2*Pi^
2*csgn(I/(exp(2*b*x+2*a)+1))^2*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)
/(exp(2*b*x+2*a)+1))^3+2*Pi^2*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(2*b*x+2
*a))^4*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))+8*I*Pi*b*x*csgn(I*exp(b*x+
a))^2*csgn(I*exp(2*b*x+2*a))+4*Pi^2*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(b
*x+a))*csgn(I*exp(2*b*x+2*a))^2*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2
-8*I*Pi*b*x*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1)
)^2-16*I*Pi*b*x*csgn(I*exp(b*x+a))*csgn(I*exp(2*b*x+2*a))^2)/x^2
```

**maxima** [A] time = 0.46, size = 34, normalized size = 0.94

$$b^2 \log(x) - \frac{b \operatorname{arcoth}(\tanh(bx + a))}{x} - \frac{\operatorname{arcoth}(\tanh(bx + a))^2}{2x^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(tanh(b*x+a))^2/x^3,x, algorithm="maxima")
[Out] b^2*log(x) - b*arccoth(tanh(b*x + a))/x - 1/2*arccoth(tanh(b*x + a))^2/x^2
```

**mupad** [B] time = 1.16, size = 34, normalized size = 0.94

$$b^2 \ln(x) - \frac{\frac{\operatorname{acoth}(\tanh(a+b\,x))^2}{2} + b\,x\,\operatorname{acoth}(\tanh(a + b\,x))}{x^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(tanh(a + b*x))^2/x^3,x)
[Out] b^2*log(x) - (acoth(tanh(a + b*x))^2/2 + b*x*acoth(tanh(a + b*x)))/x^2
```

**sympy** [**A**] time = 0.57, size = 32, normalized size = 0.89

$$b^2 \log(x) - \frac{b \operatorname{acoth}(\tanh(a + bx))}{x} - \frac{\operatorname{acoth}^2(\tanh(a + bx))}{2x^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(tanh(b*x+a))**2/x**3,x)
```

```
[Out] b**2*log(x) - b*acoth(tanh(a + b*x))/x - acoth(tanh(a + b*x))**2/(2*x**2)
```

# 3.144 $\int \frac{\coth^{-1}(\tanh(a+bx))^2}{x^4} dx$

**Optimal**. Leaf size=31

$$\frac{\coth^{-1}(\tanh(a+bx))^3}{3x^3\left(bx-\coth^{-1}(\tanh(a+bx))\right)}$$

```
[Out] 1/3*arccoth(tanh(b*x+a))^3/x^3/(b*x-arccoth(tanh(b*x+a)))
```

**Rubi [A]** time = 0.01, antiderivative size = 31, normalized size of antiderivative = 1.00, number of steps used = 1, number of rules used = 1, integrand size = 13, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.077, Rules used = {2167}

$$\frac{\coth^{-1}(\tanh(a+bx))^3}{3x^3\left(bx-\coth^{-1}(\tanh(a+bx))\right)}$$

Antiderivative was successfully verified.

```
[In] Int[ArcCoth[Tanh[a + b*x]]^2/x^4,x]
```

```
[Out] ArcCoth[Tanh[a + b*x]]^3/(3*x^3*(b*x - ArcCoth[Tanh[a + b*x]]))
```

Rule 2167

```
Int[(u_)^(m_)*(v_)^(n_), x_Symbol] :> With[{a = Simplify[D[u, x]], b = Simp
lify[D[v, x]]}, -Simp[(u^(m + 1)*v^(n + 1))/((m + 1)*(b*u - a*v)), x] /; Ne
Q[b*u - a*v, 0]] /; FreeQ[{m, n}, x] && PiecewiseLinearQ[u, v, x] && EqQ[m
+ n + 2, 0] && NeQ[m, -1]
```

Rubi steps

$$\int \frac{\coth^{-1}(\tanh(a+bx))^2}{x^4} dx = \frac{\coth^{-1}(\tanh(a+bx))^3}{3x^3\left(bx-\coth^{-1}(\tanh(a+bx))\right)}$$

**Mathematica [A]** time = 0.05, size = 34, normalized size = 1.10

$$-\frac{bx\coth^{-1}(\tanh(a+bx))+\coth^{-1}(\tanh(a+bx))^2+b^2x^2}{3x^3}$$

Antiderivative was successfully verified.

```
[In] Integrate[ArcCoth[Tanh[a + b*x]]^2/x^4,x]
```

```
[Out] -1/3*(b^2*x^2 + b*x*ArcCoth[Tanh[a + b*x]] + ArcCoth[Tanh[a + b*x]]^2)/x^3
```

**fricas [A]** time = 1.44, size = 29, normalized size = 0.94

$$-\frac{12\,b^2x^2+12\,abx-\pi^2+4\,a^2}{12\,x^3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(tanh(b*x+a))^2/x^4,x, algorithm="fricas")
```

```
[Out] -1/12*(12*b^2*x^2 + 12*a*b*x - pi^2 + 4*a^2)/x^3
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{arcoth}\left(\tanh\left(bx+a\right)\right)^2}{x^4}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

[In] integrate(arccoth(tanh(b*x+a))^2/x^4,x, algorithm="giac")

[Out] integrate(arccoth(tanh(b*x + a))^2/x^4, x)

**maple** **[C]** time = 0.39, size = 3217, normalized size = 103.77

output too large to display

Verification of antiderivative is not currently implemented for this CAS.

[In] int(arccoth(tanh(b*x+a))^2/x^4,x)

```
[Out] -1/3/x^3*ln(exp(b*x+a))^2-1/6*(2*b*x-I*Pi*csgn(I*exp(b*x+a))^2*csgn(I*exp(2
*b*x+2*a))+2*I*Pi*csgn(I*exp(b*x+a))*csgn(I*exp(2*b*x+2*a))^2+2*I*Pi*csgn(I
/(exp(2*b*x+2*a)+1))^2-2*I*Pi-I*Pi*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1)
)^3+I*Pi*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1
))^2-2*I*Pi*csgn(I/(exp(2*b*x+2*a)+1))^3-I*Pi*csgn(I/(exp(2*b*x+2*a)+1))*cs
gn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))+I*Pi*csgn(I*
exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2-I*Pi*csgn(I*exp
(2*b*x+2*a))^3)/x^3*ln(exp(b*x+a))-1/48*(-4*Pi^2+16*b^2*x^2+4*Pi^2*csgn(I*e
xp(b*x+a))*csgn(I*exp(2*b*x+2*a))^5+8*Pi^2*csgn(I/(exp(2*b*x+2*a)+1))^5+4*P
i^2*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2-Pi^2
*csgn(I*exp(b*x+a))^4*csgn(I*exp(2*b*x+2*a))^2+4*Pi^2*csgn(I*exp(b*x+a))^3*
csgn(I*exp(2*b*x+2*a))^3-4*csgn(I*exp(2*b*x+2*a))^3*Pi^2-4*Pi^2*csgn(I/(exp
(2*b*x+2*a)+1))^6+8*csgn(I/(exp(2*b*x+2*a)+1))^2*Pi^2-4*csgn(I*exp(2*b*x+2*
a)/(exp(2*b*x+2*a)+1))^3*Pi^2-2*Pi^2*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(
b*x+a))^2*csgn(I*exp(2*b*x+2*a))^2*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1)
)+4*Pi^2*csgn(I/(exp(2*b*x+2*a)+1))^3*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b
*x+2*a)/(exp(2*b*x+2*a)+1))-Pi^2*csgn(I*exp(2*b*x+2*a))^6-Pi^2*csgn(I*exp(2
*b*x+2*a)/(exp(2*b*x+2*a)+1))^6+8*Pi^2*csgn(I*exp(b*x+a))*csgn(I*exp(2*b*x+
2*a))^2+4*Pi^2*csgn(I*exp(2*b*x+2*a))^3*csgn(I/(exp(2*b*x+2*a)+1))^2+4*Pi^2
*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2+2*P
i^2*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^5-4*Pi
^2*csgn(I*exp(2*b*x+2*a))^3*csgn(I/(exp(2*b*x+2*a)+1))^3-Pi^2*csgn(I*exp(2*
b*x+2*a))^2*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^4-8*I*Pi*x*b+2*Pi^2*c
sgn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^5-4*I*P
i*x*b*csgn(I*exp(2*b*x+2*a))^3-4*I*Pi*x*b*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+
2*a)+1))^3-4*I*Pi*b*x*csgn(I*exp(b*x+a))^2*csgn(I*exp(2*b*x+2*a))+8*I*Pi*b*
x*csgn(I*exp(b*x+a))*csgn(I*exp(2*b*x+2*a))^2-4*Pi^2*csgn(I/(exp(2*b*x+2*a)
+1))^4-4*Pi^2*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2*csgn(I/(exp(2*b*x
+2*a)+1))^3+4*Pi^2*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^3*csgn(I/(exp(
2*b*x+2*a)+1))^2+4*Pi^2*csgn(I/(exp(2*b*x+2*a)+1))^4*csgn(I*exp(2*b*x+2*a)/
(exp(2*b*x+2*a)+1))^2+8*Pi^2*csgn(I*exp(b*x+a))*csgn(I*exp(2*b*x+2*a))^2*cs
gn(I/(exp(2*b*x+2*a)+1))^3+2*Pi^2*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(b*x
+a))^2*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2+4
*Pi^2*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(b*x+a))*csgn(I*exp(2*b*x+2*a))^
3*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))+4*I*Pi*b*x*csgn(I*exp(2*b*x+2*a
))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2+4*I*Pi*b*x*csgn(I/(exp(2*b*x
+2*a)+1))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2-4*Pi^2*csgn(I/(exp(2*
b*x+2*a)+1))*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1
))^4+8*I*Pi*b*x*csgn(I/(exp(2*b*x+2*a)+1))^2-8*I*Pi*b*x*csgn(I/(exp(2*b*x+2
*a)+1))^3-4*Pi^2*csgn(I*exp(b*x+a))^2*csgn(I*exp(2*b*x+2*a))-6*Pi^2*csgn(I*
exp(b*x+a))^2*csgn(I*exp(2*b*x+2*a))^4-2*Pi^2*csgn(I*exp(2*b*x+2*a))^3*csgn
(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^3-4*I*Pi*b*x*csgn(I/(exp(2*b*x+2*a)+1
))*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))-Pi^2*cs
gn(I/(exp(2*b*x+2*a)+1))^2*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^4+2*Pi
^2*csgn(I*exp(2*b*x+2*a))^4*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2-4*P
i^2*csgn(I/(exp(2*b*x+2*a)+1))^3*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^
3-4*Pi^2*csgn(I/(exp(2*b*x+2*a)+1))^3*csgn(I*exp(b*x+a))^2*csgn(I*exp(2*b*x
```

```
+2*a))-2*Pi^2*csgn(I*exp(b*x+a))^2*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+
2*a)/(exp(2*b*x+2*a)+1))^3+4*Pi^2*csgn(I*exp(b*x+a))*csgn(I*exp(2*b*x+2*a))
^2*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^3-4*Pi^2*csgn(I/(exp(2*b*x+2*a
)+1))^4*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))-8*
csgn(I/(exp(2*b*x+2*a)+1))^3*Pi^2+4*Pi^2*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(
2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2*csgn(I/(exp(2*b*x+2*a)+1))^3-Pi^2*csgn(I/(
exp(2*b*x+2*a)+1))^2*csgn(I*exp(2*b*x+2*a))^2*csgn(I*exp(2*b*x+2*a)/(exp(2*
b*x+2*a)+1))^2+2*Pi^2*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(2*b*x+2*a))^3*c
sgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2+2*Pi^2*csgn(I/(exp(2*b*x+2*a)+1)
)*csgn(I*exp(2*b*x+2*a))^2*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^3-4*Pi
^2*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/
(exp(2*b*x+2*a)+1))+4*Pi^2*csgn(I*exp(b*x+a))^2*csgn(I*exp(2*b*x+2*a))*csgn
(I/(exp(2*b*x+2*a)+1))^2-4*Pi^2*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a
)/(exp(2*b*x+2*a)+1))^2*csgn(I/(exp(2*b*x+2*a)+1))^2-8*Pi^2*csgn(I*exp(b*x+
a))*csgn(I*exp(2*b*x+2*a))^2*csgn(I/(exp(2*b*x+2*a)+1))^2+2*Pi^2*csgn(I*exp
(b*x+a))^2*csgn(I*exp(2*b*x+2*a))^2*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1
))^2-4*Pi^2*csgn(I*exp(b*x+a))*csgn(I*exp(2*b*x+2*a))^3*csgn(I*exp(2*b*x+2*
a)/(exp(2*b*x+2*a)+1))^2+2*Pi^2*csgn(I/(exp(2*b*x+2*a)+1))^2*csgn(I*exp(2*b
*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^3-2*Pi^2*csgn(I/(exp(2*b
*x+2*a)+1))*csgn(I*exp(2*b*x+2*a))^4*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+
1))-4*Pi^2*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(b*x+a))*csgn(I*exp(2*b*x+2
*a))^2*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2)/x^3
```

**maxima** [A] time = 0.45, size = 36, normalized size = 1.16

$$-\frac{b^2}{3\,x}-\frac{b\,\mathrm{arcoth}\left(\tanh\left(bx+a\right)\right)}{3\,x^2}-\frac{\mathrm{arcoth}\left(\tanh\left(bx+a\right)\right)^2}{3\,x^3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(tanh(b*x+a))^2/x^4,x, algorithm="maxima")
```

```
[Out] -1/3*b^2/x - 1/3*b*arccoth(tanh(b*x + a))/x^2 - 1/3*arccoth(tanh(b*x + a))^
2/x^3
```

**mupad** [B] time = 1.12, size = 32, normalized size = 1.03

$$-\frac{b^2\,x^2+b\,x\,\mathrm{acoth}\left(\tanh\left(a+b\,x\right)\right)+\mathrm{acoth}\left(\tanh\left(a+b\,x\right)\right)^2}{3\,x^3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(tanh(a + b*x))^2/x^4,x)
```

```
[Out] -(acoth(tanh(a + b*x))^2 + b^2*x^2 + b*x*acoth(tanh(a + b*x)))/(3*x^3)
```

**sympy** [A] time = 0.87, size = 37, normalized size = 1.19

$$-\frac{b^2}{3x}-\frac{b\,\mathrm{acoth}\left(\tanh\left(a+bx\right)\right)}{3x^2}-\frac{\mathrm{acoth}^2\left(\tanh\left(a+bx\right)\right)}{3x^3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(tanh(b*x+a))**2/x**4,x)
```

```
[Out] -b**2/(3*x) - b*acoth(tanh(a + b*x))/(3*x**2) - acoth(tanh(a + b*x))**2/(3*
x**3)
```

## 3.145 $\int \frac{\coth^{-1}(\tanh(a+bx))^2}{x^5}\,dx$

**Optimal**. Leaf size=64

$$\frac{\coth^{-1}(\tanh(a+bx))^3}{4x^4\left(bx-\coth^{-1}(\tanh(a+bx))\right)}+\frac{b\coth^{-1}(\tanh(a+bx))^3}{12x^3\left(bx-\coth^{-1}(\tanh(a+bx))\right)^2}$$

```
[Out] 1/12*b*arccoth(tanh(b*x+a))^3/x^3/(b*x-arccoth(tanh(b*x+a)))^2+1/4*arccoth(
tanh(b*x+a))^3/x^4/(b*x-arccoth(tanh(b*x+a)))
```

**Rubi [A]** time = 0.04, antiderivative size = 64, normalized size of antiderivative = 1.00, number of steps used = 2, number of rules used = 2, integrand size = 13, $\frac{\text{number of rules}}{\text{integrand size}} = 0.154$, Rules used = $\{2171, 2167\}$

$$\frac{\coth^{-1}(\tanh(a+bx))^3}{4x^4\left(bx-\coth^{-1}(\tanh(a+bx))\right)}+\frac{b\coth^{-1}(\tanh(a+bx))^3}{12x^3\left(bx-\coth^{-1}(\tanh(a+bx))\right)^2}$$

Antiderivative was successfully verified.

```
[In] Int[ArcCoth[Tanh[a + b*x]]^2/x^5,x]
```

```
[Out] (b*ArcCoth[Tanh[a + b*x]]^3)/(12*x^3*(b*x - ArcCoth[Tanh[a + b*x]])^2) + Ar
cCoth[Tanh[a + b*x]]^3/(4*x^4*(b*x - ArcCoth[Tanh[a + b*x]]))
```

Rule 2167

```
Int[(u_)^(m_)*(v_)^(n_), x_Symbol] :> With[{a = Simplify[D[u, x]], b = Simp
lify[D[v, x]]}, -Simp[(u^(m + 1)*v^(n + 1))/((m + 1)*(b*u - a*v)), x] /; Ne
Q[b*u - a*v, 0]] /; FreeQ[{m, n}, x] && PiecewiseLinearQ[u, v, x] && EqQ[m
+ n + 2, 0] && NeQ[m, -1]
```

Rule 2171

```
Int[(u_)^(m_)*(v_)^(n_), x_Symbol] :> With[{a = Simplify[D[u, x]], b = Simp
lify[D[v, x]]}, -Simp[(u^(m + 1)*v^(n + 1))/((m + 1)*(b*u - a*v)), x] + Dis
t[(b*(m + n + 2))/((m + 1)*(b*u - a*v)), Int[u^(m + 1)*v^n, x], x] /; NeQ[b
*u - a*v, 0]] /; PiecewiseLinearQ[u, v, x] && NeQ[m + n + 2, 0] && LtQ[m, -
1]
```

Rubi steps

$$\begin{aligned}\int \frac{\coth^{-1}(\tanh(a+bx))^2}{x^5}\,dx &= \frac{\coth^{-1}(\tanh(a+bx))^3}{4x^4\left(bx-\coth^{-1}(\tanh(a+bx))\right)}+\frac{b\int \frac{\coth^{-1}(\tanh(a+bx))^2}{x^4}\,dx}{4\left(bx-\coth^{-1}(\tanh(a+bx))\right)}\\ &= \frac{b\coth^{-1}(\tanh(a+bx))^3}{12x^3\left(bx-\coth^{-1}(\tanh(a+bx))\right)^2}+\frac{\coth^{-1}(\tanh(a+bx))^3}{4x^4\left(bx-\coth^{-1}(\tanh(a+bx))\right)}\end{aligned}$$

**Mathematica [A]** time = 0.03, size = 37, normalized size = 0.58

$$-\frac{2bx\coth^{-1}(\tanh(a+bx))+3\coth^{-1}(\tanh(a+bx))^2+b^2x^2}{12x^4}$$

Antiderivative was successfully verified.

```
[In] Integrate[ArcCoth[Tanh[a + b*x]]^2/x^5,x]
```

```
[Out] -1/12*(b^2*x^2 + 2*b*x*ArcCoth[Tanh[a + b*x]] + 3*ArcCoth[Tanh[a + b*x]]^2)
/x^4
```

**fricas [A]** time = 0.61, size = 29, normalized size = 0.45

$$-\frac{24\,b^2x^2 + 32\,abx - 3\,\pi^2 + 12\,a^2}{48\,x^4}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(tanh(b*x+a))^2/x^5,x, algorithm="fricas")
```

```
[Out] -1/48*(24*b^2*x^2 + 32*a*b*x - 3*pi^2 + 12*a^2)/x^4
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{arcoth}\left(\tanh\left(bx + a\right)\right)^2}{x^5}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(tanh(b*x+a))^2/x^5,x, algorithm="giac")
```

```
[Out] integrate(arccoth(tanh(b*x + a))^2/x^5, x)
```

**maple [C]** time = 0.39, size = 3217, normalized size = 50.27

output too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(arccoth(tanh(b*x+a))^2/x^5,x)
```

```
[Out] -1/4/x^4*ln(exp(b*x+a))^2-1/24*(4*b*x-3*I*Pi*csgn(I*exp(b*x+a))^2*csgn(I*ex
p(2*b*x+2*a))+6*I*Pi*csgn(I*exp(b*x+a))*csgn(I*exp(2*b*x+2*a))^2-6*I*Pi-3*I
*Pi*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^3-6*I*Pi*csgn(I/(exp(2*b*x+2*
a)+1))^3+3*I*Pi*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x
+2*a)+1))^2-3*I*Pi*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(2*b*x+2*a))*csgn(I
*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))+6*I*Pi*csgn(I/(exp(2*b*x+2*a)+1))^2+3*I
*Pi*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2-3*I*
Pi*csgn(I*exp(2*b*x+2*a))^3)/x^4*ln(exp(b*x+a))-1/192*(-12*Pi^2+16*b^2*x^2+
12*Pi^2*csgn(I*exp(b*x+a))*csgn(I*exp(2*b*x+2*a))^5+24*Pi^2*csgn(I/(exp(2*b
*x+2*a)+1))^5+12*Pi^2*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b
*x+2*a)+1))^2-3*Pi^2*csgn(I*exp(b*x+a))^4*csgn(I*exp(2*b*x+2*a))^2+12*Pi^2*
csgn(I*exp(b*x+a))^3*csgn(I*exp(2*b*x+2*a))^3-12*csgn(I*exp(2*b*x+2*a))^3*P
i^2-12*Pi^2*csgn(I/(exp(2*b*x+2*a)+1))^6+24*csgn(I/(exp(2*b*x+2*a)+1))^2*Pi
^2-12*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^3*Pi^2-6*Pi^2*csgn(I/(exp(2
*b*x+2*a)+1))*csgn(I*exp(b*x+a))^2*csgn(I*exp(2*b*x+2*a))^2*csgn(I*exp(2*b*
x+2*a)/(exp(2*b*x+2*a)+1))+12*Pi^2*csgn(I/(exp(2*b*x+2*a)+1))^3*csgn(I*exp(
2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))-3*Pi^2*csgn(I*exp(2*b
*x+2*a))^6-3*Pi^2*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^6+16*I*Pi*b*x*c
sgn(I/(exp(2*b*x+2*a)+1))^2-16*I*Pi*b*x*csgn(I/(exp(2*b*x+2*a)+1))^3+24*Pi^
2*csgn(I*exp(b*x+a))*csgn(I*exp(2*b*x+2*a))^2+12*Pi^2*csgn(I*exp(2*b*x+2*a)
)^3*csgn(I/(exp(2*b*x+2*a)+1))^2+12*Pi^2*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*
exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2+6*Pi^2*csgn(I*exp(2*b*x+2*a))*csgn(I*e
xp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^5-12*Pi^2*csgn(I*exp(2*b*x+2*a))^3*csgn(I
/(exp(2*b*x+2*a)+1))^3-3*Pi^2*csgn(I*exp(2*b*x+2*a))^2*csgn(I*exp(2*b*x+2*a
)/(exp(2*b*x+2*a)+1))^4-16*I*Pi*x*b+6*Pi^2*csgn(I/(exp(2*b*x+2*a)+1))*csgn(
I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^5-12*Pi^2*csgn(I/(exp(2*b*x+2*a)+1))^4
-12*Pi^2*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2*csgn(I/(exp(2*b*x+2*a)
+1))^3+12*Pi^2*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^3*csgn(I/(exp(2*b*
x+2*a)+1))^2+12*Pi^2*csgn(I/(exp(2*b*x+2*a)+1))^4*csgn(I*exp(2*b*x+2*a)/(ex
```

```
p(2*b*x+2*a)+1))^2+24*Pi^2*csgn(I*exp(b*x+a))*csgn(I*exp(2*b*x+2*a))^2*csgn
(I/(exp(2*b*x+2*a)+1))^3+6*Pi^2*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(b*x+a
))^2*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2+12*
Pi^2*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(b*x+a))*csgn(I*exp(2*b*x+2*a))^3
*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))-8*I*Pi*b*x*csgn(I*exp(b*x+a))^2*
csgn(I*exp(2*b*x+2*a))+16*I*Pi*b*x*csgn(I*exp(b*x+a))*csgn(I*exp(2*b*x+2*a)
)^2+8*I*Pi*b*x*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)
+1))^2+8*I*Pi*b*x*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(2*b*x+2*a)/(exp(2*b
*x+2*a)+1))^2-12*Pi^2*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(2*b*x+2*a))*csg
n(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^4-8*I*Pi*x*b*csgn(I*exp(2*b*x+2*a))^
3-8*I*Pi*x*b*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^3-12*Pi^2*csgn(I*exp
(b*x+a))^2*csgn(I*exp(2*b*x+2*a))-18*Pi^2*csgn(I*exp(b*x+a))^2*csgn(I*exp(2
*b*x+2*a))^4-6*Pi^2*csgn(I*exp(2*b*x+2*a))^3*csgn(I*exp(2*b*x+2*a)/(exp(2*b
*x+2*a)+1))^3-8*I*Pi*b*x*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(2*b*x+2*a))*
csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))-3*Pi^2*csgn(I/(exp(2*b*x+2*a)+1))
^2*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^4+6*Pi^2*csgn(I*exp(2*b*x+2*a)
)^4*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2-12*Pi^2*csgn(I/(exp(2*b*x+2
*a)+1))^3*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^3-12*Pi^2*csgn(I/(exp(2
*b*x+2*a)+1))^3*csgn(I*exp(b*x+a))^2*csgn(I*exp(2*b*x+2*a))-6*Pi^2*csgn(I*e
xp(b*x+a))^2*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1
))^3+12*Pi^2*csgn(I*exp(b*x+a))*csgn(I*exp(2*b*x+2*a))^2*csgn(I*exp(2*b*x+2
*a)/(exp(2*b*x+2*a)+1))^3-12*Pi^2*csgn(I/(exp(2*b*x+2*a)+1))^4*csgn(I*exp(2
*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))-24*csgn(I/(exp(2*b*x+2
*a)+1))^3*Pi^2+12*Pi^2*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*
b*x+2*a)+1))^2*csgn(I/(exp(2*b*x+2*a)+1))^3-3*Pi^2*csgn(I/(exp(2*b*x+2*a)+1
))^2*csgn(I*exp(2*b*x+2*a))^2*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2+6
*Pi^2*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(2*b*x+2*a))^3*csgn(I*exp(2*b*x+
2*a)/(exp(2*b*x+2*a)+1))^2+6*Pi^2*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(2*b
*x+2*a))^2*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^3-12*Pi^2*csgn(I/(exp(
2*b*x+2*a)+1))*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)
+1))+12*Pi^2*csgn(I*exp(b*x+a))^2*csgn(I*exp(2*b*x+2*a))*csgn(I/(exp(2*b*x+
2*a)+1))^2-12*Pi^2*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+
2*a)+1))^2*csgn(I/(exp(2*b*x+2*a)+1))^2-24*Pi^2*csgn(I*exp(b*x+a))*csgn(I*e
xp(2*b*x+2*a))^2*csgn(I/(exp(2*b*x+2*a)+1))^2+6*Pi^2*csgn(I*exp(b*x+a))^2*c
sgn(I*exp(2*b*x+2*a))^2*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2-12*Pi^2
*csgn(I*exp(b*x+a))*csgn(I*exp(2*b*x+2*a))^3*csgn(I*exp(2*b*x+2*a)/(exp(2*b
*x+2*a)+1))^2+6*Pi^2*csgn(I/(exp(2*b*x+2*a)+1))^2*csgn(I*exp(2*b*x+2*a))*cs
gn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^3-6*Pi^2*csgn(I/(exp(2*b*x+2*a)+1))
*csgn(I*exp(2*b*x+2*a))^4*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))-12*Pi^2
*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(b*x+a))*csgn(I*exp(2*b*x+2*a))^2*csg
n(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2)/x^4
```

**maxima** [A] time = 0.45, size = 36, normalized size = 0.56

$$-\frac{b^2}{12\,x^2}-\frac{b\,\mathrm{arcoth}\left(\tanh\left(bx+a\right)\right)}{6\,x^3}-\frac{\mathrm{arcoth}\left(\tanh\left(bx+a\right)\right)^2}{4\,x^4}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(tanh(b*x+a))^2/x^5,x, algorithm="maxima")
```

```
[Out] -1/12*b^2/x^2 - 1/6*b*arccoth(tanh(b*x + a))/x^3 - 1/4*arccoth(tanh(b*x + a
))^2/x^4
```

**mupad** [B] time = 1.17, size = 36, normalized size = 0.56

$$-\frac{\mathrm{acoth}\left(\tanh\left(a+b\,x\right)\right)^2}{4\,x^4}-\frac{b^2}{12\,x^2}-\frac{b\,\mathrm{acoth}\left(\tanh\left(a+b\,x\right)\right)}{6\,x^3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(tanh(a + b*x))^2/x^5,x)
```

```
[Out] - acoth(tanh(a + b*x))^2/(4*x^4) - b^2/(12*x^2) - (b*acoth(tanh(a + b*x)))/
(6*x^3)
```

**sympy** [**A**] time = 1.29, size = 39, normalized size = 0.61

$$-\frac{b^2}{12x^2}-\frac{b\operatorname{acoth}\left(\tanh\left(a+bx\right)\right)}{6x^3}-\frac{\operatorname{acoth}^2\left(\tanh\left(a+bx\right)\right)}{4x^4}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(tanh(b*x+a))**2/x**5,x)
```

```
[Out] -b**2/(12*x**2) - b*acoth(tanh(a + b*x))/(6*x**3) - acoth(tanh(a + b*x))**2
/(4*x**4)
```

# 3.146 $\int x^m \coth^{-1}(\tanh(a+bx))^3 \, dx$

**Optimal**. Leaf size=110

$$\frac{6b^2x^{m+3}\coth^{-1}(\tanh(a+bx))}{m^3+6m^2+11m+6}-\frac{3bx^{m+2}\coth^{-1}(\tanh(a+bx))^2}{m^2+3m+2}+\frac{x^{m+1}\coth^{-1}(\tanh(a+bx))^3}{m+1}-\frac{6b^3x^m}{(m+1)\left(m^3+9m\right.}$$

```
[Out] -6*b^3*x^(4+m)/(1+m)/(m^3+9*m^2+26*m+24)+6*b^2*x^(3+m)*arccoth(tanh(b*x+a))
/(m^3+6*m^2+11*m+6)-3*b*x^(2+m)*arccoth(tanh(b*x+a))^2/(m^2+3*m+2)+x^(1+m)*
arccoth(tanh(b*x+a))^3/(1+m)
```

**Rubi [A]** time = 0.06, antiderivative size = 110, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 2, integrand size = 13, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.154, Rules used = {2168, 30}

$$\frac{6b^2x^{m+3}\coth^{-1}(\tanh(a+bx))}{m^3+6m^2+11m+6}-\frac{3bx^{m+2}\coth^{-1}(\tanh(a+bx))^2}{m^2+3m+2}+\frac{x^{m+1}\coth^{-1}(\tanh(a+bx))^3}{m+1}-\frac{6b^3x^m}{(m+1)\left(m^3+9m\right.}$$

Antiderivative was successfully verified.

```
[In] Int[x^m*ArcCoth[Tanh[a + b*x]]^3,x]
```

```
[Out] (-6*b^3*x^(4 + m))/((1 + m)*(24 + 26*m + 9*m^2 + m^3)) + (6*b^2*x^(3 + m)*A
rcCoth[Tanh[a + b*x]])/(6 + 11*m + 6*m^2 + m^3) - (3*b*x^(2 + m)*ArcCoth[Ta
nh[a + b*x]]^2)/(2 + 3*m + m^2) + (x^(1 + m)*ArcCoth[Tanh[a + b*x]]^3)/(1 +
 m)
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 2168

```
Int[(u_)^(m_)*(v_)^(n_.), x_Symbol] :> With[{a = Simplify[D[u, x]], b = Sim
plify[D[v, x]]}, Simp[(u^(m + 1)*v^n)/(a*(m + 1)), x] - Dist[(b*n)/(a*(m +
1)), Int[u^(m + 1)*v^(n - 1), x], x] /; NeQ[b*u - a*v, 0]] /; FreeQ[{m, n},
 x] && PiecewiseLinearQ[u, v, x] && NeQ[m, -1] && ((LtQ[m, -1] && GtQ[n, 0]
 &&  !(ILtQ[m + n, -2] && (FractionQ[m] || GeQ[2*n + m + 1, 0]))) || (IGtQ[
n, 0] && IGtQ[m, 0] && LeQ[n, m]) || (IGtQ[n, 0] &&  !IntegerQ[m]) || (ILtQ
[m, 0] &&  !IntegerQ[n]))
```

Rubi steps

$$\begin{aligned}\int x^m \coth^{-1}(\tanh(a+bx))^3\,dx &= \frac{x^{1+m}\coth^{-1}(\tanh(a+bx))^3}{1+m}-\frac{(3b)\int x^{1+m}\coth^{-1}(\tanh(a+bx))^2\,dx}{1+m}\\ &= -\frac{3bx^{2+m}\coth^{-1}(\tanh(a+bx))^2}{2+3m+m^2}+\frac{x^{1+m}\coth^{-1}(\tanh(a+bx))^3}{1+m}+\frac{\left(6b^2\right)\int x^{2+}}{}\\ &= \frac{6b^2x^{3+m}\coth^{-1}(\tanh(a+bx))}{6+11m+6m^2+m^3}-\frac{3bx^{2+m}\coth^{-1}(\tanh(a+bx))^2}{2+3m+m^2}+\frac{x^{1+m}\coth^{-}}{}\\ &= -\frac{6b^3x^{4+m}}{(4+m)\left(6+11m+6m^2+m^3\right)}+\frac{6b^2x^{3+m}\coth^{-1}(\tanh(a+bx))}{6+11m+6m^2+m^3}-\frac{3bx^{2+m}c}{}\end{aligned}$$

**Mathematica [A]** time = 0.28, size = 97, normalized size = 0.88

$$\frac{x^{m+1}\left(6b^2(m+4)x^2\coth^{-1}(\tanh(a+bx))-3b\left(m^2+7m+12\right)x\coth^{-1}(\tanh(a+bx))^2+\left(m^3+9m^2+26m+2\right.\right.}{(m+1)(m+2)(m+3)(m+4)}$$

Antiderivative was successfully verified.

```
[In] Integrate[x^m*ArcCoth[Tanh[a + b*x]]^3,x]
```

```
[Out] (x^(1 + m)*(-6*b^3*x^3 + 6*b^2*(4 + m)*x^2*ArcCoth[Tanh[a + b*x]] - 3*b*(12
 + 7*m + m^2)*x*ArcCoth[Tanh[a + b*x]]^2 + (24 + 26*m + 9*m^2 + m^3)*ArcCot
h[Tanh[a + b*x]]^3))/((1 + m)*(2 + m)*(3 + m)*(4 + m))
```

**fricas [A]** time = 0.62, size = 209, normalized size = 1.90

$$\frac{\left(4\left(b^3m^3 + 6\,b^3m^2 + 11\,b^3m + 6\,b^3\right)x^4 + 12\left(ab^2m^3 + 7\,ab^2m^2 + 14\,ab^2m + 8\,ab^2\right)x^3 + 3\left(4\,a^2bm^3 + 32\,a^2bm^2 \cdots\right.}{4\left(\cdots\right.}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^m*arccoth(tanh(b*x+a))^3,x, algorithm="fricas")
```

```
[Out] 1/4*(4*(b^3*m^3 + 6*b^3*m^2 + 11*b^3*m + 6*b^3)*x^4 + 12*(a*b^2*m^3 + 7*a*b
^2*m^2 + 14*a*b^2*m + 8*a*b^2)*x^3 + 3*(4*a^2*b*m^3 + 32*a^2*b*m^2 + 76*a^2
*b*m - pi^2*(b*m^3 + 8*b*m^2 + 19*b*m + 12*b) + 48*a^2*b)*x^2 + (4*a^3*m^3
+ 36*a^3*m^2 + 104*a^3*m - 3*pi^2*(a*m^3 + 9*a*m^2 + 26*a*m + 24*a) + 96*a^
3)*x)*x^m/(m^4 + 10*m^3 + 35*m^2 + 50*m + 24)
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int x^m \operatorname{arcoth}\left(\tanh\left(bx + a\right)\right)^3\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^m*arccoth(tanh(b*x+a))^3,x, algorithm="giac")
```

```
[Out] integrate(x^m*arccoth(tanh(b*x + a))^3, x)
```

**maple [C]** time = 9.36, size = 63382, normalized size = 576.20

output too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^m*arccoth(tanh(b*x+a))^3,x)
```

```
[Out] result too large to display
```

**maxima [A]** time = 0.46, size = 109, normalized size = 0.99

$$-\frac{3\,bx^2x^m \operatorname{arcoth}\left(\tanh\left(bx + a\right)\right)^2}{(m+2)(m+1)} + \frac{x^{m+1}\operatorname{arcoth}\left(\tanh\left(bx + a\right)\right)^3}{m+1} - \frac{6\left(\frac{b^2x^4x^m}{(m+4)(m+3)(m+2)} - \frac{bx^3x^m \operatorname{arcoth}(\tanh(bx+a))}{(m+3)(m+2)}\right)b}{m+1}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^m*arccoth(tanh(b*x+a))^3,x, algorithm="maxima")
```

```
[Out] -3*b*x^2*x^m*arccoth(tanh(b*x + a))^2/((m + 2)*(m + 1)) + x^(m + 1)*arccoth
(tanh(b*x + a))^3/(m + 1) - 6*(b^2*x^4*x^m/((m + 4)*(m + 3)*(m + 2)) - b*x^
3*x^m*arccoth(tanh(b*x + a))/((m + 3)*(m + 2)))*b/(m + 1)
```

**mupad [B]** time = 1.45, size = 332, normalized size = 3.02

$$\frac{8\,b^3\,x^m\,x^4\,\left(m^3+6\,m^2+11\,m+6\right)}{8\,m^4+80\,m^3+280\,m^2+400\,m+192} - \frac{x\,x^m\left(\ln\left(-\frac{2}{e^{2\,a}\,e^{2\,b\,x}-1}\right)-\ln\left(\frac{2\,e^{2\,a}\,e^{2\,b\,x}}{e^{2\,a}\,e^{2\,b\,x}-1}\right)+2\,b\,x\right)^3\left(m^3+9\,m^2+26\,m+\cdots\right)}{8\,m^4+80\,m^3+280\,m^2+400\,m+192}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^m*acoth(tanh(a + b*x))^3,x)
```

```
[Out] (8*b^3*x^m*x^4*(11*m + 6*m^2 + m^3 + 6))/(400*m + 280*m^2 + 80*m^3 + 8*m^4
+ 192) - (x*x^m*(log(-2/(exp(2*a)*exp(2*b*x) - 1)) - log((2*exp(2*a)*exp(2*
b*x))/(exp(2*a)*exp(2*b*x) - 1)) + 2*b*x)^3*(26*m + 9*m^2 + m^3 + 24))/(400
*m + 280*m^2 + 80*m^3 + 8*m^4 + 192) - (12*b^2*x^m*x^3*(log(-2/(exp(2*a)*ex
p(2*b*x) - 1)) - log((2*exp(2*a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x) - 1)) + 2
*b*x)*(14*m + 7*m^2 + m^3 + 8))/(400*m + 280*m^2 + 80*m^3 + 8*m^4 + 192) +
(6*b*x^m*x^2*(log(-2/(exp(2*a)*exp(2*b*x) - 1)) - log((2*exp(2*a)*exp(2*b*x
))/(exp(2*a)*exp(2*b*x) - 1)) + 2*b*x)^2*(19*m + 8*m^2 + m^3 + 12))/(400*m
+ 280*m^2 + 80*m^3 + 8*m^4 + 192)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\begin{cases} b^3\log(x) - \frac{b^2\operatorname{acoth}(\tanh(a+bx))}{x} - \frac{b\operatorname{acoth}^2(\tanh(a+bx))}{2x^2} - \frac{\operatorname{acoth}^3(\tanh(a+bx))}{3x^3} \\ \int \frac{\operatorname{acoth}^3(\tanh(a+bx))}{x^3}\,dx \\ \int \frac{\operatorname{acoth}^3(\tanh(a+bx))}{x^2}\,dx \\ \int \frac{\operatorname{acoth}^3(\tanh(a+bx))}{x}\,dx \\ -\frac{6b^3x^4x^m}{m^4+10m^3+35m^2+50m+24} + \frac{6b^2mx^3x^m\operatorname{acoth}(\tanh(a+bx))}{m^4+10m^3+35m^2+50m+24} + \frac{24b^2x^3x^m\operatorname{acoth}(\tanh(a+bx))}{m^4+10m^3+35m^2+50m+24} - \frac{3bm^2x^2x^m\operatorname{acoth}^2(\tanh(a+bx))}{m^4+10m^3+35m^2+50m+24} - \frac{21bmx^2x^{\prime}}{m^4+10} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**m*acoth(tanh(b*x+a))**3,x)
```

```
[Out] Piecewise((b**3*log(x) - b**2*acoth(tanh(a + b*x))/x - b*acoth(tanh(a + b*x
))**2/(2*x**2) - acoth(tanh(a + b*x))**3/(3*x**3), Eq(m, -4)), (Integral(ac
oth(tanh(a + b*x))**3/x**3, x), Eq(m, -3)), (Integral(acoth(tanh(a + b*x))*
*3/x**2, x), Eq(m, -2)), (Integral(acoth(tanh(a + b*x))**3/x, x), Eq(m, -1)
), (-6*b**3*x**4*x**m/(m**4 + 10*m**3 + 35*m**2 + 50*m + 24) + 6*b**2*m*x**
3*x**m*acoth(tanh(a + b*x))/(m**4 + 10*m**3 + 35*m**2 + 50*m + 24) + 24*b**
2*x**3*x**m*acoth(tanh(a + b*x))/(m**4 + 10*m**3 + 35*m**2 + 50*m + 24) - 3
*b*m**2*x**2*x**m*acoth(tanh(a + b*x))**2/(m**4 + 10*m**3 + 35*m**2 + 50*m
+ 24) - 21*b*m*x**2*x**m*acoth(tanh(a + b*x))**2/(m**4 + 10*m**3 + 35*m**2
+ 50*m + 24) - 36*b*x**2*x**m*acoth(tanh(a + b*x))**2/(m**4 + 10*m**3 + 35*
m**2 + 50*m + 24) + m**3*x*x**m*acoth(tanh(a + b*x))**3/(m**4 + 10*m**3 + 3
5*m**2 + 50*m + 24) + 9*m**2*x*x**m*acoth(tanh(a + b*x))**3/(m**4 + 10*m**3
 + 35*m**2 + 50*m + 24) + 26*m*x*x**m*acoth(tanh(a + b*x))**3/(m**4 + 10*m*
*3 + 35*m**2 + 50*m + 24) + 24*x*x**m*acoth(tanh(a + b*x))**3/(m**4 + 10*m*
*3 + 35*m**2 + 50*m + 24), True))
```

## 3.147 $\int x^4 \coth^{-1}(\tanh(a+bx))^3 \, dx$

**Optimal**. Leaf size=61

$$\frac{1}{35}b^2x^7\coth^{-1}(\tanh(a+bx))-\frac{1}{10}bx^6\coth^{-1}(\tanh(a+bx))^2+\frac{1}{5}x^5\coth^{-1}(\tanh(a+bx))^3-\frac{1}{280}b^3x^8$$

```
[Out] -1/280*b^3*x^8+1/35*b^2*x^7*arccoth(tanh(b*x+a))-1/10*b*x^6*arccoth(tanh(b*
x+a))^2+1/5*x^5*arccoth(tanh(b*x+a))^3
```

**Rubi [A]** time = 0.04, antiderivative size = 61, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 2, integrand size = 13, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.154, Rules used = {2168, 30}

$$\frac{1}{35}b^2x^7\coth^{-1}(\tanh(a+bx))-\frac{1}{10}bx^6\coth^{-1}(\tanh(a+bx))^2+\frac{1}{5}x^5\coth^{-1}(\tanh(a+bx))^3-\frac{1}{280}b^3x^8$$

Antiderivative was successfully verified.

```
[In] Int[x^4*ArcCoth[Tanh[a + b*x]]^3,x]
```

```
[Out] -(b^3*x^8)/280 + (b^2*x^7*ArcCoth[Tanh[a + b*x]])/35 - (b*x^6*ArcCoth[Tanh[
a + b*x]]^2)/10 + (x^5*ArcCoth[Tanh[a + b*x]]^3)/5
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 2168

```
Int[(u_)^(m_)*(v_)^(n_.), x_Symbol] :> With[{a = Simplify[D[u, x]], b = Sim
plify[D[v, x]]}, Simp[(u^(m + 1)*v^n)/(a*(m + 1)), x] - Dist[(b*n)/(a*(m +
1)), Int[u^(m + 1)*v^(n - 1), x], x] /; NeQ[b*u - a*v, 0]] /; FreeQ[{m, n},
 x] && PiecewiseLinearQ[u, v, x] && NeQ[m, -1] && ((LtQ[m, -1] && GtQ[n, 0]
 &&  !(ILtQ[m + n, -2] && (FractionQ[m] || GeQ[2*n + m + 1, 0]))) || (IGtQ[
n, 0] && IGtQ[m, 0] && LeQ[n, m]) || (IGtQ[n, 0] &&  !IntegerQ[m]) || (ILtQ
[m, 0] &&  !IntegerQ[n]))
```

Rubi steps

$$\begin{aligned}\int x^4\coth^{-1}(\tanh(a+bx))^3\,dx &= \frac{1}{5}x^5\coth^{-1}(\tanh(a+bx))^3-\frac{1}{5}(3b)\int x^5\coth^{-1}(\tanh(a+bx))^2\,dx\\ &= -\frac{1}{10}bx^6\coth^{-1}(\tanh(a+bx))^2+\frac{1}{5}x^5\coth^{-1}(\tanh(a+bx))^3+\frac{1}{5}b^2\int x^6\text{co}\\ &= \frac{1}{35}b^2x^7\coth^{-1}(\tanh(a+bx))-\frac{1}{10}bx^6\coth^{-1}(\tanh(a+bx))^2+\frac{1}{5}x^5\coth^{-1}(\\ &= -\frac{1}{280}b^3x^8+\frac{1}{35}b^2x^7\coth^{-1}(\tanh(a+bx))-\frac{1}{10}bx^6\coth^{-1}(\tanh(a+bx))^2+\end{aligned}$$

**Mathematica [A]** time = 0.03, size = 54, normalized size = 0.89

$$-\frac{1}{280}x^5\left(-8b^2x^2\coth^{-1}(\tanh(a+bx))+28bx\coth^{-1}(\tanh(a+bx))^2-56\coth^{-1}(\tanh(a+bx))^3+b^3x^3\right)$$

Antiderivative was successfully verified.

```
[In] Integrate[x^4*ArcCoth[Tanh[a + b*x]]^3,x]
```

```
[Out] -1/280*(x^5*(b^3*x^3 - 8*b^2*x^2*ArcCoth[Tanh[a + b*x]] + 28*b*x*ArcCoth[Tanh[a + b*x]]^2 - 56*ArcCoth[Tanh[a + b*x]]^3))
```

**fricas [A]** time = 0.62, size = 52, normalized size = 0.85

$$\frac{1}{8}\,b^3x^8 + \frac{3}{7}\,ab^2x^7 - \frac{1}{8}\left(\pi^2 b - 4\,a^2 b\right)x^6 - \frac{1}{20}\left(3\,\pi^2 a - 4\,a^3\right)x^5$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^4*arccoth(tanh(b*x+a))^3,x, algorithm="fricas")
```

```
[Out] 1/8*b^3*x^8 + 3/7*a*b^2*x^7 - 1/8*(pi^2*b - 4*a^2*b)*x^6 - 1/20*(3*pi^2*a - 4*a^3)*x^5
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int x^4 \operatorname{arcoth}\left(\tanh\left(bx + a\right)\right)^3\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^4*arccoth(tanh(b*x+a))^3,x, algorithm="giac")
```

```
[Out] integrate(x^4*arccoth(tanh(b*x + a))^3, x)
```

**maple [C]** time = 1.14, size = 18111, normalized size = 296.90

output too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^4*arccoth(tanh(b*x+a))^3,x)
```

```
[Out] result too large to display
```

**maxima [A]** time = 0.52, size = 54, normalized size = 0.89

$$-\frac{1}{10}\,bx^6 \operatorname{arcoth}\left(\tanh\left(bx + a\right)\right)^2 + \frac{1}{5}\,x^5 \operatorname{arcoth}\left(\tanh\left(bx + a\right)\right)^3 - \frac{1}{280}\left(b^2x^8 - 8\,bx^7 \operatorname{arcoth}\left(\tanh\left(bx + a\right)\right)\right)b$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^4*arccoth(tanh(b*x+a))^3,x, algorithm="maxima")
```

```
[Out] -1/10*b*x^6*arccoth(tanh(b*x + a))^2 + 1/5*x^5*arccoth(tanh(b*x + a))^3 - 1/280*(b^2*x^8 - 8*b*x^7*arccoth(tanh(b*x + a)))*b
```

**mupad [B]** time = 1.25, size = 53, normalized size = 0.87

$$-\frac{b^3\,x^8}{280} + \frac{b^2\,x^7 \operatorname{acoth}\left(\tanh\left(a + b\,x\right)\right)}{35} - \frac{b\,x^6 \operatorname{acoth}\left(\tanh\left(a + b\,x\right)\right)^2}{10} + \frac{x^5 \operatorname{acoth}\left(\tanh\left(a + b\,x\right)\right)^3}{5}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^4*acoth(tanh(a + b*x))^3,x)
```

```
[Out] (x^5*acoth(tanh(a + b*x))^3)/5 - (b^3*x^8)/280 - (b*x^6*acoth(tanh(a + b*x))^2)/10 + (b^2*x^7*acoth(tanh(a + b*x)))/35
```

**sympy [A]** time = 6.88, size = 97, normalized size = 1.59

$$\begin{cases} \frac{x^4 \operatorname{acoth}^4\left(\tanh\left(a+bx\right)\right)}{4b} - \frac{x^3 \operatorname{acoth}^5\left(\tanh\left(a+bx\right)\right)}{5b^2} + \frac{x^2 \operatorname{acoth}^6\left(\tanh\left(a+bx\right)\right)}{10b^3} - \frac{x \operatorname{acoth}^7\left(\tanh\left(a+bx\right)\right)}{35b^4} + \frac{\operatorname{acoth}^8\left(\tanh\left(a+bx\right)\right)}{280b^5} & \text{for}\ b \neq 0 \\ \frac{x^5 \operatorname{acoth}^3\left(\tanh\left(a\right)\right)}{5} & \text{otherwis} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**4*acoth(tanh(b*x+a))**3,x)
```

```
[Out] Piecewise((x**4*acoth(tanh(a + b*x))**4/(4*b) - x**3*acoth(tanh(a + b*x))**
5/(5*b**2) + x**2*acoth(tanh(a + b*x))**6/(10*b**3) - x*acoth(tanh(a + b*x)
)**7/(35*b**4) + acoth(tanh(a + b*x))**8/(280*b**5), Ne(b, 0)), (x**5*acoth
(tanh(a))**3/5, True))
```

# 3.148 $\int x^3 \coth^{-1}(\tanh(a+bx))^3 \, dx$

**Optimal**. Leaf size=61

$$\frac{1}{20}b^2x^6\coth^{-1}(\tanh(a+bx))-\frac{3}{20}bx^5\coth^{-1}(\tanh(a+bx))^2+\frac{1}{4}x^4\coth^{-1}(\tanh(a+bx))^3-\frac{1}{140}b^3x^7$$

```
[Out] -1/140*b^3*x^7+1/20*b^2*x^6*arccoth(tanh(b*x+a))-3/20*b*x^5*arccoth(tanh(b*
x+a))^2+1/4*x^4*arccoth(tanh(b*x+a))^3
```

**Rubi [A]** time = 0.04, antiderivative size = 61, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 2, integrand size = 13, $\frac{\text{number of rules}}{\text{integrand size}} = 0.154$, Rules used = {2168, 30}

$$\frac{1}{20}b^2x^6\coth^{-1}(\tanh(a+bx))-\frac{3}{20}bx^5\coth^{-1}(\tanh(a+bx))^2+\frac{1}{4}x^4\coth^{-1}(\tanh(a+bx))^3-\frac{1}{140}b^3x^7$$

Antiderivative was successfully verified.

```
[In] Int[x^3*ArcCoth[Tanh[a + b*x]]^3,x]
```

```
[Out] -(b^3*x^7)/140 + (b^2*x^6*ArcCoth[Tanh[a + b*x]])/20 - (3*b*x^5*ArcCoth[Tan
h[a + b*x]]^2)/20 + (x^4*ArcCoth[Tanh[a + b*x]]^3)/4
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 2168

```
Int[(u_)^(m_)*(v_)^(n_.), x_Symbol] :> With[{a = Simplify[D[u, x]], b = Sim
plify[D[v, x]]}, Simp[(u^(m + 1)*v^n)/(a*(m + 1)), x] - Dist[(b*n)/(a*(m +
1)), Int[u^(m + 1)*v^(n - 1), x], x] /; NeQ[b*u - a*v, 0]] /; FreeQ[{m, n},
 x] && PiecewiseLinearQ[u, v, x] && NeQ[m, -1] && ((LtQ[m, -1] && GtQ[n, 0]
 && !(ILtQ[m + n, -2] && (FractionQ[m] || GeQ[2*n + m + 1, 0]))) || (IGtQ[
n, 0] && IGtQ[m, 0] && LeQ[n, m]) || (IGtQ[n, 0] && !IntegerQ[m]) || (ILtQ
[m, 0] && !IntegerQ[n]))
```

Rubi steps

$$\begin{aligned}\int x^3\coth^{-1}(\tanh(a+bx))^3\,dx &= \frac{1}{4}x^4\coth^{-1}(\tanh(a+bx))^3-\frac{1}{4}(3b)\int x^4\coth^{-1}(\tanh(a+bx))^2\,dx\\ &= -\frac{3}{20}bx^5\coth^{-1}(\tanh(a+bx))^2+\frac{1}{4}x^4\coth^{-1}(\tanh(a+bx))^3+\frac{1}{10}\left(3b^2\right)\int x^5 \mathrm{c}\\ &= \frac{1}{20}b^2x^6\coth^{-1}(\tanh(a+bx))-\frac{3}{20}bx^5\coth^{-1}(\tanh(a+bx))^2+\frac{1}{4}x^4\coth^{-1}(\mathrm{tar}\\ &= -\frac{1}{140}b^3x^7+\frac{1}{20}b^2x^6\coth^{-1}(\tanh(a+bx))-\frac{3}{20}bx^5\coth^{-1}(\tanh(a+bx))^2+\frac{1}{4}\end{aligned}$$

**Mathematica [A]** time = 0.03, size = 54, normalized size = 0.89

$$-\frac{1}{140}x^4\left(-7b^2x^2\coth^{-1}(\tanh(a+bx))+21bx\coth^{-1}(\tanh(a+bx))^2-35\coth^{-1}(\tanh(a+bx))^3+b^3x^3\right)$$

Antiderivative was successfully verified.

```
[In] Integrate[x^3*ArcCoth[Tanh[a + b*x]]^3,x]
```

```
[Out] -1/140*(x^4*(b^3*x^3 - 7*b^2*x^2*ArcCoth[Tanh[a + b*x]] + 21*b*x*ArcCoth[Ta
nh[a + b*x]]^2 - 35*ArcCoth[Tanh[a + b*x]]^3))
```

**fricas [A]** time = 0.46, size = 52, normalized size = 0.85

$$\frac{1}{7}b^3x^7 + \frac{1}{2}ab^2x^6 - \frac{3}{20}\left(\pi^2 b - 4a^2b\right)x^5 - \frac{1}{16}\left(3\pi^2 a - 4a^3\right)x^4$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^3*arccoth(tanh(b*x+a))^3,x, algorithm="fricas")
```

```
[Out] 1/7*b^3*x^7 + 1/2*a*b^2*x^6 - 3/20*(pi^2*b - 4*a^2*b)*x^5 - 1/16*(3*pi^2*a
- 4*a^3)*x^4
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int x^3 \operatorname{arcoth}\left(\tanh\left(bx+a\right)\right)^3 \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^3*arccoth(tanh(b*x+a))^3,x, algorithm="giac")
```

```
[Out] integrate(x^3*arccoth(tanh(b*x + a))^3, x)
```

**maple [C]** time = 1.28, size = 18111, normalized size = 296.90

output too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^3*arccoth(tanh(b*x+a))^3,x)
```

```
[Out] result too large to display
```

**maxima [A]** time = 0.52, size = 54, normalized size = 0.89

$$-\frac{3}{20}bx^5 \operatorname{arcoth}\left(\tanh\left(bx+a\right)\right)^2 + \frac{1}{4}x^4 \operatorname{arcoth}\left(\tanh\left(bx+a\right)\right)^3 - \frac{1}{140}\left(b^2x^7 - 7\,bx^6 \operatorname{arcoth}\left(\tanh\left(bx+a\right)\right)\right)b$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^3*arccoth(tanh(b*x+a))^3,x, algorithm="maxima")
```

```
[Out] -3/20*b*x^5*arccoth(tanh(b*x + a))^2 + 1/4*x^4*arccoth(tanh(b*x + a))^3 - 1
/140*(b^2*x^7 - 7*b*x^6*arccoth(tanh(b*x + a)))*b
```

**mupad [B]** time = 1.23, size = 53, normalized size = 0.87

$$-\frac{b^3\,x^7}{140} + \frac{b^2\,x^6 \operatorname{acoth}\left(\tanh\left(a+b\,x\right)\right)}{20} - \frac{3\,b\,x^5 \operatorname{acoth}\left(\tanh\left(a+b\,x\right)\right)^2}{20} + \frac{x^4 \operatorname{acoth}\left(\tanh\left(a+b\,x\right)\right)^3}{4}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^3*acoth(tanh(a + b*x))^3,x)
```

```
[Out] (x^4*acoth(tanh(a + b*x))^3)/4 - (b^3*x^7)/140 - (3*b*x^5*acoth(tanh(a + b*
x))^2)/20 + (b^2*x^6*acoth(tanh(a + b*x)))/20
```

**sympy [A]** time = 4.09, size = 80, normalized size = 1.31

$$\begin{cases} \frac{x^3 \operatorname{acoth}^4\left(\tanh\left(a+bx\right)\right)}{4b} - \frac{3x^2 \operatorname{acoth}^5\left(\tanh\left(a+bx\right)\right)}{20b^2} + \frac{x \operatorname{acoth}^6\left(\tanh\left(a+bx\right)\right)}{20b^3} - \frac{\operatorname{acoth}^7\left(\tanh\left(a+bx\right)\right)}{140b^4} & \text{for}\: b \neq 0 \\ \frac{x^4 \operatorname{acoth}^3\left(\tanh\left(a\right)\right)}{4} & \text{otherwise} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**3*acoth(tanh(b*x+a))**3,x)
```

```
[Out] Piecewise((x**3*acoth(tanh(a + b*x))**4/(4*b) - 3*x**2*acoth(tanh(a + b*x))
**5/(20*b**2) + x*acoth(tanh(a + b*x))**6/(20*b**3) - acoth(tanh(a + b*x))*
*7/(140*b**4), Ne(b, 0)), (x**4*acoth(tanh(a))**3/4, True))
```

# 3.149 $\int x^2 \coth^{-1}(\tanh(a+bx))^3 \, dx$

**Optimal**. Leaf size=53

$$\frac{\coth^{-1}(\tanh(a+bx))^6}{60b^3}-\frac{x\coth^{-1}(\tanh(a+bx))^5}{10b^2}+\frac{x^2\coth^{-1}(\tanh(a+bx))^4}{4b}$$

```
[Out] 1/4*x^2*arccoth(tanh(b*x+a))^4/b-1/10*x*arccoth(tanh(b*x+a))^5/b^2+1/60*arc
coth(tanh(b*x+a))^6/b^3
```

**Rubi [A]** time = 0.03, antiderivative size = 53, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 3, integrand size = 13, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.231, Rules used = {2168, 2157, 30}

$$\frac{\coth^{-1}(\tanh(a+bx))^6}{60b^3}-\frac{x\coth^{-1}(\tanh(a+bx))^5}{10b^2}+\frac{x^2\coth^{-1}(\tanh(a+bx))^4}{4b}$$

Antiderivative was successfully verified.

```
[In] Int[x^2*ArcCoth[Tanh[a + b*x]]^3,x]
```

```
[Out] (x^2*ArcCoth[Tanh[a + b*x]]^4)/(4*b) - (x*ArcCoth[Tanh[a + b*x]]^5)/(10*b^2
) + ArcCoth[Tanh[a + b*x]]^6/(60*b^3)
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 2157

```
Int[(u_)^(m_.), x_Symbol] :> With[{c = Simplify[D[u, x]]}, Dist[1/c, Subst[
Int[x^m, x], x, u], x]] /; FreeQ[m, x] && PiecewiseLinearQ[u, x]
```

Rule 2168

```
Int[(u_)^(m_)*(v_)^(n_.), x_Symbol] :> With[{a = Simplify[D[u, x]], b = Sim
plify[D[v, x]]}, Simp[(u^(m + 1)*v^n)/(a*(m + 1)), x] - Dist[(b*n)/(a*(m +
1)), Int[u^(m + 1)*v^(n - 1), x], x] /; NeQ[b*u - a*v, 0]] /; FreeQ[{m, n},
 x] && PiecewiseLinearQ[u, v, x] && NeQ[m, -1] && ((LtQ[m, -1] && GtQ[n, 0]
 && !(ILtQ[m + n, -2] && (FractionQ[m] || GeQ[2*n + m + 1, 0]))) || (IGtQ[
n, 0] && IGtQ[m, 0] && LeQ[n, m]) || (IGtQ[n, 0] && !IntegerQ[m]) || (ILtQ
[m, 0] && !IntegerQ[n]))
```

Rubi steps

$$\begin{aligned}
\int x^2\coth^{-1}(\tanh(a+bx))^3\,dx &= \frac{x^2\coth^{-1}(\tanh(a+bx))^4}{4b}-\frac{\int x\coth^{-1}(\tanh(a+bx))^4\,dx}{2b}\\
&= \frac{x^2\coth^{-1}(\tanh(a+bx))^4}{4b}-\frac{x\coth^{-1}(\tanh(a+bx))^5}{10b^2}+\frac{\int \coth^{-1}(\tanh(a+
\end{aligned}$$

$$\begin{aligned}
&= \frac{x^2\coth^{-1}(\tanh(a+bx))^4}{4b}-\frac{x\coth^{-1}(\tanh(a+bx))^5}{10b^2}+\frac{\text{Subst}\left(\int x^5\,dx,x,\text{c}\right.}{1}\\
&= \frac{x^2\coth^{-1}(\tanh(a+bx))^4}{4b}-\frac{x\coth^{-1}(\tanh(a+bx))^5}{10b^2}+\frac{\coth^{-1}(\tanh(a+b}{60b^3}
\end{aligned}$$

**Mathematica [A]** time = 0.02, size = 54, normalized size = 1.02

$$-\frac{1}{60}x^3\left(-6b^2x^2\coth^{-1}(\tanh(a+bx))+15bx\coth^{-1}(\tanh(a+bx))^2-20\coth^{-1}(\tanh(a+bx))^3+b^3x^3\right)$$

Antiderivative was successfully verified.

```
[In] Integrate[x^2*ArcCoth[Tanh[a + b*x]]^3,x]
```

```
[Out] -1/60*(x^3*(b^3*x^3 - 6*b^2*x^2*ArcCoth[Tanh[a + b*x]] + 15*b*x*ArcCoth[Tan
h[a + b*x]]^2 - 20*ArcCoth[Tanh[a + b*x]]^3))
```

**fricas [A]** time = 0.71, size = 52, normalized size = 0.98

$$\frac{1}{6}b^3x^6 + \frac{3}{5}ab^2x^5 - \frac{3}{16}\left(\pi^2b - 4a^2b\right)x^4 - \frac{1}{12}\left(3\pi^2a - 4a^3\right)x^3$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*arccoth(tanh(b*x+a))^3,x, algorithm="fricas")
```

```
[Out] 1/6*b^3*x^6 + 3/5*a*b^2*x^5 - 3/16*(pi^2*b - 4*a^2*b)*x^4 - 1/12*(3*pi^2*a
- 4*a^3)*x^3
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int x^2 \operatorname{arcoth}\left(\tanh\left(bx + a\right)\right)^3 \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*arccoth(tanh(b*x+a))^3,x, algorithm="giac")
```

```
[Out] integrate(x^2*arccoth(tanh(b*x + a))^3, x)
```

**maple [C]** time = 1.13, size = 18111, normalized size = 341.72

output too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^2*arccoth(tanh(b*x+a))^3,x)
```

```
[Out] result too large to display
```

**maxima [A]** time = 0.52, size = 54, normalized size = 1.02

$$-\frac{1}{4}bx^4 \operatorname{arcoth}\left(\tanh\left(bx + a\right)\right)^2 + \frac{1}{3}x^3 \operatorname{arcoth}\left(\tanh\left(bx + a\right)\right)^3 - \frac{1}{60}\left(b^2x^6 - 6bx^5 \operatorname{arcoth}\left(\tanh\left(bx + a\right)\right)\right)b$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*arccoth(tanh(b*x+a))^3,x, algorithm="maxima")
```

```
[Out] -1/4*b*x^4*arccoth(tanh(b*x + a))^2 + 1/3*x^3*arccoth(tanh(b*x + a))^3 - 1/
60*(b^2*x^6 - 6*b*x^5*arccoth(tanh(b*x + a)))*b
```

**mupad [B]** time = 1.21, size = 53, normalized size = 1.00

$$-\frac{b^3\,x^6}{60} + \frac{b^2\,x^5\,\mathrm{acoth}\left(\tanh\left(a + b\,x\right)\right)}{10} - \frac{b\,x^4\,\mathrm{acoth}\left(\tanh\left(a + b\,x\right)\right)^2}{4} + \frac{x^3\,\mathrm{acoth}\left(\tanh\left(a + b\,x\right)\right)^3}{3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^2*acoth(tanh(a + b*x))^3,x)
```

```
[Out] (x^3*acoth(tanh(a + b*x))^3)/3 - (b^3*x^6)/60 - (b*x^4*acoth(tanh(a + b*x))
^2)/4 + (b^2*x^5*acoth(tanh(a + b*x)))/10
```

**sympy** [A] time = 2.38, size = 60, normalized size = 1.13

$$\begin{cases} \frac{x^2 \operatorname{acoth}^4(\tanh(a+bx))}{4b} - \frac{x \operatorname{acoth}^5(\tanh(a+bx))}{10b^2} + \frac{\operatorname{acoth}^6(\tanh(a+bx))}{60b^3} & \text{for } b \neq 0 \\ \frac{x^3 \operatorname{acoth}^3(\tanh(a))}{3} & \text{otherwise} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**2*acoth(tanh(b*x+a))**3,x)
```

```
[Out] Piecewise((x**2*acoth(tanh(a + b*x))**4/(4*b) - x*acoth(tanh(a + b*x))**5/(
10*b**2) + acoth(tanh(a + b*x))**6/(60*b**3), Ne(b, 0)), (x**3*acoth(tanh(a
))**3/3, True))
```

# 3.150 $\int x \coth^{-1}(\tanh(a+bx))^3 \, dx$

**Optimal**. Leaf size=34

$$\frac{x \coth^{-1}(\tanh(a+bx))^4}{4b}-\frac{\coth^{-1}(\tanh(a+bx))^5}{20b^2}$$

```
[Out] 1/4*x*arccoth(tanh(b*x+a))^4/b-1/20*arccoth(tanh(b*x+a))^5/b^2
```

**Rubi [A]** time = 0.01, antiderivative size = 34, normalized size of antiderivative = 1.00, number of steps used = 3, number of rules used = 3, integrand size = 11, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.273, Rules used = {2168, 2157, 30}

$$\frac{x \coth^{-1}(\tanh(a+bx))^4}{4b}-\frac{\coth^{-1}(\tanh(a+bx))^5}{20b^2}$$

Antiderivative was successfully verified.

```
[In] Int[x*ArcCoth[Tanh[a + b*x]]^3,x]
```

```
[Out] (x*ArcCoth[Tanh[a + b*x]]^4)/(4*b) - ArcCoth[Tanh[a + b*x]]^5/(20*b^2)
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 2157

```
Int[(u_)^(m_.), x_Symbol] :> With[{c = Simplify[D[u, x]]}, Dist[1/c, Subst[
Int[x^m, x], x, u], x]] /; FreeQ[m, x] && PiecewiseLinearQ[u, x]
```

Rule 2168

```
Int[(u_)^(m_)*(v_)^(n_.), x_Symbol] :> With[{a = Simplify[D[u, x]], b = Sim
plify[D[v, x]]}, Simp[(u^(m + 1)*v^n)/(a*(m + 1)), x] - Dist[(b*n)/(a*(m +
1)), Int[u^(m + 1)*v^(n - 1), x], x] /; NeQ[b*u - a*v, 0]] /; FreeQ[{m, n},
 x] && PiecewiseLinearQ[u, v, x] && NeQ[m, -1] && ((LtQ[m, -1] && GtQ[n, 0]
 &&  !(ILtQ[m + n, -2] && (FractionQ[m] || GeQ[2*n + m + 1, 0]))) || (IGtQ[
n, 0] && IGtQ[m, 0] && LeQ[n, m]) || (IGtQ[n, 0] &&  !IntegerQ[m]) || (ILtQ
[m, 0] &&  !IntegerQ[n]))
```

Rubi steps

$$\begin{aligned}\int x \coth^{-1}(\tanh(a+bx))^3 \, dx &= \frac{x \coth^{-1}(\tanh(a+bx))^4}{4b}-\frac{\int \coth^{-1}(\tanh(a+bx))^4 \, dx}{4b}\\ &= \frac{x \coth^{-1}(\tanh(a+bx))^4}{4b}-\frac{\operatorname{Subst}\left(\int x^4 \, dx, x, \coth^{-1}(\tanh(a+bx))\right)}{4b^2}\\ &= \frac{x \coth^{-1}(\tanh(a+bx))^4}{4b}-\frac{\coth^{-1}(\tanh(a+bx))^5}{20b^2}\end{aligned}$$

**Mathematica [B]** time = 0.07, size = 99, normalized size = 2.91

$$\frac{(a+bx)\left(10\left(2a^2+abx-b^2x^2\right)\coth^{-1}(\tanh(a+bx))^2+(4a-bx)(a+bx)^3-5(3a-bx)(a+bx)^2\coth^{-1}(\tanh(a\right.}{20b^2}$$

Antiderivative was successfully verified.

```
[In] Integrate[x*ArcCoth[Tanh[a + b*x]]^3,x]
```

```
[Out] ((a + b*x)*((4*a - b*x)*(a + b*x)^3 - 5*(3*a - b*x)*(a + b*x)^2*ArcCoth[Tan
h[a + b*x]] + 10*(2*a^2 + a*b*x - b^2*x^2)*ArcCoth[Tanh[a + b*x]]^2 - 10*(a
 - b*x)*ArcCoth[Tanh[a + b*x]]^3))/(20*b^2)
```

**fricas [A]** time = 0.55, size = 52, normalized size = 1.53

$$\frac{1}{5}\,b^3x^5+\frac{3}{4}\,ab^2x^4-\frac{1}{4}\left(\pi^2b-4\,a^2b\right)x^3-\frac{1}{8}\left(3\,\pi^2a-4\,a^3\right)x^2$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*arccoth(tanh(b*x+a))^3,x, algorithm="fricas")
```

```
[Out] 1/5*b^3*x^5 + 3/4*a*b^2*x^4 - 1/4*(pi^2*b - 4*a^2*b)*x^3 - 1/8*(3*pi^2*a -
4*a^3)*x^2
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int x\,\mathrm{arcoth}\left(\tanh\left(bx+a\right)\right)^3\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*arccoth(tanh(b*x+a))^3,x, algorithm="giac")
```

```
[Out] integrate(x*arccoth(tanh(b*x + a))^3, x)
```

**maple [C]** time = 1.13, size = 18111, normalized size = 532.68

output too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x*arccoth(tanh(b*x+a))^3,x)
```

```
[Out] result too large to display
```

**maxima [A]** time = 0.52, size = 54, normalized size = 1.59

$$-\frac{1}{2}\,bx^3\,\mathrm{arcoth}\left(\tanh\left(bx+a\right)\right)^2+\frac{1}{2}\,x^2\,\mathrm{arcoth}\left(\tanh\left(bx+a\right)\right)^3-\frac{1}{20}\left(b^2x^5-5\,bx^4\,\mathrm{arcoth}\left(\tanh\left(bx+a\right)\right)\right)b$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*arccoth(tanh(b*x+a))^3,x, algorithm="maxima")
```

```
[Out] -1/2*b*x^3*arccoth(tanh(b*x + a))^2 + 1/2*x^2*arccoth(tanh(b*x + a))^3 - 1/
20*(b^2*x^5 - 5*b*x^4*arccoth(tanh(b*x + a)))*b
```

**mupad [B]** time = 0.12, size = 53, normalized size = 1.56

$$-\frac{b^3\,x^5}{20}+\frac{b^2\,x^4\,\mathrm{acoth}\left(\tanh\left(a+b\,x\right)\right)}{4}-\frac{b\,x^3\,{\mathrm{acoth}\left(\tanh\left(a+b\,x\right)\right)}^2}{2}+\frac{x^2\,{\mathrm{acoth}\left(\tanh\left(a+b\,x\right)\right)}^3}{2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x*acoth(tanh(a + b*x))^3,x)
```

```
[Out] (x^2*acoth(tanh(a + b*x))^3)/2 - (b^3*x^5)/20 - (b*x^3*acoth(tanh(a + b*x))
^2)/2 + (b^2*x^4*acoth(tanh(a + b*x)))/4
```

<u>**sympy**</u> **[A]** time = 1.21, size = 41, normalized size = 1.21

$$\begin{cases} \frac{x \operatorname{acoth}^{4}(\tanh(a+bx))}{4b} - \frac{\operatorname{acoth}^{5}(\tanh(a+bx))}{20b^{2}} & \text{for } b \neq 0 \\ \frac{x^{2} \operatorname{acoth}^{3}(\tanh(a))}{2} & \text{otherwise} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*acoth(tanh(b*x+a))**3,x)
```

```
[Out] Piecewise((x*acoth(tanh(a + b*x))**4/(4*b) - acoth(tanh(a + b*x))**5/(20*b*
*2), Ne(b, 0)), (x**2*acoth(tanh(a))**3/2, True))
```

# 3.151 $\int \coth^{-1}(\tanh(a+bx))^3\,dx$

**Optimal**. Leaf size=16

$$\frac{\coth^{-1}(\tanh(a+bx))^4}{4b}$$

[Out] 1/4*arccoth(tanh(b*x+a))^4/b

**Rubi [A]** time = 0.01, antiderivative size = 16, normalized size of antiderivative = 1.00, number of steps used = 2, number of rules used = 2, integrand size = 9, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.222, Rules used = {2157, 30}

$$\frac{\coth^{-1}(\tanh(a+bx))^4}{4b}$$

Antiderivative was successfully verified.

[In] Int[ArcCoth[Tanh[a + b*x]]^3,x]

[Out] ArcCoth[Tanh[a + b*x]]^4/(4*b)

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 2157

```
Int[(u_)^(m_.), x_Symbol] :> With[{c = Simplify[D[u, x]]}, Dist[1/c, Subst[
Int[x^m, x], x, u], x]] /; FreeQ[m, x] && PiecewiseLinearQ[u, x]
```

Rubi steps

$$\begin{aligned}\int \coth^{-1}(\tanh(a+bx))^3\,dx &= \frac{\text{Subst}\left(\int x^3\,dx, x, \coth^{-1}(\tanh(a+bx))\right)}{b}\\ &= \frac{\coth^{-1}(\tanh(a+bx))^4}{4b}\end{aligned}$$

**Mathematica [A]** time = 0.01, size = 16, normalized size = 1.00

$$\frac{\coth^{-1}(\tanh(a+bx))^4}{4b}$$

Antiderivative was successfully verified.

[In] Integrate[ArcCoth[Tanh[a + b*x]]^3,x]

[Out] ArcCoth[Tanh[a + b*x]]^4/(4*b)

**fricas [B]** time = 0.93, size = 49, normalized size = 3.06

$$\frac{1}{4}\,b^3x^4 + ab^2x^3 - \frac{3}{8}\left(\pi^2 b - 4\,a^2 b\right)x^2 - \frac{1}{4}\left(3\,\pi^2 a - 4\,a^3\right)x$$

Verification of antiderivative is not currently implemented for this CAS.

[In] integrate(arccoth(tanh(b*x+a))^3,x, algorithm="fricas")

```
[Out] 1/4*b^3*x^4 + a*b^2*x^3 - 3/8*(pi^2*b - 4*a^2*b)*x^2 - 1/4*(3*pi^2*a - 4*a^
3)*x
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \operatorname{arcoth}\left(\tanh\left(bx+a\right)\right)^{3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(tanh(b*x+a))^3,x, algorithm="giac")
```

```
[Out] integrate(arccoth(tanh(b*x + a))^3, x)
```

**maple [A]** time = 0.09, size = 15, normalized size = 0.94

$$\frac{\operatorname{arccoth}\left(\tanh\left(bx+a\right)\right)^{4}}{4b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(arccoth(tanh(b*x+a))^3,x)
```

```
[Out] 1/4*arccoth(tanh(b*x+a))^4/b
```

**maxima [B]** time = 0.52, size = 51, normalized size = 3.19

$$-\frac{3}{2}\,bx^{2}\operatorname{arcoth}\left(\tanh\left(bx+a\right)\right)^{2}+x\operatorname{arcoth}\left(\tanh\left(bx+a\right)\right)^{3}-\frac{1}{4}\left(b^{2}x^{4}-4\,bx^{3}\operatorname{arcoth}\left(\tanh\left(bx+a\right)\right)\right)b$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(tanh(b*x+a))^3,x, algorithm="maxima")
```

```
[Out] -3/2*b*x^2*arccoth(tanh(b*x + a))^2 + x*arccoth(tanh(b*x + a))^3 - 1/4*(b^2
*x^4 - 4*b*x^3*arccoth(tanh(b*x + a)))*b
```

**mupad [B]** time = 1.18, size = 47, normalized size = 2.94

$$\frac{x\,\left(2\operatorname{acoth}\left(\tanh\left(a+b\,x\right)\right)-b\,x\right)\,\left(b^{2}\,x^{2}-2\,b\,x\operatorname{acoth}\left(\tanh\left(a+b\,x\right)\right)+2\operatorname{acoth}\left(\tanh\left(a+b\,x\right)\right)^{2}\right)}{4}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(tanh(a + b*x))^3,x)
```

```
[Out] (x*(2*acoth(tanh(a + b*x)) - b*x)*(2*acoth(tanh(a + b*x))^2 + b^2*x^2 - 2*b
*x*acoth(tanh(a + b*x))))/4
```

**sympy [A]** time = 0.61, size = 20, normalized size = 1.25

$$\begin{cases}\frac{\operatorname{acoth}^{4}\left(\tanh\left(a+bx\right)\right)}{4b} & \text{for}\: b\neq 0\\x\operatorname{acoth}^{3}\left(\tanh\left(a\right)\right) & \text{otherwise}\end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(tanh(b*x+a))**3,x)
```

```
[Out] Piecewise((acoth(tanh(a + b*x))**4/(4*b), Ne(b, 0)), (x*acoth(tanh(a))**3,
True))
```

# 3.152 $\int \frac{\coth^{-1}(\tanh(a+bx))^3}{x}\,dx$

**Optimal**. Leaf size=77

$$bx\left(bx-\coth^{-1}(\tanh(a+bx))\right)^2-\frac{1}{2}\coth^{-1}(\tanh(a+bx))^2\left(bx-\coth^{-1}(\tanh(a+bx))\right)+\frac{1}{3}\coth^{-1}(\tanh(a+bx)$$

```
[Out] b*x*(b*x-arccoth(tanh(b*x+a)))^2-1/2*(b*x-arccoth(tanh(b*x+a)))*arccoth(tan
h(b*x+a))^2+1/3*arccoth(tanh(b*x+a))^3-(b*x-arccoth(tanh(b*x+a)))^3*ln(x)
```

**Rubi [A]** time = 0.10, antiderivative size = 77, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 3, integrand size = 13, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.231, Rules used = {2159, 2158, 29}

$$bx\left(bx-\coth^{-1}(\tanh(a+bx))\right)^2-\frac{1}{2}\coth^{-1}(\tanh(a+bx))^2\left(bx-\coth^{-1}(\tanh(a+bx))\right)+\frac{1}{3}\coth^{-1}(\tanh(a+bx)$$

Antiderivative was successfully verified.

```
[In] Int[ArcCoth[Tanh[a + b*x]]^3/x,x]
```

```
[Out] b*x*(b*x - ArcCoth[Tanh[a + b*x]])^2 - ((b*x - ArcCoth[Tanh[a + b*x]])*ArcC
oth[Tanh[a + b*x]]^2)/2 + ArcCoth[Tanh[a + b*x]]^3/3 - (b*x - ArcCoth[Tanh[
a + b*x]])^3*Log[x]
```

Rule 29

```
Int[(x_)^(-1), x_Symbol] :> Simp[Log[x], x]
```

Rule 2158

```
Int[(v_)/(u_), x_Symbol] :> With[{a = Simplify[D[u, x]], b = Simplify[D[v,
x]]}, Simp[(b*x)/a, x] - Dist[(b*u - a*v)/a, Int[1/u, x], x] /; NeQ[b*u - a
*v, 0]] /; PiecewiseLinearQ[u, v, x]
```

Rule 2159

```
Int[(v_)^(n_)/(u_), x_Symbol] :> With[{a = Simplify[D[u, x]], b = Simplify[
D[v, x]]}, Simp[v^n/(a*n), x] - Dist[(b*u - a*v)/a, Int[v^(n - 1)/u, x], x]
 /; NeQ[b*u - a*v, 0]] /; PiecewiseLinearQ[u, v, x] && GtQ[n, 0] && NeQ[n,
1]
```

Rubi steps

$$\begin{aligned}\int \frac{\coth^{-1}(\tanh(a+bx))^3}{x}\,dx &= \frac{1}{3}\coth^{-1}(\tanh(a+bx))^3-\left(bx-\coth^{-1}(\tanh(a+bx))\right)\int \frac{\coth^{-1}(\tanh(a+b}{x}\\ &= -\frac{1}{2}\left(bx-\coth^{-1}(\tanh(a+bx))\right)\coth^{-1}(\tanh(a+bx))^2+\frac{1}{3}\coth^{-1}(\tanh(a+\\ &= bx\left(bx-\coth^{-1}(\tanh(a+bx))\right)^2-\frac{1}{2}\left(bx-\coth^{-1}(\tanh(a+bx))\right)\coth^{-1}(\tan\\ &= bx\left(bx-\coth^{-1}(\tanh(a+bx))\right)^2-\frac{1}{2}\left(bx-\coth^{-1}(\tanh(a+bx))\right)\coth^{-1}(\tan\end{aligned}$$

**Mathematica [A]** time = 0.10, size = 104, normalized size = 1.35

$$(a+bx)\left(a^2-3a\left(-\coth^{-1}(\tanh(a+bx))+a+bx\right)+3\left(-\coth^{-1}(\tanh(a+bx))+a+bx\right)^2\right)+\frac{1}{3}(a+bx)^3-\frac{1}{2}(a+$$

Antiderivative was successfully verified.

```
[In] Integrate[ArcCoth[Tanh[a + b*x]]^3/x,x]
```

```
[Out] (a + b*x)^3/3 + (a + b*x)*(a^2 - 3*a*(a + b*x - ArcCoth[Tanh[a + b*x]]) + 3
*(a + b*x - ArcCoth[Tanh[a + b*x]])^2) - ((a + b*x)^2*(2*a + 3*b*x - 3*ArcC
oth[Tanh[a + b*x]]))/2 + (-(b*x) + ArcCoth[Tanh[a + b*x]])^3*Log[b*x]
```

**fricas [A]** time = 0.67, size = 49, normalized size = 0.64

$$\frac{1}{3}b^3x^3 + \frac{3}{2}ab^2x^2 - \frac{3}{4}\left(\pi^2 b - 4a^2 b\right)x - \frac{1}{4}\left(3\pi^2 a - 4a^3\right)\log(x)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(tanh(b*x+a))^3/x,x, algorithm="fricas")
```

```
[Out] 1/3*b^3*x^3 + 3/2*a*b^2*x^2 - 3/4*(pi^2*b - 4*a^2*b)*x - 1/4*(3*pi^2*a - 4*
a^3)*log(x)
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{arcoth}\left(\tanh\left(bx+a\right)\right)^3}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(tanh(b*x+a))^3/x,x, algorithm="giac")
```

```
[Out] integrate(arccoth(tanh(b*x + a))^3/x, x)
```

**maple [C]** time = 0.90, size = 21848, normalized size = 283.74

output too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(arccoth(tanh(b*x+a))^3/x,x)
```

```
[Out] result too large to display
```

**maxima [C]** time = 0.76, size = 75, normalized size = 0.97

$$\frac{1}{3}b^3x^3+\frac{1}{24}\left(-18i\pi b^2+36ab^2\right)x^2-\frac{1}{24}\left(18\pi^2 b+72i\pi ab-72a^2 b\right)x+\frac{1}{8}\left(i\pi^3-6\pi^2 a-12i\pi a^2+8a^3\right)\log(x)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(tanh(b*x+a))^3/x,x, algorithm="maxima")
```

```
[Out] 1/3*b^3*x^3 + 1/24*(-18*I*pi*b^2 + 36*a*b^2)*x^2 - 1/24*(18*pi^2*b + 72*I*p
i*a*b - 72*a^2*b)*x + 1/8*(I*pi^3 - 6*pi^2*a - 12*I*pi*a^2 + 8*a^3)*log(x)
```

**mupad [B]** time = 0.14, size = 306, normalized size = 3.97

$$\frac{b^3x^3}{3}-\ln(x)\left(\frac{\left(2a-\ln\left(\frac{2e^{2a}e^{2bx}}{e^{2a}e^{2bx}-1}\right)+\ln\left(-\frac{2}{e^{2a}e^{2bx}-1}\right)+2bx\right)^3}{8}-a^3-\frac{3a\left(2a-\ln\left(\frac{2e^{2a}e^{2bx}}{e^{2a}e^{2bx}-1}\right)+\ln\left(-\frac{2}{e^{2a}e^{2bx}-1}\right)\right.}{4}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(tanh(a + b*x))^3/x,x)
```

```
[Out] (b^3*x^3)/3 - log(x)*((2*a - log((2*exp(2*a)*exp(2*b*x))/(exp(2*a)*exp(2*b*
x) - 1)) + log(-2/(exp(2*a)*exp(2*b*x) - 1)) + 2*b*x)^3/8 - a^3 - (3*a*(2*a
 - log((2*exp(2*a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x) - 1)) + log(-2/(exp(2*a
)*exp(2*b*x) - 1)) + 2*b*x)^2)/4 + (3*a^2*(2*a - log((2*exp(2*a)*exp(2*b*x)
)/(exp(2*a)*exp(2*b*x) - 1)) + log(-2/(exp(2*a)*exp(2*b*x) - 1)) + 2*b*x))/
2) - (3*b^2*x^2*(log(-2/(exp(2*a)*exp(2*b*x) - 1)) - log((2*exp(2*a)*exp(2*
b*x))/(exp(2*a)*exp(2*b*x) - 1)) + 2*b*x))/4 + (3*b*x*(log(-2/(exp(2*a)*exp
(2*b*x) - 1)) - log((2*exp(2*a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x) - 1)) + 2*
b*x)^2)/4
```

**sympy** [**F**] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{acoth}^3(\tanh(a+bx))}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(tanh(b*x+a))**3/x,x)
```

```
[Out] Integral(acoth(tanh(a + b*x))**3/x, x)
```

## 3.153 $\int \frac{\coth^{-1}(\tanh(a+bx))^3}{x^2}\,dx$

**Optimal**. Leaf size=68

$$-3b^2x\left(bx-\coth^{-1}(\tanh(a+bx))\right)-\frac{\coth^{-1}(\tanh(a+bx))^3}{x}+\frac{3}{2}b\coth^{-1}(\tanh(a+bx))^2+3b\log(x)\left(bx-\coth^{-1}(\mathrm{ta}\right.$$

```
[Out] -3*b^2*x*(b*x-arccoth(tanh(b*x+a)))+3/2*b*arccoth(tanh(b*x+a))^2-arccoth(ta
nh(b*x+a))^3/x+3*b*(b*x-arccoth(tanh(b*x+a)))^2*ln(x)
```

**Rubi [A]** time = 0.04, antiderivative size = 68, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 4, integrand size = 13, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.308, Rules used = {2168, 2159, 2158, 29}

$$-3b^2x\left(bx-\coth^{-1}(\tanh(a+bx))\right)-\frac{\coth^{-1}(\tanh(a+bx))^3}{x}+\frac{3}{2}b\coth^{-1}(\tanh(a+bx))^2+3b\log(x)\left(bx-\coth^{-1}(\mathrm{ta}\right.$$

Antiderivative was successfully verified.

```
[In] Int[ArcCoth[Tanh[a + b*x]]^3/x^2,x]
```

```
[Out] -3*b^2*x*(b*x - ArcCoth[Tanh[a + b*x]]) + (3*b*ArcCoth[Tanh[a + b*x]]^2)/2
- ArcCoth[Tanh[a + b*x]]^3/x + 3*b*(b*x - ArcCoth[Tanh[a + b*x]])^2*Log[x]
```

Rule 29

```
Int[(x_)^(-1), x_Symbol] :> Simp[Log[x], x]
```

Rule 2158

```
Int[(v_)/(u_), x_Symbol] :> With[{a = Simplify[D[u, x]], b = Simplify[D[v,
x]]}, Simp[(b*x)/a, x] - Dist[(b*u - a*v)/a, Int[1/u, x], x] /; NeQ[b*u - a
*v, 0]] /; PiecewiseLinearQ[u, v, x]
```

Rule 2159

```
Int[(v_)^(n_)/(u_), x_Symbol] :> With[{a = Simplify[D[u, x]], b = Simplify[
D[v, x]]}, Simp[v^n/(a*n), x] - Dist[(b*u - a*v)/a, Int[v^(n - 1)/u, x], x]
 /; NeQ[b*u - a*v, 0]] /; PiecewiseLinearQ[u, v, x] && GtQ[n, 0] && NeQ[n,
1]
```

Rule 2168

```
Int[(u_)^(m_)*(v_)^(n_.), x_Symbol] :> With[{a = Simplify[D[u, x]], b = Sim
plify[D[v, x]]}, Simp[(u^(m + 1)*v^n)/(a*(m + 1)), x] - Dist[(b*n)/(a*(m +
1)), Int[u^(m + 1)*v^(n - 1), x], x] /; NeQ[b*u - a*v, 0]] /; FreeQ[{m, n},
 x] && PiecewiseLinearQ[u, v, x] && NeQ[m, -1] && ((LtQ[m, -1] && GtQ[n, 0]
 && !(ILtQ[m + n, -2] && (FractionQ[m] || GeQ[2*n + m + 1, 0]))) || (IGtQ[
n, 0] && IGtQ[m, 0] && LeQ[n, m]) || (IGtQ[n, 0] && !IntegerQ[m]) || (ILtQ
[m, 0] && !IntegerQ[n]))
```

Rubi steps

$$\int \frac{\coth^{-1}(\tanh(a+bx))^3}{x^2}\,dx = -\frac{\coth^{-1}(\tanh(a+bx))^3}{x} + (3b)\int \frac{\coth^{-1}(\tanh(a+bx))^2}{x}\,dx$$
$$= \frac{3}{2}b\coth^{-1}(\tanh(a+bx))^2 - \frac{\coth^{-1}(\tanh(a+bx))^3}{x} - \left(3b\left(bx-\coth^{-1}(\tanh(\right.\right.$$
$$= -3b^2x\left(bx-\coth^{-1}(\tanh(a+bx))\right) + \frac{3}{2}b\coth^{-1}(\tanh(a+bx))^2 - \frac{\coth^{-1}(\tan}{x}$$
$$= -3b^2x\left(bx-\coth^{-1}(\tanh(a+bx))\right) + \frac{3}{2}b\coth^{-1}(\tanh(a+bx))^2 - \frac{\coth^{-1}(\tan}{x}$$

**Mathematica** [A] time = 0.04, size = 62, normalized size = 0.91

$$-6b^2x\log(x)\coth^{-1}(\tanh(a+bx)) - \frac{\coth^{-1}(\tanh(a+bx))^3}{x} + 3b(\log(x)+1)\coth^{-1}(\tanh(a+bx))^2 + \frac{3}{2}b^3x^2(2\log($$

Antiderivative was successfully verified.

```
[In] Integrate[ArcCoth[Tanh[a + b*x]]^3/x^2,x]
```

```
[Out] -(ArcCoth[Tanh[a + b*x]]^3/x) - 6*b^2*x*ArcCoth[Tanh[a + b*x]]*Log[x] + 3*b
*ArcCoth[Tanh[a + b*x]]^2*(1 + Log[x]) + (3*b^3*x^2*(-1 + 2*Log[x]))/2
```

**fricas** [A] time = 0.46, size = 51, normalized size = 0.75

$$\frac{2\,b^3x^3 + 12\,ab^2x^2 + 3\,\pi^2a - 4\,a^3 - 3\left(\pi^2b - 4\,a^2b\right)x\log(x)}{4\,x}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(tanh(b*x+a))^3/x^2,x, algorithm="fricas")
```

```
[Out] 1/4*(2*b^3*x^3 + 12*a*b^2*x^2 + 3*pi^2*a - 4*a^3 - 3*(pi^2*b - 4*a^2*b)*x*l
og(x))/x
```

**giac** [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{arcoth}\left(\tanh\left(bx+a\right)\right)^3}{x^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(tanh(b*x+a))^3/x^2,x, algorithm="giac")
```

```
[Out] integrate(arccoth(tanh(b*x + a))^3/x^2, x)
```

**maple** [C] time = 0.46, size = 7683, normalized size = 112.99

output too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(arccoth(tanh(b*x+a))^3/x^2,x)
```

```
[Out] result too large to display
```

**maxima** [C] time = 0.61, size = 124, normalized size = 1.82

$$3\,b\operatorname{arcoth}\left(\tanh\left(bx+a\right)\right)^2\log(x) - \frac{3}{2}\left(2\operatorname{arcoth}\left(\tanh\left(bx+a\right)\right)^2\log(x) - \left(bx^2 - 2\left(-i\pi - 2\,a\right)x + 2\left(-\frac{i\pi(bx+}{b}\right.\right.\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(tanh(b*x+a))^3/x^2,x, algorithm="maxima")
```

```
[Out] 3*b*arccoth(tanh(b*x + a))^2*log(x) - 3/2*(2*arccoth(tanh(b*x + a))^2*log(x
) - (b*x^2 - 2*(-I*pi - 2*a)*x + 2*(-I*pi*(b*x + a)/b - (b*x + a)^2/b)*log(
x) + 2*arccoth(tanh(b*x + a))^2*log(x)/b + 2*(I*pi*a + a^2)*log(x)/b)*b)*b
- arccoth(tanh(b*x + a))^3/x
```

**mupad [B]** time = 1.20, size = 372, normalized size = 5.47

$$\ln(x)\left(3a^2 b + \frac{3b\left(2a - \ln\left(\frac{2e^{2a}e^{2bx}}{e^{2a}e^{2bx}-1}\right) + \ln\left(-\frac{2}{e^{2a}e^{2bx}-1}\right) + 2bx\right)^2}{4} - 3ab\left(2a - \ln\left(\frac{2e^{2a}e^{2bx}}{e^{2a}e^{2bx}-1}\right) + \ln\left(-\frac{2}{e^{2a}e^{2}}\right.\right.\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(tanh(a + b*x))^3/x^2,x)
```

```
[Out] log(x)*(3*a^2*b + (3*b*(2*a - log((2*exp(2*a)*exp(2*b*x))/(exp(2*a)*exp(2*b
*x) - 1)) + log(-2/(exp(2*a)*exp(2*b*x) - 1)) + 2*b*x)^2)/4 - 3*a*b*(2*a -
log((2*exp(2*a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x) - 1)) + log(-2/(exp(2*a)*e
xp(2*b*x) - 1)) + 2*b*x)) + ((2*a - log((2*exp(2*a)*exp(2*b*x))/(exp(2*a)*e
xp(2*b*x) - 1)) + log(-2/(exp(2*a)*exp(2*b*x) - 1)) + 2*b*x)^3 - 8*a^3 - 6*
a*(2*a - log((2*exp(2*a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x) - 1)) + log(-2/(e
xp(2*a)*exp(2*b*x) - 1)) + 2*b*x)^2 + 12*a^2*(2*a - log((2*exp(2*a)*exp(2*b
*x))/(exp(2*a)*exp(2*b*x) - 1)) + log(-2/(exp(2*a)*exp(2*b*x) - 1)) + 2*b*x
))/(8*x) + (b^3*x^2)/2 - (3*b^2*x*(log(-2/(exp(2*a)*exp(2*b*x) - 1)) - log(
(2*exp(2*a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x) - 1)) + 2*b*x))/2
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{acoth}^3(\tanh(a+bx))}{x^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(tanh(b*x+a))**3/x**2,x)
```

```
[Out] Integral(acoth(tanh(a + b*x))**3/x**2, x)
```

# 3.154 $\int \frac{\coth^{-1}(\tanh(a+bx))^3}{x^3} dx$

**Optimal**. Leaf size=60

$$-3b^2\log(x)\left(bx-\coth^{-1}(\tanh(a+bx))\right)-\frac{\coth^{-1}(\tanh(a+bx))^3}{2x^2}-\frac{3b\coth^{-1}(\tanh(a+bx))^2}{2x}+3b^3x$$

[Out] 3*b^3*x-3/2*b*arccoth(tanh(b*x+a))^2/x-1/2*arccoth(tanh(b*x+a))^3/x^2-3*b^2*(b*x-arccoth(tanh(b*x+a)))*ln(x)

**Rubi [A]** time = 0.04, antiderivative size = 60, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 3, integrand size = 13, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.231, Rules used = {2168, 2158, 29}

$$-3b^2\log(x)\left(bx-\coth^{-1}(\tanh(a+bx))\right)-\frac{\coth^{-1}(\tanh(a+bx))^3}{2x^2}-\frac{3b\coth^{-1}(\tanh(a+bx))^2}{2x}+3b^3x$$

Antiderivative was successfully verified.

[In] Int[ArcCoth[Tanh[a + b*x]]^3/x^3,x]

[Out] 3*b^3*x - (3*b*ArcCoth[Tanh[a + b*x]]^2)/(2*x) - ArcCoth[Tanh[a + b*x]]^3/(2*x^2) - 3*b^2*(b*x - ArcCoth[Tanh[a + b*x]])*Log[x]

Rule 29

```
Int[(x_)^(-1), x_Symbol] :> Simp[Log[x], x]
```

Rule 2158

```
Int[(v_)/(u_), x_Symbol] :> With[{a = Simplify[D[u, x]], b = Simplify[D[v, x]]}, Simp[(b*x)/a, x] - Dist[(b*u - a*v)/a, Int[1/u, x], x] /; NeQ[b*u - a*v, 0]] /; PiecewiseLinearQ[u, v, x]
```

Rule 2168

```
Int[(u_)^(m_)*(v_)^(n_.), x_Symbol] :> With[{a = Simplify[D[u, x]], b = Simplify[D[v, x]]}, Simp[(u^(m + 1)*v^n)/(a*(m + 1)), x] - Dist[(b*n)/(a*(m + 1)), Int[u^(m + 1)*v^(n - 1), x], x] /; NeQ[b*u - a*v, 0]] /; FreeQ[{m, n}, x] && PiecewiseLinearQ[u, v, x] && NeQ[m, -1] && ((LtQ[m, -1] && GtQ[n, 0] && !(ILtQ[m + n, -2] && (FractionQ[m] || GeQ[2*n + m + 1, 0]))) || (IGtQ[n, 0] && IGtQ[m, 0] && LeQ[n, m]) || (IGtQ[n, 0] && !IntegerQ[m]) || (ILtQ[m, 0] && !IntegerQ[n]))
```

Rubi steps

$$\begin{aligned}\int \frac{\coth^{-1}(\tanh(a+bx))^3}{x^3}\,dx &= -\frac{\coth^{-1}(\tanh(a+bx))^3}{2x^2}+\frac{1}{2}(3b)\int \frac{\coth^{-1}(\tanh(a+bx))^2}{x^2}\,dx\\ &= -\frac{3b\coth^{-1}(\tanh(a+bx))^2}{2x}-\frac{\coth^{-1}(\tanh(a+bx))^3}{2x^2}+\left(3b^2\right)\int \frac{\coth^{-1}(\tanh(}{x}\\ &= 3b^3x-\frac{3b\coth^{-1}(\tanh(a+bx))^2}{2x}-\frac{\coth^{-1}(\tanh(a+bx))^3}{2x^2}-\left(3b^2\left(bx-\coth^{-}\right.\right.\\ &= 3b^3x-\frac{3b\coth^{-1}(\tanh(a+bx))^2}{2x}-\frac{\coth^{-1}(\tanh(a+bx))^3}{2x^2}-3b^2\left(bx-\coth^{-1}\right.\end{aligned}$$

**Mathematica [A]** time = 0.04, size = 66, normalized size = 1.10

$$3b^2\log(x)\left(\coth^{-1}(\tanh(a+bx))-bx\right)-\frac{\left(\coth^{-1}(\tanh(a+bx))-bx\right)^3}{2x^2}-\frac{3b\left(\coth^{-1}(\tanh(a+bx))-bx\right)^2}{x}+b^3x$$

Antiderivative was successfully verified.

```
[In] Integrate[ArcCoth[Tanh[a + b*x]]^3/x^3,x]
```

```
[Out] b^3*x - (3*b*(-(b*x) + ArcCoth[Tanh[a + b*x]])^2)/x - (-(b*x) + ArcCoth[Tan
h[a + b*x]])^3/(2*x^2) + 3*b^2*(-(b*x) + ArcCoth[Tanh[a + b*x]])*Log[x]
```

**fricas [A]** time = 0.51, size = 51, normalized size = 0.85

$$\frac{8\,b^3x^3+24\,ab^2x^2\log(x)+3\,\pi^2a-4\,a^3+6\left(\pi^2b-4\,a^2b\right)x}{8\,x^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(tanh(b*x+a))^3/x^3,x, algorithm="fricas")
```

```
[Out] 1/8*(8*b^3*x^3 + 24*a*b^2*x^2*log(x) + 3*pi^2*a - 4*a^3 + 6*(pi^2*b - 4*a^2
*b)*x)/x^2
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int\frac{\operatorname{arcoth}\left(\tanh\left(bx+a\right)\right)^3}{x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(tanh(b*x+a))^3/x^3,x, algorithm="giac")
```

```
[Out] integrate(arccoth(tanh(b*x + a))^3/x^3, x)
```

**maple [C]** time = 0.55, size = 7366, normalized size = 122.77

output too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(arccoth(tanh(b*x+a))^3/x^3,x)
```

```
[Out] result too large to display
```

**maxima [A]** time = 0.46, size = 72, normalized size = 1.20

$$3\left(b\operatorname{arcoth}\left(\tanh\left(bx+a\right)\right)\log(x)-\left(b\left(x+\frac{a}{b}\right)\log(x)-b\left(x+\frac{a\log(x)}{b}\right)\right)b\right)b-\frac{3\,b\operatorname{arcoth}\left(\tanh\left(bx+a\right)\right)^2}{2\,x}-\operatorname{arcot}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(tanh(b*x+a))^3/x^3,x, algorithm="maxima")
```

```
[Out] 3*(b*arccoth(tanh(b*x + a))*log(x) - (b*(x + a/b)*log(x) - b*(x + a*log(x)/
b))*b)*b - 3/2*b*arccoth(tanh(b*x + a))^2/x - 1/2*arccoth(tanh(b*x + a))^3/
x^2
```

**mupad [B]** time = 1.33, size = 383, normalized size = 6.38

$$\frac{\ln\left(-\frac{2}{e^{2a}\,e^{2bx}-1}\right)^3}{16\,x^2}-\frac{\ln\left(\frac{2\,e^{2a}\,e^{2bx}}{e^{2a}\,e^{2bx}-1}\right)^3}{16\,x^2}+\frac{9\,b^2\,\ln\left(\frac{e^{2bx}}{e^{2a}\,e^{2bx}-1}\right)}{4}-\frac{9\,b^2\,\ln\left(\frac{1}{e^{2a}\,e^{2bx}-1}\right)}{4}-\frac{3\,b^3\,x}{2}-\frac{3\,b\ln\left(\frac{2\,e^{2a}\,e^{2bx}}{e^{2a}\,e^{2bx}-1}\right)^2}{8\,x}+\frac{3\,b^2\,\ln\left(\right.}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(tanh(a + b*x))^3/x^3,x)
```

```
[Out] log(-2/(exp(2*a)*exp(2*b*x) - 1))^3/(16*x^2) - log((2*exp(2*a)*exp(2*b*x))/
(exp(2*a)*exp(2*b*x) - 1))^3/(16*x^2) + (9*b^2*log(exp(2*b*x)/(exp(2*a)*exp
(2*b*x) - 1)))/4 - (9*b^2*log(1/(exp(2*a)*exp(2*b*x) - 1)))/4 - (3*b^3*x)/2
 - (3*b*log((2*exp(2*a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x) - 1))^2)/(8*x) + (
3*b^2*log((2*exp(2*a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x) - 1))*log(x))/2 - 3*
b^3*x*log(x) - (3*b*log(-2/(exp(2*a)*exp(2*b*x) - 1))^2)/(8*x) - (3*b^2*log
(-2/(exp(2*a)*exp(2*b*x) - 1))*log(x))/2 - (3*log((2*exp(2*a)*exp(2*b*x))/(
exp(2*a)*exp(2*b*x) - 1))*log(-2/(exp(2*a)*exp(2*b*x) - 1))^2)/(16*x^2) + (
3*log((2*exp(2*a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x) - 1))^2*log(-2/(exp(2*a)
*exp(2*b*x) - 1)))/(16*x^2) + (3*b*log((2*exp(2*a)*exp(2*b*x))/(exp(2*a)*ex
p(2*b*x) - 1))*log(-2/(exp(2*a)*exp(2*b*x) - 1)))/(4*x)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{acoth}^3(\tanh(a+bx))}{x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(tanh(b*x+a))**3/x**3,x)
```

```
[Out] Integral(acoth(tanh(a + b*x))**3/x**3, x)
```

## 3.155 $\int \frac{\coth^{-1}(\tanh(a+bx))^3}{x^4} dx$

**Optimal**. Leaf size=55

$$-\frac{b^2 \coth^{-1}(\tanh(a+bx))}{x} - \frac{\coth^{-1}(\tanh(a+bx))^3}{3x^3} - \frac{b \coth^{-1}(\tanh(a+bx))^2}{2x^2} + b^3 \log(x)$$

```
[Out] -b^2*arccoth(tanh(b*x+a))/x-1/2*b*arccoth(tanh(b*x+a))^2/x^2-1/3*arccoth(ta
nh(b*x+a))^3/x^3+b^3*ln(x)
```

**Rubi [A]** time = 0.04, antiderivative size = 55, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 2, integrand size = 13, $\frac{\text{number of rules}}{\text{integrand size}} = 0.154$, Rules used = {2168, 29}

$$-\frac{b^2 \coth^{-1}(\tanh(a+bx))}{x} - \frac{b \coth^{-1}(\tanh(a+bx))^2}{2x^2} - \frac{\coth^{-1}(\tanh(a+bx))^3}{3x^3} + b^3 \log(x)$$

Antiderivative was successfully verified.

```
[In] Int[ArcCoth[Tanh[a + b*x]]^3/x^4,x]
```

```
[Out] -((b^2*ArcCoth[Tanh[a + b*x]])/x) - (b*ArcCoth[Tanh[a + b*x]]^2)/(2*x^2) -
ArcCoth[Tanh[a + b*x]]^3/(3*x^3) + b^3*Log[x]
```

Rule 29

```
Int[(x_)^(-1), x_Symbol] :> Simp[Log[x], x]
```

Rule 2168

```
Int[(u_)^(m_)*(v_)^(n_.), x_Symbol] :> With[{a = Simplify[D[u, x]], b = Sim
plify[D[v, x]]}, Simp[(u^(m + 1)*v^n)/(a*(m + 1)), x] - Dist[(b*n)/(a*(m +
1)), Int[u^(m + 1)*v^(n - 1), x], x] /; NeQ[b*u - a*v, 0]] /; FreeQ[{m, n},
 x] && PiecewiseLinearQ[u, v, x] && NeQ[m, -1] && ((LtQ[m, -1] && GtQ[n, 0]
 && !(ILtQ[m + n, -2] && (FractionQ[m] || GeQ[2*n + m + 1, 0]))) || (IGtQ[
n, 0] && IGtQ[m, 0] && LeQ[n, m]) || (IGtQ[n, 0] && !IntegerQ[m]) || (ILtQ
[m, 0] && !IntegerQ[n]))
```

Rubi steps

$$\begin{aligned}
\int \frac{\coth^{-1}(\tanh(a+bx))^3}{x^4} dx &= -\frac{\coth^{-1}(\tanh(a+bx))^3}{3x^3} + b \int \frac{\coth^{-1}(\tanh(a+bx))^2}{x^3} dx \\
&= -\frac{b \coth^{-1}(\tanh(a+bx))^2}{2x^2} - \frac{\coth^{-1}(\tanh(a+bx))^3}{3x^3} + b^2 \int \frac{\coth^{-1}(\tanh(a+bx)}{x^2} \\
&= -\frac{b^2 \coth^{-1}(\tanh(a+bx))}{x} - \frac{b \coth^{-1}(\tanh(a+bx))^2}{2x^2} - \frac{\coth^{-1}(\tanh(a+bx))^3}{3x^3} + \\
&= -\frac{b^2 \coth^{-1}(\tanh(a+bx))}{x} - \frac{b \coth^{-1}(\tanh(a+bx))^2}{2x^2} - \frac{\coth^{-1}(\tanh(a+bx))^3}{3x^3} +
\end{aligned}$$

**Mathematica [A]** time = 0.03, size = 60, normalized size = 1.09

$$\frac{-6b^2x^2 \coth^{-1}(\tanh(a+bx)) - 3bx \coth^{-1}(\tanh(a+bx))^2 - 2\coth^{-1}(\tanh(a+bx))^3 + b^3x^3(6\log(x)+11)}{6x^3}$$

Antiderivative was successfully verified.

```
[In] Integrate[ArcCoth[Tanh[a + b*x]]^3/x^4,x]
```

```
[Out] (-6*b^2*x^2*ArcCoth[Tanh[a + b*x]] - 3*b*x*ArcCoth[Tanh[a + b*x]]^2 - 2*Arc
Coth[Tanh[a + b*x]]^3 + b^3*x^3*(11 + 6*Log[x]))/(6*x^3)
```

**fricas [A]** time = 0.92, size = 51, normalized size = 0.93

$$\frac{24\,b^3x^3\log(x) - 72\,ab^2x^2 + 6\,\pi^2a - 8\,a^3 + 9\,\left(\pi^2b - 4\,a^2b\right)x}{24\,x^3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(tanh(b*x+a))^3/x^4,x, algorithm="fricas")
```

```
[Out] 1/24*(24*b^3*x^3*log(x) - 72*a*b^2*x^2 + 6*pi^2*a - 8*a^3 + 9*(pi^2*b - 4*a
^2*b)*x)/x^3
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{arcoth}\left(\tanh\left(bx + a\right)\right)^3}{x^4}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(tanh(b*x+a))^3/x^4,x, algorithm="giac")
```

```
[Out] integrate(arccoth(tanh(b*x + a))^3/x^4, x)
```

**maple [C]** time = 1.59, size = 17237, normalized size = 313.40

output too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(arccoth(tanh(b*x+a))^3/x^4,x)
```

```
[Out] result too large to display
```

**maxima [A]** time = 0.59, size = 52, normalized size = 0.95

$$\left(b^2\log(x) - \frac{b\operatorname{arcoth}\left(\tanh\left(bx + a\right)\right)}{x}\right)b - \frac{b\operatorname{arcoth}\left(\tanh\left(bx + a\right)\right)^2}{2\,x^2} - \frac{\operatorname{arcoth}\left(\tanh\left(bx + a\right)\right)^3}{3\,x^3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(tanh(b*x+a))^3/x^4,x, algorithm="maxima")
```

```
[Out] (b^2*log(x) - b*arccoth(tanh(b*x + a))/x)*b - 1/2*b*arccoth(tanh(b*x + a))^
2/x^2 - 1/3*arccoth(tanh(b*x + a))^3/x^3
```

**mupad [B]** time = 1.18, size = 51, normalized size = 0.93

$$b^3\,\ln(x) - \frac{b^2\,x^2\,\mathrm{acoth}\left(\tanh\left(a + b\,x\right)\right) + \frac{b\,x\,\mathrm{acoth}\left(\tanh\left(a+b\,x\right)\right)^2}{2} + \frac{\mathrm{acoth}\left(\tanh\left(a+b\,x\right)\right)^3}{3}}{x^3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(tanh(a + b*x))^3/x^4,x)
```

```
[Out] b^3*log(x) - (acoth(tanh(a + b*x))^3/3 + (b*x*acoth(tanh(a + b*x))^2)/2 + b
^2*x^2*acoth(tanh(a + b*x)))/x^3
```

**sympy [A]** time = 0.85, size = 51, normalized size = 0.93

$$b^3\log(x) - \frac{b^2\operatorname{acoth}(\tanh(a+bx))}{x} - \frac{b\operatorname{acoth}^2(\tanh(a+bx))}{2x^2} - \frac{\operatorname{acoth}^3(\tanh(a+bx))}{3x^3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(tanh(b*x+a))**3/x**4,x)
```

```
[Out] b**3*log(x) - b**2*acoth(tanh(a + b*x))/x - b*acoth(tanh(a + b*x))**2/(2*x*
*2) - acoth(tanh(a + b*x))**3/(3*x**3)
```

## 3.156 $\int \frac{\coth^{-1}(\tanh(a+bx))^3}{x^5}\,dx$

**Optimal**. Leaf size=31

$$\frac{\coth^{-1}(\tanh(a+bx))^4}{4x^4\left(bx-\coth^{-1}(\tanh(a+bx))\right)}$$

```
[Out] 1/4*arccoth(tanh(b*x+a))^4/x^4/(b*x-arccoth(tanh(b*x+a)))
```

**Rubi [A]** time = 0.01, antiderivative size = 31, normalized size of antiderivative = 1.00, number of steps used = 1, number of rules used = 1, integrand size = 13, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.077, Rules used = {2167}

$$\frac{\coth^{-1}(\tanh(a+bx))^4}{4x^4\left(bx-\coth^{-1}(\tanh(a+bx))\right)}$$

Antiderivative was successfully verified.

```
[In] Int[ArcCoth[Tanh[a + b*x]]^3/x^5,x]
```

```
[Out] ArcCoth[Tanh[a + b*x]]^4/(4*x^4*(b*x - ArcCoth[Tanh[a + b*x]]))
```

Rule 2167

```
Int[(u_)^(m_)*(v_)^(n_), x_Symbol] :> With[{a = Simplify[D[u, x]], b = Simp
lify[D[v, x]]}, -Simp[(u^(m + 1)*v^(n + 1))/((m + 1)*(b*u - a*v)), x] /; Ne
Q[b*u - a*v, 0]] /; FreeQ[{m, n}, x] && PiecewiseLinearQ[u, v, x] && EqQ[m
+ n + 2, 0] && NeQ[m, -1]
```

Rubi steps

$$\int \frac{\coth^{-1}(\tanh(a+bx))^3}{x^5}\,dx=\frac{\coth^{-1}(\tanh(a+bx))^4}{4x^4\left(bx-\coth^{-1}(\tanh(a+bx))\right)}$$

**Mathematica [A]** time = 0.02, size = 50, normalized size = 1.61

$$-\frac{b^2x^2\coth^{-1}(\tanh(a+bx))+bx\coth^{-1}(\tanh(a+bx))^2+\coth^{-1}(\tanh(a+bx))^3+b^3x^3}{4x^4}$$

Antiderivative was successfully verified.

```
[In] Integrate[ArcCoth[Tanh[a + b*x]]^3/x^5,x]
```

```
[Out] -1/4*(b^3*x^3 + b^2*x^2*ArcCoth[Tanh[a + b*x]] + b*x*ArcCoth[Tanh[a + b*x]]
^2 + ArcCoth[Tanh[a + b*x]]^3)/x^4
```

**fricas [A]** time = 0.47, size = 49, normalized size = 1.58

$$-\frac{16\,b^3x^3+24\,ab^2x^2-3\,\pi^2a+4\,a^3-4\left(\pi^2b-4\,a^2b\right)x}{16\,x^4}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(tanh(b*x+a))^3/x^5,x, algorithm="fricas")
```

```
[Out] -1/16*(16*b^3*x^3 + 24*a*b^2*x^2 - 3*pi^2*a + 4*a^3 - 4*(pi^2*b - 4*a^2*b)*
x)/x^4
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{arcoth}\left(\tanh\left(bx+a\right)\right)^3}{x^5}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(tanh(b*x+a))^3/x^5,x, algorithm="giac")
```

```
[Out] integrate(arccoth(tanh(b*x + a))^3/x^5, x)
```

**maple [C]** time = 1.47, size = 17235, normalized size = 555.97

output too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(arccoth(tanh(b*x+a))^3/x^5,x)
```

```
[Out] result too large to display
```

**maxima [A]** time = 0.52, size = 53, normalized size = 1.71

$$-\frac{1}{4}\,b\left(\frac{b^2}{x}+\frac{b\operatorname{arcoth}\left(\tanh\left(bx+a\right)\right)}{x^2}\right)-\frac{b\operatorname{arcoth}\left(\tanh\left(bx+a\right)\right)^2}{4\,x^3}-\frac{\operatorname{arcoth}\left(\tanh\left(bx+a\right)\right)^3}{4\,x^4}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(tanh(b*x+a))^3/x^5,x, algorithm="maxima")
```

```
[Out] -1/4*b*(b^2/x + b*arccoth(tanh(b*x + a))/x^2) - 1/4*b*arccoth(tanh(b*x + a)
)^2/x^3 - 1/4*arccoth(tanh(b*x + a))^3/x^4
```

**mupad [B]** time = 1.19, size = 48, normalized size = 1.55

$$-\frac{b^3\,x^3+b^2\,x^2\operatorname{acoth}\left(\tanh\left(a+b\,x\right)\right)+b\,x\operatorname{acoth}\left(\tanh\left(a+b\,x\right)\right)^2+\operatorname{acoth}\left(\tanh\left(a+b\,x\right)\right)^3}{4\,x^4}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(tanh(a + b*x))^3/x^5,x)
```

```
[Out] -(acoth(tanh(a + b*x))^3 + b^3*x^3 + b*x*acoth(tanh(a + b*x))^2 + b^2*x^2*a
coth(tanh(a + b*x)))/(4*x^4)
```

**sympy [B]** time = 1.32, size = 56, normalized size = 1.81

$$-\frac{b^3}{4x}-\frac{b^2\operatorname{acoth}\left(\tanh\left(a+bx\right)\right)}{4x^2}-\frac{b\operatorname{acoth}^2\left(\tanh\left(a+bx\right)\right)}{4x^3}-\frac{\operatorname{acoth}^3\left(\tanh\left(a+bx\right)\right)}{4x^4}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(tanh(b*x+a))**3/x**5,x)
```

```
[Out] -b**3/(4*x) - b**2*acoth(tanh(a + b*x))/(4*x**2) - b*acoth(tanh(a + b*x))**
2/(4*x**3) - acoth(tanh(a + b*x))**3/(4*x**4)
```

## 3.157 $\int \frac{\coth^{-1}(\tanh(a+bx))^3}{x^6} dx$

**Optimal**. Leaf size=64

$$\frac{\coth^{-1}(\tanh(a+bx))^4}{5x^5\left(bx-\coth^{-1}(\tanh(a+bx))\right)}+\frac{b\coth^{-1}(\tanh(a+bx))^4}{20x^4\left(bx-\coth^{-1}(\tanh(a+bx))\right)^2}$$

```
[Out] 1/20*b*arccoth(tanh(b*x+a))^4/x^4/(b*x-arccoth(tanh(b*x+a)))^2+1/5*arccoth(
tanh(b*x+a))^4/x^5/(b*x-arccoth(tanh(b*x+a)))
```

**Rubi [A]** time = 0.03, antiderivative size = 64, normalized size of antiderivative = 1.00, number of steps used = 2, number of rules used = 2, integrand size = 13, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.154, Rules used = {2171, 2167}

$$\frac{\coth^{-1}(\tanh(a+bx))^4}{5x^5\left(bx-\coth^{-1}(\tanh(a+bx))\right)}+\frac{b\coth^{-1}(\tanh(a+bx))^4}{20x^4\left(bx-\coth^{-1}(\tanh(a+bx))\right)^2}$$

Antiderivative was successfully verified.

```
[In] Int[ArcCoth[Tanh[a + b*x]]^3/x^6,x]
```

```
[Out] (b*ArcCoth[Tanh[a + b*x]]^4)/(20*x^4*(b*x - ArcCoth[Tanh[a + b*x]])^2) + Ar
cCoth[Tanh[a + b*x]]^4/(5*x^5*(b*x - ArcCoth[Tanh[a + b*x]]))
```

Rule 2167

```
Int[(u_)^(m_)*(v_)^(n_), x_Symbol] :> With[{a = Simplify[D[u, x]], b = Simp
lify[D[v, x]]}, -Simp[(u^(m + 1)*v^(n + 1))/((m + 1)*(b*u - a*v)), x] /; Ne
Q[b*u - a*v, 0]] /; FreeQ[{m, n}, x] && PiecewiseLinearQ[u, v, x] && EqQ[m
+ n + 2, 0] && NeQ[m, -1]
```

Rule 2171

```
Int[(u_)^(m_)*(v_)^(n_), x_Symbol] :> With[{a = Simplify[D[u, x]], b = Simp
lify[D[v, x]]}, -Simp[(u^(m + 1)*v^(n + 1))/((m + 1)*(b*u - a*v)), x] + Dis
t[(b*(m + n + 2))/((m + 1)*(b*u - a*v)), Int[u^(m + 1)*v^n, x], x] /; NeQ[b
*u - a*v, 0]] /; PiecewiseLinearQ[u, v, x] && NeQ[m + n + 2, 0] && LtQ[m, -
1]
```

Rubi steps

$$\begin{aligned}\int \frac{\coth^{-1}(\tanh(a+bx))^3}{x^6} dx &= \frac{\coth^{-1}(\tanh(a+bx))^4}{5x^5\left(bx-\coth^{-1}(\tanh(a+bx))\right)}+\frac{b\int \frac{\coth^{-1}(\tanh(a+bx))^3}{x^5} dx}{5\left(bx-\coth^{-1}(\tanh(a+bx))\right)}\\ &= \frac{b\coth^{-1}(\tanh(a+bx))^4}{20x^4\left(bx-\coth^{-1}(\tanh(a+bx))\right)^2}+\frac{\coth^{-1}(\tanh(a+bx))^4}{5x^5\left(bx-\coth^{-1}(\tanh(a+bx))\right)}\end{aligned}$$

**Mathematica [A]** time = 0.04, size = 54, normalized size = 0.84

$$-\frac{2b^2x^2\coth^{-1}(\tanh(a+bx))+3bx\coth^{-1}(\tanh(a+bx))^2+4\coth^{-1}(\tanh(a+bx))^3+b^3x^3}{20x^5}$$

Antiderivative was successfully verified.

```
[In] Integrate[ArcCoth[Tanh[a + b*x]]^3/x^6,x]
```

```
[Out] -1/20*(b^3*x^3 + 2*b^2*x^2*ArcCoth[Tanh[a + b*x]] + 3*b*x*ArcCoth[Tanh[a +
b*x]]^2 + 4*ArcCoth[Tanh[a + b*x]]^3)/x^5
```

**fricas [A]** time = 0.51, size = 49, normalized size = 0.77

$$-\frac{40\,b^3x^3 + 80\,ab^2x^2 - 12\,\pi^2 a + 16\,a^3 - 15\left(\pi^2 b - 4\,a^2 b\right)x}{80\,x^5}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(tanh(b*x+a))^3/x^6,x, algorithm="fricas")
```

```
[Out] -1/80*(40*b^3*x^3 + 80*a*b^2*x^2 - 12*pi^2*a + 16*a^3 - 15*(pi^2*b - 4*a^2*
b)*x)/x^5
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{arcoth}\left(\tanh\left(bx + a\right)\right)^3}{x^6}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(tanh(b*x+a))^3/x^6,x, algorithm="giac")
```

```
[Out] integrate(arccoth(tanh(b*x + a))^3/x^6, x)
```

**maple [C]** time = 1.42, size = 17234, normalized size = 269.28

output too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(arccoth(tanh(b*x+a))^3/x^6,x)
```

```
[Out] result too large to display
```

**maxima [A]** time = 0.54, size = 54, normalized size = 0.84

$$-\frac{1}{20}\,b\left(\frac{b^2}{x^2} + \frac{2\,b\operatorname{arcoth}\left(\tanh\left(bx + a\right)\right)}{x^3}\right) - \frac{3\,b\operatorname{arcoth}\left(\tanh\left(bx + a\right)\right)^2}{20\,x^4} - \frac{\operatorname{arcoth}\left(\tanh\left(bx + a\right)\right)^3}{5\,x^5}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(tanh(b*x+a))^3/x^6,x, algorithm="maxima")
```

```
[Out] -1/20*b*(b^2/x^2 + 2*b*arccoth(tanh(b*x + a))/x^3) - 3/20*b*arccoth(tanh(b*
x + a))^2/x^4 - 1/5*arccoth(tanh(b*x + a))^3/x^5
```

**mupad [B]** time = 0.12, size = 53, normalized size = 0.83

$$-\frac{\operatorname{acoth}\left(\tanh\left(a + b\,x\right)\right)^3}{5\,x^5} - \frac{b^3}{20\,x^2} - \frac{b^2\operatorname{acoth}\left(\tanh\left(a + b\,x\right)\right)}{10\,x^3} - \frac{3\,b\operatorname{acoth}\left(\tanh\left(a + b\,x\right)\right)^2}{20\,x^4}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(tanh(a + b*x))^3/x^6,x)
```

```
[Out] - acoth(tanh(a + b*x))^3/(5*x^5) - b^3/(20*x^2) - (b^2*acoth(tanh(a + b*x))
)/(10*x^3) - (3*b*acoth(tanh(a + b*x))^2)/(20*x^4)
```

**sympy [A]** time = 2.12, size = 60, normalized size = 0.94

$$-\frac{b^3}{20x^2} - \frac{b^2\operatorname{acoth}\left(\tanh\left(a + bx\right)\right)}{10x^3} - \frac{3b\operatorname{acoth}^2\left(\tanh\left(a + bx\right)\right)}{20x^4} - \frac{\operatorname{acoth}^3\left(\tanh\left(a + bx\right)\right)}{5x^5}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(tanh(b*x+a))**3/x**6,x)
```

```
[Out] -b**3/(20*x**2) - b**2*acoth(tanh(a + b*x))/(10*x**3) - 3*b*acoth(tanh(a +
b*x))**2/(20*x**4) - acoth(tanh(a + b*x))**3/(5*x**5)
```

## 3.158 $\int \frac{x^m}{\coth^{-1}(\tanh(a+bx))} \, dx$

**Optimal**. Leaf size=53

$$-\frac{x^{m+1}\,{}_2F_1\left(1,m+1;m+2;\frac{bx}{bx-\coth^{-1}(\tanh(a+bx))}\right)}{(m+1)\left(bx-\coth^{-1}(\tanh(a+bx))\right)}$$

```
[Out] -x^(1+m)*hypergeom([1, 1+m],[2+m],b*x/(b*x-arccoth(tanh(b*x+a))))/(1+m)/(b*
x-arccoth(tanh(b*x+a)))
```

**Rubi [A]** time = 0.03, antiderivative size = 53, normalized size of antiderivative = 1.00, number of steps used = 1, number of rules used = 1, integrand size = 13, $\frac{\text{number of rules}}{\text{integrand size}} = 0.077$, Rules used = {2164}

$$-\frac{x^{m+1}\,{}_2F_1\left(1,m+1;m+2;\frac{bx}{bx-\coth^{-1}(\tanh(a+bx))}\right)}{(m+1)\left(bx-\coth^{-1}(\tanh(a+bx))\right)}$$

Antiderivative was successfully verified.

```
[In] Int[x^m/ArcCoth[Tanh[a + b*x]],x]
```

```
[Out] -((x^(1 + m)*Hypergeometric2F1[1, 1 + m, 2 + m, (b*x)/(b*x - ArcCoth[Tanh[a
 + b*x]])])/((1 + m)*(b*x - ArcCoth[Tanh[a + b*x]])))
```

Rule 2164

```
Int[(v_)^(n_)/(u_), x_Symbol] :> With[{a = Simplify[D[u, x]], b = Simplify[
D[v, x]]}, Simp[(v^(n + 1)*Hypergeometric2F1[1, n + 1, n + 2, -((a*v)/(b*u
- a*v))])/((n + 1)*(b*u - a*v)), x] /; NeQ[b*u - a*v, 0]] /; PiecewiseLinea
rQ[u, v, x] && !IntegerQ[n]
```

Rubi steps

$$\int \frac{x^m}{\coth^{-1}(\tanh(a+bx))} \, dx = -\frac{x^{1+m}\,{}_2F_1\left(1,1+m;2+m;\frac{bx}{bx-\coth^{-1}(\tanh(a+bx))}\right)}{(1+m)\left(bx-\coth^{-1}(\tanh(a+bx))\right)}$$

**Mathematica [A]** time = 0.09, size = 51, normalized size = 0.96

$$\frac{x^{m+1}\,{}_2F_1\left(1,m+1;m+2;-\frac{bx}{\coth^{-1}(\tanh(a+bx))-bx}\right)}{(m+1)\left(\coth^{-1}(\tanh(a+bx))-bx\right)}$$

Antiderivative was successfully verified.

```
[In] Integrate[x^m/ArcCoth[Tanh[a + b*x]],x]
```

```
[Out] (x^(1 + m)*Hypergeometric2F1[1, 1 + m, 2 + m, -((b*x)/(-(b*x) + ArcCoth[Tan
h[a + b*x]]))])/((1 + m)*(-(b*x) + ArcCoth[Tanh[a + b*x]]))
```

**fricas [F]** time = 0.55, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{x^m}{\text{arcoth}\left(\tanh\left(bx+a\right)\right)}, x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^m/arccoth(tanh(b*x+a)),x, algorithm="fricas")
[Out] integral(x^m/arccoth(tanh(b*x + a)), x)
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{x^m}{\operatorname{arcoth}(\tanh(bx+a))}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^m/arccoth(tanh(b*x+a)),x, algorithm="giac")
[Out] integrate(x^m/arccoth(tanh(b*x + a)), x)
```

**maple [F]** time = 0.98, size = 0, normalized size = 0.00

$$\int \frac{x^m}{\operatorname{arccoth}(\tanh(bx+a))}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^m/arccoth(tanh(b*x+a)),x)
[Out] int(x^m/arccoth(tanh(b*x+a)),x)
```

**maxima [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{x^m}{\operatorname{arcoth}(\tanh(bx+a))}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^m/arccoth(tanh(b*x+a)),x, algorithm="maxima")
[Out] integrate(x^m/arccoth(tanh(b*x + a)), x)
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.02

$$\int \frac{x^m}{\operatorname{acoth}(\tanh(a+b\,x))}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^m/acoth(tanh(a + b*x)),x)
[Out] int(x^m/acoth(tanh(a + b*x)), x)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{x^m}{\operatorname{acoth}(\tanh(a+bx))}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**m/acoth(tanh(b*x+a)),x)
[Out] Integral(x**m/acoth(tanh(a + b*x)), x)
```

## 3.159 $\int \frac{x^3}{\coth^{-1}(\tanh(a+bx))}\,dx$

**Optimal**. Leaf size=81

$$\frac{\left(bx-\coth^{-1}(\tanh(a+bx))\right)^3\log\left(\coth^{-1}(\tanh(a+bx))\right)}{b^4}+\frac{x\left(bx-\coth^{-1}(\tanh(a+bx))\right)^2}{b^3}+\frac{x^2\left(bx-\coth^{-1}(\tan\right.}{2b^2}$$

```
[Out] 1/3*x^3/b+1/2*x^2*(b*x-arccoth(tanh(b*x+a)))/b^2+x*(b*x-arccoth(tanh(b*x+a)
))^2/b^3+(b*x-arccoth(tanh(b*x+a)))^3*ln(arccoth(tanh(b*x+a)))/b^4
```

**Rubi [A]** time = 0.06, antiderivative size = 81, normalized size of antiderivative = 1.00, number of steps used = 5, number of rules used = 4, integrand size = 13, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.308, Rules used = {2159, 2158, 2157, 29}

$$\frac{x^2\left(bx-\coth^{-1}(\tanh(a+bx))\right)}{2b^2}+\frac{x\left(bx-\coth^{-1}(\tanh(a+bx))\right)^2}{b^3}+\frac{\left(bx-\coth^{-1}(\tanh(a+bx))\right)^3\log\left(\coth^{-1}(\tan\right.}{b^4}$$

Antiderivative was successfully verified.

```
[In] Int[x^3/ArcCoth[Tanh[a + b*x]],x]
```

```
[Out] x^3/(3*b) + (x^2*(b*x - ArcCoth[Tanh[a + b*x]]))/(2*b^2) + (x*(b*x - ArcCot
h[Tanh[a + b*x]])^2)/b^3 + ((b*x - ArcCoth[Tanh[a + b*x]])^3*Log[ArcCoth[Ta
nh[a + b*x]]])/b^4
```

Rule 29

```
Int[(x_)^(-1), x_Symbol] :> Simp[Log[x], x]
```

Rule 2157

```
Int[(u_)^(m_.), x_Symbol] :> With[{c = Simplify[D[u, x]]}, Dist[1/c, Subst[
Int[x^m, x], x, u], x]] /; FreeQ[m, x] && PiecewiseLinearQ[u, x]
```

Rule 2158

```
Int[(v_)/(u_), x_Symbol] :> With[{a = Simplify[D[u, x]], b = Simplify[D[v,
x]]}, Simp[(b*x)/a, x] - Dist[(b*u - a*v)/a, Int[1/u, x], x] /; NeQ[b*u - a
*v, 0]] /; PiecewiseLinearQ[u, v, x]
```

Rule 2159

```
Int[(v_)^(n_)/(u_), x_Symbol] :> With[{a = Simplify[D[u, x]], b = Simplify[
D[v, x]]}, Simp[v^n/(a*n), x] - Dist[(b*u - a*v)/a, Int[v^(n - 1)/u, x], x]
 /; NeQ[b*u - a*v, 0]] /; PiecewiseLinearQ[u, v, x] && GtQ[n, 0] && NeQ[n,
1]
```

Rubi steps

$$\int \frac{x^3}{\coth^{-1}(\tanh(a+bx))}\,dx = \frac{x^3}{3b} - \frac{\left(-bx+\coth^{-1}(\tanh(a+bx))\right)\int \frac{x^2}{\coth^{-1}(\tanh(a+bx))}\,dx}{b}$$

$$= \frac{x^3}{3b} + \frac{x^2\left(bx-\coth^{-1}(\tanh(a+bx))\right)}{2b^2} + \frac{\left(-bx+\coth^{-1}(\tanh(a+bx))\right)^2 \int \frac{}{\coth^{-}}$$

$$= \frac{x^3}{3b} + \frac{x^2\left(bx-\coth^{-1}(\tanh(a+bx))\right)}{2b^2} + \frac{x\left(bx-\coth^{-1}(\tanh(a+bx))\right)^2}{b^3} - \frac{(-bx}{}$$

$$= \frac{x^3}{3b} + \frac{x^2\left(bx-\coth^{-1}(\tanh(a+bx))\right)}{2b^2} + \frac{x\left(bx-\coth^{-1}(\tanh(a+bx))\right)^2}{b^3} - \frac{(-bx}{}$$

$$= \frac{x^3}{3b} + \frac{x^2\left(bx-\coth^{-1}(\tanh(a+bx))\right)}{2b^2} + \frac{x\left(bx-\coth^{-1}(\tanh(a+bx))\right)^2}{b^3} + \frac{(bx}{}$$

**Mathematica [A]** time = 0.05, size = 79, normalized size = 0.98

$$-\frac{\left(\coth^{-1}(\tanh(a+bx))-bx\right)^3 \log\left(\coth^{-1}(\tanh(a+bx))\right)}{b^4} + \frac{x\left(\coth^{-1}(\tanh(a+bx))-bx\right)^2}{b^3} - \frac{x^2\left(\coth^{-1}(\tan\right.}{2}$$

Antiderivative was successfully verified.

```
[In] Integrate[x^3/ArcCoth[Tanh[a + b*x]],x]
```

```
[Out] x^3/(3*b) - (x^2*(-(b*x) + ArcCoth[Tanh[a + b*x]]))/(2*b^2) + (x*(-(b*x) +
ArcCoth[Tanh[a + b*x]])^2)/b^3 - ((-(b*x) + ArcCoth[Tanh[a + b*x]])^3*Log[A
rcCoth[Tanh[a + b*x]]])/b^4
```

**fricas [A]** time = 0.59, size = 127, normalized size = 1.57

$$\frac{8\,b^3x^3 - 12\,ab^2x^2 - 6\left(\pi^2b - 4\,a^2b\right)x - 6\left(\pi^3 - 12\,\pi a^2\right)\arctan\left(-\frac{2\,bx+2\,a-\sqrt{4\,b^2x^2+8\,abx+\pi^2+4\,a^2}}{\pi}\right) + 3\left(3\,\pi^2a - 4\,a^3\right.}{24\,b^4}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^3/arccoth(tanh(b*x+a)),x, algorithm="fricas")
```

```
[Out] 1/24*(8*b^3*x^3 - 12*a*b^2*x^2 - 6*(pi^2*b - 4*a^2*b)*x - 6*(pi^3 - 12*pi*a
^2)*arctan(-(2*b*x + 2*a - sqrt(4*b^2*x^2 + 8*a*b*x + pi^2 + 4*a^2))/pi) +
3*(3*pi^2*a - 4*a^3)*log(4*b^2*x^2 + 8*a*b*x + pi^2 + 4*a^2))/b^4
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{x^3}{\operatorname{arcoth}\left(\tanh\left(bx+a\right)\right)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^3/arccoth(tanh(b*x+a)),x, algorithm="giac")
```

```
[Out] integrate(x^3/arccoth(tanh(b*x + a)), x)
```

**maple [C]** time = 4.80, size = 130774, normalized size = 1614.49

output too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^3/arccoth(tanh(b*x+a)),x)
```

```
[Out] result too large to display
```

**maxima [C]** time = 0.53, size = 86, normalized size = 1.06

$$\frac{4\,b^2x^3 + (3i\,\pi b - 6\,ab)x^2 - \left(3\,\pi^2 + 12i\,\pi a - 12\,a^2\right)x}{12\,b^3} - \frac{\left(i\,\pi^3 - 6\,\pi^2 a - 12i\,\pi a^2 + 8\,a^3\right)\log\left(-i\,\pi + 2\,bx + 2\,a\right)}{8\,b^4}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^3/arccoth(tanh(b*x+a)),x, algorithm="maxima")
```

```
[Out] 1/12*(4*b^2*x^3 + (3*I*pi*b - 6*a*b)*x^2 - (3*pi^2 + 12*I*pi*a - 12*a^2)*x)
/b^3 - 1/8*(I*pi^3 - 6*pi^2*a - 12*I*pi*a^2 + 8*a^3)*log(-I*pi + 2*b*x + 2*
a)/b^4
```

**mupad [B]** time = 0.13, size = 354, normalized size = 4.37

$$\frac{x^3}{3\,b} + \frac{x^2\left(\ln\left(-\frac{2}{e^{2\,a}\,e^{2\,b\,x}-1}\right) - \ln\left(\frac{2\,e^{2\,a}\,e^{2\,b\,x}}{e^{2\,a}\,e^{2\,b\,x}-1}\right) + 2\,b\,x\right)}{4\,b^2} + \frac{x\left(\ln\left(-\frac{2}{e^{2\,a}\,e^{2\,b\,x}-1}\right) - \ln\left(\frac{2\,e^{2\,a}\,e^{2\,b\,x}}{e^{2\,a}\,e^{2\,b\,x}-1}\right) + 2\,b\,x\right)^2}{4\,b^3} + \frac{\ln\left(\ln\left(\frac{2\,e^{2\,a}\,e^{2\,b}}{e^{2\,a}\,e^{2\,b\,x-}}\right.\right.}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^3/acoth(tanh(a + b*x)),x)
```

```
[Out] x^3/(3*b) + (x^2*(log(-2/(exp(2*a)*exp(2*b*x) - 1)) - log((2*exp(2*a)*exp(2
*b*x))/(exp(2*a)*exp(2*b*x) - 1)) + 2*b*x))/(4*b^2) + (x*(log(-2/(exp(2*a)*
exp(2*b*x) - 1)) - log((2*exp(2*a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x) - 1)) +
 2*b*x)^2)/(4*b^3) + (log(log((2*exp(2*a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x)
- 1)) - log(-2/(exp(2*a)*exp(2*b*x) - 1)))*((2*a - log((2*exp(2*a)*exp(2*b*
x))/(exp(2*a)*exp(2*b*x) - 1)) + log(-2/(exp(2*a)*exp(2*b*x) - 1)) + 2*b*x)
^3 - 8*a^3 - 6*a*(2*a - log((2*exp(2*a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x) -
1)) + log(-2/(exp(2*a)*exp(2*b*x) - 1)) + 2*b*x)^2 + 12*a^2*(2*a - log((2*e
xp(2*a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x) - 1)) + log(-2/(exp(2*a)*exp(2*b*x
) - 1)) + 2*b*x)))/(8*b^4)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{x^3}{\operatorname{acoth}\left(\tanh\left(a + bx\right)\right)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**3/acoth(tanh(b*x+a)),x)
```

```
[Out] Integral(x**3/acoth(tanh(a + b*x)), x)
```

## 3.160 $\int \frac{x^2}{\coth^{-1}(\tanh(a+bx))} dx$

**Optimal**. Leaf size=56

$$\frac{(bx-\coth^{-1}(\tanh(a+bx)))^2 \log(\coth^{-1}(\tanh(a+bx)))}{b^3}+\frac{x(bx-\coth^{-1}(\tanh(a+bx)))}{b^2}+\frac{x^2}{2b}$$

```
[Out] 1/2*x^2/b+x*(b*x-arccoth(tanh(b*x+a)))/b^2+(b*x-arccoth(tanh(b*x+a)))^2*ln(
arccoth(tanh(b*x+a)))/b^3
```

**Rubi [A]** time = 0.03, antiderivative size = 56, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 4, integrand size = 13, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.308, Rules used = {2159, 2158, 2157, 29}

$$\frac{x(bx-\coth^{-1}(\tanh(a+bx)))}{b^2}+\frac{(bx-\coth^{-1}(\tanh(a+bx)))^2 \log(\coth^{-1}(\tanh(a+bx)))}{b^3}+\frac{x^2}{2b}$$

Antiderivative was successfully verified.

```
[In] Int[x^2/ArcCoth[Tanh[a + b*x]],x]
```

```
[Out] x^2/(2*b) + (x*(b*x - ArcCoth[Tanh[a + b*x]]))/b^2 + ((b*x - ArcCoth[Tanh[a
 + b*x]])^2*Log[ArcCoth[Tanh[a + b*x]]])/b^3
```

Rule 29

```
Int[(x_)^(-1), x_Symbol] :> Simp[Log[x], x]
```

Rule 2157

```
Int[(u_)^(m_.), x_Symbol] :> With[{c = Simplify[D[u, x]]}, Dist[1/c, Subst[
Int[x^m, x], x, u], x]] /; FreeQ[m, x] && PiecewiseLinearQ[u, x]
```

Rule 2158

```
Int[(v_)/(u_), x_Symbol] :> With[{a = Simplify[D[u, x]], b = Simplify[D[v,
x]]}, Simp[(b*x)/a, x] - Dist[(b*u - a*v)/a, Int[1/u, x], x] /; NeQ[b*u - a
*v, 0]] /; PiecewiseLinearQ[u, v, x]
```

Rule 2159

```
Int[(v_)^(n_)/(u_), x_Symbol] :> With[{a = Simplify[D[u, x]], b = Simplify[
D[v, x]]}, Simp[v^n/(a*n), x] - Dist[(b*u - a*v)/a, Int[v^(n - 1)/u, x], x]
 /; NeQ[b*u - a*v, 0]] /; PiecewiseLinearQ[u, v, x] && GtQ[n, 0] && NeQ[n,
1]
```

Rubi steps

$$\int \frac{x^2}{\coth^{-1}(\tanh(a+bx))}\,dx = \frac{x^2}{2b} - \frac{\left(-bx+\coth^{-1}(\tanh(a+bx))\right)\int \frac{x}{\coth^{-1}(\tanh(a+bx))}\,dx}{b}$$
$$= \frac{x^2}{2b} + \frac{x\left(bx-\coth^{-1}(\tanh(a+bx))\right)}{b^2} + \frac{\left(-bx+\coth^{-1}(\tanh(a+bx))\right)^2 \int \frac{1}{\coth^{-1}(\tan}}{b^2}$$
$$= \frac{x^2}{2b} + \frac{x\left(bx-\coth^{-1}(\tanh(a+bx))\right)}{b^2} + \frac{\left(-bx+\coth^{-1}(\tanh(a+bx))\right)^2 \text{Subst}\left(\int \frac{1}{x}\right.}{b^3}$$
$$= \frac{x^2}{2b} + \frac{x\left(bx-\coth^{-1}(\tanh(a+bx))\right)}{b^2} + \frac{\left(bx-\coth^{-1}(\tanh(a+bx))\right)^2 \log\left(\coth^{-1}(\right.}{b^3}$$

**Mathematica [A]** time = 0.04, size = 55, normalized size = 0.98

$$\frac{\left(\coth^{-1}(\tanh(a+bx))-bx\right)^2 \log\left(\coth^{-1}(\tanh(a+bx))\right)}{b^3} - \frac{x\left(\coth^{-1}(\tanh(a+bx))-bx\right)}{b^2} + \frac{x^2}{2b}$$

Antiderivative was successfully verified.

```
[In] Integrate[x^2/ArcCoth[Tanh[a + b*x]],x]
```

```
[Out] x^2/(2*b) - (x*(-(b*x) + ArcCoth[Tanh[a + b*x]]))/b^2 + ((-(b*x) + ArcCoth[
Tanh[a + b*x]])^2*Log[ArcCoth[Tanh[a + b*x]]])/b^3
```

**fricas [A]** time = 0.48, size = 97, normalized size = 1.73

$$\frac{4\,b^2x^2 - 8\,abx - 16\,\pi a \arctan\left(-\frac{2\,bx+2\,a-\sqrt{4\,b^2x^2+8\,abx+\pi^2+4\,a^2}}{\pi}\right) - \left(\pi^2-4\,a^2\right)\log\left(4\,b^2x^2+8\,abx+\pi^2+4\,a^2\right)}{8\,b^3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2/arccoth(tanh(b*x+a)),x, algorithm="fricas")
```

```
[Out] 1/8*(4*b^2*x^2 - 8*a*b*x - 16*pi*a*arctan(-(2*b*x + 2*a - sqrt(4*b^2*x^2 +
8*a*b*x + pi^2 + 4*a^2))/pi) - (pi^2 - 4*a^2)*log(4*b^2*x^2 + 8*a*b*x + pi^
2 + 4*a^2))/b^3
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{x^2}{\operatorname{arcoth}\left(\tanh\left(bx+a\right)\right)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2/arccoth(tanh(b*x+a)),x, algorithm="giac")
```

```
[Out] integrate(x^2/arccoth(tanh(b*x + a)), x)
```

**maple [C]** time = 1.18, size = 28786, normalized size = 514.04

output too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^2/arccoth(tanh(b*x+a)),x)
```

```
[Out] result too large to display
```

**maxima** [C] time = 0.53, size = 51, normalized size = 0.91

$$\frac{bx^2 + (i\pi - 2a)x}{2b^2} - \frac{\left(\pi^2 + 4i\pi a - 4a^2\right)\log\left(-i\pi + 2bx + 2a\right)}{4b^3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2/arccoth(tanh(b*x+a)),x, algorithm="maxima")
```

```
[Out] 1/2*(b*x^2 + (I*pi - 2*a)*x)/b^2 - 1/4*(pi^2 + 4*I*pi*a - 4*a^2)*log(-I*pi
+ 2*b*x + 2*a)/b^3
```

**mupad** [B] time = 1.33, size = 234, normalized size = 4.18

$$\frac{x^2}{2b} + \frac{x\left(\ln\left(-\frac{2}{e^{2a}e^{2bx}-1}\right) - \ln\left(\frac{2e^{2a}e^{2bx}}{e^{2a}e^{2bx}-1}\right) + 2bx\right)}{2b^2} + \frac{\ln\left(\ln\left(\frac{2e^{2a}e^{2bx}}{e^{2a}e^{2bx}-1}\right) - \ln\left(-\frac{2}{e^{2a}e^{2bx}-1}\right)\right)\left(\left(2a - \ln\left(\frac{2e^{2a}e^{2bx}}{e^{2a}e^{2bx}-1}\right)\right.\right.}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^2/acoth(tanh(a + b*x)),x)
```

```
[Out] x^2/(2*b) + (x*(log(-2/(exp(2*a)*exp(2*b*x) - 1)) - log((2*exp(2*a)*exp(2*b
*x))/(exp(2*a)*exp(2*b*x) - 1)) + 2*b*x))/(2*b^2) + (log(log((2*exp(2*a)*ex
p(2*b*x))/(exp(2*a)*exp(2*b*x) - 1)) - log(-2/(exp(2*a)*exp(2*b*x) - 1)))*(
(2*a - log((2*exp(2*a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x) - 1)) + log(-2/(exp
(2*a)*exp(2*b*x) - 1)) + 2*b*x)^2 - 4*a*(2*a - log((2*exp(2*a)*exp(2*b*x))/
(exp(2*a)*exp(2*b*x) - 1)) + log(-2/(exp(2*a)*exp(2*b*x) - 1)) + 2*b*x) + 4
*a^2))/(4*b^3)
```

**sympy** [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{x^2}{\operatorname{acoth}\left(\tanh\left(a + bx\right)\right)}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**2/acoth(tanh(b*x+a)),x)
```

```
[Out] Integral(x**2/acoth(tanh(a + b*x)), x)
```

# 3.161 $\int \frac{x}{\coth^{-1}(\tanh(a+bx))}\,dx$

**Optimal**. Leaf size=31

$$\frac{\left(bx-\coth^{-1}(\tanh(a+bx))\right)\log\left(\coth^{-1}(\tanh(a+bx))\right)}{b^2}+\frac{x}{b}$$

```
[Out] x/b+(b*x-arccoth(tanh(b*x+a)))*ln(arccoth(tanh(b*x+a)))/b^2
```

**Rubi [A]** time = 0.02, antiderivative size = 31, normalized size of antiderivative = 1.00, number of steps used = 3, number of rules used = 3, integrand size = 11, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.273, Rules used = {2158, 2157, 29}

$$\frac{\left(bx-\coth^{-1}(\tanh(a+bx))\right)\log\left(\coth^{-1}(\tanh(a+bx))\right)}{b^2}+\frac{x}{b}$$

Antiderivative was successfully verified.

```
[In] Int[x/ArcCoth[Tanh[a + b*x]],x]
```

```
[Out] x/b + ((b*x - ArcCoth[Tanh[a + b*x]])*Log[ArcCoth[Tanh[a + b*x]]])/b^2
```

Rule 29

```
Int[(x_)^(-1), x_Symbol] :> Simp[Log[x], x]
```

Rule 2157

```
Int[(u_)^(m_.), x_Symbol] :> With[{c = Simplify[D[u, x]]}, Dist[1/c, Subst[
Int[x^m, x], x, u], x]] /; FreeQ[m, x] && PiecewiseLinearQ[u, x]
```

Rule 2158

```
Int[(v_)/(u_), x_Symbol] :> With[{a = Simplify[D[u, x]], b = Simplify[D[v,
x]]}, Simp[(b*x)/a, x] - Dist[(b*u - a*v)/a, Int[1/u, x], x] /; NeQ[b*u - a
*v, 0]] /; PiecewiseLinearQ[u, v, x]
```

Rubi steps

$$\begin{aligned}
\int \frac{x}{\coth^{-1}(\tanh(a+bx))}\,dx &= \frac{x}{b}-\frac{\left(-bx+\coth^{-1}(\tanh(a+bx))\right)\int \frac{1}{\coth^{-1}(\tanh(a+bx))}\,dx}{b}\\
&= \frac{x}{b}-\frac{\left(-bx+\coth^{-1}(\tanh(a+bx))\right)\operatorname{Subst}\left(\int \frac{1}{x}\,dx, x, \coth^{-1}(\tanh(a+bx))\right)}{b^2}\\
&= \frac{x}{b}+\frac{\left(bx-\coth^{-1}(\tanh(a+bx))\right)\log\left(\coth^{-1}(\tanh(a+bx))\right)}{b^2}
\end{aligned}$$

**Mathematica [A]** time = 0.03, size = 31, normalized size = 1.00

$$\frac{x}{b}-\frac{\left(\coth^{-1}(\tanh(a+bx))-bx\right)\log\left(\coth^{-1}(\tanh(a+bx))\right)}{b^2}$$

Antiderivative was successfully verified.

```
[In] Integrate[x/ArcCoth[Tanh[a + b*x]],x]
```

```
[Out] x/b - ((-(b*x) + ArcCoth[Tanh[a + b*x]])*Log[ArcCoth[Tanh[a + b*x]]])/b^2
```

**fricas [B]** time = 0.60, size = 79, normalized size = 2.55

$$\frac{2\,bx + 2\,\pi\arctan\left(-\frac{2\,bx+2\,a-\sqrt{4\,b^2x^2+8\,abx+\pi^2+4\,a^2}}{\pi}\right) - a\log\left(4\,b^2x^2 + 8\,abx + \pi^2 + 4\,a^2\right)}{2\,b^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x/arccoth(tanh(b*x+a)),x, algorithm="fricas")
[Out] 1/2*(2*b*x + 2*pi*arctan(-(2*b*x + 2*a - sqrt(4*b^2*x^2 + 8*a*b*x + pi^2 +
4*a^2))/pi) - a*log(4*b^2*x^2 + 8*a*b*x + pi^2 + 4*a^2))/b^2
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{x}{\operatorname{arcoth}\left(\tanh\left(bx + a\right)\right)}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x/arccoth(tanh(b*x+a)),x, algorithm="giac")
[Out] integrate(x/arccoth(tanh(b*x + a)), x)
```

**maple [C]** time = 0.41, size = 4303, normalized size = 138.81

output too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x/arccoth(tanh(b*x+a)),x)
[Out] x/b-1/2*I/b^2*ln(-2*Pi*csgn(I/(exp(2*b*x+2*a)+1))^2+Pi*csgn(I/(exp(2*b*x+2*
a)+1))*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))-Pi*
csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2+2*Pi
*csgn(I/(exp(2*b*x+2*a)+1))^3+Pi*csgn(I*exp(b*x+a))^2*csgn(I*exp(2*b*x+2*a)
)-2*Pi*csgn(I*exp(b*x+a))*csgn(I*exp(2*b*x+2*a))^2+Pi*csgn(I*exp(2*b*x+2*a)
)^3-Pi*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2+P
i*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^3+4*I*(ln(exp(b*x+a))-b*x-a)+4*
I*b*x+4*I*a+2*Pi)*Pi*csgn(I/(exp(2*b*x+2*a)+1))^2+1/4*I/b^2*ln(-2*Pi*csgn(I
/(exp(2*b*x+2*a)+1))^2+Pi*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(2*b*x+2*a))
*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))-Pi*csgn(I/(exp(2*b*x+2*a)+1))*cs
gn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2+2*Pi*csgn(I/(exp(2*b*x+2*a)+1))^3
+Pi*csgn(I*exp(b*x+a))^2*csgn(I*exp(2*b*x+2*a))-2*Pi*csgn(I*exp(b*x+a))*csg
n(I*exp(2*b*x+2*a))^2+Pi*csgn(I*exp(2*b*x+2*a))^3-Pi*csgn(I*exp(2*b*x+2*a))
*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2+Pi*csgn(I*exp(2*b*x+2*a)/(exp(
2*b*x+2*a)+1))^3+4*I*(ln(exp(b*x+a))-b*x-a)+4*I*b*x+4*I*a+2*Pi)*Pi*csgn(I/(
exp(2*b*x+2*a)+1))*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+
2*a)+1))-1/4*I/b^2*ln(-2*Pi*csgn(I/(exp(2*b*x+2*a)+1))^2+Pi*csgn(I/(exp(2*b
*x+2*a)+1))*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1)
)-Pi*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2
+2*Pi*csgn(I/(exp(2*b*x+2*a)+1))^3+Pi*csgn(I*exp(b*x+a))^2*csgn(I*exp(2*b*x
+2*a))-2*Pi*csgn(I*exp(b*x+a))*csgn(I*exp(2*b*x+2*a))^2+Pi*csgn(I*exp(2*b*x
+2*a))^3-Pi*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1)
)^2+Pi*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^3+4*I*(ln(exp(b*x+a))-b*x-
a)+4*I*b*x+4*I*a+2*Pi)*Pi*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(2*b*x+2*a)/
(exp(2*b*x+2*a)+1))^2+1/2*I/b^2*ln(-2*Pi*csgn(I/(exp(2*b*x+2*a)+1))^2+Pi*cs
gn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(
2*b*x+2*a)+1))-Pi*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(2*b*x+2*a)/(exp(2*b
*x+2*a)+1))^2+2*Pi*csgn(I/(exp(2*b*x+2*a)+1))^3+Pi*csgn(I*exp(b*x+a))^2*csg
```

```
n(I*exp(2*b*x+2*a))-2*Pi*csgn(I*exp(b*x+a))*csgn(I*exp(2*b*x+2*a))^2+Pi*csg
n(I*exp(2*b*x+2*a))^3-Pi*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(
2*b*x+2*a)+1))^2+Pi*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^3+4*I*(ln(exp
(b*x+a))-b*x-a)+4*I*b*x+4*I*a+2*Pi)*Pi*csgn(I/(exp(2*b*x+2*a)+1))^3+1/4*I/b
^2*ln(-2*Pi*csgn(I/(exp(2*b*x+2*a)+1))^2+Pi*csgn(I/(exp(2*b*x+2*a)+1))*csgn
(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))-Pi*csgn(I/(exp
(2*b*x+2*a)+1))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2+2*Pi*csgn(I/(ex
p(2*b*x+2*a)+1))^3+Pi*csgn(I*exp(b*x+a))^2*csgn(I*exp(2*b*x+2*a))-2*Pi*csgn
(I*exp(b*x+a))*csgn(I*exp(2*b*x+2*a))^2+Pi*csgn(I*exp(2*b*x+2*a))^3-Pi*csgn
(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2+Pi*csgn(I*ex
p(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^3+4*I*(ln(exp(b*x+a))-b*x-a)+4*I*b*x+4*I*a
+2*Pi)*Pi*csgn(I*exp(b*x+a))^2*csgn(I*exp(2*b*x+2*a))-1/2*I/b^2*ln(-2*Pi*cs
gn(I/(exp(2*b*x+2*a)+1))^2+Pi*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(2*b*x+2
*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))-Pi*csgn(I/(exp(2*b*x+2*a)+1)
)*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2+2*Pi*csgn(I/(exp(2*b*x+2*a)+1
))^3+Pi*csgn(I*exp(b*x+a))^2*csgn(I*exp(2*b*x+2*a))-2*Pi*csgn(I*exp(b*x+a))
*csgn(I*exp(2*b*x+2*a))^2+Pi*csgn(I*exp(2*b*x+2*a))^3-Pi*csgn(I*exp(2*b*x+2
*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2+Pi*csgn(I*exp(2*b*x+2*a)/(
exp(2*b*x+2*a)+1))^3+4*I*(ln(exp(b*x+a))-b*x-a)+4*I*b*x+4*I*a+2*Pi)*Pi*csgn
(I*exp(b*x+a))*csgn(I*exp(2*b*x+2*a))^2+1/4*I/b^2*ln(-2*Pi*csgn(I/(exp(2*b*
x+2*a)+1))^2+Pi*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(2*b*x+2*a))*csgn(I*ex
p(2*b*x+2*a)/(exp(2*b*x+2*a)+1))-Pi*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(2
*b*x+2*a)/(exp(2*b*x+2*a)+1))^2+2*Pi*csgn(I/(exp(2*b*x+2*a)+1))^3+Pi*csgn(I
*exp(b*x+a))^2*csgn(I*exp(2*b*x+2*a))-2*Pi*csgn(I*exp(b*x+a))*csgn(I*exp(2*
b*x+2*a))^2+Pi*csgn(I*exp(2*b*x+2*a))^3-Pi*csgn(I*exp(2*b*x+2*a))*csgn(I*ex
p(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2+Pi*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)
+1))^3+4*I*(ln(exp(b*x+a))-b*x-a)+4*I*b*x+4*I*a+2*Pi)*Pi*csgn(I*exp(2*b*x+2
*a))^3-1/4*I/b^2*ln(-2*Pi*csgn(I/(exp(2*b*x+2*a)+1))^2+Pi*csgn(I/(exp(2*b*x
+2*a)+1))*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))-
Pi*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2+2
*Pi*csgn(I/(exp(2*b*x+2*a)+1))^3+Pi*csgn(I*exp(b*x+a))^2*csgn(I*exp(2*b*x+2
*a))-2*Pi*csgn(I*exp(b*x+a))*csgn(I*exp(2*b*x+2*a))^2+Pi*csgn(I*exp(2*b*x+2
*a))^3-Pi*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^
2+Pi*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^3+4*I*(ln(exp(b*x+a))-b*x-a)
+4*I*b*x+4*I*a+2*Pi)*Pi*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2
*b*x+2*a)+1))^2+1/4*I/b^2*ln(-2*Pi*csgn(I/(exp(2*b*x+2*a)+1))^2+Pi*csgn(I/(
exp(2*b*x+2*a)+1))*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+
2*a)+1))-Pi*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a
)+1))^2+2*Pi*csgn(I/(exp(2*b*x+2*a)+1))^3+Pi*csgn(I*exp(b*x+a))^2*csgn(I*ex
p(2*b*x+2*a))-2*Pi*csgn(I*exp(b*x+a))*csgn(I*exp(2*b*x+2*a))^2+Pi*csgn(I*ex
p(2*b*x+2*a))^3-Pi*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+
2*a)+1))^2+Pi*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^3+4*I*(ln(exp(b*x+a
))-b*x-a)+4*I*b*x+4*I*a+2*Pi)*Pi*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^
3+1/2*I*Pi*ln(-2*Pi*csgn(I/(exp(2*b*x+2*a)+1))^2+Pi*csgn(I/(exp(2*b*x+2*a)+
1))*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))-Pi*csg
n(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2+2*Pi*cs
gn(I/(exp(2*b*x+2*a)+1))^3+Pi*csgn(I*exp(b*x+a))^2*csgn(I*exp(2*b*x+2*a))-2
*Pi*csgn(I*exp(b*x+a))*csgn(I*exp(2*b*x+2*a))^2+Pi*csgn(I*exp(2*b*x+2*a))^3
-Pi*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2+Pi*c
sgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^3+4*I*(ln(exp(b*x+a))-b*x-a)+4*I*b
*x+4*I*a+2*Pi)/b^2+1/b*ln(-2*Pi*csgn(I/(exp(2*b*x+2*a)+1))^2+Pi*csgn(I/(exp
(2*b*x+2*a)+1))*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a
)+1))-Pi*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1
))^2+2*Pi*csgn(I/(exp(2*b*x+2*a)+1))^3+Pi*csgn(I*exp(b*x+a))^2*csgn(I*exp(2
*b*x+2*a))-2*Pi*csgn(I*exp(b*x+a))*csgn(I*exp(2*b*x+2*a))^2+Pi*csgn(I*exp(2
*b*x+2*a))^3-Pi*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a
)+1))^2+Pi*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^3+4*I*(ln(exp(b*x+a))-
b*x-a)+4*I*b*x+4*I*a+2*Pi)*x-1/b^2*ln(-2*Pi*csgn(I/(exp(2*b*x+2*a)+1))^2+Pi
*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(e
```

```
xp(2*b*x+2*a)+1))-Pi*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(2*b*x+2*a)/(exp(
2*b*x+2*a)+1))^2+2*Pi*csgn(I/(exp(2*b*x+2*a)+1))^3+Pi*csgn(I*exp(b*x+a))^2*
csgn(I*exp(2*b*x+2*a))-2*Pi*csgn(I*exp(b*x+a))*csgn(I*exp(2*b*x+2*a))^2+Pi*
csgn(I*exp(2*b*x+2*a))^3-Pi*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(e
xp(2*b*x+2*a)+1))^2+Pi*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^3+4*I*(ln(
exp(b*x+a))-b*x-a)+4*I*b*x+4*I*a+2*Pi)*ln(exp(b*x+a))
```

**maxima [C]** time = 0.52, size = 30, normalized size = 0.97

$$\frac{x}{b} - \frac{(-i\,\pi + 2\,a)\log\left(-i\,\pi + 2\,bx + 2\,a\right)}{2\,b^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x/arccoth(tanh(b*x+a)),x, algorithm="maxima")
```

```
[Out] x/b - 1/2*(-I*pi + 2*a)*log(-I*pi + 2*b*x + 2*a)/b^2
```

**mupad [B]** time = 0.14, size = 108, normalized size = 3.48

$$\frac{x}{b} + \frac{\ln\left(\ln\left(\frac{2\,e^{2\,a}\,e^{2\,b\,x}}{e^{2\,a}\,e^{2\,b\,x}-1}\right) - \ln\left(-\frac{2}{e^{2\,a}\,e^{2\,b\,x}-1}\right)\right)\left(\ln\left(-\frac{2}{e^{2\,a}\,e^{2\,b\,x}-1}\right) - \ln\left(\frac{2\,e^{2\,a}\,e^{2\,b\,x}}{e^{2\,a}\,e^{2\,b\,x}-1}\right) + 2\,b\,x\right)}{2\,b^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x/acoth(tanh(a + b*x)),x)
```

```
[Out] x/b + (log(log((2*exp(2*a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x) - 1)) - log(-2/
(exp(2*a)*exp(2*b*x) - 1)))*(log(-2/(exp(2*a)*exp(2*b*x) - 1)) - log((2*exp
(2*a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x) - 1)) + 2*b*x))/(2*b^2)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{x}{\operatorname{acoth}\left(\tanh\left(a + bx\right)\right)}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x/acoth(tanh(b*x+a)),x)
```

```
[Out] Integral(x/acoth(tanh(a + b*x)), x)
```

# 3.162 $\int \frac{1}{\coth^{-1}(\tanh(a+bx))} dx$

**Optimal**. Leaf size=12

$$\frac{\log\left(\coth^{-1}(\tanh(a+bx))\right)}{b}$$

```
[Out] ln(arccoth(tanh(b*x+a)))/b
```

**Rubi [A]** time = 0.00, antiderivative size = 12, normalized size of antiderivative = 1.00, number of steps used = 2, number of rules used = 2, integrand size = 9, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.222, Rules used = {2157, 29}

$$\frac{\log\left(\coth^{-1}(\tanh(a+bx))\right)}{b}$$

Antiderivative was successfully verified.

```
[In] Int[ArcCoth[Tanh[a + b*x]]^(-1),x]
[Out] Log[ArcCoth[Tanh[a + b*x]]]/b
```

Rule 29

```
Int[(x_)^(-1), x_Symbol] :> Simp[Log[x], x]
```

Rule 2157

```
Int[(u_)^(m_.), x_Symbol] :> With[{c = Simplify[D[u, x]]}, Dist[1/c, Subst[
Int[x^m, x], x, u], x]] /; FreeQ[m, x] && PiecewiseLinearQ[u, x]
```

Rubi steps

$$\begin{aligned}
\int \frac{1}{\coth^{-1}(\tanh(a+bx))} dx &= \frac{\text{Subst}\left(\int \frac{1}{x} dx, x, \coth^{-1}(\tanh(a+bx))\right)}{b} \\
&= \frac{\log\left(\coth^{-1}(\tanh(a+bx))\right)}{b}
\end{aligned}$$

**Mathematica [A]** time = 0.05, size = 12, normalized size = 1.00

$$\frac{\log\left(\coth^{-1}(\tanh(a+bx))\right)}{b}$$

Antiderivative was successfully verified.

```
[In] Integrate[ArcCoth[Tanh[a + b*x]]^(-1),x]
[Out] Log[ArcCoth[Tanh[a + b*x]]]/b
```

**fricas [B]** time = 0.68, size = 28, normalized size = 2.33

$$\frac{\log\left(4 b^2 x^2 + 8 abx + \pi^2 + 4 a^2\right)}{2 b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/arccoth(tanh(b*x+a)),x, algorithm="fricas")
```

```
[Out] 1/2*log(4*b^2*x^2 + 8*a*b*x + pi^2 + 4*a^2)/b
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{1}{\operatorname{arcoth}\left(\tanh\left(bx+a\right)\right)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/arccoth(tanh(b*x+a)),x, algorithm="giac")
[Out] integrate(1/arccoth(tanh(b*x + a)), x)
```

**maple [A]** time = 0.07, size = 13, normalized size = 1.08

$$\frac{\ln\left(\operatorname{arccoth}\left(\tanh\left(bx+a\right)\right)\right)}{b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(1/arccoth(tanh(b*x+a)),x)
[Out] ln(arccoth(tanh(b*x+a)))/b
```

**maxima [C]** time = 0.41, size = 16, normalized size = 1.33

$$\frac{\log\left(-\frac{1}{2}i\,\pi-bx-a\right)}{b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/arccoth(tanh(b*x+a)),x, algorithm="maxima")
[Out] log(-1/2*I*pi - b*x - a)/b
```

**mupad [B]** time = 1.18, size = 12, normalized size = 1.00

$$\frac{\ln\left(\operatorname{acoth}\left(\tanh\left(a+b\,x\right)\right)\right)}{b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(1/acoth(tanh(a + b*x)),x)
[Out] log(acoth(tanh(a + b*x)))/b
```

**sympy [F(-2)]** time = 0.00, size = 0, normalized size = 0.00

Exception raised: TypeError

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/acoth(tanh(b*x+a)),x)
[Out] Exception raised: TypeError
```

## 3.163 $\int \frac{1}{x \coth^{-1}(\tanh(a+bx))} dx$

**Optimal**. Leaf size=44

$$\frac{\log\left(\coth^{-1}(\tanh(a+bx))\right)}{bx-\coth^{-1}(\tanh(a+bx))}-\frac{\log(x)}{bx-\coth^{-1}(\tanh(a+bx))}$$

```
[Out] -ln(x)/(b*x-arccoth(tanh(b*x+a)))+ln(arccoth(tanh(b*x+a)))/(b*x-arccoth(tan
h(b*x+a)))
```

**Rubi [A]** time = 0.03, antiderivative size = 44, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 3, integrand size = 13, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.231, Rules used = {2160, 2157, 29}

$$\frac{\log\left(\coth^{-1}(\tanh(a+bx))\right)}{bx-\coth^{-1}(\tanh(a+bx))}-\frac{\log(x)}{bx-\coth^{-1}(\tanh(a+bx))}$$

Antiderivative was successfully verified.

```
[In] Int[1/(x*ArcCoth[Tanh[a + b*x]]),x]
```

```
[Out] -(Log[x]/(b*x - ArcCoth[Tanh[a + b*x]])) + Log[ArcCoth[Tanh[a + b*x]]]/(b*x
 - ArcCoth[Tanh[a + b*x]])
```

Rule 29

```
Int[(x_)^(-1), x_Symbol] :> Simp[Log[x], x]
```

Rule 2157

```
Int[(u_)^(m_.), x_Symbol] :> With[{c = Simplify[D[u, x]]}, Dist[1/c, Subst[
Int[x^m, x], x, u], x]] /; FreeQ[m, x] && PiecewiseLinearQ[u, x]
```

Rule 2160

```
Int[1/((u_)*(v_)), x_Symbol] :> With[{a = Simplify[D[u, x]], b = Simplify[D
[v, x]]}, Dist[b/(b*u - a*v), Int[1/v, x], x] - Dist[a/(b*u - a*v), Int[1/u
, x], x] /; NeQ[b*u - a*v, 0]] /; PiecewiseLinearQ[u, v, x]
```

Rubi steps

$$\begin{aligned}
\int \frac{1}{x\coth^{-1}(\tanh(a+bx))}\,dx &= -\frac{\int \frac{1}{x}\,dx}{bx-\coth^{-1}(\tanh(a+bx))}+\frac{b\int \frac{1}{\coth^{-1}(\tanh(a+bx))}\,dx}{bx-\coth^{-1}(\tanh(a+bx))}\\
&= -\frac{\log(x)}{bx-\coth^{-1}(\tanh(a+bx))}+\frac{\text{Subst}\left(\int \frac{1}{x}\,dx,x,\coth^{-1}(\tanh(a+bx))\right)}{bx-\coth^{-1}(\tanh(a+bx))}\\
&= -\frac{\log(x)}{bx-\coth^{-1}(\tanh(a+bx))}+\frac{\log\left(\coth^{-1}(\tanh(a+bx))\right)}{bx-\coth^{-1}(\tanh(a+bx))}
\end{aligned}$$

**Mathematica [A]** time = 0.03, size = 29, normalized size = 0.66

$$\frac{\log\left(\coth^{-1}(\tanh(a+bx))\right)-\log(x)}{bx-\coth^{-1}(\tanh(a+bx))}$$

Antiderivative was successfully verified.

```
[In] Integrate[1/(x*ArcCoth[Tanh[a + b*x]]),x]
[Out] (-Log[x] + Log[ArcCoth[Tanh[a + b*x]]])/(b*x - ArcCoth[Tanh[a + b*x]])
```

**fricas [A]** time = 0.52, size = 87, normalized size = 1.98

$$-\frac{2\left(2\,\pi\arctan\left(-\frac{2\,bx+2\,a-\sqrt{4\,b^2x^2+8\,abx+\pi^2+4\,a^2}}{\pi}\right)+a\log\left(4\,b^2x^2+8\,abx+\pi^2+4\,a^2\right)-2\,a\log(x)\right)}{\pi^2+4\,a^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/x/arccoth(tanh(b*x+a)),x, algorithm="fricas")
[Out] -2*(2*pi*arctan(-(2*b*x + 2*a - sqrt(4*b^2*x^2 + 8*a*b*x + pi^2 + 4*a^2))/p
i) + a*log(4*b^2*x^2 + 8*a*b*x + pi^2 + 4*a^2) - 2*a*log(x))/(pi^2 + 4*a^2)
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int\frac{1}{x\operatorname{arcoth}\left(\tanh\left(bx+a\right)\right)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/x/arccoth(tanh(b*x+a)),x, algorithm="giac")
[Out] integrate(1/(x*arccoth(tanh(b*x + a))), x)
```

**maple [C]** time = 10.10, size = 972, normalized size = 22.09

result too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(1/x/arccoth(tanh(b*x+a)),x)
[Out] 4*I/(2*Pi*csgn(I/(exp(2*b*x+2*a)+1))^3+Pi*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I
*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))-Pi*csgn(I/(exp(2
*b*x+2*a)+1))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2+Pi*csgn(I*exp(2*b
*x+2*a))^3-2*Pi*csgn(I*exp(b*x+a))*csgn(I*exp(2*b*x+2*a))^2-Pi*csgn(I*exp(2
*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2+Pi*csgn(I*exp(b*x+a)
)^2*csgn(I*exp(2*b*x+2*a))+Pi*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^3-4
*I*b*x-2*Pi*csgn(I/(exp(2*b*x+2*a)+1))^2+4*I*ln(exp(b*x+a))+2*Pi)*ln(x)-4*I
/(2*Pi*csgn(I/(exp(2*b*x+2*a)+1))^3+Pi*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*ex
p(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))-Pi*csgn(I/(exp(2*b*
x+2*a)+1))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2+Pi*csgn(I*exp(2*b*x+
2*a))^3-2*Pi*csgn(I*exp(b*x+a))*csgn(I*exp(2*b*x+2*a))^2-Pi*csgn(I*exp(2*b*
x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2+Pi*csgn(I*exp(b*x+a))^2
*csgn(I*exp(2*b*x+2*a))+Pi*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^3-4*I*
b*x-2*Pi*csgn(I/(exp(2*b*x+2*a)+1))^2+4*I*ln(exp(b*x+a))+2*Pi)*ln(-2*Pi*csg
n(I/(exp(2*b*x+2*a)+1))^2+Pi*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(2*b*x+2*
a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))-Pi*csgn(I/(exp(2*b*x+2*a)+1))
*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2+2*Pi*csgn(I/(exp(2*b*x+2*a)+1)
)^3+Pi*csgn(I*exp(b*x+a))^2*csgn(I*exp(2*b*x+2*a))-2*Pi*csgn(I*exp(b*x+a))*
csgn(I*exp(2*b*x+2*a))^2+Pi*csgn(I*exp(2*b*x+2*a))^3-Pi*csgn(I*exp(2*b*x+2*
a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2+Pi*csgn(I*exp(2*b*x+2*a)/(e
xp(2*b*x+2*a)+1))^3+4*I*(ln(exp(b*x+a))-b*x-a)+4*I*b*x+4*I*a+2*Pi)
```

**maxima [C]** time = 0.52, size = 37, normalized size = 0.84

$$\frac{2\,\log\left(-i\,\pi+2\,bx+2\,a\right)}{i\,\pi-2\,a}-\frac{2\,\log(x)}{i\,\pi-2\,a}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/x/arccoth(tanh(b*x+a)),x, algorithm="maxima")
```

```
[Out] 2*log(-I*pi + 2*b*x + 2*a)/(I*pi - 2*a) - 2*log(x)/(I*pi - 2*a)
```

**mupad [B]** time = 2.91, size = 113, normalized size = 2.57

$$-\frac{4\,\mathrm{atanh}\left(\frac{4\,b\,x}{\ln\left(-\frac{2}{e^{2\,a}\,e^{2\,b\,x}-1}\right)-\ln\left(\frac{2\,e^{2\,a}\,e^{2\,b\,x}}{e^{2\,a}\,e^{2\,b\,x}-1}\right)+2\,b\,x}-1\right)}{\ln\left(-\frac{2}{e^{2\,a}\,e^{2\,b\,x}-1}\right)-\ln\left(\frac{2\,e^{2\,a}\,e^{2\,b\,x}}{e^{2\,a}\,e^{2\,b\,x}-1}\right)+2\,b\,x}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(1/(x*acoth(tanh(a + b*x))),x)
```

```
[Out] -(4*atanh((4*b*x)/(log(-2/(exp(2*a)*exp(2*b*x) - 1)) - log((2*exp(2*a)*exp(
2*b*x))/(exp(2*a)*exp(2*b*x) - 1)) + 2*b*x) - 1))/(log(-2/(exp(2*a)*exp(2*b
*x) - 1)) - log((2*exp(2*a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x) - 1)) + 2*b*x)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{1}{x\,\mathrm{acoth}\left(\tanh\left(a+bx\right)\right)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/x/acoth(tanh(b*x+a)),x)
```

```
[Out] Integral(1/(x*acoth(tanh(a + b*x))), x)
```

# 3.164 $\int \frac{1}{x^2 \coth^{-1}(\tanh(a+bx))} dx$

**Optimal**. Leaf size=65

$$\frac{1}{x\left(bx-\coth^{-1}(\tanh(a+bx))\right)}-\frac{b\log(x)}{\left(bx-\coth^{-1}(\tanh(a+bx))\right)^2}+\frac{b\log\left(\coth^{-1}(\tanh(a+bx))\right)}{\left(bx-\coth^{-1}(\tanh(a+bx))\right)^2}$$

```
[Out] 1/x/(b*x-arccoth(tanh(b*x+a)))-b*ln(x)/(b*x-arccoth(tanh(b*x+a)))^2+b*ln(ar
ccoth(tanh(b*x+a)))/(b*x-arccoth(tanh(b*x+a)))^2
```

**Rubi** [A] time = 0.04, antiderivative size = 65, normalized size of antiderivative = 1.00, number of steps used = 5, number of rules used = 4, integrand size = 13, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.308, Rules used = {2163, 2160, 2157, 29}

$$\frac{1}{x\left(bx-\coth^{-1}(\tanh(a+bx))\right)}-\frac{b\log(x)}{\left(bx-\coth^{-1}(\tanh(a+bx))\right)^2}+\frac{b\log\left(\coth^{-1}(\tanh(a+bx))\right)}{\left(bx-\coth^{-1}(\tanh(a+bx))\right)^2}$$

Antiderivative was successfully verified.

```
[In] Int[1/(x^2*ArcCoth[Tanh[a + b*x]]),x]
```

```
[Out] 1/(x*(b*x - ArcCoth[Tanh[a + b*x]])) - (b*Log[x])/(b*x - ArcCoth[Tanh[a + b
*x]])^2 + (b*Log[ArcCoth[Tanh[a + b*x]]])/(b*x - ArcCoth[Tanh[a + b*x]])^2
```

Rule 29

```
Int[(x_)^(-1), x_Symbol] :> Simp[Log[x], x]
```

Rule 2157

```
Int[(u_)^(m_.), x_Symbol] :> With[{c = Simplify[D[u, x]]}, Dist[1/c, Subst[
Int[x^m, x], x, u], x]] /; FreeQ[m, x] && PiecewiseLinearQ[u, x]
```

Rule 2160

```
Int[1/((u_)*(v_)), x_Symbol] :> With[{a = Simplify[D[u, x]], b = Simplify[D
[v, x]]}, Dist[b/(b*u - a*v), Int[1/v, x], x] - Dist[a/(b*u - a*v), Int[1/u
, x], x] /; NeQ[b*u - a*v, 0]] /; PiecewiseLinearQ[u, v, x]
```

Rule 2163

```
Int[(v_)^(n_)/(u_), x_Symbol] :> With[{a = Simplify[D[u, x]], b = Simplify[
D[v, x]]}, Simp[v^(n + 1)/((n + 1)*(b*u - a*v)), x] - Dist[(a*(n + 1))/((n
+ 1)*(b*u - a*v)), Int[v^(n + 1)/u, x], x] /; NeQ[b*u - a*v, 0]] /; Piecewi
seLinearQ[u, v, x] && LtQ[n, -1]
```

Rubi steps

$$\int \frac{1}{x^2 \coth^{-1}(\tanh(a+bx))}dx = \frac{1}{x\left(bx-\coth^{-1}(\tanh(a+bx))\right)} + \frac{b\int \frac{1}{x\coth^{-1}(\tanh(a+bx))}dx}{bx-\coth^{-1}(\tanh(a+bx))}$$

$$= \frac{1}{x\left(bx-\coth^{-1}(\tanh(a+bx))\right)} - \frac{b\int \frac{1}{x}dx}{\left(bx-\coth^{-1}(\tanh(a+bx))\right)^2} + \frac{b^2\int \frac{}{\coth^{-1}}}{\left(bx-\coth^{-1}\right.}$$

$$= \frac{1}{x\left(bx-\coth^{-1}(\tanh(a+bx))\right)} - \frac{b\log(x)}{\left(bx-\coth^{-1}(\tanh(a+bx))\right)^2} + \frac{b\,\mathrm{Subst}\left(\int \frac{1}{x}\right.}{\left(bx-\mathrm{c}\right.}$$

$$= \frac{1}{x\left(bx-\coth^{-1}(\tanh(a+bx))\right)} - \frac{b\log(x)}{\left(bx-\coth^{-1}(\tanh(a+bx))\right)^2} + \frac{b\log\left(\coth^{-}\right.}{\left(bx-\coth^{-1}\right.}$$

**Mathematica [A]** time = 0.03, size = 45, normalized size = 0.69

$$\frac{bx\left(\log\left(\coth^{-1}(\tanh(a+bx))\right)-\log(x)+1\right)-\coth^{-1}(\tanh(a+bx))}{x\left(\coth^{-1}(\tanh(a+bx))-bx\right)^2}$$

Antiderivative was successfully verified.

```
[In] Integrate[1/(x^2*ArcCoth[Tanh[a + b*x]]),x]
```

```
[Out] (-ArcCoth[Tanh[a + b*x]] + b*x*(1 - Log[x] + Log[ArcCoth[Tanh[a + b*x]]]))/
(x*(-(b*x) + ArcCoth[Tanh[a + b*x]])^2)
```

**fricas [B]** time = 0.59, size = 137, normalized size = 2.11

$$\frac{2\left(16\,\pi abx\arctan\left(-\frac{2\,bx+2\,a-\sqrt{4\,b^2x^2+8\,abx+\pi^2+4\,a^2}}{\pi}\right)-2\,\pi^2a-8\,a^3-\left(\pi^2b-4\,a^2b\right)x\log\left(4\,b^2x^2+8\,abx+\pi^2+4\,a^2\right.\right.}{\left(\pi^4+8\,\pi^2a^2+16\,a^4\right)x}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/x^2/arccoth(tanh(b*x+a)),x, algorithm="fricas")
```

```
[Out] 2*(16*pi*a*b*x*arctan(-(2*b*x + 2*a - sqrt(4*b^2*x^2 + 8*a*b*x + pi^2 + 4*a
^2))/pi) - 2*pi^2*a - 8*a^3 - (pi^2*b - 4*a^2*b)*x*log(4*b^2*x^2 + 8*a*b*x
+ pi^2 + 4*a^2) + 2*(pi^2*b - 4*a^2*b)*x*log(x))/((pi^4 + 8*pi^2*a^2 + 16*a
^4)*x)
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{1}{x^2 \operatorname{arcoth}(\tanh(bx+a))}dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/x^2/arccoth(tanh(b*x+a)),x, algorithm="giac")
```

```
[Out] integrate(1/(x^2*arccoth(tanh(b*x + a))), x)
```

**maple [F(-1)]** time = 180.00, size = 0, normalized size = 0.00

$$\int \frac{1}{x^2 \operatorname{arccoth}(\tanh(bx+a))}dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(1/x^2/arccoth(tanh(b*x+a)),x)
```

```
[Out] int(1/x^2/arccoth(tanh(b*x+a)),x)
```

**maxima [C]** time = 0.52, size = 65, normalized size = 1.00

$$-\frac{4\,b\log\left(-i\,\pi+2\,bx+2\,a\right)}{\pi^2+4i\,\pi a-4\,a^2}+\frac{4\,b\log(x)}{\pi^2+4i\,\pi a-4\,a^2}+\frac{2}{(i\,\pi-2\,a)x}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/x^2/arccoth(tanh(b*x+a)),x, algorithm="maxima")
```

```
[Out] -4*b*log(-I*pi + 2*b*x + 2*a)/(pi^2 + 4*I*pi*a - 4*a^2) + 4*b*log(x)/(pi^2
+ 4*I*pi*a - 4*a^2) + 2/((I*pi - 2*a)*x)
```

**mupad [B]** time = 3.12, size = 220, normalized size = 3.38

$$\frac{2\,\ln\left(-\frac{1}{e^{2\,a}\,e^{2\,b\,x}-1}\right)-2\,\ln\left(\frac{e^{2\,a}\,e^{2\,b\,x}}{e^{2\,a}\,e^{2\,b\,x}-1}\right)+4\,b\,x+b\,x\,\mathrm{atan}\left(\frac{\ln\left(\frac{2\,e^{2\,a}\,e^{2\,b\,x}}{e^{2\,a}\,e^{2\,b\,x}-1}\right)1\mathrm{i}-\ln\left(-\frac{2}{e^{2\,a}\,e^{2\,b\,x}-1}\right)1\mathrm{i}+b\,x\,2\mathrm{i}}{\ln\left(-\frac{2}{e^{2\,a}\,e^{2\,b\,x}-1}\right)-\ln\left(\frac{2\,e^{2\,a}\,e^{2\,b\,x}}{e^{2\,a}\,e^{2\,b\,x}-1}\right)+2\,b\,x}\right)8\mathrm{i}}{x\left(\ln\left(-\frac{1}{e^{2\,a}\,e^{2\,b\,x}-1}\right)-\ln\left(\frac{e^{2\,a}\,e^{2\,b\,x}}{e^{2\,a}\,e^{2\,b\,x}-1}\right)+2\,b\,x\right)^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(1/(x^2*acoth(tanh(a + b*x))),x)
```

```
[Out] (2*log(-1/(exp(2*a)*exp(2*b*x) - 1)) - 2*log((exp(2*a)*exp(2*b*x))/(exp(2*a
)*exp(2*b*x) - 1)) + 4*b*x + b*x*atan((log((2*exp(2*a)*exp(2*b*x))/(exp(2*a
)*exp(2*b*x) - 1))*1i - log(-2/(exp(2*a)*exp(2*b*x) - 1))*1i + b*x*2i)/(log
(-2/(exp(2*a)*exp(2*b*x) - 1)) - log((2*exp(2*a)*exp(2*b*x))/(exp(2*a)*exp(
2*b*x) - 1)) + 2*b*x))*8i)/(x*(log(-1/(exp(2*a)*exp(2*b*x) - 1)) - log((exp
(2*a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x) - 1)) + 2*b*x)^2)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int\frac{1}{x^2\,\mathrm{acoth}\left(\tanh\left(a+bx\right)\right)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/x**2/acoth(tanh(b*x+a)),x)
```

```
[Out] Integral(1/(x**2*acoth(tanh(a + b*x))), x)
```

## 3.165 $\int \frac{1}{x^3 \coth^{-1}(\tanh(a+bx))} dx$

**Optimal**. Leaf size=92

$$-\frac{b^2 \log(x)}{\left(bx-\coth^{-1}(\tanh(a+bx))\right)^3}+\frac{b^2 \log\left(\coth^{-1}(\tanh(a+bx))\right)}{\left(bx-\coth^{-1}(\tanh(a+bx))\right)^3}+\frac{1}{2x^2\left(bx-\coth^{-1}(\tanh(a+bx))\right)}+\frac{}{x\left(bx-\coth\right.}$$

```
[Out] b/x/(b*x-arccoth(tanh(b*x+a)))^2+1/2/x^2/(b*x-arccoth(tanh(b*x+a)))-b^2*ln(
x)/(b*x-arccoth(tanh(b*x+a)))^3+b^2*ln(arccoth(tanh(b*x+a)))/(b*x-arccoth(t
anh(b*x+a)))^3
```

**Rubi [A]** time = 0.06, antiderivative size = 92, normalized size of antiderivative = 1.00, number of steps used = 6, number of rules used = 4, integrand size = 13, $\frac{\text{number of rules}}{\text{integrand size}} = 0.308$, Rules used = {2163, 2160, 2157, 29}

$$-\frac{b^2 \log(x)}{\left(bx-\coth^{-1}(\tanh(a+bx))\right)^3}+\frac{b^2 \log\left(\coth^{-1}(\tanh(a+bx))\right)}{\left(bx-\coth^{-1}(\tanh(a+bx))\right)^3}+\frac{1}{2x^2\left(bx-\coth^{-1}(\tanh(a+bx))\right)}+\frac{}{x\left(bx-\coth\right.}$$

Antiderivative was successfully verified.

```
[In] Int[1/(x^3*ArcCoth[Tanh[a + b*x]]),x]
```

```
[Out] b/(x*(b*x - ArcCoth[Tanh[a + b*x]])^2) + 1/(2*x^2*(b*x - ArcCoth[Tanh[a + b
*x]])) - (b^2*Log[x])/(b*x - ArcCoth[Tanh[a + b*x]])^3 + (b^2*Log[ArcCoth[T
anh[a + b*x]]])/(b*x - ArcCoth[Tanh[a + b*x]])^3
```

Rule 29

```
Int[(x_)^(-1), x_Symbol] :> Simp[Log[x], x]
```

Rule 2157

```
Int[(u_)^(m_.), x_Symbol] :> With[{c = Simplify[D[u, x]]}, Dist[1/c, Subst[
Int[x^m, x], x, u], x]] /; FreeQ[m, x] && PiecewiseLinearQ[u, x]
```

Rule 2160

```
Int[1/((u_)*(v_)), x_Symbol] :> With[{a = Simplify[D[u, x]], b = Simplify[D
[v, x]]}, Dist[b/(b*u - a*v), Int[1/v, x], x] - Dist[a/(b*u - a*v), Int[1/u
, x], x] /; NeQ[b*u - a*v, 0]] /; PiecewiseLinearQ[u, v, x]
```

Rule 2163

```
Int[(v_)^(n_)/(u_), x_Symbol] :> With[{a = Simplify[D[u, x]], b = Simplify[
D[v, x]]}, Simp[v^(n + 1)/((n + 1)*(b*u - a*v)), x] - Dist[(a*(n + 1))/((n
+ 1)*(b*u - a*v)), Int[v^(n + 1)/u, x], x] /; NeQ[b*u - a*v, 0]] /; Piecewi
seLinearQ[u, v, x] && LtQ[n, -1]
```

Rubi steps

$$\int \frac{1}{x^3 \coth^{-1}(\tanh(a+bx))} dx = \frac{1}{2x^2 \left(bx - \coth^{-1}(\tanh(a+bx))\right)} - \frac{b \int \frac{1}{x^2 \coth^{-1}(\tanh(a+bx))} dx}{-bx + \coth^{-1}(\tanh(a+bx))}$$

$$= \frac{b}{x\left(bx - \coth^{-1}(\tanh(a+bx))\right)^2} + \frac{1}{2x^2\left(bx - \coth^{-1}(\tanh(a+bx))\right)} - \frac{}{(bx -}$$

$$= \frac{b}{x\left(bx - \coth^{-1}(\tanh(a+bx))\right)^2} + \frac{1}{2x^2\left(bx - \coth^{-1}(\tanh(a+bx))\right)} + \frac{}{(bx -}$$

$$= \frac{b}{x\left(bx - \coth^{-1}(\tanh(a+bx))\right)^2} + \frac{1}{2x^2\left(bx - \coth^{-1}(\tanh(a+bx))\right)} - \frac{}{(bx -}$$

$$= \frac{b}{x\left(bx - \coth^{-1}(\tanh(a+bx))\right)^2} + \frac{1}{2x^2\left(bx - \coth^{-1}(\tanh(a+bx))\right)} - \frac{}{(bx -}$$

**Mathematica [A]** time = 0.03, size = 66, normalized size = 0.72

$$\frac{b^2x^2\left(2\log\left(\coth^{-1}(\tanh(a+bx))\right) - 2\log(x) + 3\right) - 4bx\coth^{-1}(\tanh(a+bx)) + \coth^{-1}(\tanh(a+bx))^2}{2x^2\left(bx - \coth^{-1}(\tanh(a+bx))\right)^3}$$

Antiderivative was successfully verified.

```
[In] Integrate[1/(x^3*ArcCoth[Tanh[a + b*x]]),x]
```

```
[Out] (-4*b*x*ArcCoth[Tanh[a + b*x]] + ArcCoth[Tanh[a + b*x]]^2 + b^2*x^2*(3 - 2*
Log[x] + 2*Log[ArcCoth[Tanh[a + b*x]]]))/(2*x^2*(b*x - ArcCoth[Tanh[a + b*x
]])^3)
```

**fricas [B]** time = 0.68, size = 199, normalized size = 2.16

$$-\frac{2\left(\pi^4 a + 8\,\pi^2 a^3 + 16\,a^5 - 8\left(\pi^3 b^2 - 12\,\pi a^2 b^2\right)x^2 \arctan\left(-\frac{2\,bx + 2\,a - \sqrt{4\,b^2x^2 + 8\,abx + \pi^2 + 4\,a^2}}{\pi}\right) - 4\left(3\,\pi^2 ab^2 - 4\,a^3 b^2\right.\right.}{\left(\pi^6 + 12\,\pi^4 a^2 + 48\,\pi^2 a^4 +\right.}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/x^3/arccoth(tanh(b*x+a)),x, algorithm="fricas")
```

```
[Out] -2*(pi^4*a + 8*pi^2*a^3 + 16*a^5 - 8*(pi^3*b^2 - 12*pi*a^2*b^2)*x^2*arctan(
-(2*b*x + 2*a - sqrt(4*b^2*x^2 + 8*a*b*x + pi^2 + 4*a^2))/pi) - 4*(3*pi^2*a
*b^2 - 4*a^3*b^2)*x^2*log(4*b^2*x^2 + 8*a*b*x + pi^2 + 4*a^2) + 8*(3*pi^2*a
*b^2 - 4*a^3*b^2)*x^2*log(x) + 2*(pi^4*b - 16*a^4*b)*x)/((pi^6 + 12*pi^4*a^
2 + 48*pi^2*a^4 + 64*a^6)*x^2)
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{1}{x^3 \operatorname{arcoth}\left(\tanh\left(bx + a\right)\right)}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/x^3/arccoth(tanh(b*x+a)),x, algorithm="giac")
```

```
[Out] integrate(1/(x^3*arccoth(tanh(b*x + a))), x)
```

**maple** [**F(-1)**] time = 180.00, size = 0, normalized size = 0.00

$$\int \frac{1}{x^3 \operatorname{arccoth}(\tanh(bx+a))}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(1/x^3/arccoth(tanh(b*x+a)),x)
[Out] int(1/x^3/arccoth(tanh(b*x+a)),x)
```

**maxima** [**C**] time = 0.55, size = 108, normalized size = 1.17

$$\frac{8\,b^2 \log\left(-i\,\pi+2\,bx+2\,a\right)}{-i\,\pi^3+6\,\pi^2 a+12i\,\pi a^2-8\,a^3}-\frac{8\,b^2 \log(x)}{-i\,\pi^3+6\,\pi^2 a+12i\,\pi a^2-8\,a^3}-\frac{2\left(i\,\pi+4\,bx-2\,a\right)}{\left(2\,\pi^2+8i\,\pi a-8\,a^2\right)x^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/x^3/arccoth(tanh(b*x+a)),x, algorithm="maxima")
[Out] 8*b^2*log(-I*pi + 2*b*x + 2*a)/(-I*pi^3 + 6*pi^2*a + 12*I*pi*a^2 - 8*a^3) -
 8*b^2*log(x)/(-I*pi^3 + 6*pi^2*a + 12*I*pi*a^2 - 8*a^3) - 2*(I*pi + 4*b*x
- 2*a)/((2*pi^2 + 8*I*pi*a - 8*a^2)*x^2)
```

**mupad** [**B**] time = 3.60, size = 300, normalized size = 3.26

$$\frac{\ln\left(-\frac{1}{e^{2\,a}\,e^{2\,b\,x}-1}\right)^2-\ln\left(\frac{e^{2\,a}\,e^{2\,b\,x}}{e^{2\,a}\,e^{2\,b\,x}-1}\right)\left(2\,\ln\left(-\frac{1}{e^{2\,a}\,e^{2\,b\,x}-1}\right)+8\,b\,x\right)+\ln\left(\frac{e^{2\,a}\,e^{2\,b\,x}}{e^{2\,a}\,e^{2\,b\,x}-1}\right)^2+12\,b^2\,x^2+8\,b\,x\,\ln\left(-\frac{1}{e^{2\,a}\,e^{2\,b\,x}-1}\right)}{x^2\left(\ln\left(-\frac{1}{e^{2\,a}\,e^{2\,b\,x}-1}\right)-\ln\left(\frac{e^{2\,a}\,e^{2\,b\,x}}{e^{2\,a}\,e^{2\,b\,x}-1}\right)+2\,b\,x\right)^3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(1/(x^3*acoth(tanh(a + b*x))),x)
[Out] (log(-1/(exp(2*a)*exp(2*b*x) - 1))^2 - log((exp(2*a)*exp(2*b*x))/(exp(2*a)*
exp(2*b*x) - 1))*(2*log(-1/(exp(2*a)*exp(2*b*x) - 1)) + 8*b*x) + log((exp(2
*a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x) - 1))^2 + 12*b^2*x^2 + b^2*x^2*atan((l
og((2*exp(2*a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x) - 1))*1i - log(-2/(exp(2*a)
*exp(2*b*x) - 1))*1i + b*x*2i)/(log(-2/(exp(2*a)*exp(2*b*x) - 1)) - log((2*
exp(2*a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x) - 1)) + 2*b*x))*16i + 8*b*x*log(-
1/(exp(2*a)*exp(2*b*x) - 1)))/(x^2*(log(-1/(exp(2*a)*exp(2*b*x) - 1)) - log
((exp(2*a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x) - 1)) + 2*b*x)^3)
```

**sympy** [**F**] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{1}{x^3 \operatorname{acoth}(\tanh(a+bx))}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/x**3/acoth(tanh(b*x+a)),x)
[Out] Integral(1/(x**3*acoth(tanh(a + b*x))), x)
```

# 3.166 $\int \frac{x^m}{\coth^{-1}(\tanh(a+bx))^2}\,dx$

**Optimal**. Leaf size=65

$$-\frac{x^m\,{}_2F_1\left(1,m;m+1;\frac{bx}{bx-\coth^{-1}(\tanh(a+bx))}\right)}{b\left(bx-\coth^{-1}(\tanh(a+bx))\right)}-\frac{x^m}{b\coth^{-1}(\tanh(a+bx))}$$

```
[Out] -x^m/b/arccoth(tanh(b*x+a))-x^m*hypergeom([1, m],[1+m],b*x/(b*x-arccoth(tan
h(b*x+a))))/b/(b*x-arccoth(tanh(b*x+a)))
```

**Rubi [A]** time = 0.04, antiderivative size = 65, normalized size of antiderivative = 1.00, number of steps used = 2, number of rules used = 2, integrand size = 13, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.154, Rules used = {2168, 2164}

$$-\frac{x^m\,{}_2F_1\left(1,m;m+1;\frac{bx}{bx-\coth^{-1}(\tanh(a+bx))}\right)}{b\left(bx-\coth^{-1}(\tanh(a+bx))\right)}-\frac{x^m}{b\coth^{-1}(\tanh(a+bx))}$$

Antiderivative was successfully verified.

```
[In] Int[x^m/ArcCoth[Tanh[a + b*x]]^2,x]
```

```
[Out] -(x^m/(b*ArcCoth[Tanh[a + b*x]])) - (x^m*Hypergeometric2F1[1, m, 1 + m, (b*
x)/(b*x - ArcCoth[Tanh[a + b*x]])])/(b*(b*x - ArcCoth[Tanh[a + b*x]]))
```

Rule 2164

```
Int[(v_)^(n_)/(u_), x_Symbol] :> With[{a = Simplify[D[u, x]], b = Simplify[
D[v, x]]}, Simp[(v^(n + 1)*Hypergeometric2F1[1, n + 1, n + 2, -((a*v)/(b*u
- a*v))])/((n + 1)*(b*u - a*v)), x] /; NeQ[b*u - a*v, 0]] /; PiecewiseLinea
rQ[u, v, x] && !IntegerQ[n]
```

Rule 2168

```
Int[(u_)^(m_)*(v_)^(n_.), x_Symbol] :> With[{a = Simplify[D[u, x]], b = Sim
plify[D[v, x]]}, Simp[(u^(m + 1)*v^n)/(a*(m + 1)), x] - Dist[(b*n)/(a*(m +
1)), Int[u^(m + 1)*v^(n - 1), x], x] /; NeQ[b*u - a*v, 0]] /; FreeQ[{m, n},
 x] && PiecewiseLinearQ[u, v, x] && NeQ[m, -1] && ((LtQ[m, -1] && GtQ[n, 0]
 && !(ILtQ[m + n, -2] && (FractionQ[m] || GeQ[2*n + m + 1, 0]))) || (IGtQ[
n, 0] && IGtQ[m, 0] && LeQ[n, m]) || (IGtQ[n, 0] && !IntegerQ[m]) || (ILtQ
[m, 0] && !IntegerQ[n]))
```

Rubi steps

$$\begin{aligned}\int \frac{x^m}{\coth^{-1}(\tanh(a+bx))^2}\,dx &= -\frac{x^m}{b\coth^{-1}(\tanh(a+bx))}+\frac{m\int \frac{x^{-1+m}}{\coth^{-1}(\tanh(a+bx))}\,dx}{b}\\ &= -\frac{x^m}{b\coth^{-1}(\tanh(a+bx))}-\frac{x^m\,{}_2F_1\left(1,m;1+m;\frac{bx}{bx-\coth^{-1}(\tanh(a+bx))}\right)}{b\left(bx-\coth^{-1}(\tanh(a+bx))\right)}\end{aligned}$$

**Mathematica [A]** time = 0.54, size = 51, normalized size = 0.78

$$\frac{x^{m+1}\,{}_2F_1\left(2,m+1;m+2;-\frac{bx}{\coth^{-1}(\tanh(a+bx))-bx}\right)}{(m+1)\left(\coth^{-1}(\tanh(a+bx))-bx\right)^2}$$

Antiderivative was successfully verified.

```
[In] Integrate[x^m/ArcCoth[Tanh[a + b*x]]^2,x]
```

```
[Out] (x^(1 + m)*Hypergeometric2F1[2, 1 + m, 2 + m, -((b*x)/(-(b*x) + ArcCoth[Tan
h[a + b*x]]))])/((1 + m)*(-(b*x) + ArcCoth[Tanh[a + b*x]])^2)
```

**fricas [F]** time = 0.85, size = 0, normalized size = 0.00

$$\mathrm{integral}\left(\frac{x^m}{\operatorname{arcoth}\left(\tanh\left(bx+a\right)\right)^2},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^m/arccoth(tanh(b*x+a))^2,x, algorithm="fricas")
```

```
[Out] integral(x^m/arccoth(tanh(b*x + a))^2, x)
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{x^m}{\operatorname{arcoth}\left(\tanh\left(bx+a\right)\right)^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^m/arccoth(tanh(b*x+a))^2,x, algorithm="giac")
```

```
[Out] integrate(x^m/arccoth(tanh(b*x + a))^2, x)
```

**maple [F]** time = 2.95, size = 0, normalized size = 0.00

$$\int \frac{x^m}{\operatorname{arccoth}\left(\tanh\left(bx+a\right)\right)^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^m/arccoth(tanh(b*x+a))^2,x)
```

```
[Out] int(x^m/arccoth(tanh(b*x+a))^2,x)
```

**maxima [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{x^m}{\operatorname{arcoth}\left(\tanh\left(bx+a\right)\right)^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^m/arccoth(tanh(b*x+a))^2,x, algorithm="maxima")
```

```
[Out] integrate(x^m/arccoth(tanh(b*x + a))^2, x)
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.02

$$\int \frac{x^m}{\operatorname{acoth}\left(\tanh\left(a+b\,x\right)\right)^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^m/acoth(tanh(a + b*x))^2,x)
```

```
[Out] int(x^m/acoth(tanh(a + b*x))^2, x)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{x^m}{\operatorname{acoth}^2\left(\tanh\left(a+bx\right)\right)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**m/acoth(tanh(b*x+a))**2,x)
```

```
[Out] Integral(x**m/acoth(tanh(a + b*x))**2, x)
```

## 3.167 $\int \frac{x^4}{\coth^{-1}(\tanh(a+bx))^2}\,dx$

**Optimal**. Leaf size=98

$$\frac{4\left(bx-\coth^{-1}(\tanh(a+bx))\right)^3\log\left(\coth^{-1}(\tanh(a+bx))\right)}{b^5}+\frac{4x\left(bx-\coth^{-1}(\tanh(a+bx))\right)^2}{b^4}+\frac{2x^2\left(bx-\coth^{-1}\right.}{b^3}$$

```
[Out] 4/3*x^3/b^2+2*x^2*(b*x-arccoth(tanh(b*x+a)))/b^3+4*x*(b*x-arccoth(tanh(b*x+
a)))^2/b^4-x^4/b/arccoth(tanh(b*x+a))+4*(b*x-arccoth(tanh(b*x+a)))^3*ln(arc
coth(tanh(b*x+a)))/b^5
```

**Rubi [A]** time = 0.08, antiderivative size = 98, normalized size of antiderivative = 1.00, number of steps used = 6, number of rules used = 5, integrand size = 13, $\frac{\text{number of rules}}{\text{integrand size}} = 0.385$, Rules used = {2168, 2159, 2158, 2157, 29}

$$\frac{2x^2\left(bx-\coth^{-1}(\tanh(a+bx))\right)}{b^3}+\frac{4x\left(bx-\coth^{-1}(\tanh(a+bx))\right)^2}{b^4}+\frac{4\left(bx-\coth^{-1}(\tanh(a+bx))\right)^3\log\left(\coth^{-1}\right.}{b^5}$$

Antiderivative was successfully verified.

```
[In] Int[x^4/ArcCoth[Tanh[a + b*x]]^2,x]
```

```
[Out] (4*x^3)/(3*b^2) + (2*x^2*(b*x - ArcCoth[Tanh[a + b*x]]))/b^3 + (4*x*(b*x -
ArcCoth[Tanh[a + b*x]])^2)/b^4 - x^4/(b*ArcCoth[Tanh[a + b*x]]) + (4*(b*x -
 ArcCoth[Tanh[a + b*x]])^3*Log[ArcCoth[Tanh[a + b*x]]])/b^5
```

Rule 29

```
Int[(x_)^(-1), x_Symbol] :> Simp[Log[x], x]
```

Rule 2157

```
Int[(u_)^(m_.), x_Symbol] :> With[{c = Simplify[D[u, x]]}, Dist[1/c, Subst[
Int[x^m, x], x, u], x]] /; FreeQ[m, x] && PiecewiseLinearQ[u, x]
```

Rule 2158

```
Int[(v_)/(u_), x_Symbol] :> With[{a = Simplify[D[u, x]], b = Simplify[D[v,
x]]}, Simp[(b*x)/a, x] - Dist[(b*u - a*v)/a, Int[1/u, x], x] /; NeQ[b*u - a
*v, 0]] /; PiecewiseLinearQ[u, v, x]
```

Rule 2159

```
Int[(v_)^(n_)/(u_), x_Symbol] :> With[{a = Simplify[D[u, x]], b = Simplify[
D[v, x]]}, Simp[v^n/(a*n), x] - Dist[(b*u - a*v)/a, Int[v^(n - 1)/u, x], x]
 /; NeQ[b*u - a*v, 0]] /; PiecewiseLinearQ[u, v, x] && GtQ[n, 0] && NeQ[n,
1]
```

Rule 2168

```
Int[(u_)^(m_)*(v_)^(n_.), x_Symbol] :> With[{a = Simplify[D[u, x]], b = Sim
plify[D[v, x]]}, Simp[(u^(m + 1)*v^n)/(a*(m + 1)), x] - Dist[(b*n)/(a*(m +
1)), Int[u^(m + 1)*v^(n - 1), x], x] /; NeQ[b*u - a*v, 0]] /; FreeQ[{m, n},
 x] && PiecewiseLinearQ[u, v, x] && NeQ[m, -1] && ((LtQ[m, -1] && GtQ[n, 0]
 &&  !(ILtQ[m + n, -2] && (FractionQ[m] || GeQ[2*n + m + 1, 0]))) || (IGtQ[
n, 0] && IGtQ[m, 0] && LeQ[n, m]) || (IGtQ[n, 0] &&  !IntegerQ[m]) || (ILtQ
[m, 0] &&  !IntegerQ[n]))
```

Rubi steps

$$\int \frac{x^4}{\coth^{-1}(\tanh(a+bx))^2}\,dx = -\frac{x^4}{b\coth^{-1}(\tanh(a+bx))} + \frac{4\int \frac{x^3}{\coth^{-1}(\tanh(a+bx))}\,dx}{b}$$

$$= \frac{4x^3}{3b^2} - \frac{x^4}{b\coth^{-1}(\tanh(a+bx))} - \frac{\left(4\left(-bx+\coth^{-1}(\tanh(a+bx))\right)\right)\int \frac{x^2}{\coth^{-1}(\tan}}{b^2}$$

$$= \frac{4x^3}{3b^2} + \frac{2x^2\left(bx-\coth^{-1}(\tanh(a+bx))\right)}{b^3} - \frac{x^4}{b\coth^{-1}(\tanh(a+bx))} + \frac{\left(4\left(-bx\right.\right.}{}$$

$$= \frac{4x^3}{3b^2} + \frac{2x^2\left(bx-\coth^{-1}(\tanh(a+bx))\right)}{b^3} + \frac{4x\left(bx-\coth^{-1}(\tanh(a+bx))\right)^2}{b^4} -$$

$$= \frac{4x^3}{3b^2} + \frac{2x^2\left(bx-\coth^{-1}(\tanh(a+bx))\right)}{b^3} + \frac{4x\left(bx-\coth^{-1}(\tanh(a+bx))\right)^2}{b^4} -$$

$$= \frac{4x^3}{3b^2} + \frac{2x^2\left(bx-\coth^{-1}(\tanh(a+bx))\right)}{b^3} + \frac{4x\left(bx-\coth^{-1}(\tanh(a+bx))\right)^2}{b^4} -$$

**Mathematica [A]** time = 0.09, size = 106, normalized size = 1.08

$$-\frac{\left(\coth^{-1}(\tanh(a+bx))-bx\right)^4}{b^5\coth^{-1}(\tanh(a+bx))} - \frac{4\left(\coth^{-1}(\tanh(a+bx))-bx\right)^3\log\left(\coth^{-1}(\tanh(a+bx))\right)}{b^5} + \frac{3x\left(\coth^{-1}(\tan\right.}{}$$

Antiderivative was successfully verified.

```
[In] Integrate[x^4/ArcCoth[Tanh[a + b*x]]^2,x]
```

```
[Out] x^3/(3*b^2) - (x^2*(-(b*x) + ArcCoth[Tanh[a + b*x]]))/b^3 + (3*x*(-(b*x) +
ArcCoth[Tanh[a + b*x]])^2)/b^4 - (-(b*x) + ArcCoth[Tanh[a + b*x]])^4/(b^5*A
rcCoth[Tanh[a + b*x]]) - (4*(-(b*x) + ArcCoth[Tanh[a + b*x]])^3*Log[ArcCoth
[Tanh[a + b*x]]])/b^5
```

**fricas [B]** time = 0.52, size = 326, normalized size = 3.33

$$\frac{16\,b^5x^5 - 16\,ab^4x^4 + 9\,\pi^4a + 24\,\pi^2a^3 - 48\,a^5 - 32\left(\pi^2b^3 - 2\,a^2b^3\right)x^3 - 12\left(7\,\pi^2ab^2 - 20\,a^3b^2\right)x^2 - 12\left(\pi^4b - 6\right.}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^4/arccoth(tanh(b*x+a))^2,x, algorithm="fricas")
```

```
[Out] 1/12*(16*b^5*x^5 - 16*a*b^4*x^4 + 9*pi^4*a + 24*pi^2*a^3 - 48*a^5 - 32*(pi^
2*b^3 - 2*a^2*b^3)*x^3 - 12*(7*pi^2*a*b^2 - 20*a^3*b^2)*x^2 - 12*(pi^4*b -
6*pi^2*a^2*b - 8*a^4*b)*x - 12*(pi^5 - 8*pi^3*a^2 - 48*pi*a^4 + 4*(pi^3*b^2
 - 12*pi*a^2*b^2)*x^2 + 8*(pi^3*a*b - 12*pi*a^3*b)*x)*arctan(-(2*b*x + 2*a
- sqrt(4*b^2*x^2 + 8*a*b*x + pi^2 + 4*a^2))/pi) + 6*(3*pi^4*a + 8*pi^2*a^3
- 16*a^5 + 4*(3*pi^2*a*b^2 - 4*a^3*b^2)*x^2 + 8*(3*pi^2*a^2*b - 4*a^4*b)*x)
*log(4*b^2*x^2 + 8*a*b*x + pi^2 + 4*a^2))/(4*b^7*x^2 + 8*a*b^6*x + pi^2*b^5
 + 4*a^2*b^5)
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{x^4}{\operatorname{arcoth}\left(\tanh\left(bx+a\right)\right)^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^4/arccoth(tanh(b*x+a))^2,x, algorithm="giac")
```

```
[Out] integrate(x^4/arccoth(tanh(b*x + a))^2, x)
```

**maple [C]** time = 5.95, size = 131085, normalized size = 1337.60

output too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^4/arccoth(tanh(b*x+a))^2,x)
```

```
[Out] result too large to display
```

**maxima [C]** time = 0.77, size = 178, normalized size = 1.82

$$\frac{4\left(16\,b^4x^4-3\,\pi^4-24i\,\pi^3a+72\,\pi^2a^2+96i\,\pi a^3-48\,a^4+\left(16i\,\pi b^3-32\,ab^3\right)x^3-\left(24\,\pi^2b^2+96i\,\pi ab^2-96\,a^2b^2\right)x^2 \cdots}{192\,b^6x-96i\,\pi b^5+192\,ab^5}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^4/arccoth(tanh(b*x+a))^2,x, algorithm="maxima")
```

```
[Out] 4*(16*b^4*x^4 - 3*pi^4 - 24*I*pi^3*a + 72*pi^2*a^2 + 96*I*pi*a^3 - 48*a^4 +
 (16*I*pi*b^3 - 32*a*b^3)*x^3 - (24*pi^2*b^2 + 96*I*pi*a*b^2 - 96*a^2*b^2)*
x^2 + (18*I*pi^3*b - 108*pi^2*a*b - 216*I*pi*a^2*b + 144*a^3*b)*x)/(192*b^6
*x - 96*I*pi*b^5 + 192*a*b^5) - 1/2*(I*pi^3 - 6*pi^2*a - 12*I*pi*a^2 + 8*a^
3)*log(-I*pi + 2*b*x + 2*a)/b^5
```

**mupad [B]** time = 1.29, size = 669, normalized size = 6.83

$$\frac{x^3}{3\,b^2}-\frac{\left(2\,a-\ln\left(\frac{2\,e^{2\,a}\,e^{2\,b\,x}}{e^{2\,a}\,e^{2\,b\,x}-1}\right)+\ln\left(-\frac{2}{e^{2\,a}\,e^{2\,b\,x}-1}\right)+2\,b\,x\right)^4+24\,a^2\left(2\,a-\ln\left(\frac{2\,e^{2\,a}\,e^{2\,b\,x}}{e^{2\,a}\,e^{2\,b\,x}-1}\right)+\ln\left(-\frac{2}{e^{2\,a}\,e^{2\,b\,x}-1}\right)+2\,b\,x\right)^2+ \cdots}{2\,b\,\left(8\,a\,b^4+8\,b^5\,x-4\,b^4\,\left(2\,a-\cdots\right.\right.}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^4/acoth(tanh(a + b*x))^2,x)
```

```
[Out] x^3/(3*b^2) - ((2*a - log((2*exp(2*a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x) - 1)
) + log(-2/(exp(2*a)*exp(2*b*x) - 1)) + 2*b*x)^4 + 24*a^2*(2*a - log((2*exp
(2*a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x) - 1)) + log(-2/(exp(2*a)*exp(2*b*x)
- 1)) + 2*b*x)^2 + 16*a^4 - 8*a*(2*a - log((2*exp(2*a)*exp(2*b*x))/(exp(2*a
)*exp(2*b*x) - 1)) + log(-2/(exp(2*a)*exp(2*b*x) - 1)) + 2*b*x)^3 - 32*a^3*
(2*a - log((2*exp(2*a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x) - 1)) + log(-2/(exp
(2*a)*exp(2*b*x) - 1)) + 2*b*x))/(2*b*(8*a*b^4 + 8*b^5*x - 4*b^4*(2*a - log
((2*exp(2*a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x) - 1)) + log(-2/(exp(2*a)*exp(
2*b*x) - 1)) + 2*b*x))) + (x^2*(log(-2/(exp(2*a)*exp(2*b*x) - 1)) - log((2*
exp(2*a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x) - 1)) + 2*b*x))/(2*b^3) + (3*x*(l
og(-2/(exp(2*a)*exp(2*b*x) - 1)) - log((2*exp(2*a)*exp(2*b*x))/(exp(2*a)*ex
p(2*b*x) - 1)) + 2*b*x)^2)/(4*b^4) + (log(log((2*exp(2*a)*exp(2*b*x))/(exp(
2*a)*exp(2*b*x) - 1)) - log(-2/(exp(2*a)*exp(2*b*x) - 1)))*((2*a - log((2*e
xp(2*a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x) - 1)) + log(-2/(exp(2*a)*exp(2*b*x
) - 1)) + 2*b*x)^3 - 8*a^3 - 6*a*(2*a - log((2*exp(2*a)*exp(2*b*x))/(exp(2*
a)*exp(2*b*x) - 1)) + log(-2/(exp(2*a)*exp(2*b*x) - 1)) + 2*b*x)^2 + 12*a^2
*(2*a - log((2*exp(2*a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x) - 1)) + log(-2/(ex
p(2*a)*exp(2*b*x) - 1)) + 2*b*x)))/(2*b^5)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{x^4}{\operatorname{acoth}^2\left(\tanh\left(a+bx\right)\right)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**4/acoth(tanh(b*x+a))**2,x)
```

```
[Out] Integral(x**4/acoth(tanh(a + b*x))**2, x)
```

# 3.168 $\int \frac{x^3}{\coth^{-1}(\tanh(a+bx))^2}\,dx$

**Optimal**. Leaf size=75

$$\frac{3\left(bx-\coth^{-1}(\tanh(a+bx))\right)^2\log\left(\coth^{-1}(\tanh(a+bx))\right)}{b^4}+\frac{3x\left(bx-\coth^{-1}(\tanh(a+bx))\right)}{b^3}-\frac{x^3}{b\coth^{-1}(\tanh(a+$$

```
[Out] 3/2*x^2/b^2+3*x*(b*x-arccoth(tanh(b*x+a)))/b^3-x^3/b/arccoth(tanh(b*x+a))+3
*(b*x-arccoth(tanh(b*x+a)))^2*ln(arccoth(tanh(b*x+a)))/b^4
```

**Rubi [A]** time = 0.05, antiderivative size = 75, normalized size of antiderivative = 1.00, number of steps used = 5, number of rules used = 5, integrand size = 13, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.385, Rules used = {2168, 2159, 2158, 2157, 29}

$$\frac{3x\left(bx-\coth^{-1}(\tanh(a+bx))\right)}{b^3}+\frac{3\left(bx-\coth^{-1}(\tanh(a+bx))\right)^2\log\left(\coth^{-1}(\tanh(a+bx))\right)}{b^4}-\frac{x^3}{b\coth^{-1}(\tanh(a+$$

Antiderivative was successfully verified.

```
[In] Int[x^3/ArcCoth[Tanh[a + b*x]]^2,x]
```

```
[Out] (3*x^2)/(2*b^2) + (3*x*(b*x - ArcCoth[Tanh[a + b*x]]))/b^3 - x^3/(b*ArcCoth
[Tanh[a + b*x]]) + (3*(b*x - ArcCoth[Tanh[a + b*x]])^2*Log[ArcCoth[Tanh[a +
 b*x]]])/b^4
```

Rule 29

```
Int[(x_)^(-1), x_Symbol] :> Simp[Log[x], x]
```

Rule 2157

```
Int[(u_)^(m_.), x_Symbol] :> With[{c = Simplify[D[u, x]]}, Dist[1/c, Subst[
Int[x^m, x], x, u], x]] /; FreeQ[m, x] && PiecewiseLinearQ[u, x]
```

Rule 2158

```
Int[(v_)/(u_), x_Symbol] :> With[{a = Simplify[D[u, x]], b = Simplify[D[v,
x]]}, Simp[(b*x)/a, x] - Dist[(b*u - a*v)/a, Int[1/u, x], x] /; NeQ[b*u - a
*v, 0]] /; PiecewiseLinearQ[u, v, x]
```

Rule 2159

```
Int[(v_)^(n_)/(u_), x_Symbol] :> With[{a = Simplify[D[u, x]], b = Simplify[
D[v, x]]}, Simp[v^n/(a*n), x] - Dist[(b*u - a*v)/a, Int[v^(n - 1)/u, x], x]
 /; NeQ[b*u - a*v, 0]] /; PiecewiseLinearQ[u, v, x] && GtQ[n, 0] && NeQ[n,
1]
```

Rule 2168

```
Int[(u_)^(m_)*(v_)^(n_.), x_Symbol] :> With[{a = Simplify[D[u, x]], b = Sim
plify[D[v, x]]}, Simp[(u^(m + 1)*v^n)/(a*(m + 1)), x] - Dist[(b*n)/(a*(m +
1)), Int[u^(m + 1)*v^(n - 1), x], x] /; NeQ[b*u - a*v, 0]] /; FreeQ[{m, n},
 x] && PiecewiseLinearQ[u, v, x] && NeQ[m, -1] && ((LtQ[m, -1] && GtQ[n, 0]
 &&  !(ILtQ[m + n, -2] && (FractionQ[m] || GeQ[2*n + m + 1, 0]))) || (IGtQ[
n, 0] && IGtQ[m, 0] && LeQ[n, m]) || (IGtQ[n, 0] &&  !IntegerQ[m]) || (ILtQ
[m, 0] &&  !IntegerQ[n]))
```

Rubi steps

$$\int \frac{x^3}{\coth^{-1}(\tanh(a+bx))^2}\,dx = -\frac{x^3}{b\coth^{-1}(\tanh(a+bx))} + \frac{3\int \frac{x^2}{\coth^{-1}(\tanh(a+bx))}\,dx}{b}$$

$$= \frac{3x^2}{2b^2} - \frac{x^3}{b\coth^{-1}(\tanh(a+bx))} - \frac{\left(3\left(-bx+\coth^{-1}(\tanh(a+bx))\right)\right)\int \frac{x}{\coth^{-1}(\tan}}{b^2}$$

$$= \frac{3x^2}{2b^2} + \frac{3x\left(bx-\coth^{-1}(\tanh(a+bx))\right)}{b^3} - \frac{x^3}{b\coth^{-1}(\tanh(a+bx))} + \left(3\left(-bx+\right.\right.$$

$$= \frac{3x^2}{2b^2} + \frac{3x\left(bx-\coth^{-1}(\tanh(a+bx))\right)}{b^3} - \frac{x^3}{b\coth^{-1}(\tanh(a+bx))} + \left(3\left(-bx+\right.\right.$$

$$= \frac{3x^2}{2b^2} + \frac{3x\left(bx-\coth^{-1}(\tanh(a+bx))\right)}{b^3} - \frac{x^3}{b\coth^{-1}(\tanh(a+bx))} + 3\left(bx-\mathrm{co}\right.$$

**Mathematica [A]** time = 0.05, size = 83, normalized size = 1.11

$$\frac{\left(\coth^{-1}(\tanh(a+bx))-bx\right)^3}{b^4\coth^{-1}(\tanh(a+bx))} + \frac{3\left(\coth^{-1}(\tanh(a+bx))-bx\right)^2\log\left(\coth^{-1}(\tanh(a+bx))\right)}{b^4} - \frac{2x\left(\coth^{-1}(\tanh\right.}{b^3}$$

Antiderivative was successfully verified.

```
[In] Integrate[x^3/ArcCoth[Tanh[a + b*x]]^2,x]
```

```
[Out] x^2/(2*b^2) - (2*x*(-(b*x) + ArcCoth[Tanh[a + b*x]]))/b^3 + (-(b*x) + ArcCo
th[Tanh[a + b*x]])^3/(b^4*ArcCoth[Tanh[a + b*x]]) + (3*(-(b*x) + ArcCoth[Ta
nh[a + b*x]])^2*Log[ArcCoth[Tanh[a + b*x]]])/b^4
```

**fricas [B]** time = 0.50, size = 244, normalized size = 3.25

$$\frac{16\,b^4x^4 - 32\,ab^3x^3 - 2\,\pi^4 + 32\,a^4 + 4\left(\pi^2b^2 - 28\,a^2b^2\right)x^2 - 8\left(5\,\pi^2ab + 4\,a^3b\right)x - 48\left(4\,\pi ab^2x^2 + 8\,\pi a^2bx + \pi^3\right.}{8\left(\right.}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^3/arccoth(tanh(b*x+a))^2,x, algorithm="fricas")
```

```
[Out] 1/8*(16*b^4*x^4 - 32*a*b^3*x^3 - 2*pi^4 + 32*a^4 + 4*(pi^2*b^2 - 28*a^2*b^2
)*x^2 - 8*(5*pi^2*a*b + 4*a^3*b)*x - 48*(4*pi*a*b^2*x^2 + 8*pi*a^2*b*x + pi
^3*a + 4*pi*a^3)*arctan(-(2*b*x + 2*a - sqrt(4*b^2*x^2 + 8*a*b*x + pi^2 + 4
*a^2))/pi) - 3*(pi^4 - 16*a^4 + 4*(pi^2*b^2 - 4*a^2*b^2)*x^2 + 8*(pi^2*a*b
- 4*a^3*b)*x)*log(4*b^2*x^2 + 8*a*b*x + pi^2 + 4*a^2))/(4*b^6*x^2 + 8*a*b^5
*x + pi^2*b^4 + 4*a^2*b^4)
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{x^3}{\operatorname{arcoth}\left(\tanh\left(bx+a\right)\right)^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^3/arccoth(tanh(b*x+a))^2,x, algorithm="giac")
```

```
[Out] integrate(x^3/arccoth(tanh(b*x + a))^2, x)
```

**maple [C]** time = 1.48, size = 29109, normalized size = 388.12

output too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^3/arccoth(tanh(b*x+a))^2,x)
```

```
[Out] result too large to display
```

**maxima [C]** time = 0.76, size = 124, normalized size = 1.65

$$\frac{4\left(4\,b^3x^3+i\,\pi^3-6\,\pi^2a-12i\,\pi a^2+8\,a^3+\left(6i\,\pi b^2-12\,ab^2\right)x^2+\left(4\,\pi^2b+16i\,\pi ab-16\,a^2b\right)x\right)}{32\,b^5x-16i\,\pi b^4+32\,ab^4}-\frac{\left(3\,\pi^2+12i\,\pi a-\right.}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^3/arccoth(tanh(b*x+a))^2,x, algorithm="maxima")
```

```
[Out] 4*(4*b^3*x^3 + I*pi^3 - 6*pi^2*a - 12*I*pi*a^2 + 8*a^3 + (6*I*pi*b^2 - 12*a
*b^2)*x^2 + (4*pi^2*b + 16*I*pi*a*b - 16*a^2*b)*x)/(32*b^5*x - 16*I*pi*b^4
+ 32*a*b^4) - 1/4*(3*pi^2 + 12*I*pi*a - 12*a^2)*log(-I*pi + 2*b*x + 2*a)/b^
4
```

**mupad [B]** time = 0.17, size = 490, normalized size = 6.53

$$\frac{x^2}{2\,b^2}+\frac{\ln\left(\ln\left(\frac{2\,e^{2\,a}\,e^{2\,b\,x}}{e^{2\,a}\,e^{2\,b\,x}-1}\right)-\ln\left(-\frac{2}{e^{2\,a}\,e^{2\,b\,x}-1}\right)\right)\left(3\left(2\,a-\ln\left(\frac{2\,e^{2\,a}\,e^{2\,b\,x}}{e^{2\,a}\,e^{2\,b\,x}-1}\right)+\ln\left(-\frac{2}{e^{2\,a}\,e^{2\,b\,x}-1}\right)+2\,b\,x\right)^2-12\,a\left(2\,a-\ln\left(\frac{2}{e}\right.\right.\right.}{4\,b^4}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^3/acoth(tanh(a + b*x))^2,x)
```

```
[Out] x^2/(2*b^2) + (log(log((2*exp(2*a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x) - 1)) -
 log(-2/(exp(2*a)*exp(2*b*x) - 1)))*(3*(2*a - log((2*exp(2*a)*exp(2*b*x))/(
exp(2*a)*exp(2*b*x) - 1)) + log(-2/(exp(2*a)*exp(2*b*x) - 1)) + 2*b*x)^2 -
12*a*(2*a - log((2*exp(2*a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x) - 1)) + log(-2
/(exp(2*a)*exp(2*b*x) - 1)) + 2*b*x) + 12*a^2))/(4*b^4) - ((2*a - log((2*ex
p(2*a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x) - 1)) + log(-2/(exp(2*a)*exp(2*b*x)
 - 1)) + 2*b*x)^3 - 8*a^3 - 6*a*(2*a - log((2*exp(2*a)*exp(2*b*x))/(exp(2*a
)*exp(2*b*x) - 1)) + log(-2/(exp(2*a)*exp(2*b*x) - 1)) + 2*b*x)^2 + 12*a^2*
(2*a - log((2*exp(2*a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x) - 1)) + log(-2/(exp
(2*a)*exp(2*b*x) - 1)) + 2*b*x))/(4*b*(2*a*b^3 + 2*b^4*x - b^3*(2*a - log((
2*exp(2*a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x) - 1)) + log(-2/(exp(2*a)*exp(2*
b*x) - 1)) + 2*b*x))) + (x*(log(-2/(exp(2*a)*exp(2*b*x) - 1)) - log((2*exp(
2*a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x) - 1)) + 2*b*x))/b^3
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int\frac{x^3}{\operatorname{acoth}^2(\tanh(a+bx))}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**3/acoth(tanh(b*x+a))**2,x)
```

```
[Out] Integral(x**3/acoth(tanh(a + b*x))**2, x)
```

# 3.169 $\int \frac{x^2}{\coth^{-1}(\tanh(a+bx))^2} dx$

**Optimal**. Leaf size=50

$$\frac{2\left(bx-\coth^{-1}(\tanh(a+bx))\right)\log\left(\coth^{-1}(\tanh(a+bx))\right)}{b^3}-\frac{x^2}{b\coth^{-1}(\tanh(a+bx))}+\frac{2x}{b^2}$$

```
[Out] 2*x/b^2-x^2/b/arccoth(tanh(b*x+a))+2*(b*x-arccoth(tanh(b*x+a)))*ln(arccoth(
tanh(b*x+a)))/b^3
```

**Rubi [A]** time = 0.03, antiderivative size = 50, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 4, integrand size = 13, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.308, Rules used = {2168, 2158, 2157, 29}

$$\frac{2\left(bx-\coth^{-1}(\tanh(a+bx))\right)\log\left(\coth^{-1}(\tanh(a+bx))\right)}{b^3}-\frac{x^2}{b\coth^{-1}(\tanh(a+bx))}+\frac{2x}{b^2}$$

Antiderivative was successfully verified.

```
[In] Int[x^2/ArcCoth[Tanh[a + b*x]]^2,x]
```

```
[Out] (2*x)/b^2 - x^2/(b*ArcCoth[Tanh[a + b*x]]) + (2*(b*x - ArcCoth[Tanh[a + b*x
]])*Log[ArcCoth[Tanh[a + b*x]]])/b^3
```

Rule 29

```
Int[(x_)^(-1), x_Symbol] :> Simp[Log[x], x]
```

Rule 2157

```
Int[(u_)^(m_.), x_Symbol] :> With[{c = Simplify[D[u, x]]}, Dist[1/c, Subst[
Int[x^m, x], x, u], x]] /; FreeQ[m, x] && PiecewiseLinearQ[u, x]
```

Rule 2158

```
Int[(v_)/(u_), x_Symbol] :> With[{a = Simplify[D[u, x]], b = Simplify[D[v,
x]]}, Simp[(b*x)/a, x] - Dist[(b*u - a*v)/a, Int[1/u, x], x] /; NeQ[b*u - a
*v, 0]] /; PiecewiseLinearQ[u, v, x]
```

Rule 2168

```
Int[(u_)^(m_)*(v_)^(n_.), x_Symbol] :> With[{a = Simplify[D[u, x]], b = Sim
plify[D[v, x]]}, Simp[(u^(m + 1)*v^n)/(a*(m + 1)), x] - Dist[(b*n)/(a*(m +
1)), Int[u^(m + 1)*v^(n - 1), x], x] /; NeQ[b*u - a*v, 0]] /; FreeQ[{m, n},
 x] && PiecewiseLinearQ[u, v, x] && NeQ[m, -1] && ((LtQ[m, -1] && GtQ[n, 0]
 &&  !(ILtQ[m + n, -2] && (FractionQ[m] || GeQ[2*n + m + 1, 0]))) || (IGtQ[
n, 0] && IGtQ[m, 0] && LeQ[n, m]) || (IGtQ[n, 0] &&  !IntegerQ[m]) || (ILtQ
[m, 0] &&  !IntegerQ[n]))
```

Rubi steps

$$\int \frac{x^2}{\coth^{-1}(\tanh(a+bx))^2}\,dx = -\frac{x^2}{b\coth^{-1}(\tanh(a+bx))} + \frac{2\int \frac{x}{\coth^{-1}(\tanh(a+bx))}\,dx}{b}$$
$$= \frac{2x}{b^2} - \frac{x^2}{b\coth^{-1}(\tanh(a+bx))} - \frac{\left(2\left(-bx+\coth^{-1}(\tanh(a+bx))\right)\right)\int \frac{1}{\coth^{-1}(\tanh(a+}}{b^2}$$
$$= \frac{2x}{b^2} - \frac{x^2}{b\coth^{-1}(\tanh(a+bx))} - \frac{\left(2\left(-bx+\coth^{-1}(\tanh(a+bx))\right)\right)\text{Subst}\left(\int \frac{1}{x}\,dx,\right.}{b^3}$$
$$= \frac{2x}{b^2} - \frac{x^2}{b\coth^{-1}(\tanh(a+bx))} + \frac{2\left(bx-\coth^{-1}(\tanh(a+bx))\right)\log\left(\coth^{-1}(\tanh(\right.}{b^3}$$

**Mathematica [A]** time = 0.07, size = 56, normalized size = 1.12

$$\frac{-\frac{\left(\coth^{-1}(\tanh(a+bx))-bx\right)^2}{\coth^{-1}(\tanh(a+bx))} + 2\left(bx-\coth^{-1}(\tanh(a+bx))\right)\log\left(\coth^{-1}(\tanh(a+bx))\right) + bx}{b^3}$$

Antiderivative was successfully verified.

```
[In] Integrate[x^2/ArcCoth[Tanh[a + b*x]]^2,x]
```

```
[Out] (b*x - (-(b*x) + ArcCoth[Tanh[a + b*x]])^2/ArcCoth[Tanh[a + b*x]] + 2*(b*x
- ArcCoth[Tanh[a + b*x]])*Log[ArcCoth[Tanh[a + b*x]]])/b^3
```

**fricas [B]** time = 0.46, size = 189, normalized size = 3.78

$$\frac{4b^3x^3 + 8ab^2x^2 + 2\pi^2bx - \pi^2a - 4a^3 + 2\left(4\pi b^2x^2 + 8\pi abx + \pi^3 + 4\pi a^2\right)\arctan\left(-\frac{2bx+2a-\sqrt{4b^2x^2+8abx+\pi^2+4a^2}}{\pi}\right.}{4b^5x^2 + 8ab^4x + \pi^2b^3 + 4a^2b^3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2/arccoth(tanh(b*x+a))^2,x, algorithm="fricas")
```

```
[Out] (4*b^3*x^3 + 8*a*b^2*x^2 + 2*pi^2*b*x - pi^2*a - 4*a^3 + 2*(4*pi*b^2*x^2 +
8*pi*a*b*x + pi^3 + 4*pi*a^2)*arctan(-(2*b*x + 2*a - sqrt(4*b^2*x^2 + 8*a*b
*x + pi^2 + 4*a^2))/pi) - (4*a*b^2*x^2 + 8*a^2*b*x + pi^2*a + 4*a^3)*log(4*
b^2*x^2 + 8*a*b*x + pi^2 + 4*a^2))/(4*b^5*x^2 + 8*a*b^4*x + pi^2*b^3 + 4*a^
2*b^3)
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{x^2}{\operatorname{arcoth}(\tanh(bx+a))^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2/arccoth(tanh(b*x+a))^2,x, algorithm="giac")
```

```
[Out] integrate(x^2/arccoth(tanh(b*x + a))^2, x)
```

**maple [C]** time = 0.48, size = 4626, normalized size = 92.52

output too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^2/arccoth(tanh(b*x+a))^2,x)
```

```
[Out] -4*I*x^2/b/(-2*Pi*csgn(I/(exp(2*b*x+2*a)+1))^2+Pi*csgn(I/(exp(2*b*x+2*a)+1)
)*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))-Pi*csgn(
I/(exp(2*b*x+2*a)+1))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2+2*Pi*csgn
(I/(exp(2*b*x+2*a)+1))^3+Pi*csgn(I*exp(b*x+a))^2*csgn(I*exp(2*b*x+2*a))-2*P
i*csgn(I*exp(b*x+a))*csgn(I*exp(2*b*x+2*a))^2+Pi*csgn(I*exp(2*b*x+2*a))^3-P
i*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2+Pi*csg
n(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^3+2*Pi+4*I*ln(exp(b*x+a)))+2*x/b^2-I
/b^3*ln(-2*Pi*csgn(I/(exp(2*b*x+2*a)+1))^2+Pi*csgn(I/(exp(2*b*x+2*a)+1))*cs
gn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))-Pi*csgn(I/(e
xp(2*b*x+2*a)+1))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2+2*Pi*csgn(I/(
exp(2*b*x+2*a)+1))^3+Pi*csgn(I*exp(b*x+a))^2*csgn(I*exp(2*b*x+2*a))-2*Pi*cs
gn(I*exp(b*x+a))*csgn(I*exp(2*b*x+2*a))^2+Pi*csgn(I*exp(2*b*x+2*a))^3-Pi*cs
gn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2+Pi*csgn(I*
exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^3+4*I*(ln(exp(b*x+a))-b*x-a)+4*I*b*x+4*I
*a+2*Pi)*Pi*csgn(I/(exp(2*b*x+2*a)+1))^2+1/2*I/b^3*ln(-2*Pi*csgn(I/(exp(2*b
*x+2*a)+1))^2+Pi*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(2*b*x+2*a))*csgn(I*e
xp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))-Pi*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(
2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2+2*Pi*csgn(I/(exp(2*b*x+2*a)+1))^3+Pi*csgn(
I*exp(b*x+a))^2*csgn(I*exp(2*b*x+2*a))-2*Pi*csgn(I*exp(b*x+a))*csgn(I*exp(2
*b*x+2*a))^2+Pi*csgn(I*exp(2*b*x+2*a))^3-Pi*csgn(I*exp(2*b*x+2*a))*csgn(I*e
xp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2+Pi*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a
)+1))^3+4*I*(ln(exp(b*x+a))-b*x-a)+4*I*b*x+4*I*a+2*Pi)*Pi*csgn(I/(exp(2*b*x
+2*a)+1))*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))-
1/2*I/b^3*ln(-2*Pi*csgn(I/(exp(2*b*x+2*a)+1))^2+Pi*csgn(I/(exp(2*b*x+2*a)+1
))*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))-Pi*csgn
(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2+2*Pi*csg
n(I/(exp(2*b*x+2*a)+1))^3+Pi*csgn(I*exp(b*x+a))^2*csgn(I*exp(2*b*x+2*a))-2*
Pi*csgn(I*exp(b*x+a))*csgn(I*exp(2*b*x+2*a))^2+Pi*csgn(I*exp(2*b*x+2*a))^3-
Pi*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2+Pi*cs
gn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^3+4*I*(ln(exp(b*x+a))-b*x-a)+4*I*b*
x+4*I*a+2*Pi)*Pi*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*
x+2*a)+1))^2+I/b^3*ln(-2*Pi*csgn(I/(exp(2*b*x+2*a)+1))^2+Pi*csgn(I/(exp(2*b
*x+2*a)+1))*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1)
)-Pi*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2
+2*Pi*csgn(I/(exp(2*b*x+2*a)+1))^3+Pi*csgn(I*exp(b*x+a))^2*csgn(I*exp(2*b*x
+2*a))-2*Pi*csgn(I*exp(b*x+a))*csgn(I*exp(2*b*x+2*a))^2+Pi*csgn(I*exp(2*b*x
+2*a))^3-Pi*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1)
)^2+Pi*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^3+4*I*(ln(exp(b*x+a))-b*x-
a)+4*I*b*x+4*I*a+2*Pi)*Pi*csgn(I/(exp(2*b*x+2*a)+1))^3+1/2*I/b^3*ln(-2*Pi*c
sgn(I/(exp(2*b*x+2*a)+1))^2+Pi*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(2*b*x+
2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))-Pi*csgn(I/(exp(2*b*x+2*a)+1
))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2+2*Pi*csgn(I/(exp(2*b*x+2*a)+
1))^3+Pi*csgn(I*exp(b*x+a))^2*csgn(I*exp(2*b*x+2*a))-2*Pi*csgn(I*exp(b*x+a)
)*csgn(I*exp(2*b*x+2*a))^2+Pi*csgn(I*exp(2*b*x+2*a))^3-Pi*csgn(I*exp(2*b*x+
2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2+Pi*csgn(I*exp(2*b*x+2*a)/
(exp(2*b*x+2*a)+1))^3+4*I*(ln(exp(b*x+a))-b*x-a)+4*I*b*x+4*I*a+2*Pi)*Pi*csg
n(I*exp(b*x+a))^2*csgn(I*exp(2*b*x+2*a))-I/b^3*ln(-2*Pi*csgn(I/(exp(2*b*x+2
*a)+1))^2+Pi*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2
*b*x+2*a)/(exp(2*b*x+2*a)+1))-Pi*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(2*b*
x+2*a)/(exp(2*b*x+2*a)+1))^2+2*Pi*csgn(I/(exp(2*b*x+2*a)+1))^3+Pi*csgn(I*ex
p(b*x+a))^2*csgn(I*exp(2*b*x+2*a))-2*Pi*csgn(I*exp(b*x+a))*csgn(I*exp(2*b*x
+2*a))^2+Pi*csgn(I*exp(2*b*x+2*a))^3-Pi*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2
*b*x+2*a)/(exp(2*b*x+2*a)+1))^2+Pi*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1)
)^3+4*I*(ln(exp(b*x+a))-b*x-a)+4*I*b*x+4*I*a+2*Pi)*Pi*csgn(I*exp(b*x+a))*cs
gn(I*exp(2*b*x+2*a))^2+1/2*I/b^3*ln(-2*Pi*csgn(I/(exp(2*b*x+2*a)+1))^2+Pi*c
sgn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp
(2*b*x+2*a)+1))-Pi*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(2*b*x+2*a)/(exp(2*
b*x+2*a)+1))^2+2*Pi*csgn(I/(exp(2*b*x+2*a)+1))^3+Pi*csgn(I*exp(b*x+a))^2*cs
```

```
gn(I*exp(2*b*x+2*a))-2*Pi*csgn(I*exp(b*x+a))*csgn(I*exp(2*b*x+2*a))^2+Pi*cs
gn(I*exp(2*b*x+2*a))^3-Pi*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp
(2*b*x+2*a)+1))^2+Pi*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^3+4*I*(ln(ex
p(b*x+a))-b*x-a)+4*I*b*x+4*I*a+2*Pi)*Pi*csgn(I*exp(2*b*x+2*a))^3-1/2*I/b^3*
ln(-2*Pi*csgn(I/(exp(2*b*x+2*a)+1))^2+Pi*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*
exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))-Pi*csgn(I/(exp(2*
b*x+2*a)+1))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2+2*Pi*csgn(I/(exp(2
*b*x+2*a)+1))^3+Pi*csgn(I*exp(b*x+a))^2*csgn(I*exp(2*b*x+2*a))-2*Pi*csgn(I*
exp(b*x+a))*csgn(I*exp(2*b*x+2*a))^2+Pi*csgn(I*exp(2*b*x+2*a))^3-Pi*csgn(I*
exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2+Pi*csgn(I*exp(2
*b*x+2*a)/(exp(2*b*x+2*a)+1))^3+4*I*(ln(exp(b*x+a))-b*x-a)+4*I*b*x+4*I*a+2*
Pi)*Pi*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2+1
/2*I/b^3*ln(-2*Pi*csgn(I/(exp(2*b*x+2*a)+1))^2+Pi*csgn(I/(exp(2*b*x+2*a)+1)
)*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))-Pi*csgn(
I/(exp(2*b*x+2*a)+1))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2+2*Pi*csgn
(I/(exp(2*b*x+2*a)+1))^3+Pi*csgn(I*exp(b*x+a))^2*csgn(I*exp(2*b*x+2*a))-2*P
i*csgn(I*exp(b*x+a))*csgn(I*exp(2*b*x+2*a))^2+Pi*csgn(I*exp(2*b*x+2*a))^3-P
i*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2+Pi*csg
n(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^3+4*I*(ln(exp(b*x+a))-b*x-a)+4*I*b*x
+4*I*a+2*Pi)*Pi*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^3+I/b^3*Pi*ln(-2*
Pi*csgn(I/(exp(2*b*x+2*a)+1))^2+Pi*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(2*
b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))-Pi*csgn(I/(exp(2*b*x+2*
a)+1))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2+2*Pi*csgn(I/(exp(2*b*x+2
*a)+1))^3+Pi*csgn(I*exp(b*x+a))^2*csgn(I*exp(2*b*x+2*a))-2*Pi*csgn(I*exp(b*
x+a))*csgn(I*exp(2*b*x+2*a))^2+Pi*csgn(I*exp(2*b*x+2*a))^3-Pi*csgn(I*exp(2*
b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2+Pi*csgn(I*exp(2*b*x+2
*a)/(exp(2*b*x+2*a)+1))^3+4*I*(ln(exp(b*x+a))-b*x-a)+4*I*b*x+4*I*a+2*Pi)+2/
b^2*ln(-2*Pi*csgn(I/(exp(2*b*x+2*a)+1))^2+Pi*csgn(I/(exp(2*b*x+2*a)+1))*csg
n(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))-Pi*csgn(I/(ex
p(2*b*x+2*a)+1))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2+2*Pi*csgn(I/(e
xp(2*b*x+2*a)+1))^3+Pi*csgn(I*exp(b*x+a))^2*csgn(I*exp(2*b*x+2*a))-2*Pi*csg
n(I*exp(b*x+a))*csgn(I*exp(2*b*x+2*a))^2+Pi*csgn(I*exp(2*b*x+2*a))^3-Pi*csg
n(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2+Pi*csgn(I*e
xp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^3+4*I*(ln(exp(b*x+a))-b*x-a)+4*I*b*x+4*I*
a+2*Pi)*x-2/b^3*ln(-2*Pi*csgn(I/(exp(2*b*x+2*a)+1))^2+Pi*csgn(I/(exp(2*b*x+
2*a)+1))*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))-P
i*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2+2*
Pi*csgn(I/(exp(2*b*x+2*a)+1))^3+Pi*csgn(I*exp(b*x+a))^2*csgn(I*exp(2*b*x+2*
a))-2*Pi*csgn(I*exp(b*x+a))*csgn(I*exp(2*b*x+2*a))^2+Pi*csgn(I*exp(2*b*x+2*
a))^3-Pi*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2
+Pi*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^3+4*I*(ln(exp(b*x+a))-b*x-a)+
4*I*b*x+4*I*a+2*Pi)*ln(exp(b*x+a))
```

**maxima [C]** time = 0.75, size = 80, normalized size = 1.60

$$\frac{4\left(4\,b^2x^2+\pi^2+4i\,\pi a-4\,a^2+(-2i\,\pi b+4\,ab)x\right)}{16\,b^4x-8i\,\pi b^3+16\,ab^3}-\frac{(-i\,\pi+2\,a)\log\left(-i\,\pi+2\,bx+2\,a\right)}{b^3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2/arccoth(tanh(b*x+a))^2,x, algorithm="maxima")
```

```
[Out] 4*(4*b^2*x^2 + pi^2 + 4*I*pi*a - 4*a^2 + (-2*I*pi*b + 4*a*b)*x)/(16*b^4*x -
 8*I*pi*b^3 + 16*a*b^3) - (-I*pi + 2*a)*log(-I*pi + 2*b*x + 2*a)/b^3
```

**mupad [B]** time = 1.29, size = 302, normalized size = 6.04

$$\frac{x}{b^2}-\frac{\left(2\,a-\ln\left(\frac{2\,{\mathrm{e}}^{2\,a}\,{\mathrm{e}}^{2\,b\,x}}{{\mathrm{e}}^{2\,a}\,{\mathrm{e}}^{2\,b\,x}-1}\right)+\ln\left(-\frac{2}{{\mathrm{e}}^{2\,a}\,{\mathrm{e}}^{2\,b\,x}-1}\right)+2\,b\,x\right)^2-4\,a\,\left(2\,a-\ln\left(\frac{2\,{\mathrm{e}}^{2\,a}\,{\mathrm{e}}^{2\,b\,x}}{{\mathrm{e}}^{2\,a}\,{\mathrm{e}}^{2\,b\,x}-1}\right)+\ln\left(-\frac{2}{{\mathrm{e}}^{2\,a}\,{\mathrm{e}}^{2\,b\,x}-1}\right)+2\,b\,x\right)+4\,a^2}{2\,b\,\left(2\,a\,b^2+2\,b^3\,x-b^2\,\left(2\,a-\ln\left(\frac{2\,{\mathrm{e}}^{2\,a}\,{\mathrm{e}}^{2\,b\,x}}{{\mathrm{e}}^{2\,a}\,{\mathrm{e}}^{2\,b\,x}-1}\right)+\ln\left(-\frac{2}{{\mathrm{e}}^{2\,a}\,{\mathrm{e}}^{2\,b\,x}-1}\right)+2\,b\,x\right)\right)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^2/acoth(tanh(a + b*x))^2,x)
```

```
[Out] x/b^2 - ((2*a - log((2*exp(2*a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x) - 1)) + lo
g(-2/(exp(2*a)*exp(2*b*x) - 1)) + 2*b*x)^2 - 4*a*(2*a - log((2*exp(2*a)*exp
(2*b*x))/(exp(2*a)*exp(2*b*x) - 1)) + log(-2/(exp(2*a)*exp(2*b*x) - 1)) + 2
*b*x) + 4*a^2)/(2*b*(2*a*b^2 + 2*b^3*x - b^2*(2*a - log((2*exp(2*a)*exp(2*b
*x))/(exp(2*a)*exp(2*b*x) - 1)) + log(-2/(exp(2*a)*exp(2*b*x) - 1)) + 2*b*x
))) + (log(log((2*exp(2*a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x) - 1)) - log(-2/
(exp(2*a)*exp(2*b*x) - 1)))*(log(-2/(exp(2*a)*exp(2*b*x) - 1)) - log((2*exp
(2*a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x) - 1)) + 2*b*x))/b^3
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{x^2}{\operatorname{acoth}^2(\tanh(a+bx))}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**2/acoth(tanh(b*x+a))**2,x)
```

```
[Out] Integral(x**2/acoth(tanh(a + b*x))**2, x)
```

## 3.170 $\int \frac{x}{\coth^{-1}(\tanh(a+bx))^2} \, dx$

**Optimal**. Leaf size=28

$$\frac{\log\left(\coth^{-1}(\tanh(a+bx))\right)}{b^2}-\frac{x}{b\coth^{-1}(\tanh(a+bx))}$$

```
[Out] -x/b/arccoth(tanh(b*x+a))+ln(arccoth(tanh(b*x+a)))/b^2
```

**Rubi [A]** time = 0.01, antiderivative size = 28, normalized size of antiderivative = 1.00, number of steps used = 3, number of rules used = 3, integrand size = 11, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.273, Rules used = {2168, 2157, 29}

$$\frac{\log\left(\coth^{-1}(\tanh(a+bx))\right)}{b^2}-\frac{x}{b\coth^{-1}(\tanh(a+bx))}$$

Antiderivative was successfully verified.

```
[In] Int[x/ArcCoth[Tanh[a + b*x]]^2,x]
```

```
[Out] -(x/(b*ArcCoth[Tanh[a + b*x]])) + Log[ArcCoth[Tanh[a + b*x]]]/b^2
```

Rule 29

```
Int[(x_)^(-1), x_Symbol] :> Simp[Log[x], x]
```

Rule 2157

```
Int[(u_)^(m_.), x_Symbol] :> With[{c = Simplify[D[u, x]]}, Dist[1/c, Subst[
Int[x^m, x], x, u], x]] /; FreeQ[m, x] && PiecewiseLinearQ[u, x]
```

Rule 2168

```
Int[(u_)^(m_)*(v_)^(n_.), x_Symbol] :> With[{a = Simplify[D[u, x]], b = Sim
plify[D[v, x]]}, Simp[(u^(m + 1)*v^n)/(a*(m + 1)), x] - Dist[(b*n)/(a*(m +
1)), Int[u^(m + 1)*v^(n - 1), x], x] /; NeQ[b*u - a*v, 0]] /; FreeQ[{m, n},
 x] && PiecewiseLinearQ[u, v, x] && NeQ[m, -1] && ((LtQ[m, -1] && GtQ[n, 0]
 && !(ILtQ[m + n, -2] && (FractionQ[m] || GeQ[2*n + m + 1, 0]))) || (IGtQ[
n, 0] && IGtQ[m, 0] && LeQ[n, m]) || (IGtQ[n, 0] && !IntegerQ[m]) || (ILtQ
[m, 0] && !IntegerQ[n]))
```

Rubi steps

$$\begin{aligned}
\int \frac{x}{\coth^{-1}(\tanh(a+bx))^2} \, dx &= -\frac{x}{b\coth^{-1}(\tanh(a+bx))}+\frac{\int \frac{1}{\coth^{-1}(\tanh(a+bx))} \, dx}{b}\\
&= -\frac{x}{b\coth^{-1}(\tanh(a+bx))}+\frac{\text{Subst}\left(\int \frac{1}{x} \, dx,x,\coth^{-1}(\tanh(a+bx))\right)}{b^2}\\
&= -\frac{x}{b\coth^{-1}(\tanh(a+bx))}+\frac{\log\left(\coth^{-1}(\tanh(a+bx))\right)}{b^2}
\end{aligned}$$

**Mathematica [A]** time = 0.06, size = 27, normalized size = 0.96

$$\frac{-\frac{bx}{\coth^{-1}(\tanh(a+bx))}+\log\left(\coth^{-1}(\tanh(a+bx))\right)+1}{b^2}$$

Antiderivative was successfully verified.

```
[In] Integrate[x/ArcCoth[Tanh[a + b*x]]^2,x]
```

```
[Out] (1 - (b*x)/ArcCoth[Tanh[a + b*x]] + Log[ArcCoth[Tanh[a + b*x]]])/b^2
```

**fricas [B]** time = 0.75, size = 97, normalized size = 3.46

$$\frac{8\,abx + 2\,\pi^2 + 8\,a^2 + \left(4\,b^2x^2 + 8\,abx + \pi^2 + 4\,a^2\right)\log\left(4\,b^2x^2 + 8\,abx + \pi^2 + 4\,a^2\right)}{2\left(4\,b^4x^2 + 8\,ab^3x + \pi^2b^2 + 4\,a^2b^2\right)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x/arccoth(tanh(b*x+a))^2,x, algorithm="fricas")
```

```
[Out] 1/2*(8*a*b*x + 2*pi^2 + 8*a^2 + (4*b^2*x^2 + 8*a*b*x + pi^2 + 4*a^2)*log(4*
b^2*x^2 + 8*a*b*x + pi^2 + 4*a^2))/(4*b^4*x^2 + 8*a*b^3*x + pi^2*b^2 + 4*a^
2*b^2)
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{x}{\operatorname{arcoth}\left(\tanh\left(bx + a\right)\right)^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x/arccoth(tanh(b*x+a))^2,x, algorithm="giac")
```

```
[Out] integrate(x/arccoth(tanh(b*x + a))^2, x)
```

**maple [C]** time = 0.27, size = 625, normalized size = 22.32

$$-\frac{\phantom{x}}{b\left(-2\pi\operatorname{csgn}\left(\frac{i}{e^{2bx+2a}+1}\right)^2 + \pi\operatorname{csgn}\left(\frac{i}{e^{2bx+2a}+1}\right)\operatorname{csgn}\left(ie^{2bx+2a}\right)\operatorname{csgn}\left(\frac{ie^{2bx+2a}}{e^{2bx+2a}+1}\right) - \pi\operatorname{csgn}\left(\frac{i}{e^{2bx+2a}+1}\right)\operatorname{csgn}\left(\frac{ie^{2bx}}{e^{2bx+}}\right.\right.}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x/arccoth(tanh(b*x+a))^2,x)
```

```
[Out] -4*I*x/b/(-2*Pi*csgn(I/(exp(2*b*x+2*a)+1))^2+Pi*csgn(I/(exp(2*b*x+2*a)+1))*
csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))-Pi*csgn(I/
(exp(2*b*x+2*a)+1))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2+2*Pi*csgn(I
/(exp(2*b*x+2*a)+1))^3+Pi*csgn(I*exp(b*x+a))^2*csgn(I*exp(2*b*x+2*a))-2*Pi*
csgn(I*exp(b*x+a))*csgn(I*exp(2*b*x+2*a))^2+Pi*csgn(I*exp(2*b*x+2*a))^3-Pi*
csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2+Pi*csgn(
I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^3+2*Pi+4*I*ln(exp(b*x+a)))+1/b^2*ln(ln
(exp(b*x+a))-1/4*I*Pi*(-2*csgn(I/(exp(2*b*x+2*a)+1))^2+csgn(I/(exp(2*b*x+2*
a)+1))*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))-csg
n(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2+2*csgn(
I/(exp(2*b*x+2*a)+1))^3+csgn(I*exp(b*x+a))^2*csgn(I*exp(2*b*x+2*a))-2*csgn(
I*exp(b*x+a))*csgn(I*exp(2*b*x+2*a))^2+csgn(I*exp(2*b*x+2*a))^3-csgn(I*exp(
2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2+csgn(I*exp(2*b*x+2*
a)/(exp(2*b*x+2*a)+1))^3+2))
```

**maxima [C]** time = 0.76, size = 47, normalized size = 1.68

$$\frac{4\,(-i\,\pi + 2\,a)}{8\,b^3x - 4i\,\pi b^2 + 8\,ab^2} + \frac{\log\left(-i\,\pi + 2\,bx + 2\,a\right)}{b^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x/arccoth(tanh(b*x+a))^2,x, algorithm="maxima")
```

```
[Out] 4*(-I*pi + 2*a)/(8*b^3*x - 4*I*pi*b^2 + 8*a*b^2) + log(-I*pi + 2*b*x + 2*a)
/b^2
```

**mupad [B]** time = 0.09, size = 28, normalized size = 1.00

$$\frac{\ln\left(\mathrm{acoth}\left(\tanh\left(a+b\,x\right)\right)\right)}{b^2}-\frac{x}{b\,\mathrm{acoth}\left(\tanh\left(a+b\,x\right)\right)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x/acoth(tanh(a + b*x))^2,x)
```

```
[Out] log(acoth(tanh(a + b*x)))/b^2 - x/(b*acoth(tanh(a + b*x)))
```

**sympy [F(-2)]** time = 0.00, size = 0, normalized size = 0.00

Exception raised: TypeError

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x/acoth(tanh(b*x+a))**2,x)
```

```
[Out] Exception raised: TypeError
```

# 3.171 $\int \frac{1}{\coth^{-1}(\tanh(a+bx))^2}\, dx$

**Optimal**. Leaf size=14

$$-\frac{1}{b\coth^{-1}(\tanh(a+bx))}$$

```
[Out] -1/b/arccoth(tanh(b*x+a))
```

**Rubi [A]** time = 0.00, antiderivative size = 14, normalized size of antiderivative = 1.00, number of steps used = 2, number of rules used = 2, integrand size = 9, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.222, Rules used = {2157, 30}

$$-\frac{1}{b\coth^{-1}(\tanh(a+bx))}$$

Antiderivative was successfully verified.

```
[In] Int[ArcCoth[Tanh[a + b*x]]^(-2),x]
```

```
[Out] -(1/(b*ArcCoth[Tanh[a + b*x]]))
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 2157

```
Int[(u_)^(m_.), x_Symbol] :> With[{c = Simplify[D[u, x]]}, Dist[1/c, Subst[
Int[x^m, x], x, u], x]] /; FreeQ[m, x] && PiecewiseLinearQ[u, x]
```

Rubi steps

$$\begin{aligned} \int \frac{1}{\coth^{-1}(\tanh(a+bx))^2}\, dx &= \frac{\text{Subst}\left(\int \frac{1}{x^2}\, dx, x, \coth^{-1}(\tanh(a+bx))\right)}{b}\\ &= -\frac{1}{b\coth^{-1}(\tanh(a+bx))} \end{aligned}$$

**Mathematica [A]** time = 0.01, size = 14, normalized size = 1.00

$$-\frac{1}{b\coth^{-1}(\tanh(a+bx))}$$

Antiderivative was successfully verified.

```
[In] Integrate[ArcCoth[Tanh[a + b*x]]^(-2),x]
```

```
[Out] -(1/(b*ArcCoth[Tanh[a + b*x]]))
```

**fricas [B]** time = 0.65, size = 36, normalized size = 2.57

$$-\frac{4\,(bx+a)}{4\,b^3x^2+8\,ab^2x+\pi^2b+4\,a^2b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/arccoth(tanh(b*x+a))^2,x, algorithm="fricas")
```

```
[Out] -4*(b*x + a)/(4*b^3*x^2 + 8*a*b^2*x + pi^2*b + 4*a^2*b)
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{1}{\operatorname{arcoth}\left(\tanh\left(bx+a\right)\right)^{2}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/arccoth(tanh(b*x+a))^2,x, algorithm="giac")
[Out] integrate(arccoth(tanh(b*x + a))^(-2), x)
```

**maple [A]** time = 0.08, size = 15, normalized size = 1.07

$$-\frac{1}{b\,\mathrm{arccoth}\left(\tanh\left(bx+a\right)\right)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(1/arccoth(tanh(b*x+a))^2,x)
[Out] -1/b/arccoth(tanh(b*x+a))
```

**maxima [C]** time = 0.41, size = 18, normalized size = 1.29

$$\frac{4}{-2\,(i\,\pi + 2\,bx + 2\,a)b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/arccoth(tanh(b*x+a))^2,x, algorithm="maxima")
[Out] 4/((-2*I*pi - 4*b*x - 4*a)*b)
```

**mupad [B]** time = 1.14, size = 14, normalized size = 1.00

$$-\frac{1}{b\,\mathrm{acoth}\left(\tanh\left(a+b\,x\right)\right)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(1/acoth(tanh(a + b*x))^2,x)
[Out] -1/(b*acoth(tanh(a + b*x)))
```

**sympy [F(-2)]** time = 0.00, size = 0, normalized size = 0.00

Exception raised: TypeError

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/acoth(tanh(b*x+a))**2,x)
[Out] Exception raised: TypeError
```

## 3.172 $\int \frac{1}{x \coth^{-1}(\tanh(a+bx))^2} \, dx$

**Optimal**. Leaf size=70

$$-\frac{1}{\left(bx-\coth^{-1}(\tanh(a+bx))\right)\coth^{-1}(\tanh(a+bx))}+\frac{\log(x)}{\left(bx-\coth^{-1}(\tanh(a+bx))\right)^2}-\frac{\log\left(\coth^{-1}(\tanh(a+b\right.}{\left(bx-\coth^{-1}(\tanh(a+b\right.}$$

```
[Out] -1/(b*x-arccoth(tanh(b*x+a)))/arccoth(tanh(b*x+a))+ln(x)/(b*x-arccoth(tanh(
b*x+a)))^2-ln(arccoth(tanh(b*x+a)))/(b*x-arccoth(tanh(b*x+a)))^2
```

**Rubi** [A] time = 0.05, antiderivative size = 70, normalized size of antiderivative = 1.00, number of steps used = 5, number of rules used = 4, integrand size = 13, $\frac{\text{number of rules}}{\text{integrand size}} = 0.308$, Rules used = {2163, 2160, 2157, 29}

$$-\frac{1}{\left(bx-\coth^{-1}(\tanh(a+bx))\right)\coth^{-1}(\tanh(a+bx))}+\frac{\log(x)}{\left(bx-\coth^{-1}(\tanh(a+bx))\right)^2}-\frac{\log\left(\coth^{-1}(\tanh(a+b\right.}{\left(bx-\coth^{-1}(\tanh(a+b\right.}$$

Antiderivative was successfully verified.

```
[In] Int[1/(x*ArcCoth[Tanh[a + b*x]]^2),x]
```

```
[Out] -(1/((b*x - ArcCoth[Tanh[a + b*x]])*ArcCoth[Tanh[a + b*x]])) + Log[x]/(b*x
- ArcCoth[Tanh[a + b*x]])^2 - Log[ArcCoth[Tanh[a + b*x]]]/(b*x - ArcCoth[Ta
nh[a + b*x]])^2
```

Rule 29

```
Int[(x_)^(-1), x_Symbol] :> Simp[Log[x], x]
```

Rule 2157

```
Int[(u_)^(m_.), x_Symbol] :> With[{c = Simplify[D[u, x]]}, Dist[1/c, Subst[
Int[x^m, x], x, u], x]] /; FreeQ[m, x] && PiecewiseLinearQ[u, x]
```

Rule 2160

```
Int[1/((u_)*(v_)), x_Symbol] :> With[{a = Simplify[D[u, x]], b = Simplify[D
[v, x]]}, Dist[b/(b*u - a*v), Int[1/v, x], x] - Dist[a/(b*u - a*v), Int[1/u
, x], x] /; NeQ[b*u - a*v, 0]] /; PiecewiseLinearQ[u, v, x]
```

Rule 2163

```
Int[(v_)^(n_)/(u_), x_Symbol] :> With[{a = Simplify[D[u, x]], b = Simplify[
D[v, x]]}, Simp[v^(n + 1)/((n + 1)*(b*u - a*v)), x] - Dist[(a*(n + 1))/((n
+ 1)*(b*u - a*v)), Int[v^(n + 1)/u, x], x] /; NeQ[b*u - a*v, 0]] /; Piecewi
seLinearQ[u, v, x] && LtQ[n, -1]
```

Rubi steps

$$\int \frac{1}{x\coth^{-1}(\tanh(a+bx))^2}\,dx = -\frac{1}{\left(bx-\coth^{-1}(\tanh(a+bx))\right)\coth^{-1}(\tanh(a+bx))} + \frac{\int \frac{1}{x\coth^{-1}(\tanh(a+bx))}\,d}{-bx+\coth^{-1}(\tanh(a+}$$

$$= -\frac{1}{\left(bx-\coth^{-1}(\tanh(a+bx))\right)\coth^{-1}(\tanh(a+bx))} - \frac{}{\left(bx-\coth^{-1}(\tanh(a+b\right.}$$

$$= -\frac{1}{\left(bx-\coth^{-1}(\tanh(a+bx))\right)\coth^{-1}(\tanh(a+bx))} + \frac{\log(x)}{\left(bx-\coth^{-1}(\tanh(a+\right.}$$

$$= -\frac{1}{\left(bx-\coth^{-1}(\tanh(a+bx))\right)\coth^{-1}(\tanh(a+bx))} + \frac{\log(x)}{\left(bx-\coth^{-1}(\tanh(a+\right.}$$

**Mathematica [A]** time = 0.07, size = 53, normalized size = 0.76

$$\frac{\coth^{-1}(\tanh(a+bx))\left(-\log\left(\coth^{-1}(\tanh(a+bx))\right)+\log(bx)+1\right)-bx}{\coth^{-1}(\tanh(a+bx))\left(\coth^{-1}(\tanh(a+bx))-bx\right)^2}$$

Antiderivative was successfully verified.

```
[In] Integrate[1/(x*ArcCoth[Tanh[a + b*x]]^2),x]
```

```
[Out] (-(b*x) + ArcCoth[Tanh[a + b*x]]*(1 + Log[b*x] - Log[ArcCoth[Tanh[a + b*x]]
]))/(ArcCoth[Tanh[a + b*x]]*(-(b*x) + ArcCoth[Tanh[a + b*x]])^2)
```

**fricas [B]** time = 0.46, size = 306, normalized size = 4.37

$$-\frac{2\left(2\pi^4-32a^4-8\left(\pi^2ab+4a^3b\right)x+16\left(4\pi ab^2x^2+8\pi a^2bx+\pi^3a+4\pi a^3\right)\arctan\left(-\frac{2bx+2a-\sqrt{4b^2x^2+8abx+\pi^2+4}}{\pi}\right.}{\pi^6+12\pi^4a^2+48\pi^2a^4}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/x/arccoth(tanh(b*x+a))^2,x, algorithm="fricas")
```

```
[Out] -2*(2*pi^4 - 32*a^4 - 8*(pi^2*a*b + 4*a^3*b)*x + 16*(4*pi*a*b^2*x^2 + 8*pi*
a^2*b*x + pi^3*a + 4*pi*a^3)*arctan(-(2*b*x + 2*a - sqrt(4*b^2*x^2 + 8*a*b*
x + pi^2 + 4*a^2))/pi) - (pi^4 - 16*a^4 + 4*(pi^2*b^2 - 4*a^2*b^2)*x^2 + 8*
(pi^2*a*b - 4*a^3*b)*x)*log(4*b^2*x^2 + 8*a*b*x + pi^2 + 4*a^2) + 2*(pi^4 -
 16*a^4 + 4*(pi^2*b^2 - 4*a^2*b^2)*x^2 + 8*(pi^2*a*b - 4*a^3*b)*x)*log(x))/
(pi^6 + 12*pi^4*a^2 + 48*pi^2*a^4 + 64*a^6 + 4*(pi^4*b^2 + 8*pi^2*a^2*b^2 +
 16*a^4*b^2)*x^2 + 8*(pi^4*a*b + 8*pi^2*a^3*b + 16*a^5*b)*x)
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{1}{x\,\mathrm{arcoth}\left(\tanh\left(bx+a\right)\right)^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/x/arccoth(tanh(b*x+a))^2,x, algorithm="giac")
```

```
[Out] integrate(1/(x*arccoth(tanh(b*x + a))^2), x)
```

**maple [F(-1)]** time = 180.00, size = 0, normalized size = 0.00

$$\int \frac{1}{x\mathrm{arccoth}\left(\tanh\left(bx+a\right)\right)^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(1/x/arccoth(tanh(b*x+a))^2,x)
```

```
[Out] int(1/x/arccoth(tanh(b*x+a))^2,x)
```

**maxima [C]** time = 0.77, size = 77, normalized size = 1.10

$$\frac{4\,\log\left(-i\,\pi+2\,bx+2\,a\right)}{\pi^2+4i\,\pi a-4\,a^2}-\frac{4\,\log(x)}{\pi^2+4i\,\pi a-4\,a^2}-\frac{4}{\pi^2+4i\,\pi a-4\,a^2+(2i\,\pi b-4\,ab)x}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/x/arccoth(tanh(b*x+a))^2,x, algorithm="maxima")
```

```
[Out] 4*log(-I*pi + 2*b*x + 2*a)/(pi^2 + 4*I*pi*a - 4*a^2) - 4*log(x)/(pi^2 + 4*I
*pi*a - 4*a^2) - 4/(pi^2 + 4*I*pi*a - 4*a^2 + (2*I*pi*b - 4*a*b)*x)
```

**mupad [B]** time = 4.03, size = 421, normalized size = 6.01

$$-\frac{4\,\ln\left(-\frac{1}{e^{2\,a}\,e^{2\,b\,x}-1}\right)-4\,\ln\left(\frac{e^{2\,a}\,e^{2\,b\,x}}{e^{2\,a}\,e^{2\,b\,x}-1}\right)+8\,b\,x+\ln\left(\frac{2\,e^{2\,a}\,e^{2\,b\,x}}{e^{2\,a}\,e^{2\,b\,x}-1}\right)\,\mathrm{atan}\left(\frac{\ln\left(\frac{2\,e^{2\,a}\,e^{2\,b\,x}}{e^{2\,a}\,e^{2\,b\,x}-1}\right)1\mathrm{i}-\ln\left(-\frac{2}{e^{2\,a}\,e^{2\,b\,x}-1}\right)1\mathrm{i}+b\,x\,2\mathrm{i}}{\ln\left(-\frac{2}{e^{2\,a}\,e^{2\,b\,x}-1}\right)-\ln\left(\frac{2\,e^{2\,a}\,e^{2\,b\,x}}{e^{2\,a}\,e^{2\,b\,x}-1}\right)+2\,b\,x}\right)\,8\mathrm{i}-}{\left(\ln\left(\frac{e^{2\,a}\,e^{2\,b\,x}}{e^{2\,a}\,e^{2\,b\,x}-1}\right)-\ln\left(-\frac{1}{e^{2\,a}\,e^{2\,b\,x}-1}\right)\right)\,\left(\ln\left(-\frac{1}{e^{2\,a}\,e^{2\,b\,x}-1}\right)-\ln\left(\right.\right.}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(1/(x*acoth(tanh(a + b*x))^2),x)
```

```
[Out] -(4*log(-1/(exp(2*a)*exp(2*b*x) - 1)) - 4*log((exp(2*a)*exp(2*b*x))/(exp(2*
a)*exp(2*b*x) - 1)) + 8*b*x + log((2*exp(2*a)*exp(2*b*x))/(exp(2*a)*exp(2*b
*x) - 1))*atan((log((2*exp(2*a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x) - 1))*1i -
 log(-2/(exp(2*a)*exp(2*b*x) - 1))*1i + b*x*2i)/(log(-2/(exp(2*a)*exp(2*b*x
) - 1)) - log((2*exp(2*a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x) - 1)) + 2*b*x))*
8i - atan((log((2*exp(2*a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x) - 1))*1i - log(
-2/(exp(2*a)*exp(2*b*x) - 1))*1i + b*x*2i)/(log(-2/(exp(2*a)*exp(2*b*x) - 1
)) - log((2*exp(2*a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x) - 1)) + 2*b*x))*(log(
2) + log(-1/(exp(2*a)*exp(2*b*x) - 1)))*8i)/((log((exp(2*a)*exp(2*b*x))/(ex
p(2*a)*exp(2*b*x) - 1)) - log(-1/(exp(2*a)*exp(2*b*x) - 1)))*(log(-1/(exp(2
*a)*exp(2*b*x) - 1)) - log((exp(2*a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x) - 1))
 + 2*b*x)^2)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{1}{x\,\mathrm{acoth}^2\left(\tanh\left(a+bx\right)\right)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/x/acoth(tanh(b*x+a))**2,x)
```

```
[Out] Integral(1/(x*acoth(tanh(a + b*x))**2), x)
```

## 3.173 $\int \frac{1}{x^2 \coth^{-1}(\tanh(a+bx))^2} dx$

**Optimal**. Leaf size=102

$$-\frac{2b}{\left(bx-\coth^{-1}(\tanh(a+bx))\right)^2 \coth^{-1}(\tanh(a+bx))}+\frac{1}{x\left(bx-\coth^{-1}(\tanh(a+bx))\right) \coth^{-1}(\tanh(a+bx))}+\frac{}{(bx}$$

```
[Out] -2*b/(b*x-arccoth(tanh(b*x+a)))^2/arccoth(tanh(b*x+a))+1/x/(b*x-arccoth(tan
h(b*x+a)))/arccoth(tanh(b*x+a))+2*b*ln(x)/(b*x-arccoth(tanh(b*x+a)))^3-2*b*
ln(arccoth(tanh(b*x+a)))/(b*x-arccoth(tanh(b*x+a)))^3
```

**Rubi [A]** time = 0.06, antiderivative size = 102, normalized size of antiderivative = 1.00, number of steps used = 6, number of rules used = 5, integrand size = 13, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.385, Rules used = {2171, 2163, 2160, 2157, 29}

$$-\frac{2b}{\left(bx-\coth^{-1}(\tanh(a+bx))\right)^2 \coth^{-1}(\tanh(a+bx))}+\frac{1}{x\left(bx-\coth^{-1}(\tanh(a+bx))\right) \coth^{-1}(\tanh(a+bx))}+\frac{}{(bx}$$

Antiderivative was successfully verified.

```
[In] Int[1/(x^2*ArcCoth[Tanh[a + b*x]]^2),x]
```

```
[Out] (-2*b)/((b*x - ArcCoth[Tanh[a + b*x]])^2*ArcCoth[Tanh[a + b*x]]) + 1/(x*(b*
x - ArcCoth[Tanh[a + b*x]])*ArcCoth[Tanh[a + b*x]]) + (2*b*Log[x])/(b*x - A
rcCoth[Tanh[a + b*x]])^3 - (2*b*Log[ArcCoth[Tanh[a + b*x]]])/(b*x - ArcCoth
[Tanh[a + b*x]])^3
```

Rule 29

```
Int[(x_)^(-1), x_Symbol] :> Simp[Log[x], x]
```

Rule 2157

```
Int[(u_)^(m_.), x_Symbol] :> With[{c = Simplify[D[u, x]]}, Dist[1/c, Subst[
Int[x^m, x], x, u], x]] /; FreeQ[m, x] && PiecewiseLinearQ[u, x]
```

Rule 2160

```
Int[1/((u_)*(v_)), x_Symbol] :> With[{a = Simplify[D[u, x]], b = Simplify[D
[v, x]]}, Dist[b/(b*u - a*v), Int[1/v, x], x] - Dist[a/(b*u - a*v), Int[1/u
, x], x] /; NeQ[b*u - a*v, 0]] /; PiecewiseLinearQ[u, v, x]
```

Rule 2163

```
Int[(v_)^(n_)/(u_), x_Symbol] :> With[{a = Simplify[D[u, x]], b = Simplify[
D[v, x]]}, Simp[v^(n + 1)/((n + 1)*(b*u - a*v)), x] - Dist[(a*(n + 1))/((n
+ 1)*(b*u - a*v)), Int[v^(n + 1)/u, x], x] /; NeQ[b*u - a*v, 0]] /; Piecewi
seLinearQ[u, v, x] && LtQ[n, -1]
```

Rule 2171

```
Int[(u_)^(m_)*(v_)^(n_), x_Symbol] :> With[{a = Simplify[D[u, x]], b = Simp
lify[D[v, x]]}, -Simp[(u^(m + 1)*v^(n + 1))/((m + 1)*(b*u - a*v)), x] + Dis
t[(b*(m + n + 2))/((m + 1)*(b*u - a*v)), Int[u^(m + 1)*v^n, x], x] /; NeQ[b
*u - a*v, 0]] /; PiecewiseLinearQ[u, v, x] && NeQ[m + n + 2, 0] && LtQ[m, -
1]
```

Rubi steps

$$\int \frac{1}{x^2 \coth^{-1}(\tanh(a+bx))^2}\,dx = \frac{1}{x\left(bx-\coth^{-1}(\tanh(a+bx))\right)\coth^{-1}(\tanh(a+bx))} - \frac{(2b)\int \frac{1}{x\coth^{-1}(\tanh(a\cdots}}{-bx+\coth^{-1}(\tanh\cdots}$$

$$= -\frac{2b}{\left(bx-\coth^{-1}(\tanh(a+bx))\right)^2\coth^{-1}(\tanh(a+bx))} + \frac{\cdots}{x\left(bx-\coth^{-1}(\tan\cdots\right.}$$

$$= -\frac{2b}{\left(bx-\coth^{-1}(\tanh(a+bx))\right)^2\coth^{-1}(\tanh(a+bx))} + \frac{\cdots}{x\left(bx-\coth^{-1}(\tan\cdots\right.}$$

$$= -\frac{2b}{\left(bx-\coth^{-1}(\tanh(a+bx))\right)^2\coth^{-1}(\tanh(a+bx))} + \frac{\cdots}{x\left(bx-\coth^{-1}(\tan\cdots\right.}$$

$$= -\frac{2b}{\left(bx-\coth^{-1}(\tanh(a+bx))\right)^2\coth^{-1}(\tanh(a+bx))} + \frac{\cdots}{x\left(bx-\coth^{-1}(\tan\cdots\right.}$$

**Mathematica [A]** time = 0.06, size = 70, normalized size = 0.69

$$\frac{\coth^{-1}(\tanh(a+bx))^2 + 2bx\coth^{-1}(\tanh(a+bx))\left(\log(x)-\log\left(\coth^{-1}(\tanh(a+bx))\right)\right) - b^2x^2}{x\left(bx-\coth^{-1}(\tanh(a+bx))\right)^3\coth^{-1}(\tanh(a+bx))}$$

Antiderivative was successfully verified.

```
[In] Integrate[1/(x^2*ArcCoth[Tanh[a + b*x]]^2),x]
```

```
[Out] (-(b^2*x^2) + ArcCoth[Tanh[a + b*x]]^2 + 2*b*x*ArcCoth[Tanh[a + b*x]]*(Log[
x] - Log[ArcCoth[Tanh[a + b*x]]]))/(x*(b*x - ArcCoth[Tanh[a + b*x]])^3*ArcC
oth[Tanh[a + b*x]])
```

**fricas [B]** time = 0.68, size = 480, normalized size = 4.71

$$4\left(\pi^6 + 4\,\pi^4a^2 - 16\,\pi^2a^4 - 64\,a^6 + 8\left(\pi^4b^2 - 16\,a^4b^2\right)x^2 + 4\left(5\,\pi^4ab + 8\,\pi^2a^3b - 48\,a^5b\right)x - 8\left(4\left(\pi^3b^3 - 12\,\pi\cdots\right.\right.\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/x^2/arccoth(tanh(b*x+a))^2,x, algorithm="fricas")
```

```
[Out] 4*(pi^6 + 4*pi^4*a^2 - 16*pi^2*a^4 - 64*a^6 + 8*(pi^4*b^2 - 16*a^4*b^2)*x^2
 + 4*(5*pi^4*a*b + 8*pi^2*a^3*b - 48*a^5*b)*x - 8*(4*(pi^3*b^3 - 12*pi*a^2*
b^3)*x^3 + 8*(pi^3*a*b^2 - 12*pi*a^3*b^2)*x^2 + (pi^5*b - 8*pi^3*a^2*b - 48
*pi*a^4*b)*x)*arctan(-(2*b*x + 2*a - sqrt(4*b^2*x^2 + 8*a*b*x + pi^2 + 4*a^
2))/pi) - 4*(4*(3*pi^2*a*b^3 - 4*a^3*b^3)*x^3 + 8*(3*pi^2*a^2*b^2 - 4*a^4*b
^2)*x^2 + (3*pi^4*a*b + 8*pi^2*a^3*b - 16*a^5*b)*x)*log(4*b^2*x^2 + 8*a*b*x
 + pi^2 + 4*a^2) + 8*(4*(3*pi^2*a*b^3 - 4*a^3*b^3)*x^3 + 8*(3*pi^2*a^2*b^2
- 4*a^4*b^2)*x^2 + (3*pi^4*a*b + 8*pi^2*a^3*b - 16*a^5*b)*x)*log(x))/(4*(pi
^6*b^2 + 12*pi^4*a^2*b^2 + 48*pi^2*a^4*b^2 + 64*a^6*b^2)*x^3 + 8*(pi^6*a*b
+ 12*pi^4*a^3*b + 48*pi^2*a^5*b + 64*a^7*b)*x^2 + (pi^8 + 16*pi^6*a^2 + 96*
pi^4*a^4 + 256*pi^2*a^6 + 256*a^8)*x)
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{1}{x^2\operatorname{arcoth}\left(\tanh\left(bx+a\right)\right)^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/x^2/arccoth(tanh(b*x+a))^2,x, algorithm="giac")
[Out] integrate(1/(x^2*arccoth(tanh(b*x + a))^2), x)
```

**maple [F(-1)]** time = 180.00, size = 0, normalized size = 0.00

$$\int \frac{1}{x^2 \operatorname{arccoth}(\tanh(bx+a))^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(1/x^2/arccoth(tanh(b*x+a))^2,x)
[Out] int(1/x^2/arccoth(tanh(b*x+a))^2,x)
```

**maxima [C]** time = 0.78, size = 135, normalized size = 1.32

$$-\frac{16\,b\log(-i\pi+2\,bx+2\,a)}{-i\pi^3+6\,\pi^2a+12i\,\pi a^2-8\,a^3}+\frac{16\,b\log(x)}{-i\pi^3+6\,\pi^2a+12i\,\pi a^2-8\,a^3}-\frac{4\,(i\pi-4\,bx-2\,a)}{\left(2\,\pi^2b+8i\,\pi ab-8\,a^2b\right)x^2-\left(i\pi^3-6\,\pi^2a-12\right.}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/x^2/arccoth(tanh(b*x+a))^2,x, algorithm="maxima")
[Out] -16*b*log(-I*pi + 2*b*x + 2*a)/(-I*pi^3 + 6*pi^2*a + 12*I*pi*a^2 - 8*a^3) +
 16*b*log(x)/(-I*pi^3 + 6*pi^2*a + 12*I*pi*a^2 - 8*a^3) - 4*(I*pi - 4*b*x -
 2*a)/((2*pi^2*b + 8*I*pi*a*b - 8*a^2*b)*x^2 - (I*pi^3 - 6*pi^2*a - 12*I*pi
*a^2 + 8*a^3)*x)
```

**mupad [B]** time = 3.80, size = 453, normalized size = 4.44

$$\frac{4\ln\left(-\frac{1}{e^{2a}e^{2bx}-1}\right)^2-\ln\left(\frac{e^{2a}e^{2bx}}{e^{2a}e^{2bx}-1}\right)\left(8\,\ln\left(-\frac{1}{e^{2a}e^{2bx}-1}\right)+b\,x\,\mathrm{atan}\left(\frac{\ln\left(\frac{2\,e^{2a}e^{2bx}}{e^{2a}e^{2bx}-1}\right)1\mathrm{i}-\ln\left(-\frac{2}{e^{2a}e^{2bx}-1}\right)1\mathrm{i}+b\,x\,2\mathrm{i}}{\ln\left(-\frac{2}{e^{2a}e^{2bx}-1}\right)-\ln\left(\frac{2\,e^{2a}e^{2bx}}{e^{2a}e^{2bx}-1}\right)+2\,b\,x}\right)32\mathrm{i}\right)+4\,\mathrm{l}}{x\left(\ln\left(\frac{e^{2a}e^{2bx}}{e^{2a}e^{2bx}-1}\right)-\ln\left(-\frac{1}{e^{2a}e^{2bx}-1}\right)\right)\left(\ln\left(-\frac{1}{e^{2a}e^{2bx}}\right.\right.}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(1/(x^2*acoth(tanh(a + b*x))^2),x)
[Out] (4*log(-1/(exp(2*a)*exp(2*b*x) - 1))^2 - log((exp(2*a)*exp(2*b*x))/(exp(2*a
)*exp(2*b*x) - 1))*(8*log(-1/(exp(2*a)*exp(2*b*x) - 1)) + b*x*atan((log((2*
exp(2*a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x) - 1))*1i - log(-2/(exp(2*a)*exp(2
*b*x) - 1))*1i + b*x*2i)/(log(-2/(exp(2*a)*exp(2*b*x) - 1)) - log((2*exp(2*
a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x) - 1)) + 2*b*x))*32i) + 4*log((exp(2*a)*
exp(2*b*x))/(exp(2*a)*exp(2*b*x) - 1))^2 - 16*b^2*x^2 + b*x*log(-1/(exp(2*a
)*exp(2*b*x) - 1))*atan((log((2*exp(2*a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x) -
 1))*1i - log(-2/(exp(2*a)*exp(2*b*x) - 1))*1i + b*x*2i)/(log(-2/(exp(2*a)*
exp(2*b*x) - 1)) - log((2*exp(2*a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x) - 1)) +
 2*b*x))*32i)/(x*(log((exp(2*a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x) - 1)) - lo
g(-1/(exp(2*a)*exp(2*b*x) - 1)))*(log(-1/(exp(2*a)*exp(2*b*x) - 1)) - log((
exp(2*a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x) - 1)) + 2*b*x)^3)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{1}{x^2\operatorname{acoth}^2(\tanh(a+bx))}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/x**2/acoth(tanh(b*x+a))**2,x)
[Out] Integral(1/(x**2*acoth(tanh(a + b*x))**2), x)
```

## 3.174 $\int \frac{1}{x^3 \coth^{-1}(\tanh(a+bx))^2} dx$

**Optimal**. Leaf size=143

$$-\frac{3b^2}{\left(bx-\coth^{-1}(\tanh(a+bx))\right)^3\coth^{-1}(\tanh(a+bx))}+\frac{3b^2\log(x)}{\left(bx-\coth^{-1}(\tanh(a+bx))\right)^4}-\frac{3b^2\log\left(\coth^{-1}(\tanh(a\right.}{\left(bx-\coth^{-1}(\tanh(a\right.}$$

```
[Out] -3*b^2/(b*x-arccoth(tanh(b*x+a)))^3/arccoth(tanh(b*x+a))+3/2*b/x/(b*x-arcco
th(tanh(b*x+a)))^2/arccoth(tanh(b*x+a))+1/2/x^2/(b*x-arccoth(tanh(b*x+a)))/
arccoth(tanh(b*x+a))+3*b^2*ln(x)/(b*x-arccoth(tanh(b*x+a)))^4-3*b^2*ln(arcc
oth(tanh(b*x+a)))/(b*x-arccoth(tanh(b*x+a)))^4
```

**Rubi [A]** time = 0.09, antiderivative size = 143, normalized size of antiderivative = 1.00, number of steps used = 7, number of rules used = 5, integrand size = 13, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.385, Rules used = {2171, 2163, 2160, 2157, 29}

$$-\frac{3b^2}{\left(bx-\coth^{-1}(\tanh(a+bx))\right)^3\coth^{-1}(\tanh(a+bx))}+\frac{3b^2\log(x)}{\left(bx-\coth^{-1}(\tanh(a+bx))\right)^4}-\frac{3b^2\log\left(\coth^{-1}(\tanh(a\right.}{\left(bx-\coth^{-1}(\tanh(a\right.}$$

Antiderivative was successfully verified.

```
[In] Int[1/(x^3*ArcCoth[Tanh[a + b*x]]^2),x]
```

```
[Out] (-3*b^2)/((b*x - ArcCoth[Tanh[a + b*x]])^3*ArcCoth[Tanh[a + b*x]]) + (3*b)/
(2*x*(b*x - ArcCoth[Tanh[a + b*x]])^2*ArcCoth[Tanh[a + b*x]]) + 1/(2*x^2*(b
*x - ArcCoth[Tanh[a + b*x]])*ArcCoth[Tanh[a + b*x]]) + (3*b^2*Log[x])/(b*x
- ArcCoth[Tanh[a + b*x]])^4 - (3*b^2*Log[ArcCoth[Tanh[a + b*x]]])/(b*x - Ar
cCoth[Tanh[a + b*x]])^4
```

Rule 29

```
Int[(x_)^(-1), x_Symbol] :> Simp[Log[x], x]
```

Rule 2157

```
Int[(u_)^(m_.), x_Symbol] :> With[{c = Simplify[D[u, x]]}, Dist[1/c, Subst[
Int[x^m, x], x, u], x]] /; FreeQ[m, x] && PiecewiseLinearQ[u, x]
```

Rule 2160

```
Int[1/((u_)*(v_)), x_Symbol] :> With[{a = Simplify[D[u, x]], b = Simplify[D
[v, x]]}, Dist[b/(b*u - a*v), Int[1/v, x], x] - Dist[a/(b*u - a*v), Int[1/u
, x], x] /; NeQ[b*u - a*v, 0]] /; PiecewiseLinearQ[u, v, x]
```

Rule 2163

```
Int[(v_)^(n_)/(u_), x_Symbol] :> With[{a = Simplify[D[u, x]], b = Simplify[
D[v, x]]}, Simp[v^(n + 1)/((n + 1)*(b*u - a*v)), x] - Dist[(a*(n + 1))/((n
+ 1)*(b*u - a*v)), Int[v^(n + 1)/u, x], x] /; NeQ[b*u - a*v, 0]] /; Piecewi
seLinearQ[u, v, x] && LtQ[n, -1]
```

Rule 2171

```
Int[(u_)^(m_)*(v_)^(n_), x_Symbol] :> With[{a = Simplify[D[u, x]], b = Simp
lify[D[v, x]]}, -Simp[(u^(m + 1)*v^(n + 1))/((m + 1)*(b*u - a*v)), x] + Dis
t[(b*(m + n + 2))/((m + 1)*(b*u - a*v)), Int[u^(m + 1)*v^n, x], x] /; NeQ[b
*u - a*v, 0]] /; PiecewiseLinearQ[u, v, x] && NeQ[m + n + 2, 0] && LtQ[m, -
1]
```

Rubi steps

$$\int \frac{1}{x^3 \coth^{-1}(\tanh(a+bx))^2} dx = \frac{1}{2x^2 \left(bx - \coth^{-1}(\tanh(a+bx))\right) \coth^{-1}(\tanh(a+bx))} + \frac{(3b) \int \frac{1}{x^2 \coth^{-1}(\tanh(}}{2 \left(bx - \coth^{-1}(\tanh}$$

$$= \frac{3b}{2x \left(bx - \coth^{-1}(\tanh(a+bx))\right)^2 \coth^{-1}(\tanh(a+bx))} + \frac{}{2x^2 \left(bx - \coth^{-1}(\tan\right.}$$

$$= -\frac{3b^2}{\left(bx - \coth^{-1}(\tanh(a+bx))\right)^3 \coth^{-1}(\tanh(a+bx))} + \frac{}{2x \left(bx - \coth^{-1}(\tanh\right.}$$

$$= -\frac{3b^2}{\left(bx - \coth^{-1}(\tanh(a+bx))\right)^3 \coth^{-1}(\tanh(a+bx))} + \frac{}{2x \left(bx - \coth^{-1}(\tanh\right.}$$

$$= -\frac{3b^2}{\left(bx - \coth^{-1}(\tanh(a+bx))\right)^3 \coth^{-1}(\tanh(a+bx))} + \frac{}{2x \left(bx - \coth^{-1}(\tanh\right.}$$

$$= -\frac{3b^2}{\left(bx - \coth^{-1}(\tanh(a+bx))\right)^3 \coth^{-1}(\tanh(a+bx))} + \frac{}{2x \left(bx - \coth^{-1}(\tanh\right.}$$

**Mathematica [A]** time = 0.04, size = 92, normalized size = 0.64

$$-\frac{-3b^2x^2 \coth^{-1}(\tanh(a+bx)) \left(-2\log\left(\coth^{-1}(\tanh(a+bx))\right) + 2\log(x) - 1\right) - 6bx \coth^{-1}(\tanh(a+bx))^2 + \mathrm{co}}{2x^2 \coth^{-1}(\tanh(a+bx)) \left(\coth^{-1}(\tanh(a+bx)) - bx\right)^4}$$

Antiderivative was successfully verified.

```
[In] Integrate[1/(x^3*ArcCoth[Tanh[a + b*x]]^2),x]
```

```
[Out] -1/2*(2*b^3*x^3 - 6*b*x*ArcCoth[Tanh[a + b*x]]^2 + ArcCoth[Tanh[a + b*x]]^3
 - 3*b^2*x^2*ArcCoth[Tanh[a + b*x]]*(-1 + 2*Log[x] - 2*Log[ArcCoth[Tanh[a +
 b*x]]]))/(x^2*ArcCoth[Tanh[a + b*x]]*(-(b*x) + ArcCoth[Tanh[a + b*x]])^4)
```

**fricas [B]** time = 0.55, size = 644, normalized size = 4.50

$$2\left(\pi^8 + 8\pi^6a^2 - 128\pi^2a^6 - 256a^8 - 96\left(3\pi^4ab^3 + 8\pi^2a^3b^3 - 16a^5b^3\right)x^3 + 12\left(\pi^6b^2 - 44\pi^4a^2b^2 - 144\pi^2a^4b^2\right.\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/x^3/arccoth(tanh(b*x+a))^2,x, algorithm="fricas")
```

```
[Out] 2*(pi^8 + 8*pi^6*a^2 - 128*pi^2*a^6 - 256*a^8 - 96*(3*pi^4*a*b^3 + 8*pi^2*a
^3*b^3 - 16*a^5*b^3)*x^3 + 12*(pi^6*b^2 - 44*pi^4*a^2*b^2 - 144*pi^2*a^4*b^
2 + 192*a^6*b^2)*x^2 - 8*(5*pi^6*a*b + 36*pi^4*a^3*b + 48*pi^2*a^5*b - 64*a
^7*b)*x + 384*(4*(pi^3*a*b^4 - 4*pi*a^3*b^4)*x^4 + 8*(pi^3*a^2*b^3 - 4*pi*a
^4*b^3)*x^3 + (pi^5*a*b^2 - 16*pi*a^5*b^2)*x^2)*arctan(-(2*b*x + 2*a - sqrt
(4*b^2*x^2 + 8*a*b*x + pi^2 + 4*a^2))/pi) - 12*(4*(pi^4*b^4 - 24*pi^2*a^2*b
^4 + 16*a^4*b^4)*x^4 + 8*(pi^4*a*b^3 - 24*pi^2*a^3*b^3 + 16*a^5*b^3)*x^3 +
(pi^6*b^2 - 20*pi^4*a^2*b^2 - 80*pi^2*a^4*b^2 + 64*a^6*b^2)*x^2)*log(4*b^2*
x^2 + 8*a*b*x + pi^2 + 4*a^2) + 24*(4*(pi^4*b^4 - 24*pi^2*a^2*b^4 + 16*a^4*
b^4)*x^4 + 8*(pi^4*a*b^3 - 24*pi^2*a^3*b^3 + 16*a^5*b^3)*x^3 + (pi^6*b^2 -
```

```
20*pi^4*a^2*b^2 - 80*pi^2*a^4*b^2 + 64*a^6*b^2)*x^2)*log(x))/(4*(pi^8*b^2 +
 16*pi^6*a^2*b^2 + 96*pi^4*a^4*b^2 + 256*pi^2*a^6*b^2 + 256*a^8*b^2)*x^4 +
8*(pi^8*a*b + 16*pi^6*a^3*b + 96*pi^4*a^5*b + 256*pi^2*a^7*b + 256*a^9*b)*x
^3 + (pi^10 + 20*pi^8*a^2 + 160*pi^6*a^4 + 640*pi^4*a^6 + 1280*pi^2*a^8 + 1
024*a^10)*x^2)
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{1}{x^3 \operatorname{arcoth}(\tanh(bx+a))^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/x^3/arccoth(tanh(b*x+a))^2,x, algorithm="giac")
```

```
[Out] integrate(1/(x^3*arccoth(tanh(b*x + a))^2), x)
```

**maple [F(-1)]** time = 180.00, size = 0, normalized size = 0.00

$$\int \frac{1}{x^3 \operatorname{arccoth}(\tanh(bx+a))^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(1/x^3/arccoth(tanh(b*x+a))^2,x)
```

```
[Out] int(1/x^3/arccoth(tanh(b*x+a))^2,x)
```

**maxima [C]** time = 0.76, size = 191, normalized size = 1.34

$$-\frac{48\,b^2\log(-i\pi+2\,bx+2\,a)}{\pi^4+8i\,\pi^3a-24\,\pi^2a^2-32i\,\pi a^3+16\,a^4}+\frac{48\,b^2\log(x)}{\pi^4+8i\,\pi^3a-24\,\pi^2a^2-32i\,\pi a^3+16\,a^4}-\frac{4\,(2}{(-4i\,\pi^3b+24\,\pi^2ab+48}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/x^3/arccoth(tanh(b*x+a))^2,x, algorithm="maxima")
```

```
[Out] -48*b^2*log(-I*pi + 2*b*x + 2*a)/(pi^4 + 8*I*pi^3*a - 24*pi^2*a^2 - 32*I*pi
*a^3 + 16*a^4) + 48*b^2*log(x)/(pi^4 + 8*I*pi^3*a - 24*pi^2*a^2 - 32*I*pi*a
^3 + 16*a^4) - 4*(24*b^2*x^2 + pi^2 + 4*I*pi*a - 4*a^2 + (-6*I*pi*b + 12*a*
b)*x)/((-4*I*pi^3*b + 24*pi^2*a*b + 48*I*pi*a^2*b - 32*a^3*b)*x^3 - (2*pi^4
 + 16*I*pi^3*a - 48*pi^2*a^2 - 64*I*pi*a^3 + 32*a^4)*x^2)
```

**mupad [B]** time = 4.90, size = 689, normalized size = 4.82

$$\frac{2\ln\left(-\frac{1}{e^{2a}e^{2bx}-1}\right)^3-2\ln\left(\frac{e^{2a}e^{2bx}}{e^{2a}e^{2bx}-1}\right)^3-6\ln\left(\frac{e^{2a}e^{2bx}}{e^{2a}e^{2bx}-1}\right)\ln\left(-\frac{1}{e^{2a}e^{2bx}-1}\right)^2+6\ln\left(\frac{e^{2a}e^{2bx}}{e^{2a}e^{2bx}-1}\right)^2\ln\left(-\frac{1}{e^{2a}e^{2bx}-1}\right)-}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(1/(x^3*acoth(tanh(a + b*x))^2),x)
```

```
[Out] (2*log(-1/(exp(2*a)*exp(2*b*x) - 1))^3 - 2*log((exp(2*a)*exp(2*b*x))/(exp(2
*a)*exp(2*b*x) - 1))^3 - 6*log((exp(2*a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x) -
 1))*log(-1/(exp(2*a)*exp(2*b*x) - 1))^2 + 6*log((exp(2*a)*exp(2*b*x))/(exp
(2*a)*exp(2*b*x) - 1))^2*log(-1/(exp(2*a)*exp(2*b*x) - 1)) - 32*b^3*x^3 + 2
4*b*x*log((exp(2*a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x) - 1))^2 + 24*b*x*log(-
1/(exp(2*a)*exp(2*b*x) - 1))^2 - 24*b^2*x^2*log((exp(2*a)*exp(2*b*x))/(exp(
2*a)*exp(2*b*x) - 1)) + 24*b^2*x^2*log(-1/(exp(2*a)*exp(2*b*x) - 1)) - b^2*
```

```
x^2*log((exp(2*a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x) - 1))*atan((log((2*exp(2
*a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x) - 1))*1i - log(-2/(exp(2*a)*exp(2*b*x)
 - 1))*1i + b*x*2i)/(log(-2/(exp(2*a)*exp(2*b*x) - 1)) - log((2*exp(2*a)*ex
p(2*b*x))/(exp(2*a)*exp(2*b*x) - 1)) + 2*b*x))*96i - 48*b*x*log((exp(2*a)*e
xp(2*b*x))/(exp(2*a)*exp(2*b*x) - 1))*log(-1/(exp(2*a)*exp(2*b*x) - 1)) + b
^2*x^2*log(-1/(exp(2*a)*exp(2*b*x) - 1))*atan((log((2*exp(2*a)*exp(2*b*x))/
(exp(2*a)*exp(2*b*x) - 1))*1i - log(-2/(exp(2*a)*exp(2*b*x) - 1))*1i + b*x*
2i)/(log(-2/(exp(2*a)*exp(2*b*x) - 1)) - log((2*exp(2*a)*exp(2*b*x))/(exp(2
*a)*exp(2*b*x) - 1)) + 2*b*x))*96i)/(x^2*(log((exp(2*a)*exp(2*b*x))/(exp(2*
a)*exp(2*b*x) - 1)) - log(-1/(exp(2*a)*exp(2*b*x) - 1)))*(log(-1/(exp(2*a)*
exp(2*b*x) - 1)) - log((exp(2*a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x) - 1)) + 2
*b*x)^4)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{1}{x^3 \operatorname{acoth}^2 (\tanh (a + bx))} \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/x**3/acoth(tanh(b*x+a))**2,x)
```

```
[Out] Integral(1/(x**3*acoth(tanh(a + b*x))**2), x)
```

# 3.175 $\int \frac{x^m}{\coth^{-1}(\tanh(a+bx))^3}\,dx$

**Optimal**. Leaf size=94

$$-\frac{mx^{m-1}\,{}_2F_1\left(1,m-1;m;\frac{bx}{bx-\coth^{-1}(\tanh(a+bx))}\right)}{2b^2\left(bx-\coth^{-1}(\tanh(a+bx))\right)}-\frac{mx^{m-1}}{2b^2\coth^{-1}(\tanh(a+bx))}-\frac{x^m}{2b\coth^{-1}(\tanh(a+bx))^2}$$

```
[Out] -1/2*x^m/b/arccoth(tanh(b*x+a))^2-1/2*m*x^(-1+m)/b^2/arccoth(tanh(b*x+a))-1
/2*m*x^(-1+m)*hypergeom([1, -1+m],[m],b*x/(b*x-arccoth(tanh(b*x+a))))/b^2/(
b*x-arccoth(tanh(b*x+a)))
```

**Rubi** [A] time = 0.06, antiderivative size = 94, normalized size of antiderivative = 1.00, number of steps used = 3, number of rules used = 2, integrand size = 13, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.154, Rules used = {2168, 2164}

$$-\frac{mx^{m-1}\,{}_2F_1\left(1,m-1;m;\frac{bx}{bx-\coth^{-1}(\tanh(a+bx))}\right)}{2b^2\left(bx-\coth^{-1}(\tanh(a+bx))\right)}-\frac{mx^{m-1}}{2b^2\coth^{-1}(\tanh(a+bx))}-\frac{x^m}{2b\coth^{-1}(\tanh(a+bx))^2}$$

Antiderivative was successfully verified.

```
[In] Int[x^m/ArcCoth[Tanh[a + b*x]]^3,x]
```

```
[Out] -x^m/(2*b*ArcCoth[Tanh[a + b*x]]^2) - (m*x^(-1 + m))/(2*b^2*ArcCoth[Tanh[a
+ b*x]]) - (m*x^(-1 + m)*Hypergeometric2F1[1, -1 + m, m, (b*x)/(b*x - ArcCo
th[Tanh[a + b*x]])])/(2*b^2*(b*x - ArcCoth[Tanh[a + b*x]]))
```

Rule 2164

```
Int[(v_)^(n_)/(u_), x_Symbol] :> With[{a = Simplify[D[u, x]], b = Simplify[
D[v, x]]}, Simp[(v^(n + 1)*Hypergeometric2F1[1, n + 1, n + 2, -((a*v)/(b*u
- a*v))])/((n + 1)*(b*u - a*v)), x] /; NeQ[b*u - a*v, 0]] /; PiecewiseLinea
rQ[u, v, x] && !IntegerQ[n]
```

Rule 2168

```
Int[(u_)^(m_)*(v_)^(n_.), x_Symbol] :> With[{a = Simplify[D[u, x]], b = Sim
plify[D[v, x]]}, Simp[(u^(m + 1)*v^n)/(a*(m + 1)), x] - Dist[(b*n)/(a*(m +
1)), Int[u^(m + 1)*v^(n - 1), x], x] /; NeQ[b*u - a*v, 0]] /; FreeQ[{m, n},
 x] && PiecewiseLinearQ[u, v, x] && NeQ[m, -1] && ((LtQ[m, -1] && GtQ[n, 0]
 && !(ILtQ[m + n, -2] && (FractionQ[m] || GeQ[2*n + m + 1, 0]))) || (IGtQ[
n, 0] && IGtQ[m, 0] && LeQ[n, m]) || (IGtQ[n, 0] && !IntegerQ[m]) || (ILtQ
[m, 0] && !IntegerQ[n]))
```

Rubi steps

$$\int \frac{x^m}{\coth^{-1}(\tanh(a+bx))^3}\,dx = -\frac{x^m}{2b\coth^{-1}(\tanh(a+bx))^2}+\frac{m\int \frac{x^{-1+m}}{\coth^{-1}(\tanh(a+bx))^2}\,dx}{2b}$$

$$= -\frac{x^m}{2b\coth^{-1}(\tanh(a+bx))^2}-\frac{mx^{-1+m}}{2b^2\coth^{-1}(\tanh(a+bx))}-\frac{((1-m)m)\int \frac{x}{\coth^{-1}(}}{2b^2}$$

$$= -\frac{x^m}{2b\coth^{-1}(\tanh(a+bx))^2}-\frac{mx^{-1+m}}{2b^2\coth^{-1}(\tanh(a+bx))}-\frac{mx^{-1+m}\,{}_2F_1\left(1,-1\right.}{2b^2\left(bx-\text{co}\right.}$$

**Mathematica** [A] time = 0.54, size = 51, normalized size = 0.54

$$\frac{x^{m+1}\,{}_2F_1\left(3,m+1;m+2;-\frac{bx}{\coth^{-1}(\tanh(a+bx))-bx}\right)}{(m+1)\left(\coth^{-1}(\tanh(a+bx))-bx\right)^3}$$

Antiderivative was successfully verified.

```
[In] Integrate[x^m/ArcCoth[Tanh[a + b*x]]^3,x]
```

```
[Out] (x^(1 + m)*Hypergeometric2F1[3, 1 + m, 2 + m, -((b*x)/(-(b*x) + ArcCoth[Tan
h[a + b*x]]))])/((1 + m)*(-(b*x) + ArcCoth[Tanh[a + b*x]])^3)
```

**fricas** [F] time = 0.51, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{x^m}{\operatorname{arcoth}\left(\tanh\left(bx+a\right)\right)^3},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^m/arccoth(tanh(b*x+a))^3,x, algorithm="fricas")
```

```
[Out] integral(x^m/arccoth(tanh(b*x + a))^3, x)
```

**giac** [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{x^m}{\operatorname{arcoth}\left(\tanh\left(bx+a\right)\right)^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^m/arccoth(tanh(b*x+a))^3,x, algorithm="giac")
```

```
[Out] integrate(x^m/arccoth(tanh(b*x + a))^3, x)
```

**maple** [F] time = 3.50, size = 0, normalized size = 0.00

$$\int \frac{x^m}{\operatorname{arccoth}\left(\tanh\left(bx+a\right)\right)^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^m/arccoth(tanh(b*x+a))^3,x)
```

```
[Out] int(x^m/arccoth(tanh(b*x+a))^3,x)
```

**maxima** [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{x^m}{\operatorname{arcoth}\left(\tanh\left(bx+a\right)\right)^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^m/arccoth(tanh(b*x+a))^3,x, algorithm="maxima")
```

```
[Out] integrate(x^m/arccoth(tanh(b*x + a))^3, x)
```

**mupad** [F] time = 0.00, size = -1, normalized size = -0.01

$$\int \frac{x^m}{\operatorname{acoth}\left(\tanh\left(a+b\,x\right)\right)^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^m/acoth(tanh(a + b*x))^3,x)
```

```
[Out] int(x^m/acoth(tanh(a + b*x))^3, x)
```

**sympy** **[F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{x^m}{\operatorname{acoth}^3\left(\tanh\left(a+bx\right)\right)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**m/acoth(tanh(b*x+a))**3,x)
```

```
[Out] Integral(x**m/acoth(tanh(a + b*x))**3, x)
```

# 3.176 $\int \frac{x^4}{\coth^{-1}(\tanh(a+bx))^3} dx$

**Optimal**. Leaf size=92

$$\frac{6\left(bx-\coth^{-1}(\tanh(a+bx))\right)^2\log\left(\coth^{-1}(\tanh(a+bx))\right)}{b^5}+\frac{6x\left(bx-\coth^{-1}(\tanh(a+bx))\right)}{b^4}-\frac{2x^3}{b^2\coth^{-1}(\tanh(a$$

```
[Out] 3*x^2/b^3+6*x*x*(b*x-arccoth(tanh(b*x+a)))/b^4-1/2*x^4/b/arccoth(tanh(b*x+a))
^2-2*x^3/b^2/arccoth(tanh(b*x+a))+6*(b*x-arccoth(tanh(b*x+a)))^2*ln(arccoth
(tanh(b*x+a)))/b^5
```

**Rubi [A]** time = 0.07, antiderivative size = 92, normalized size of antiderivative = 1.00, number of steps used = 6, number of rules used = 5, integrand size = 13, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.385, Rules used = {2168, 2159, 2158, 2157, 29}

$$-\frac{2x^3}{b^2\coth^{-1}(\tanh(a+bx))}+\frac{6x\left(bx-\coth^{-1}(\tanh(a+bx))\right)}{b^4}+\frac{6\left(bx-\coth^{-1}(\tanh(a+bx))\right)^2\log\left(\coth^{-1}(\tanh(a$$

Antiderivative was successfully verified.

```
[In] Int[x^4/ArcCoth[Tanh[a + b*x]]^3,x]
```

```
[Out] (3*x^2)/b^3 + (6*x*(b*x - ArcCoth[Tanh[a + b*x]]))/b^4 - x^4/(2*b*ArcCoth[T
anh[a + b*x]]^2) - (2*x^3)/(b^2*ArcCoth[Tanh[a + b*x]]) + (6*(b*x - ArcCoth
[Tanh[a + b*x]])^2*Log[ArcCoth[Tanh[a + b*x]]])/b^5
```

Rule 29

```
Int[(x_)^(-1), x_Symbol] :> Simp[Log[x], x]
```

Rule 2157

```
Int[(u_)^(m_.), x_Symbol] :> With[{c = Simplify[D[u, x]]}, Dist[1/c, Subst[
Int[x^m, x], x, u], x]] /; FreeQ[m, x] && PiecewiseLinearQ[u, x]
```

Rule 2158

```
Int[(v_)/(u_), x_Symbol] :> With[{a = Simplify[D[u, x]], b = Simplify[D[v,
x]]}, Simp[(b*x)/a, x] - Dist[(b*u - a*v)/a, Int[1/u, x], x] /; NeQ[b*u - a
*v, 0]] /; PiecewiseLinearQ[u, v, x]
```

Rule 2159

```
Int[(v_)^(n_)/(u_), x_Symbol] :> With[{a = Simplify[D[u, x]], b = Simplify[
D[v, x]]}, Simp[v^n/(a*n), x] - Dist[(b*u - a*v)/a, Int[v^(n - 1)/u, x], x]
 /; NeQ[b*u - a*v, 0]] /; PiecewiseLinearQ[u, v, x] && GtQ[n, 0] && NeQ[n,
1]
```

Rule 2168

```
Int[(u_)^(m_)*(v_)^(n_.), x_Symbol] :> With[{a = Simplify[D[u, x]], b = Sim
plify[D[v, x]]}, Simp[(u^(m + 1)*v^n)/(a*(m + 1)), x] - Dist[(b*n)/(a*(m +
1)), Int[u^(m + 1)*v^(n - 1), x], x] /; NeQ[b*u - a*v, 0]] /; FreeQ[{m, n},
 x] && PiecewiseLinearQ[u, v, x] && NeQ[m, -1] && ((LtQ[m, -1] && GtQ[n, 0]
 &&  !(ILtQ[m + n, -2] && (FractionQ[m] || GeQ[2*n + m + 1, 0]))) || (IGtQ[
n, 0] && IGtQ[m, 0] && LeQ[n, m]) || (IGtQ[n, 0] &&  !IntegerQ[m]) || (ILtQ
[m, 0] &&  !IntegerQ[n]))
```

Rubi steps

$$\int \frac{x^4}{\coth^{-1}(\tanh(a+bx))^3}\,dx = -\frac{x^4}{2b\coth^{-1}(\tanh(a+bx))^2} + \frac{2\int \frac{x^3}{\coth^{-1}(\tanh(a+bx))^2}\,dx}{b}$$

$$= -\frac{x^4}{2b\coth^{-1}(\tanh(a+bx))^2} - \frac{2x^3}{b^2\coth^{-1}(\tanh(a+bx))} + \frac{6\int \frac{x^2}{\coth^{-1}(\tanh(a+bx))}\,d}{b^2}$$

$$= \frac{3x^2}{b^3} - \frac{x^4}{2b\coth^{-1}(\tanh(a+bx))^2} - \frac{2x^3}{b^2\coth^{-1}(\tanh(a+bx))} - \frac{\left(6\left(-bx+\coth\right.\right.}{}$$

$$= \frac{3x^2}{b^3} + \frac{6x\left(bx-\coth^{-1}(\tanh(a+bx))\right)}{b^4} - \frac{x^4}{2b\coth^{-1}(\tanh(a+bx))^2} - \frac{}{b^2\coth}$$

$$= \frac{3x^2}{b^3} + \frac{6x\left(bx-\coth^{-1}(\tanh(a+bx))\right)}{b^4} - \frac{x^4}{2b\coth^{-1}(\tanh(a+bx))^2} - \frac{}{b^2\coth}$$

$$= \frac{3x^2}{b^3} + \frac{6x\left(bx-\coth^{-1}(\tanh(a+bx))\right)}{b^4} - \frac{x^4}{2b\coth^{-1}(\tanh(a+bx))^2} - \frac{}{b^2\coth}$$

**Mathematica [A]** time = 0.04, size = 114, normalized size = 1.24

$$-\frac{\left(\coth^{-1}(\tanh(a+bx))-bx\right)^4}{2b^5\coth^{-1}(\tanh(a+bx))^2}+\frac{4\left(\coth^{-1}(\tanh(a+bx))-bx\right)^3}{b^5\coth^{-1}(\tanh(a+bx))}+\frac{6\left(\coth^{-1}(\tanh(a+bx))-bx\right)^2\log\left(\coth^{-1}\right.}{b^5}$$

Antiderivative was successfully verified.

```
[In] Integrate[x^4/ArcCoth[Tanh[a + b*x]]^3,x]
```

```
[Out] x^2/(2*b^3) - (3*x*(-(b*x) + ArcCoth[Tanh[a + b*x]]))/b^4 + (4*(-(b*x) + Ar
cCoth[Tanh[a + b*x]])^3)/(b^5*ArcCoth[Tanh[a + b*x]]) - (-(b*x) + ArcCoth[T
anh[a + b*x]])^4/(2*b^5*ArcCoth[Tanh[a + b*x]]^2) + (6*(-(b*x) + ArcCoth[Ta
nh[a + b*x]])^2*Log[ArcCoth[Tanh[a + b*x]]])/b^5
```

**fricas [B]** time = 1.14, size = 493, normalized size = 5.36

$$\frac{64\,b^6x^6 - 128\,ab^5x^5 - 7\,\pi^6 - 28\,\pi^4a^2 + 112\,\pi^2a^4 + 448\,a^6 + 32\left(\pi^2b^4 - 36\,a^2b^4\right)x^4 - 512\left(\pi^2ab^3 + 3\,a^3b^3\right)x^3 -}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^4/arccoth(tanh(b*x+a))^3,x, algorithm="fricas")
```

```
[Out] 1/8*(64*b^6*x^6 - 128*a*b^5*x^5 - 7*pi^6 - 28*pi^4*a^2 + 112*pi^2*a^4 + 448
*a^6 + 32*(pi^2*b^4 - 36*a^2*b^4)*x^4 - 512*(pi^2*a*b^3 + 3*a^3*b^3)*x^3 -
32*(pi^4*b^2 + 32*pi^2*a^2*b^2)*x^2 - 32*(5*pi^4*a*b + 12*pi^2*a^3*b - 32*a
^5*b)*x - 96*(16*pi*a*b^4*x^4 + 64*pi*a^2*b^3*x^3 + pi^5*a + 8*pi^3*a^3 + 1
6*pi*a^5 + 8*(pi^3*a*b^2 + 12*pi*a^3*b^2)*x^2 + 16*(pi^3*a^2*b + 4*pi*a^4*b
)*x)*arctan(-(2*b*x + 2*a - sqrt(4*b^2*x^2 + 8*a*b*x + pi^2 + 4*a^2))/pi) -
 6*(pi^6 + 4*pi^4*a^2 - 16*pi^2*a^4 - 64*a^6 + 16*(pi^2*b^4 - 4*a^2*b^4)*x^
4 + 64*(pi^2*a*b^3 - 4*a^3*b^3)*x^3 + 8*(pi^4*b^2 + 8*pi^2*a^2*b^2 - 48*a^4
*b^2)*x^2 + 16*(pi^4*a*b - 16*a^5*b)*x)*log(4*b^2*x^2 + 8*a*b*x + pi^2 + 4*
a^2))/(16*b^9*x^4 + 64*a*b^8*x^3 + pi^4*b^5 + 8*pi^2*a^2*b^5 + 16*a^4*b^5 +
 8*(pi^2*b^7 + 12*a^2*b^7)*x^2 + 16*(pi^2*a*b^6 + 4*a^3*b^6)*x)
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{x^4}{\operatorname{arcoth}\left(\tanh\left(bx+a\right)\right)^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^4/arccoth(tanh(b*x+a))^3,x, algorithm="giac")
```

```
[Out] integrate(x^4/arccoth(tanh(b*x + a))^3, x)
```

**maple [C]** time = 1.51, size = 29456, normalized size = 320.17

output too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^4/arccoth(tanh(b*x+a))^3,x)
```

```
[Out] result too large to display
```

**maxima [C]** time = 1.15, size = 197, normalized size = 2.14

$$\frac{8\left(16\,b^4x^4+7\,\pi^4+56i\,\pi^3a-168\,\pi^2a^2-224i\,\pi a^3+112\,a^4+\left(32i\,\pi b^3-64\,ab^3\right)x^3+\left(44\,\pi^2b^2+176i\,\pi ab^2-176\right.\right.}{256\,b^7x^2-64\,\pi^2b^5-256i\,\pi ab^5+256\,a^2b^5+\left(-256i\,\pi b^6+512\,a\right.}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^4/arccoth(tanh(b*x+a))^3,x, algorithm="maxima")
```

```
[Out] 8*(16*b^4*x^4 + 7*pi^4 + 56*I*pi^3*a - 168*pi^2*a^2 - 224*I*pi*a^3 + 112*a^
4 + (32*I*pi*b^3 - 64*a*b^3)*x^3 + (44*pi^2*b^2 + 176*I*pi*a*b^2 - 176*a^2*
b^2)*x^2 + (4*I*pi^3*b - 24*pi^2*a*b - 48*I*pi*a^2*b + 32*a^3*b)*x)/(256*b^
7*x^2 - 64*pi^2*b^5 - 256*I*pi*a*b^5 + 256*a^2*b^5 + (-256*I*pi*b^6 + 512*a
*b^6)*x) - 1/2*(3*pi^2 + 12*I*pi*a - 12*a^2)*log(-I*pi + 2*b*x + 2*a)/b^5
```

**mupad [B]** time = 1.38, size = 867, normalized size = 9.42

result too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^4/acoth(tanh(a + b*x))^3,x)
```

```
[Out] ((7*((2*a - log((2*exp(2*a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x) - 1)) + log(-2
/(exp(2*a)*exp(2*b*x) - 1)) + 2*b*x)^4 + 24*a^2*(2*a - log((2*exp(2*a)*exp(
2*b*x))/(exp(2*a)*exp(2*b*x) - 1)) + log(-2/(exp(2*a)*exp(2*b*x) - 1)) + 2*
b*x)^2 + 16*a^4 - 8*a*(2*a - log((2*exp(2*a)*exp(2*b*x))/(exp(2*a)*exp(2*b*
x) - 1)) + log(-2/(exp(2*a)*exp(2*b*x) - 1)) + 2*b*x)^3 - 32*a^3*(2*a - log
((2*exp(2*a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x) - 1)) + log(-2/(exp(2*a)*exp(
2*b*x) - 1)) + 2*b*x)))/(4*b) - x*(4*(2*a - log((2*exp(2*a)*exp(2*b*x))/(ex
p(2*a)*exp(2*b*x) - 1)) + log(-2/(exp(2*a)*exp(2*b*x) - 1)) + 2*b*x)^3 - 32
*a^3 - 24*a*(2*a - log((2*exp(2*a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x) - 1)) +
 log(-2/(exp(2*a)*exp(2*b*x) - 1)) + 2*b*x)^2 + 48*a^2*(2*a - log((2*exp(2*
a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x) - 1)) + log(-2/(exp(2*a)*exp(2*b*x) - 1
)) + 2*b*x)))/(2*b^4*(2*a - log((2*exp(2*a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x
) - 1)) + log(-2/(exp(2*a)*exp(2*b*x) - 1)) + 2*b*x)^2 + x*(16*a*b^5 - 8*b^
5*(2*a - log((2*exp(2*a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x) - 1)) + log(-2/(e
xp(2*a)*exp(2*b*x) - 1)) + 2*b*x)) + 8*a^2*b^4 + 8*b^6*x^2 - 8*a*b^4*(2*a -
 log((2*exp(2*a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x) - 1)) + log(-2/(exp(2*a)*
exp(2*b*x) - 1)) + 2*b*x)) + x^2/(2*b^3) + (log(log((2*exp(2*a)*exp(2*b*x))
/(exp(2*a)*exp(2*b*x) - 1)) - log(-2/(exp(2*a)*exp(2*b*x) - 1)))*(3*(2*a -
```

```
log((2*exp(2*a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x) - 1)) + log(-2/(exp(2*a)*e
xp(2*b*x) - 1)) + 2*b*x)^2 - 12*a*(2*a - log((2*exp(2*a)*exp(2*b*x))/(exp(2
*a)*exp(2*b*x) - 1)) + log(-2/(exp(2*a)*exp(2*b*x) - 1)) + 2*b*x) + 12*a^2)
)/(2*b^5) + (3*x*(log(-2/(exp(2*a)*exp(2*b*x) - 1)) - log((2*exp(2*a)*exp(2
*b*x))/(exp(2*a)*exp(2*b*x) - 1)) + 2*b*x))/(2*b^4)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{x^4}{\operatorname{acoth}^3(\tanh(a + bx))} \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**4/acoth(tanh(b*x+a))**3,x)
```

```
[Out] Integral(x**4/acoth(tanh(a + b*x))**3, x)
```

# 3.177 $\int \frac{x^3}{\coth^{-1}(\tanh(a+bx))^3}\,dx$

**Optimal**. Leaf size=71

$$\frac{3\left(bx-\coth^{-1}(\tanh(a+bx))\right)\log\left(\coth^{-1}(\tanh(a+bx))\right)}{b^4}-\frac{3x^2}{2b^2\coth^{-1}(\tanh(a+bx))}-\frac{x^3}{2b\coth^{-1}(\tanh(a+bx))^2}$$

```
[Out] 3*x/b^3-1/2*x^3/b/arccoth(tanh(b*x+a))^2-3/2*x^2/b^2/arccoth(tanh(b*x+a))+3
*(b*x-arccoth(tanh(b*x+a)))*ln(arccoth(tanh(b*x+a)))/b^4
```

**Rubi [A]** time = 0.05, antiderivative size = 71, normalized size of antiderivative = 1.00, number of steps used = 5, number of rules used = 4, integrand size = 13, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.308, Rules used = {2168, 2158, 2157, 29}

$$-\frac{3x^2}{2b^2\coth^{-1}(\tanh(a+bx))}+\frac{3\left(bx-\coth^{-1}(\tanh(a+bx))\right)\log\left(\coth^{-1}(\tanh(a+bx))\right)}{b^4}-\frac{x^3}{2b\coth^{-1}(\tanh(a+bx)}$$

Antiderivative was successfully verified.

```
[In] Int[x^3/ArcCoth[Tanh[a + b*x]]^3,x]
```

```
[Out] (3*x)/b^3 - x^3/(2*b*ArcCoth[Tanh[a + b*x]]^2) - (3*x^2)/(2*b^2*ArcCoth[Tan
h[a + b*x]]) + (3*(b*x - ArcCoth[Tanh[a + b*x]])*Log[ArcCoth[Tanh[a + b*x]]
])/b^4
```

Rule 29

```
Int[(x_)^(-1), x_Symbol] :> Simp[Log[x], x]
```

Rule 2157

```
Int[(u_)^(m_.), x_Symbol] :> With[{c = Simplify[D[u, x]]}, Dist[1/c, Subst[
Int[x^m, x], x, u], x]] /; FreeQ[m, x] && PiecewiseLinearQ[u, x]
```

Rule 2158

```
Int[(v_)/(u_), x_Symbol] :> With[{a = Simplify[D[u, x]], b = Simplify[D[v,
x]]}, Simp[(b*x)/a, x] - Dist[(b*u - a*v)/a, Int[1/u, x], x] /; NeQ[b*u - a
*v, 0]] /; PiecewiseLinearQ[u, v, x]
```

Rule 2168

```
Int[(u_)^(m_)*(v_)^(n_.), x_Symbol] :> With[{a = Simplify[D[u, x]], b = Sim
plify[D[v, x]]}, Simp[(u^(m + 1)*v^n)/(a*(m + 1)), x] - Dist[(b*n)/(a*(m +
1)), Int[u^(m + 1)*v^(n - 1), x], x] /; NeQ[b*u - a*v, 0]] /; FreeQ[{m, n},
 x] && PiecewiseLinearQ[u, v, x] && NeQ[m, -1] && ((LtQ[m, -1] && GtQ[n, 0]
 &&  !(ILtQ[m + n, -2] && (FractionQ[m] || GeQ[2*n + m + 1, 0]))) || (IGtQ[
n, 0] && IGtQ[m, 0] && LeQ[n, m]) || (IGtQ[n, 0] &&  !IntegerQ[m]) || (ILtQ
[m, 0] &&  !IntegerQ[n]))
```

Rubi steps

$$\int \frac{x^3}{\coth^{-1}(\tanh(a+bx))^3}\,dx = -\frac{x^3}{2b\coth^{-1}(\tanh(a+bx))^2} + \frac{3\int \frac{x^2}{\coth^{-1}(\tanh(a+bx))^2}\,dx}{2b}$$
$$= -\frac{x^3}{2b\coth^{-1}(\tanh(a+bx))^2} - \frac{3x^2}{2b^2\coth^{-1}(\tanh(a+bx))} + \frac{3\int \frac{x}{\coth^{-1}(\tanh(a+bx))}}{b^2}$$
$$= \frac{3x}{b^3} - \frac{x^3}{2b\coth^{-1}(\tanh(a+bx))^2} - \frac{3x^2}{2b^2\coth^{-1}(\tanh(a+bx))} - \frac{\left(3\left(-bx+\coth\right.\right.}{}$$
$$= \frac{3x}{b^3} - \frac{x^3}{2b\coth^{-1}(\tanh(a+bx))^2} - \frac{3x^2}{2b^2\coth^{-1}(\tanh(a+bx))} - \frac{\left(3\left(-bx+\coth\right.\right.}{}$$
$$= \frac{3x}{b^3} - \frac{x^3}{2b\coth^{-1}(\tanh(a+bx))^2} - \frac{3x^2}{2b^2\coth^{-1}(\tanh(a+bx))} + \frac{3\left(bx-\coth^{-1}\right.}{}$$

**Mathematica [A]** time = 0.05, size = 86, normalized size = 1.21

$$-\frac{3b^2x^2\coth^{-1}(\tanh(a+bx)) - bx\coth^{-1}(\tanh(a+bx))^2\left(6\log\left(\coth^{-1}(\tanh(a+bx))\right)+11\right) + \coth^{-1}(\tanh(}{2b^4\coth^{-1}(\tanh(a+bx))^2}$$

Antiderivative was successfully verified.

```
[In] Integrate[x^3/ArcCoth[Tanh[a + b*x]]^3,x]
```

```
[Out] -1/2*(b^3*x^3 + 3*b^2*x^2*ArcCoth[Tanh[a + b*x]] + ArcCoth[Tanh[a + b*x]]^3
*(5 + 6*Log[ArcCoth[Tanh[a + b*x]]]) - b*x*ArcCoth[Tanh[a + b*x]]^2*(11 + 6
*Log[ArcCoth[Tanh[a + b*x]]]))/(b^4*ArcCoth[Tanh[a + b*x]]^2)
```

**fricas [B]** time = 0.65, size = 418, normalized size = 5.89

$$\frac{32\,b^5x^5 + 128\,ab^4x^4 - 5\,\pi^4a - 40\,\pi^2a^3 - 80\,a^5 + 8\left(5\,\pi^2b^3 + 12\,a^2b^3\right)x^3 + 4\left(11\,\pi^2ab^2 - 36\,a^3b^2\right)x^2 + 2\left(3\,\pi^4b\right.}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^3/arccoth(tanh(b*x+a))^3,x, algorithm="fricas")
```

```
[Out] 1/2*(32*b^5*x^5 + 128*a*b^4*x^4 - 5*pi^4*a - 40*pi^2*a^3 - 80*a^5 + 8*(5*pi
^2*b^3 + 12*a^2*b^3)*x^3 + 4*(11*pi^2*a*b^2 - 36*a^3*b^2)*x^2 + 2*(3*pi^4*b
 - 16*pi^2*a^2*b - 112*a^4*b)*x + 6*(16*pi*b^4*x^4 + 64*pi*a*b^3*x^3 + pi^5
 + 8*pi^3*a^2 + 16*pi*a^4 + 8*(pi^3*b^2 + 12*pi*a^2*b^2)*x^2 + 16*(pi^3*a*b
 + 4*pi*a^3*b)*x)*arctan(-(2*b*x + 2*a - sqrt(4*b^2*x^2 + 8*a*b*x + pi^2 +
4*a^2))/pi) - 3*(16*a*b^4*x^4 + 64*a^2*b^3*x^3 + pi^4*a + 8*pi^2*a^3 + 16*a
^5 + 8*(pi^2*a*b^2 + 12*a^3*b^2)*x^2 + 16*(pi^2*a^2*b + 4*a^4*b)*x)*log(4*b
^2*x^2 + 8*a*b*x + pi^2 + 4*a^2))/(16*b^8*x^4 + 64*a*b^7*x^3 + pi^4*b^4 + 8
*pi^2*a^2*b^4 + 16*a^4*b^4 + 8*(pi^2*b^6 + 12*a^2*b^6)*x^2 + 16*(pi^2*a*b^5
 + 4*a^3*b^5)*x)
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{x^3}{\operatorname{arcoth}\left(\tanh\left(bx+a\right)\right)^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^3/arccoth(tanh(b*x+a))^3,x, algorithm="giac")
```

```
[Out] integrate(x^3/arccoth(tanh(b*x + a))^3, x)
```

**maple [C]** time = 0.78, size = 4977, normalized size = 70.10

output too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^3/arccoth(tanh(b*x+a))^3,x)
```

```
[Out] -2*I*(-6*Pi*x^2*csgn(I/(exp(2*b*x+2*a)+1))^2+3*Pi*x^2*csgn(I/(exp(2*b*x+2*a
)+1))*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))-3*Pi
*x^2*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2
+6*Pi*x^2*csgn(I/(exp(2*b*x+2*a)+1))^3+3*Pi*x^2*csgn(I*exp(b*x+a))^2*csgn(I
*exp(2*b*x+2*a))-6*Pi*x^2*csgn(I*exp(b*x+a))*csgn(I*exp(2*b*x+2*a))^2+3*Pi*
x^2*csgn(I*exp(2*b*x+2*a))^3-3*Pi*x^2*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b
*x+2*a)/(exp(2*b*x+2*a)+1))^2+3*Pi*x^2*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a
)+1))^3+4*I*x^3*b+6*Pi*x^2+12*I*x^2*ln(exp(b*x+a)))/b^2/(-2*Pi*csgn(I/(exp(
2*b*x+2*a)+1))^2+Pi*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(2*b*x+2*a))*csgn(
I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))-Pi*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*e
xp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2+2*Pi*csgn(I/(exp(2*b*x+2*a)+1))^3+Pi*cs
gn(I*exp(b*x+a))^2*csgn(I*exp(2*b*x+2*a))-2*Pi*csgn(I*exp(b*x+a))*csgn(I*ex
p(2*b*x+2*a))^2+Pi*csgn(I*exp(2*b*x+2*a))^3-Pi*csgn(I*exp(2*b*x+2*a))*csgn(
I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2+Pi*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+
2*a)+1))^3+2*Pi+4*I*ln(exp(b*x+a)))^2+3*x/b^3-3/2*I/b^4*ln(-2*Pi*csgn(I/(ex
p(2*b*x+2*a)+1))^2+Pi*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(2*b*x+2*a))*csg
n(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))-Pi*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I
*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2+2*Pi*csgn(I/(exp(2*b*x+2*a)+1))^3+Pi*
csgn(I*exp(b*x+a))^2*csgn(I*exp(2*b*x+2*a))-2*Pi*csgn(I*exp(b*x+a))*csgn(I*
exp(2*b*x+2*a))^2+Pi*csgn(I*exp(2*b*x+2*a))^3-Pi*csgn(I*exp(2*b*x+2*a))*csg
n(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2+Pi*csgn(I*exp(2*b*x+2*a)/(exp(2*b*
x+2*a)+1))^3+4*I*(ln(exp(b*x+a))-b*x-a)+4*I*b*x+4*I*a+2*Pi)*Pi*csgn(I/(exp(
2*b*x+2*a)+1))^2+3/4*I/b^4*ln(-2*Pi*csgn(I/(exp(2*b*x+2*a)+1))^2+Pi*csgn(I/
(exp(2*b*x+2*a)+1))*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x
+2*a)+1))-Pi*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*
a)+1))^2+2*Pi*csgn(I/(exp(2*b*x+2*a)+1))^3+Pi*csgn(I*exp(b*x+a))^2*csgn(I*e
xp(2*b*x+2*a))-2*Pi*csgn(I*exp(b*x+a))*csgn(I*exp(2*b*x+2*a))^2+Pi*csgn(I*e
xp(2*b*x+2*a))^3-Pi*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x
+2*a)+1))^2+Pi*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^3+4*I*(ln(exp(b*x+
a))-b*x-a)+4*I*b*x+4*I*a+2*Pi)*Pi*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(2*b
*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))-3/4*I/b^4*ln(-2*Pi*csgn(
I/(exp(2*b*x+2*a)+1))^2+Pi*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(2*b*x+2*a)
)*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))-Pi*csgn(I/(exp(2*b*x+2*a)+1))*c
sgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2+2*Pi*csgn(I/(exp(2*b*x+2*a)+1))^
3+Pi*csgn(I*exp(b*x+a))^2*csgn(I*exp(2*b*x+2*a))-2*Pi*csgn(I*exp(b*x+a))*cs
gn(I*exp(2*b*x+2*a))^2+Pi*csgn(I*exp(2*b*x+2*a))^3-Pi*csgn(I*exp(2*b*x+2*a)
)*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2+Pi*csgn(I*exp(2*b*x+2*a)/(exp
(2*b*x+2*a)+1))^3+4*I*(ln(exp(b*x+a))-b*x-a)+4*I*b*x+4*I*a+2*Pi)*Pi*csgn(I/
(exp(2*b*x+2*a)+1))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2+3/2*I/b^4*l
n(-2*Pi*csgn(I/(exp(2*b*x+2*a)+1))^2+Pi*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*e
xp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))-Pi*csgn(I/(exp(2*b
*x+2*a)+1))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2+2*Pi*csgn(I/(exp(2*
b*x+2*a)+1))^3+Pi*csgn(I*exp(b*x+a))^2*csgn(I*exp(2*b*x+2*a))-2*Pi*csgn(I*e
xp(b*x+a))*csgn(I*exp(2*b*x+2*a))^2+Pi*csgn(I*exp(2*b*x+2*a))^3-Pi*csgn(I*e
xp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2+Pi*csgn(I*exp(2*
b*x+2*a)/(exp(2*b*x+2*a)+1))^3+4*I*(ln(exp(b*x+a))-b*x-a)+4*I*b*x+4*I*a+2*P
i)*Pi*csgn(I/(exp(2*b*x+2*a)+1))^3+3/4*I/b^4*ln(-2*Pi*csgn(I/(exp(2*b*x+2*a
)+1))^2+Pi*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b
*x+2*a)/(exp(2*b*x+2*a)+1))-Pi*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(2*b*x+
```

```
2*a)/(exp(2*b*x+2*a)+1))^2+2*Pi*csgn(I/(exp(2*b*x+2*a)+1))^3+Pi*csgn(I*exp(
b*x+a))^2*csgn(I*exp(2*b*x+2*a))-2*Pi*csgn(I*exp(b*x+a))*csgn(I*exp(2*b*x+2
*a))^2+Pi*csgn(I*exp(2*b*x+2*a))^3-Pi*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b
*x+2*a)/(exp(2*b*x+2*a)+1))^2+Pi*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^
3+4*I*(ln(exp(b*x+a))-b*x-a)+4*I*b*x+4*I*a+2*Pi)*Pi*csgn(I*exp(b*x+a))^2*cs
gn(I*exp(2*b*x+2*a))-3/2*I/b^4*ln(-2*Pi*csgn(I/(exp(2*b*x+2*a)+1))^2+Pi*csg
n(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2
*b*x+2*a)+1))-Pi*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*
x+2*a)+1))^2+2*Pi*csgn(I/(exp(2*b*x+2*a)+1))^3+Pi*csgn(I*exp(b*x+a))^2*csgn
(I*exp(2*b*x+2*a))-2*Pi*csgn(I*exp(b*x+a))*csgn(I*exp(2*b*x+2*a))^2+Pi*csgn
(I*exp(2*b*x+2*a))^3-Pi*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2
*b*x+2*a)+1))^2+Pi*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^3+4*I*(ln(exp(
b*x+a))-b*x-a)+4*I*b*x+4*I*a+2*Pi)*Pi*csgn(I*exp(b*x+a))*csgn(I*exp(2*b*x+2
*a))^2+3/4*I/b^4*ln(-2*Pi*csgn(I/(exp(2*b*x+2*a)+1))^2+Pi*csgn(I/(exp(2*b*x
+2*a)+1))*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))-
Pi*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2+2
*Pi*csgn(I/(exp(2*b*x+2*a)+1))^3+Pi*csgn(I*exp(b*x+a))^2*csgn(I*exp(2*b*x+2
*a))-2*Pi*csgn(I*exp(b*x+a))*csgn(I*exp(2*b*x+2*a))^2+Pi*csgn(I*exp(2*b*x+2
*a))^3-Pi*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^
2+Pi*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^3+4*I*(ln(exp(b*x+a))-b*x-a)
+4*I*b*x+4*I*a+2*Pi)*Pi*csgn(I*exp(2*b*x+2*a))^3-3/4*I/b^4*ln(-2*Pi*csgn(I/
(exp(2*b*x+2*a)+1))^2+Pi*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(2*b*x+2*a))*
csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))-Pi*csgn(I/(exp(2*b*x+2*a)+1))*csg
n(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2+2*Pi*csgn(I/(exp(2*b*x+2*a)+1))^3+
Pi*csgn(I*exp(b*x+a))^2*csgn(I*exp(2*b*x+2*a))-2*Pi*csgn(I*exp(b*x+a))*csgn
(I*exp(2*b*x+2*a))^2+Pi*csgn(I*exp(2*b*x+2*a))^3-Pi*csgn(I*exp(2*b*x+2*a))*
csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2+Pi*csgn(I*exp(2*b*x+2*a)/(exp(2
*b*x+2*a)+1))^3+4*I*(ln(exp(b*x+a))-b*x-a)+4*I*b*x+4*I*a+2*Pi)*Pi*csgn(I*ex
p(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2+3/4*I/b^4*ln(-2*P
i*csgn(I/(exp(2*b*x+2*a)+1))^2+Pi*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(2*b
*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))-Pi*csgn(I/(exp(2*b*x+2*a
)+1))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2+2*Pi*csgn(I/(exp(2*b*x+2*
a)+1))^3+Pi*csgn(I*exp(b*x+a))^2*csgn(I*exp(2*b*x+2*a))-2*Pi*csgn(I*exp(b*x
+a))*csgn(I*exp(2*b*x+2*a))^2+Pi*csgn(I*exp(2*b*x+2*a))^3-Pi*csgn(I*exp(2*b
*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2+Pi*csgn(I*exp(2*b*x+2*
a)/(exp(2*b*x+2*a)+1))^3+4*I*(ln(exp(b*x+a))-b*x-a)+4*I*b*x+4*I*a+2*Pi)*Pi*
csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^3+3/2*I/b^4*Pi*ln(-2*Pi*csgn(I/(e
xp(2*b*x+2*a)+1))^2+Pi*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(2*b*x+2*a))*cs
gn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))-Pi*csgn(I/(exp(2*b*x+2*a)+1))*csgn(
I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2+2*Pi*csgn(I/(exp(2*b*x+2*a)+1))^3+Pi
*csgn(I*exp(b*x+a))^2*csgn(I*exp(2*b*x+2*a))-2*Pi*csgn(I*exp(b*x+a))*csgn(I
*exp(2*b*x+2*a))^2+Pi*csgn(I*exp(2*b*x+2*a))^3-Pi*csgn(I*exp(2*b*x+2*a))*cs
gn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2+Pi*csgn(I*exp(2*b*x+2*a)/(exp(2*b
*x+2*a)+1))^3+4*I*(ln(exp(b*x+a))-b*x-a)+4*I*b*x+4*I*a+2*Pi)+3/b^3*ln(-2*Pi
*csgn(I/(exp(2*b*x+2*a)+1))^2+Pi*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(2*b*
x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))-Pi*csgn(I/(exp(2*b*x+2*a)
+1))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2+2*Pi*csgn(I/(exp(2*b*x+2*a
)+1))^3+Pi*csgn(I*exp(b*x+a))^2*csgn(I*exp(2*b*x+2*a))-2*Pi*csgn(I*exp(b*x+
a))*csgn(I*exp(2*b*x+2*a))^2+Pi*csgn(I*exp(2*b*x+2*a))^3-Pi*csgn(I*exp(2*b*
x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2+Pi*csgn(I*exp(2*b*x+2*a
)/(exp(2*b*x+2*a)+1))^3+4*I*(ln(exp(b*x+a))-b*x-a)+4*I*b*x+4*I*a+2*Pi)*x-3/
b^4*ln(-2*Pi*csgn(I/(exp(2*b*x+2*a)+1))^2+Pi*csgn(I/(exp(2*b*x+2*a)+1))*csg
n(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))-Pi*csgn(I/(ex
p(2*b*x+2*a)+1))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2+2*Pi*csgn(I/(e
xp(2*b*x+2*a)+1))^3+Pi*csgn(I*exp(b*x+a))^2*csgn(I*exp(2*b*x+2*a))-2*Pi*csg
n(I*exp(b*x+a))*csgn(I*exp(2*b*x+2*a))^2+Pi*csgn(I*exp(2*b*x+2*a))^3-Pi*csg
n(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2+Pi*csgn(I*e
xp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^3+4*I*(ln(exp(b*x+a))-b*x-a)+4*I*b*x+4*I*
a+2*Pi)*ln(exp(b*x+a))
```

**maxima** [C] time = 1.15, size = 144, normalized size = 2.03

$$\frac{8\left(16\,b^3x^3 - 5i\,\pi^3 + 30\,\pi^2a + 60i\,\pi a^2 - 40\,a^3 + \left(-16i\,\pi b^2 + 32\,ab^2\right)x^2 + \left(8\,\pi^2b + 32i\,\pi ab - 32\,a^2b\right)x\right)}{128\,b^6x^2 - 32\,\pi^2b^4 - 128i\,\pi ab^4 + 128\,a^2b^4 + \left(-128i\,\pi b^5 + 256\,ab^5\right)x} - \frac{3\,(-i\,\pi +$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^3/arccoth(tanh(b*x+a))^3,x, algorithm="maxima")
```

```
[Out] 8*(16*b^3*x^3 - 5*I*pi^3 + 30*pi^2*a + 60*I*pi*a^2 - 40*a^3 + (-16*I*pi*b^2
 + 32*a*b^2)*x^2 + (8*pi^2*b + 32*I*pi*a*b - 32*a^2*b)*x)/(128*b^6*x^2 - 32
*pi^2*b^4 - 128*I*pi*a*b^4 + 128*a^2*b^4 + (-128*I*pi*b^5 + 256*a*b^5)*x) -
 3/2*(-I*pi + 2*a)*log(-I*pi + 2*b*x + 2*a)/b^4
```

**mupad** [B] time = 1.43, size = 620, normalized size = 8.73

$$\frac{x}{b^3} - \frac{x\left(3\left(2\,a - \ln\left(\frac{2\,e^{2\,a}\,e^{2\,b\,x}}{e^{2\,a}\,e^{2\,b\,x}-1}\right) + \ln\left(-\frac{2}{e^{2\,a}\,e^{2\,b\,x}-1}\right) + 2\,b\,x\right)^2 - 12\,a\left(2\,a - \ln\left(\frac{2\,e^{2\,a}\,e^{2\,b\,x}}{e^{2\,a}\,e^{2\,b\,x}-1}\right) + \ln\left(-\frac{2}{e^{2\,a}\,e^{2\,b\,x}-1}\right) + 2\,b\,x\right) +}{b^3\left(2\,a - \ln\left(\frac{2\,e^{2\,a}\,e^{2\,b\,x}}{e^{2\,a}\,e^{2\,b\,x}-1}\right) + \ln\left(-\frac{2}{e^{2\,a}\,e^{2\,b\,x}-1}\right) + 2\,b\,x\right)^2 + x\left(8\,a\,b^4 - 4\,b^4\left(2\,a - \ln\left(\frac{2\,e^{2\,a}}{e^{2\,a}\,e^{2}}\right.\right.\right.}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^3/acoth(tanh(a + b*x))^3,x)
```

```
[Out] x/b^3 - (x*(3*(2*a - log((2*exp(2*a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x) - 1))
 + log(-2/(exp(2*a)*exp(2*b*x) - 1)) + 2*b*x)^2 - 12*a*(2*a - log((2*exp(2*
a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x) - 1)) + log(-2/(exp(2*a)*exp(2*b*x) - 1
)) + 2*b*x) + 12*a^2) - (5*((2*a - log((2*exp(2*a)*exp(2*b*x))/(exp(2*a)*ex
p(2*b*x) - 1)) + log(-2/(exp(2*a)*exp(2*b*x) - 1)) + 2*b*x)^3 - 8*a^3 - 6*a
*(2*a - log((2*exp(2*a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x) - 1)) + log(-2/(ex
p(2*a)*exp(2*b*x) - 1)) + 2*b*x)^2 + 12*a^2*(2*a - log((2*exp(2*a)*exp(2*b*
x))/(exp(2*a)*exp(2*b*x) - 1)) + log(-2/(exp(2*a)*exp(2*b*x) - 1)) + 2*b*x)
))/(4*b))/(b^3*(2*a - log((2*exp(2*a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x) - 1)
) + log(-2/(exp(2*a)*exp(2*b*x) - 1)) + 2*b*x)^2 + x*(8*a*b^4 - 4*b^4*(2*a
- log((2*exp(2*a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x) - 1)) + log(-2/(exp(2*a)
*exp(2*b*x) - 1)) + 2*b*x)) + 4*a^2*b^3 + 4*b^5*x^2 - 4*a*b^3*(2*a - log((2
*exp(2*a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x) - 1)) + log(-2/(exp(2*a)*exp(2*b
*x) - 1)) + 2*b*x)) + (log(log((2*exp(2*a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x)
 - 1)) - log(-2/(exp(2*a)*exp(2*b*x) - 1)))*(3*log(-2/(exp(2*a)*exp(2*b*x)
- 1)) - 3*log((2*exp(2*a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x) - 1)) + 6*b*x))/
(2*b^4)
```

**sympy** [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{x^3}{\operatorname{acoth}^3\left(\tanh\left(a + bx\right)\right)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**3/acoth(tanh(b*x+a))**3,x)
```

```
[Out] Integral(x**3/acoth(tanh(a + b*x))**3, x)
```

## 3.178 $\int \frac{x^2}{\coth^{-1}(\tanh(a+bx))^3} dx$

**Optimal**. Leaf size=47

$$\frac{\log\left(\coth^{-1}(\tanh(a+bx))\right)}{b^3}-\frac{x}{b^2\coth^{-1}(\tanh(a+bx))}-\frac{x^2}{2b\coth^{-1}(\tanh(a+bx))^2}$$

```
[Out] -1/2*x^2/b/arccoth(tanh(b*x+a))^2-x/b^2/arccoth(tanh(b*x+a))+ln(arccoth(tan
h(b*x+a)))/b^3
```

**Rubi [A]** time = 0.03, antiderivative size = 47, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 3, integrand size = 13, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.231, Rules used = {2168, 2157, 29}

$$-\frac{x}{b^2\coth^{-1}(\tanh(a+bx))}+\frac{\log\left(\coth^{-1}(\tanh(a+bx))\right)}{b^3}-\frac{x^2}{2b\coth^{-1}(\tanh(a+bx))^2}$$

Antiderivative was successfully verified.

```
[In] Int[x^2/ArcCoth[Tanh[a + b*x]]^3,x]
```

```
[Out] -x^2/(2*b*ArcCoth[Tanh[a + b*x]]^2) - x/(b^2*ArcCoth[Tanh[a + b*x]]) + Log[
ArcCoth[Tanh[a + b*x]]]/b^3
```

Rule 29

```
Int[(x_)^(-1), x_Symbol] :> Simp[Log[x], x]
```

Rule 2157

```
Int[(u_)^(m_.), x_Symbol] :> With[{c = Simplify[D[u, x]]}, Dist[1/c, Subst[
Int[x^m, x], x, u], x]] /; FreeQ[m, x] && PiecewiseLinearQ[u, x]
```

Rule 2168

```
Int[(u_)^(m_)*(v_)^(n_.), x_Symbol] :> With[{a = Simplify[D[u, x]], b = Sim
plify[D[v, x]]}, Simp[(u^(m + 1)*v^n)/(a*(m + 1)), x] - Dist[(b*n)/(a*(m +
1)), Int[u^(m + 1)*v^(n - 1), x], x] /; NeQ[b*u - a*v, 0]] /; FreeQ[{m, n},
 x] && PiecewiseLinearQ[u, v, x] && NeQ[m, -1] && ((LtQ[m, -1] && GtQ[n, 0]
 &&  !(ILtQ[m + n, -2] && (FractionQ[m] || GeQ[2*n + m + 1, 0]))) || (IGtQ[
n, 0] && IGtQ[m, 0] && LeQ[n, m]) || (IGtQ[n, 0] &&  !IntegerQ[m]) || (ILtQ
[m, 0] &&  !IntegerQ[n]))
```

Rubi steps

$$\begin{aligned}\int \frac{x^2}{\coth^{-1}(\tanh(a+bx))^3} dx &= -\frac{x^2}{2b\coth^{-1}(\tanh(a+bx))^2}+\frac{\int \frac{x}{\coth^{-1}(\tanh(a+bx))^2} dx}{b}\\ &= -\frac{x^2}{2b\coth^{-1}(\tanh(a+bx))^2}-\frac{x}{b^2\coth^{-1}(\tanh(a+bx))}+\frac{\int \frac{1}{\coth^{-1}(\tanh(a+bx))} dx}{b^2}\\ &= -\frac{x^2}{2b\coth^{-1}(\tanh(a+bx))^2}-\frac{x}{b^2\coth^{-1}(\tanh(a+bx))}+\frac{\text{Subst}\left(\int \frac{1}{x} dx, x, \coth^{-1}(\tanh(a+bx))\right)}{b^3}\\ &= -\frac{x^2}{2b\coth^{-1}(\tanh(a+bx))^2}-\frac{x}{b^2\coth^{-1}(\tanh(a+bx))}+\frac{\log\left(\coth^{-1}(\tanh(a+bx))\right)}{b^3}\end{aligned}$$

**Mathematica** [A] time = 0.04, size = 49, normalized size = 1.04

$$\frac{-\frac{b^2x^2}{\coth^{-1}(\tanh(a+bx))^2}-\frac{2bx}{\coth^{-1}(\tanh(a+bx))}+2\log\left(\coth^{-1}(\tanh(a+bx))\right)+3}{2b^3}$$

Antiderivative was successfully verified.

```
[In] Integrate[x^2/ArcCoth[Tanh[a + b*x]]^3,x]
```

```
[Out] (3 - (b^2*x^2)/ArcCoth[Tanh[a + b*x]]^2 - (2*b*x)/ArcCoth[Tanh[a + b*x]] +
2*Log[ArcCoth[Tanh[a + b*x]]])/(2*b^3)
```

**fricas** [B] time = 0.51, size = 250, normalized size = 5.32

$$\frac{64\,ab^3x^3+3\,\pi^4+24\,\pi^2a^2+48\,a^4+4\left(5\,\pi^2b^2+44\,a^2b^2\right)x^2+40\left(\pi^2ab+4\,a^3b\right)x+\left(16\,b^4x^4+64\,ab^3x^3+\pi^4+8\right.}{2\left(16\,b^7x^4+64\,ab^6x^3+\pi^4b^3+8\,\pi^2a^2b^3+16\,a^4b^3+8\left(\pi^2b\right.\right.}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2/arccoth(tanh(b*x+a))^3,x, algorithm="fricas")
```

```
[Out] 1/2*(64*a*b^3*x^3 + 3*pi^4 + 24*pi^2*a^2 + 48*a^4 + 4*(5*pi^2*b^2 + 44*a^2*
b^2)*x^2 + 40*(pi^2*a*b + 4*a^3*b)*x + (16*b^4*x^4 + 64*a*b^3*x^3 + pi^4 +
8*pi^2*a^2 + 16*a^4 + 8*(pi^2*b^2 + 12*a^2*b^2)*x^2 + 16*(pi^2*a*b + 4*a^3*
b)*x)*log(4*b^2*x^2 + 8*a*b*x + pi^2 + 4*a^2))/(16*b^7*x^4 + 64*a*b^6*x^3 +
 pi^4*b^3 + 8*pi^2*a^2*b^3 + 16*a^4*b^3 + 8*(pi^2*b^5 + 12*a^2*b^5)*x^2 + 1
6*(pi^2*a*b^4 + 4*a^3*b^4)*x)
```

**giac** [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{x^2}{\operatorname{arcoth}\left(\tanh\left(bx+a\right)\right)^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2/arccoth(tanh(b*x+a))^3,x, algorithm="giac")
```

```
[Out] integrate(x^2/arccoth(tanh(b*x + a))^3, x)
```

**maple** [C] time = 0.29, size = 952, normalized size = 20.26

result too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^2/arccoth(tanh(b*x+a))^3,x)
```

```
[Out] -4*I*(-2*Pi*x*csgn(I/(exp(2*b*x+2*a)+1))^2+Pi*x*csgn(I/(exp(2*b*x+2*a)+1))*
csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))-Pi*x*csgn(
I/(exp(2*b*x+2*a)+1))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2+2*Pi*x*cs
gn(I/(exp(2*b*x+2*a)+1))^3+Pi*x*csgn(I*exp(b*x+a))^2*csgn(I*exp(2*b*x+2*a))
-2*Pi*x*csgn(I*exp(b*x+a))*csgn(I*exp(2*b*x+2*a))^2+Pi*x*csgn(I*exp(2*b*x+2
*a))^3-Pi*x*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1)
)^2+Pi*x*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^3+2*I*x^2*b+2*Pi*x+4*I*x
*ln(exp(b*x+a)))/b^2/(-2*Pi*csgn(I/(exp(2*b*x+2*a)+1))^2+Pi*csgn(I/(exp(2*b
*x+2*a)+1))*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1)
)-Pi*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2
+2*Pi*csgn(I/(exp(2*b*x+2*a)+1))^3+Pi*csgn(I*exp(b*x+a))^2*csgn(I*exp(2*b*x
+2*a))-2*Pi*csgn(I*exp(b*x+a))*csgn(I*exp(2*b*x+2*a))^2+Pi*csgn(I*exp(2*b*x
+2*a))^3-Pi*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1)
)^2+Pi*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^3+2*Pi+4*I*ln(exp(b*x+a)))
```

```
^2+1/b^3*ln(ln(exp(b*x+a))-1/4*I*Pi*(-2*csgn(I/(exp(2*b*x+2*a)+1))^2+csgn(I
/(exp(2*b*x+2*a)+1))*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*
x+2*a)+1))-csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)
+1))^2+2*csgn(I/(exp(2*b*x+2*a)+1))^3+csgn(I*exp(b*x+a))^2*csgn(I*exp(2*b*x
+2*a))-2*csgn(I*exp(b*x+a))*csgn(I*exp(2*b*x+2*a))^2+csgn(I*exp(2*b*x+2*a))
^3-csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2+csgn(
I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^3+2))
```

**maxima** [C] time = 1.12, size = 94, normalized size = 2.00

$$-\frac{8\left(3\pi^2+12i\pi a-12a^2+(8i\pi b-16ab)x\right)}{64b^5x^2-16\pi^2b^3-64i\pi ab^3+64a^2b^3+\left(-64i\pi b^4+128ab^4\right)x}+\frac{\log\left(-i\pi+2bx+2a\right)}{b^3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2/arccoth(tanh(b*x+a))^3,x, algorithm="maxima")
```

```
[Out] -8*(3*pi^2 + 12*I*pi*a - 12*a^2 + (8*I*pi*b - 16*a*b)*x)/(64*b^5*x^2 - 16*p
i^2*b^3 - 64*I*pi*a*b^3 + 64*a^2*b^3 + (-64*I*pi*b^4 + 128*a*b^4)*x) + log(
-I*pi + 2*b*x + 2*a)/b^3
```

**mupad** [B] time = 1.22, size = 46, normalized size = 0.98

$$\frac{\ln\left(\operatorname{acoth}\left(\tanh\left(a+b\,x\right)\right)\right)}{b^3}-\frac{\frac{b^2\,x^2}{2}+b\,x\operatorname{acoth}\left(\tanh\left(a+b\,x\right)\right)}{b^3\operatorname{acoth}\left(\tanh\left(a+b\,x\right)\right)^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^2/acoth(tanh(a + b*x))^3,x)
```

```
[Out] log(acoth(tanh(a + b*x)))/b^3 - ((b^2*x^2)/2 + b*x*acoth(tanh(a + b*x)))/(b
^3*acoth(tanh(a + b*x))^2)
```

**sympy** [F(-2)] time = 0.00, size = 0, normalized size = 0.00

Exception raised: TypeError

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**2/acoth(tanh(b*x+a))**3,x)
```

```
[Out] Exception raised: TypeError
```

## 3.179 $\int \frac{x}{\coth^{-1}(\tanh(a+bx))^3} \, dx$

**Optimal**. Leaf size=34

$$-\frac{1}{2b^2\coth^{-1}(\tanh(a+bx))}-\frac{x}{2b\coth^{-1}(\tanh(a+bx))^2}$$

```
[Out] -1/2*x/b/arccoth(tanh(b*x+a))^2-1/2/b^2/arccoth(tanh(b*x+a))
```

**Rubi [A]** time = 0.01, antiderivative size = 34, normalized size of antiderivative = 1.00, number of steps used = 3, number of rules used = 3, integrand size = 11, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.273, Rules used = {2168, 2157, 30}

$$-\frac{1}{2b^2\coth^{-1}(\tanh(a+bx))}-\frac{x}{2b\coth^{-1}(\tanh(a+bx))^2}$$

Antiderivative was successfully verified.

```
[In] Int[x/ArcCoth[Tanh[a + b*x]]^3,x]
```

```
[Out] -x/(2*b*ArcCoth[Tanh[a + b*x]]^2) - 1/(2*b^2*ArcCoth[Tanh[a + b*x]])
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 2157

```
Int[(u_)^(m_.), x_Symbol] :> With[{c = Simplify[D[u, x]]}, Dist[1/c, Subst[
Int[x^m, x], x, u], x]] /; FreeQ[m, x] && PiecewiseLinearQ[u, x]
```

Rule 2168

```
Int[(u_)^(m_)*(v_)^(n_.), x_Symbol] :> With[{a = Simplify[D[u, x]], b = Sim
plify[D[v, x]]}, Simp[(u^(m + 1)*v^n)/(a*(m + 1)), x] - Dist[(b*n)/(a*(m +
1)), Int[u^(m + 1)*v^(n - 1), x], x] /; NeQ[b*u - a*v, 0]] /; FreeQ[{m, n},
 x] && PiecewiseLinearQ[u, v, x] && NeQ[m, -1] && ((LtQ[m, -1] && GtQ[n, 0]
 && !(ILtQ[m + n, -2] && (FractionQ[m] || GeQ[2*n + m + 1, 0]))) || (IGtQ[
n, 0] && IGtQ[m, 0] && LeQ[n, m]) || (IGtQ[n, 0] && !IntegerQ[m]) || (ILtQ
[m, 0] && !IntegerQ[n]))
```

Rubi steps

$$\begin{aligned}
\int \frac{x}{\coth^{-1}(\tanh(a+bx))^3} \, dx &= -\frac{x}{2b\coth^{-1}(\tanh(a+bx))^2}+\frac{\int \frac{1}{\coth^{-1}(\tanh(a+bx))^2} \, dx}{2b}\\
&= -\frac{x}{2b\coth^{-1}(\tanh(a+bx))^2}+\frac{\text{Subst}\left(\int \frac{1}{x^2} \, dx, x, \coth^{-1}(\tanh(a+bx))\right)}{2b^2}\\
&= -\frac{x}{2b\coth^{-1}(\tanh(a+bx))^2}-\frac{1}{2b^2\coth^{-1}(\tanh(a+bx))}
\end{aligned}$$

**Mathematica [A]** time = 0.05, size = 27, normalized size = 0.79

$$-\frac{\coth^{-1}(\tanh(a+bx))+bx}{2b^2\coth^{-1}(\tanh(a+bx))^2}$$

Antiderivative was successfully verified.

```
[In] Integrate[x/ArcCoth[Tanh[a + b*x]]^3,x]
```

```
[Out] -1/2*(b*x + ArcCoth[Tanh[a + b*x]])/(b^2*ArcCoth[Tanh[a + b*x]]^2)
```

**fricas [B]** time = 0.84, size = 124, normalized size = 3.65

$$-\frac{2\left(8\,b^{3}x^{3}+20\,ab^{2}x^{2}+16\,a^{2}bx+\pi^{2}a+4\,a^{3}\right)}{16\,b^{6}x^{4}+64\,ab^{5}x^{3}+\pi^{4}b^{2}+8\,\pi^{2}a^{2}b^{2}+16\,a^{4}b^{2}+8\left(\pi^{2}b^{4}+12\,a^{2}b^{4}\right)x^{2}+16\left(\pi^{2}ab^{3}+4\,a^{3}b^{3}\right)x}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x/arccoth(tanh(b*x+a))^3,x, algorithm="fricas")
```

```
[Out] -2*(8*b^3*x^3 + 20*a*b^2*x^2 + 16*a^2*b*x + pi^2*a + 4*a^3)/(16*b^6*x^4 + 6
4*a*b^5*x^3 + pi^4*b^2 + 8*pi^2*a^2*b^2 + 16*a^4*b^2 + 8*(pi^2*b^4 + 12*a^2
*b^4)*x^2 + 16*(pi^2*a*b^3 + 4*a^3*b^3)*x)
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{x}{\operatorname{arcoth}\left(\tanh\left(bx+a\right)\right)^{3}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x/arccoth(tanh(b*x+a))^3,x, algorithm="giac")
```

```
[Out] integrate(x/arccoth(tanh(b*x + a))^3, x)
```

**maple [C]** time = 0.27, size = 634, normalized size = 18.65

$$-\frac{2i\left(-2\pi\operatorname{csgn}\left(\frac{i}{e^{2bx+2a}+1}\right)^{2}+\pi\operatorname{csgn}\left(\frac{i}{e^{2bx+2a}+1}\right)\operatorname{csgn}\left(ie^{2bx+2a}\right)\operatorname{csgn}\left(\frac{ie^{2bx+2a}}{e^{2bx+2a}+1}\right)-\pi\operatorname{csgn}\left(\frac{i}{e^{2bx+2a}+1}\right)\operatorname{csgn}\left(\frac{ie^{2b\cdots}}{e^{2bx\cdots}}\right.\cdots\right.}{b^{2}\left(-2\pi\operatorname{csgn}\left(\frac{i}{e^{2bx+2a}+1}\right)^{2}+\pi\operatorname{csgn}\left(\frac{i}{e^{2bx+2a}+1}\right)\operatorname{csgn}\left(ie^{2bx+2a}\right)\operatorname{csgn}\left(\frac{ie^{2bx+2a}}{e^{2bx+2a}+1}\right)-\pi\operatorname{csgn}\left(\frac{i}{e^{2bx+2a}+1}\right)\operatorname{csgn}\left(\cdots\right.\right.}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x/arccoth(tanh(b*x+a))^3,x)
```

```
[Out] -2*I*(-2*Pi*csgn(I/(exp(2*b*x+2*a)+1))^2+Pi*csgn(I/(exp(2*b*x+2*a)+1))*csgn
(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))-Pi*csgn(I/(exp
(2*b*x+2*a)+1))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2+2*Pi*csgn(I/(ex
p(2*b*x+2*a)+1))^3+Pi*csgn(I*exp(b*x+a))^2*csgn(I*exp(2*b*x+2*a))-2*Pi*csgn
(I*exp(b*x+a))*csgn(I*exp(2*b*x+2*a))^2+Pi*csgn(I*exp(2*b*x+2*a))^3-Pi*csgn
(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2+Pi*csgn(I*ex
p(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^3+2*Pi+4*I*ln(exp(b*x+a))+4*I*b*x)/b^2/(-2
*Pi*csgn(I/(exp(2*b*x+2*a)+1))^2+Pi*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(2
*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))-Pi*csgn(I/(exp(2*b*x+2
*a)+1))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2+2*Pi*csgn(I/(exp(2*b*x+
2*a)+1))^3+Pi*csgn(I*exp(b*x+a))^2*csgn(I*exp(2*b*x+2*a))-2*Pi*csgn(I*exp(b
*x+a))*csgn(I*exp(2*b*x+2*a))^2+Pi*csgn(I*exp(2*b*x+2*a))^3-Pi*csgn(I*exp(2
*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2+Pi*csgn(I*exp(2*b*x+
2*a)/(exp(2*b*x+2*a)+1))^3+2*Pi+4*I*ln(exp(b*x+a)))^2
```

**maxima [C]** time = 1.11, size = 62, normalized size = 1.82

$$-\frac{8\left(-i\,\pi+4\,bx+2\,a\right)}{32\,b^{4}x^{2}-8\,\pi^{2}b^{2}-32i\,\pi ab^{2}+32\,a^{2}b^{2}+\left(-32i\,\pi b^{3}+64\,ab^{3}\right)x}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x/arccoth(tanh(b*x+a))^3,x, algorithm="maxima")
```

```
[Out] -8*(-I*pi + 4*b*x + 2*a)/(32*b^4*x^2 - 8*pi^2*b^2 - 32*I*pi*a*b^2 + 32*a^2*
b^2 + (-32*I*pi*b^3 + 64*a*b^3)*x)
```

**mupad** [**B**] time = 0.09, size = 25, normalized size = 0.74

$$-\frac{\operatorname{acoth}\left(\tanh\left(a+b\,x\right)\right)+b\,x}{2\,b^2\operatorname{acoth}\left(\tanh\left(a+b\,x\right)\right)^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x/acoth(tanh(a + b*x))^3,x)
```

```
[Out] -(acoth(tanh(a + b*x)) + b*x)/(2*b^2*acoth(tanh(a + b*x))^2)
```

**sympy** [**F(-2)**] time = 0.00, size = 0, normalized size = 0.00

Exception raised: TypeError

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x/acoth(tanh(b*x+a))**3,x)
```

```
[Out] Exception raised: TypeError
```

## 3.180 $\int \frac{1}{\coth^{-1}(\tanh(a+bx))^3}\,dx$

**Optimal**. Leaf size=16

$$-\frac{1}{2b\coth^{-1}(\tanh(a+bx))^2}$$

```
[Out] -1/2/b/arccoth(tanh(b*x+a))^2
```

**Rubi [A]** time = 0.01, antiderivative size = 16, normalized size of antiderivative = 1.00, number of steps used = 2, number of rules used = 2, integrand size = 9, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.222, Rules used = {2157, 30}

$$-\frac{1}{2b\coth^{-1}(\tanh(a+bx))^2}$$

Antiderivative was successfully verified.

```
[In] Int[ArcCoth[Tanh[a + b*x]]^(-3),x]
[Out] -1/(2*b*ArcCoth[Tanh[a + b*x]]^2)
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 2157

```
Int[(u_)^(m_.), x_Symbol] :> With[{c = Simplify[D[u, x]]}, Dist[1/c, Subst[
Int[x^m, x], x, u], x]] /; FreeQ[m, x] && PiecewiseLinearQ[u, x]
```

Rubi steps

$$\int \frac{1}{\coth^{-1}(\tanh(a+bx))^3}\,dx = \frac{\text{Subst}\left(\int \frac{1}{x^3}\,dx, x, \coth^{-1}(\tanh(a+bx))\right)}{b}$$
$$= -\frac{1}{2b\coth^{-1}(\tanh(a+bx))^2}$$

**Mathematica [A]** time = 0.01, size = 16, normalized size = 1.00

$$-\frac{1}{2b\coth^{-1}(\tanh(a+bx))^2}$$

Antiderivative was successfully verified.

```
[In] Integrate[ArcCoth[Tanh[a + b*x]]^(-3),x]
[Out] -1/2*1/(b*ArcCoth[Tanh[a + b*x]]^2)
```

**fricas [B]** time = 0.57, size = 107, normalized size = 6.69

$$-\frac{2\left(4b^2x^2 + 8abx - \pi^2 + 4a^2\right)}{16b^5x^4 + 64ab^4x^3 + \pi^4 b + 8\pi^2a^2b + 16a^4b + 8\left(\pi^2b^3 + 12a^2b^3\right)x^2 + 16\left(\pi^2ab^2 + 4a^3b^2\right)x}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/arccoth(tanh(b*x+a))^3,x, algorithm="fricas")
```

```
[Out] -2*(4*b^2*x^2 + 8*a*b*x - pi^2 + 4*a^2)/(16*b^5*x^4 + 64*a*b^4*x^3 + pi^4*b
 + 8*pi^2*a^2*b + 16*a^4*b + 8*(pi^2*b^3 + 12*a^2*b^3)*x^2 + 16*(pi^2*a*b^2
 + 4*a^3*b^2)*x)
```

**giac** [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{1}{\operatorname{arcoth}(\tanh(bx+a))^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/arccoth(tanh(b*x+a))^3,x, algorithm="giac")
```

```
[Out] integrate(arccoth(tanh(b*x + a))^(-3), x)
```

**maple** [A] time = 0.08, size = 15, normalized size = 0.94

$$-\frac{1}{2b\operatorname{arccoth}(\tanh(bx+a))^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(1/arccoth(tanh(b*x+a))^3,x)
```

```
[Out] -1/2/b/arccoth(tanh(b*x+a))^2
```

**maxima** [C] time = 0.43, size = 30, normalized size = 1.88

$$\frac{8}{\left(4\pi^2 - 16i\pi(bx+a) - 16(bx+a)^2\right)b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/arccoth(tanh(b*x+a))^3,x, algorithm="maxima")
```

```
[Out] 8/((4*pi^2 - 16*I*pi*(b*x + a) - 16*(b*x + a)^2)*b)
```

**mupad** [B] time = 0.07, size = 14, normalized size = 0.88

$$-\frac{1}{2\,b\,\operatorname{acoth}(\tanh(a+b\,x))^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(1/acoth(tanh(a + b*x))^3,x)
```

```
[Out] -1/(2*b*acoth(tanh(a + b*x))^2)
```

**sympy** [F(-2)] time = 0.00, size = 0, normalized size = 0.00

Exception raised: TypeError

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/acoth(tanh(b*x+a))**3,x)
```

```
[Out] Exception raised: TypeError
```

# 3.181 $\int \frac{1}{x\coth^{-1}(\tanh(a+bx))^3}\,dx$

**Optimal**. Leaf size=97

$$\frac{1}{\left(bx-\coth^{-1}(\tanh(a+bx))\right)^2\coth^{-1}(\tanh(a+bx))}-\frac{1}{2\left(bx-\coth^{-1}(\tanh(a+bx))\right)\coth^{-1}(\tanh(a+bx))^2}-$$

```
[Out] -1/2/(b*x-arccoth(tanh(b*x+a)))/arccoth(tanh(b*x+a))^2+1/(b*x-arccoth(tanh(
b*x+a)))^2/arccoth(tanh(b*x+a))-ln(x)/(b*x-arccoth(tanh(b*x+a)))^3+ln(arcco
th(tanh(b*x+a)))/(b*x-arccoth(tanh(b*x+a)))^3
```

**Rubi [A]** time = 0.07, antiderivative size = 97, normalized size of antiderivative = 1.00, number of steps used = 6, number of rules used = 4, integrand size = 13, $\frac{\text{number of rules}}{\text{integrand size}} = 0.308$, Rules used = {2163, 2160, 2157, 29}

$$\frac{1}{\left(bx-\coth^{-1}(\tanh(a+bx))\right)^2\coth^{-1}(\tanh(a+bx))}-\frac{1}{2\left(bx-\coth^{-1}(\tanh(a+bx))\right)\coth^{-1}(\tanh(a+bx))^2}-$$

Antiderivative was successfully verified.

```
[In] Int[1/(x*ArcCoth[Tanh[a + b*x]]^3),x]
```

```
[Out] -1/(2*(b*x - ArcCoth[Tanh[a + b*x]])*ArcCoth[Tanh[a + b*x]]^2) + 1/((b*x -
ArcCoth[Tanh[a + b*x]])^2*ArcCoth[Tanh[a + b*x]]) - Log[x]/(b*x - ArcCoth[T
anh[a + b*x]])^3 + Log[ArcCoth[Tanh[a + b*x]]]/(b*x - ArcCoth[Tanh[a + b*x]
])^3
```

Rule 29

```
Int[(x_)^(-1), x_Symbol] :> Simp[Log[x], x]
```

Rule 2157

```
Int[(u_)^(m_.), x_Symbol] :> With[{c = Simplify[D[u, x]]}, Dist[1/c, Subst[
Int[x^m, x], x, u], x]] /; FreeQ[m, x] && PiecewiseLinearQ[u, x]
```

Rule 2160

```
Int[1/((u_)*(v_)), x_Symbol] :> With[{a = Simplify[D[u, x]], b = Simplify[D
[v, x]]}, Dist[b/(b*u - a*v), Int[1/v, x], x] - Dist[a/(b*u - a*v), Int[1/u
, x], x] /; NeQ[b*u - a*v, 0]] /; PiecewiseLinearQ[u, v, x]
```

Rule 2163

```
Int[(v_)^(n_)/(u_), x_Symbol] :> With[{a = Simplify[D[u, x]], b = Simplify[
D[v, x]]}, Simp[v^(n + 1)/((n + 1)*(b*u - a*v)), x] - Dist[(a*(n + 1))/((n
+ 1)*(b*u - a*v)), Int[v^(n + 1)/u, x], x] /; NeQ[b*u - a*v, 0]] /; Piecewi
seLinearQ[u, v, x] && LtQ[n, -1]
```

Rubi steps

$$\int \frac{1}{x \coth^{-1}(\tanh(a+bx))^3}\,dx = -\frac{1}{2\left(bx-\coth^{-1}(\tanh(a+bx))\right)\coth^{-1}(\tanh(a+bx))^2} - \frac{\int \frac{1}{x\coth^{-1}(\tanh(a+bx))^2}}{bx-\coth^{-1}(\tanh(a+}$$

$$= -\frac{1}{2\left(bx-\coth^{-1}(\tanh(a+bx))\right)\coth^{-1}(\tanh(a+bx))^2} + \frac{}{\left(bx-\coth^{-1}(\tanh(a\right.}$$

$$= -\frac{1}{2\left(bx-\coth^{-1}(\tanh(a+bx))\right)\coth^{-1}(\tanh(a+bx))^2} + \frac{}{\left(bx-\coth^{-1}(\tanh(a\right.}$$

$$= -\frac{1}{2\left(bx-\coth^{-1}(\tanh(a+bx))\right)\coth^{-1}(\tanh(a+bx))^2} + \frac{}{\left(bx-\coth^{-1}(\tanh(a\right.}$$

$$= -\frac{1}{2\left(bx-\coth^{-1}(\tanh(a+bx))\right)\coth^{-1}(\tanh(a+bx))^2} + \frac{}{\left(bx-\coth^{-1}(\tanh(a\right.}$$

**Mathematica [A]** time = 0.11, size = 74, normalized size = 0.76

$$\frac{-4bx\coth^{-1}(\tanh(a+bx)) + \coth^{-1}(\tanh(a+bx))^2\left(-2\log\left(\coth^{-1}(\tanh(a+bx))\right) + 2\log(bx) + 3\right) + b^2x^2}{2\coth^{-1}(\tanh(a+bx))^2\left(\coth^{-1}(\tanh(a+bx)) - bx\right)^3}$$

Antiderivative was successfully verified.

```
[In] Integrate[1/(x*ArcCoth[Tanh[a + b*x]]^3),x]
```

```
[Out] (b^2*x^2 - 4*b*x*ArcCoth[Tanh[a + b*x]] + ArcCoth[Tanh[a + b*x]]^2*(3 + 2*L
og[b*x] - 2*Log[ArcCoth[Tanh[a + b*x]]]))/(2*ArcCoth[Tanh[a + b*x]]^2*(-(b*
x) + ArcCoth[Tanh[a + b*x]])^3)
```

**fricas [B]** time = 0.61, size = 811, normalized size = 8.36

$$-\frac{8\left(9\,\pi^6 a + 60\,\pi^4 a^3 + 48\,\pi^2 a^5 - 192\,a^7 + 8\left(\pi^4 b^3 - 16\,a^4 b^3\right)x^3 + 4\left(9\,\pi^4 ab^2 + 8\,\pi^2 a^3 b^2 - 112\,a^5 b^2\right)x^2 + 4\left(\pi^6 b +\right.\right.}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/x/arccoth(tanh(b*x+a))^3,x, algorithm="fricas")
```

```
[Out] -8*(9*pi^6*a + 60*pi^4*a^3 + 48*pi^2*a^5 - 192*a^7 + 8*(pi^4*b^3 - 16*a^4*b
^3)*x^3 + 4*(9*pi^4*a*b^2 + 8*pi^2*a^3*b^2 - 112*a^5*b^2)*x^2 + 4*(pi^6*b +
 16*pi^4*a^2*b + 16*pi^2*a^4*b - 128*a^6*b)*x - 2*(pi^7 - 4*pi^5*a^2 - 80*p
i^3*a^4 - 192*pi*a^6 + 16*(pi^3*b^4 - 12*pi*a^2*b^4)*x^4 + 64*(pi^3*a*b^3 -
 12*pi*a^3*b^3)*x^3 + 8*(pi^5*b^2 - 144*pi*a^4*b^2)*x^2 + 16*(pi^5*a*b - 8*
pi^3*a^3*b - 48*pi*a^5*b)*x)*arctan(-(2*b*x + 2*a - sqrt(4*b^2*x^2 + 8*a*b*
x + pi^2 + 4*a^2))/pi) - (3*pi^6*a + 20*pi^4*a^3 + 16*pi^2*a^5 - 64*a^7 + 1
6*(3*pi^2*a*b^4 - 4*a^3*b^4)*x^4 + 64*(3*pi^2*a^2*b^3 - 4*a^4*b^3)*x^3 + 8*
(3*pi^4*a*b^2 + 32*pi^2*a^3*b^2 - 48*a^5*b^2)*x^2 + 16*(3*pi^4*a^2*b + 8*pi
^2*a^4*b - 16*a^6*b)*x)*log(4*b^2*x^2 + 8*a*b*x + pi^2 + 4*a^2) + 2*(3*pi^6
*a + 20*pi^4*a^3 + 16*pi^2*a^5 - 64*a^7 + 16*(3*pi^2*a*b^4 - 4*a^3*b^4)*x^4
 + 64*(3*pi^2*a^2*b^3 - 4*a^4*b^3)*x^3 + 8*(3*pi^4*a*b^2 + 32*pi^2*a^3*b^2
- 48*a^5*b^2)*x^2 + 16*(3*pi^4*a^2*b + 8*pi^2*a^4*b - 16*a^6*b)*x)*log(x))/
(pi^10 + 20*pi^8*a^2 + 160*pi^6*a^4 + 640*pi^4*a^6 + 1280*pi^2*a^8 + 1024*a
^10 + 16*(pi^6*b^4 + 12*pi^4*a^2*b^4 + 48*pi^2*a^4*b^4 + 64*a^6*b^4)*x^4 +
64*(pi^6*a*b^3 + 12*pi^4*a^3*b^3 + 48*pi^2*a^5*b^3 + 64*a^7*b^3)*x^3 + 8*(p
```

```
i^8*b^2 + 24*pi^6*a^2*b^2 + 192*pi^4*a^4*b^2 + 640*pi^2*a^6*b^2 + 768*a^8*b
^2)*x^2 + 16*(pi^8*a*b + 16*pi^6*a^3*b + 96*pi^4*a^5*b + 256*pi^2*a^7*b + 2
56*a^9*b)*x)
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{1}{x \operatorname{arcoth}\left(\tanh\left(bx + a\right)\right)^{3}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/x/arccoth(tanh(b*x+a))^3,x, algorithm="giac")
```

```
[Out] integrate(1/(x*arccoth(tanh(b*x + a))^3), x)
```

**maple [F(-1)]** time = 180.00, size = 0, normalized size = 0.00

$$\int \frac{1}{x\mathrm{arccoth}\left(\tanh\left(bx + a\right)\right)^{3}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(1/x/arccoth(tanh(b*x+a))^3,x)
```

```
[Out] int(1/x/arccoth(tanh(b*x+a))^3,x)
```

**maxima [C]** time = 1.13, size = 173, normalized size = 1.78

$$\frac{8\left(-3i\pi + 4\,bx + 6\,a\right)}{2\,\pi^4 + 16i\,\pi^3 a - 48\,\pi^2 a^2 - 64i\,\pi a^3 + 32\,a^4 - \left(8\,\pi^2 b^2 + 32i\,\pi a b^2 - 32\,a^2 b^2\right)x^2 + \left(8i\,\pi^3 b - 48\,\pi^2 a b - 96i\,\pi a^2 b\right.}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/x/arccoth(tanh(b*x+a))^3,x, algorithm="maxima")
```

```
[Out] 8*(-3*I*pi + 4*b*x + 6*a)/(2*pi^4 + 16*I*pi^3*a - 48*pi^2*a^2 - 64*I*pi*a^3
 + 32*a^4 - (8*pi^2*b^2 + 32*I*pi*a*b^2 - 32*a^2*b^2)*x^2 + (8*I*pi^3*b - 4
8*pi^2*a*b - 96*I*pi*a^2*b + 64*a^3*b)*x) + 8*log(-I*pi + 2*b*x + 2*a)/(-I*
pi^3 + 6*pi^2*a + 12*I*pi*a^2 - 8*a^3) - 8*log(x)/(-I*pi^3 + 6*pi^2*a + 12*
I*pi*a^2 - 8*a^3)
```

**mupad [B]** time = 6.49, size = 902, normalized size = 9.30

result too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(1/(x*acoth(tanh(a + b*x))^3),x)
```

```
[Out] - (16*atanh((16*(4*b*x - ((2*a - log((2*exp(2*a)*exp(2*b*x))/(exp(2*a)*exp(
2*b*x) - 1)) + log(-2/(exp(2*a)*exp(2*b*x) - 1)) + 2*b*x)^3 - 8*a^3 - 6*a*(
2*a - log((2*exp(2*a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x) - 1)) + log(-2/(exp(
2*a)*exp(2*b*x) - 1)) + 2*b*x)^2 + 12*a^2*(2*a - log((2*exp(2*a)*exp(2*b*x)
)/(exp(2*a)*exp(2*b*x) - 1)) + log(-2/(exp(2*a)*exp(2*b*x) - 1)) + 2*b*x))/
((2*a - log((2*exp(2*a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x) - 1)) + log(-2/(ex
p(2*a)*exp(2*b*x) - 1)) + 2*b*x)^2 - 4*a*(2*a - log((2*exp(2*a)*exp(2*b*x))
/(exp(2*a)*exp(2*b*x) - 1)) + log(-2/(exp(2*a)*exp(2*b*x) - 1)) + 2*b*x) +
4*a^2))*((2*a - log((2*exp(2*a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x) - 1)) + lo
g(-2/(exp(2*a)*exp(2*b*x) - 1)) + 2*b*x)^2/16 - (a*(2*a - log((2*exp(2*a)*e
xp(2*b*x))/(exp(2*a)*exp(2*b*x) - 1)) + log(-2/(exp(2*a)*exp(2*b*x) - 1)) +
 2*b*x))/4 + a^2/4))/(log(-2/(exp(2*a)*exp(2*b*x) - 1)) - log((2*exp(2*a)*e
xp(2*b*x))/(exp(2*a)*exp(2*b*x) - 1)) + 2*b*x)^3))/(log(-2/(exp(2*a)*exp(2*
```

```
b*x) - 1)) - log((2*exp(2*a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x) - 1)) + 2*b*x
)^3 - (12/(log(-2/(exp(2*a)*exp(2*b*x) - 1)) - log((2*exp(2*a)*exp(2*b*x))/
(exp(2*a)*exp(2*b*x) - 1)) + 2*b*x) - (16*b*x)/((2*a - log((2*exp(2*a)*exp(
2*b*x))/(exp(2*a)*exp(2*b*x) - 1)) + log(-2/(exp(2*a)*exp(2*b*x) - 1)) + 2*
b*x)^2 - 4*a*(2*a - log((2*exp(2*a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x) - 1))
+ log(-2/(exp(2*a)*exp(2*b*x) - 1)) + 2*b*x) + 4*a^2))/((2*a - log((2*exp(2
*a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x) - 1)) + log(-2/(exp(2*a)*exp(2*b*x) -
1)) + 2*b*x)^2 - 4*a*(2*a - log((2*exp(2*a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x
) - 1)) + log(-2/(exp(2*a)*exp(2*b*x) - 1)) + 2*b*x) + 4*a^2 + x*(8*a*b - 4
*b*(2*a - log((2*exp(2*a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x) - 1)) + log(-2/(
exp(2*a)*exp(2*b*x) - 1)) + 2*b*x)) + 4*b^2*x^2)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{1}{x\,\mathrm{acoth}^3\left(\tanh\left(a+bx\right)\right)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/x/acoth(tanh(b*x+a))**3,x)
```

```
[Out] Integral(1/(x*acoth(tanh(a + b*x))**3), x)
```

## 3.182 $\int \frac{1}{x^2 \coth^{-1}(\tanh(a+bx))^3} \, dx$

**Optimal**. Leaf size=131

$$\frac{3b}{\left(bx-\coth^{-1}(\tanh(a+bx))\right)^3 \coth^{-1}(\tanh(a+bx))} - \frac{3b}{2\left(bx-\coth^{-1}(\tanh(a+bx))\right)^2 \coth^{-1}(\tanh(a+bx))^2} +$$

```
[Out] -3/2*b/(b*x-arccoth(tanh(b*x+a)))^2/arccoth(tanh(b*x+a))^2+1/x/(b*x-arccoth
(tanh(b*x+a)))/arccoth(tanh(b*x+a))^2+3*b/(b*x-arccoth(tanh(b*x+a)))^3/arcc
oth(tanh(b*x+a))-3*b*ln(x)/(b*x-arccoth(tanh(b*x+a)))^4+3*b*ln(arccoth(tanh
(b*x+a)))/(b*x-arccoth(tanh(b*x+a)))^4
```

**Rubi [A]** time = 0.09, antiderivative size = 131, normalized size of antiderivative = 1.00, number of steps used = 7, number of rules used = 5, integrand size = 13, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.385, Rules used = {2171, 2163, 2160, 2157, 29}

$$\frac{3b}{\left(bx-\coth^{-1}(\tanh(a+bx))\right)^3 \coth^{-1}(\tanh(a+bx))} - \frac{3b}{2\left(bx-\coth^{-1}(\tanh(a+bx))\right)^2 \coth^{-1}(\tanh(a+bx))^2} +$$

Antiderivative was successfully verified.

```
[In] Int[1/(x^2*ArcCoth[Tanh[a + b*x]]^3),x]
```

```
[Out] (-3*b)/(2*(b*x - ArcCoth[Tanh[a + b*x]])^2*ArcCoth[Tanh[a + b*x]]^2) + 1/(x
*(b*x - ArcCoth[Tanh[a + b*x]])*ArcCoth[Tanh[a + b*x]]^2) + (3*b)/((b*x - A
rcCoth[Tanh[a + b*x]])^3*ArcCoth[Tanh[a + b*x]]) - (3*b*Log[x])/(b*x - ArcC
oth[Tanh[a + b*x]])^4 + (3*b*Log[ArcCoth[Tanh[a + b*x]]])/(b*x - ArcCoth[Ta
nh[a + b*x]])^4
```

Rule 29

```
Int[(x_)^(-1), x_Symbol] :> Simp[Log[x], x]
```

Rule 2157

```
Int[(u_)^(m_.), x_Symbol] :> With[{c = Simplify[D[u, x]]}, Dist[1/c, Subst[
Int[x^m, x], x, u], x]] /; FreeQ[m, x] && PiecewiseLinearQ[u, x]
```

Rule 2160

```
Int[1/((u_)*(v_)), x_Symbol] :> With[{a = Simplify[D[u, x]], b = Simplify[D
[v, x]]}, Dist[b/(b*u - a*v), Int[1/v, x], x] - Dist[a/(b*u - a*v), Int[1/u
, x], x] /; NeQ[b*u - a*v, 0]] /; PiecewiseLinearQ[u, v, x]
```

Rule 2163

```
Int[(v_)^(n_)/(u_), x_Symbol] :> With[{a = Simplify[D[u, x]], b = Simplify[
D[v, x]]}, Simp[v^(n + 1)/((n + 1)*(b*u - a*v)), x] - Dist[(a*(n + 1))/((n
+ 1)*(b*u - a*v)), Int[v^(n + 1)/u, x], x] /; NeQ[b*u - a*v, 0]] /; Piecewi
seLinearQ[u, v, x] && LtQ[n, -1]
```

Rule 2171

```
Int[(u_)^(m_)*(v_)^(n_), x_Symbol] :> With[{a = Simplify[D[u, x]], b = Simp
lify[D[v, x]]}, -Simp[(u^(m + 1)*v^(n + 1))/((m + 1)*(b*u - a*v)), x] + Dis
t[(b*(m + n + 2))/((m + 1)*(b*u - a*v)), Int[u^(m + 1)*v^n, x], x] /; NeQ[b
*u - a*v, 0]] /; PiecewiseLinearQ[u, v, x] && NeQ[m + n + 2, 0] && LtQ[m, -
1]
```

Rubi steps

$$\int \frac{1}{x^2 \coth^{-1}(\tanh(a+bx))^3}\,dx = \frac{1}{x\left(bx-\coth^{-1}(\tanh(a+bx))\right)\coth^{-1}(\tanh(a+bx))^2} - \frac{(3b)\int \frac{1}{x\coth^{-1}(\tanh(a+b}}{-bx+\coth^{-1}(\tanh(a}$$

$$= -\frac{3b}{2\left(bx-\coth^{-1}(\tanh(a+bx))\right)^2\coth^{-1}(\tanh(a+bx))^2} + \frac{}{x\left(bx-\coth^{-1}(\tan\right.}$$

$$= -\frac{3b}{2\left(bx-\coth^{-1}(\tanh(a+bx))\right)^2\coth^{-1}(\tanh(a+bx))^2} + \frac{}{x\left(bx-\coth^{-1}(\tan\right.}$$

$$= -\frac{3b}{2\left(bx-\coth^{-1}(\tanh(a+bx))\right)^2\coth^{-1}(\tanh(a+bx))^2} + \frac{}{x\left(bx-\coth^{-1}(\tan\right.}$$

$$= -\frac{3b}{2\left(bx-\coth^{-1}(\tanh(a+bx))\right)^2\coth^{-1}(\tanh(a+bx))^2} + \frac{}{x\left(bx-\coth^{-1}(\tan\right.}$$

$$= -\frac{3b}{2\left(bx-\coth^{-1}(\tanh(a+bx))\right)^2\coth^{-1}(\tanh(a+bx))^2} + \frac{}{x\left(bx-\coth^{-1}(\tan\right.}$$

**Mathematica [A]** time = 0.05, size = 93, normalized size = 0.71

$$-\frac{-6b^2x^2\coth^{-1}(\tanh(a+bx)) + 2\coth^{-1}(\tanh(a+bx))^3 + 3bx\coth^{-1}(\tanh(a+bx))^2\left(-2\log\left(\coth^{-1}(\tanh(a+\right.\right.}{2x\coth^{-1}(\tanh(a+bx))^2\left(\coth^{-1}(\tanh(a+bx))-bx\right)^4}$$

Antiderivative was successfully verified.

```
[In] Integrate[1/(x^2*ArcCoth[Tanh[a + b*x]]^3),x]
```

```
[Out] -1/2*(b^3*x^3 - 6*b^2*x^2*ArcCoth[Tanh[a + b*x]] + 2*ArcCoth[Tanh[a + b*x]]
^3 + 3*b*x*ArcCoth[Tanh[a + b*x]]^2*(1 + 2*Log[x] - 2*Log[ArcCoth[Tanh[a +
b*x]]]))/(x*ArcCoth[Tanh[a + b*x]]^2*(-(b*x) + ArcCoth[Tanh[a + b*x]])^4)
```

**fricas [B]** time = 0.54, size = 1078, normalized size = 8.23

result too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/x^2/arccoth(tanh(b*x+a))^3,x, algorithm="fricas")
```

```
[Out] 8*(6*pi^8*a + 64*pi^6*a^3 + 192*pi^4*a^5 - 512*a^9 + 96*(3*pi^4*a*b^4 + 8*p
i^2*a^3*b^4 - 16*a^5*b^4)*x^4 - 12*(pi^6*b^3 - 92*pi^4*a^2*b^3 - 272*pi^2*a
^4*b^3 + 448*a^6*b^3)*x^3 + 8*(11*pi^6*a*b^2 + 228*pi^4*a^3*b^2 + 528*pi^2*
a^5*b^2 - 832*a^7*b^2)*x^2 - (5*pi^8*b - 176*pi^6*a^2*b - 1440*pi^4*a^4*b -
 1792*pi^2*a^6*b + 3328*a^8*b)*x - 96*(16*(pi^3*a*b^5 - 4*pi*a^3*b^5)*x^5 +
 64*(pi^3*a^2*b^4 - 4*pi*a^4*b^4)*x^4 + 8*(pi^5*a*b^3 + 8*pi^3*a^3*b^3 - 48
*pi*a^5*b^3)*x^3 + 16*(pi^5*a^2*b^2 - 16*pi*a^6*b^2)*x^2 + (pi^7*a*b + 4*pi
^5*a^3*b - 16*pi^3*a^5*b - 64*pi*a^7*b)*x)*arctan(-(2*b*x + 2*a - sqrt(4*b^
2*x^2 + 8*a*b*x + pi^2 + 4*a^2))/pi) + 3*(16*(pi^4*b^5 - 24*pi^2*a^2*b^5 +
16*a^4*b^5)*x^5 + 64*(pi^4*a*b^4 - 24*pi^2*a^3*b^4 + 16*a^5*b^4)*x^4 + 8*(p
i^6*b^3 - 12*pi^4*a^2*b^3 - 272*pi^2*a^4*b^3 + 192*a^6*b^3)*x^3 + 16*(pi^6*
a*b^2 - 20*pi^4*a^3*b^2 - 80*pi^2*a^5*b^2 + 64*a^7*b^2)*x^2 + (pi^8*b - 16*
pi^6*a^2*b - 160*pi^4*a^4*b - 256*pi^2*a^6*b + 256*a^8*b)*x)*log(4*b^2*x^2
```

```
+ 8*a*b*x + pi^2 + 4*a^2) - 6*(16*(pi^4*b^5 - 24*pi^2*a^2*b^5 + 16*a^4*b^5)
*x^5 + 64*(pi^4*a*b^4 - 24*pi^2*a^3*b^4 + 16*a^5*b^4)*x^4 + 8*(pi^6*b^3 - 1
2*pi^4*a^2*b^3 - 272*pi^2*a^4*b^3 + 192*a^6*b^3)*x^3 + 16*(pi^6*a*b^2 - 20*
pi^4*a^3*b^2 - 80*pi^2*a^5*b^2 + 64*a^7*b^2)*x^2 + (pi^8*b - 16*pi^6*a^2*b
- 160*pi^4*a^4*b - 256*pi^2*a^6*b + 256*a^8*b)*x)*log(x))/(16*(pi^8*b^4 + 1
6*pi^6*a^2*b^4 + 96*pi^4*a^4*b^4 + 256*pi^2*a^6*b^4 + 256*a^8*b^4)*x^5 + 64
*(pi^8*a*b^3 + 16*pi^6*a^3*b^3 + 96*pi^4*a^5*b^3 + 256*pi^2*a^7*b^3 + 256*a
^9*b^3)*x^4 + 8*(pi^10*b^2 + 28*pi^8*a^2*b^2 + 288*pi^6*a^4*b^2 + 1408*pi^4
*a^6*b^2 + 3328*pi^2*a^8*b^2 + 3072*a^10*b^2)*x^3 + 16*(pi^10*a*b + 20*pi^8
*a^3*b + 160*pi^6*a^5*b + 640*pi^4*a^7*b + 1280*pi^2*a^9*b + 1024*a^11*b)*x
^2 + (pi^12 + 24*pi^10*a^2 + 240*pi^8*a^4 + 1280*pi^6*a^6 + 3840*pi^4*a^8 +
 6144*pi^2*a^10 + 4096*a^12)*x)
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{1}{x^2\operatorname{arcoth}\left(\tanh\left(bx+a\right)\right)^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/x^2/arccoth(tanh(b*x+a))^3,x, algorithm="giac")
```

```
[Out] integrate(1/(x^2*arccoth(tanh(b*x + a))^3), x)
```

**maple [F(-1)]** time = 180.00, size = 0, normalized size = 0.00

$$\int \frac{1}{x^2\operatorname{arccoth}\left(\tanh\left(bx+a\right)\right)^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(1/x^2/arccoth(tanh(b*x+a))^3,x)
```

```
[Out] int(1/x^2/arccoth(tanh(b*x+a))^3,x)
```

**maxima [C]** time = 1.15, size = 243, normalized size = 1.85

$$\frac{48\,b\log\left(-i\,\pi+2\,bx+2\,a\right)}{\pi^4+8i\,\pi^3a-24\,\pi^2a^2-32i\,\pi a^3+16\,a^4}-\frac{48\,b\log(x)}{\pi^4+8i\,\pi^3a-24\,\pi^2a^2-32i\,\pi a^3+16\,a^4}+\frac{\cdots}{\left(-4i\,\pi^3b^2+24\,\pi^2ab^2+4\cdots\right.}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/x^2/arccoth(tanh(b*x+a))^3,x, algorithm="maxima")
```

```
[Out] 48*b*log(-I*pi + 2*b*x + 2*a)/(pi^4 + 8*I*pi^3*a - 24*pi^2*a^2 - 32*I*pi*a^
3 + 16*a^4) - 48*b*log(x)/(pi^4 + 8*I*pi^3*a - 24*pi^2*a^2 - 32*I*pi*a^3 +
16*a^4) + 8*(12*b^2*x^2 - pi^2 - 4*I*pi*a + 4*a^2 + (-9*I*pi*b + 18*a*b)*x)
/((-4*I*pi^3*b^2 + 24*pi^2*a*b^2 + 48*I*pi*a^2*b^2 - 32*a^3*b^2)*x^3 - (4*p
i^4*b + 32*I*pi^3*a*b - 96*pi^2*a^2*b - 128*I*pi*a^3*b + 64*a^4*b)*x^2 + (I
*pi^5 - 10*pi^4*a - 40*I*pi^3*a^2 + 80*pi^2*a^3 + 80*I*pi*a^4 - 32*a^5)*x)
```

**mupad [B]** time = 5.26, size = 1074, normalized size = 8.20

result too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(1/(x^2*acoth(tanh(a + b*x))^3),x)
```

```
[Out] (8/(log(-2/(exp(2*a)*exp(2*b*x) - 1)) - log((2*exp(2*a)*exp(2*b*x))/(exp(2*
a)*exp(2*b*x) - 1)) + 2*b*x) - (72*b*x)/((2*a - log((2*exp(2*a)*exp(2*b*x))
/(exp(2*a)*exp(2*b*x) - 1)) + log(-2/(exp(2*a)*exp(2*b*x) - 1)) + 2*b*x)^2
```

```
- 4*a*(2*a - log((2*exp(2*a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x) - 1)) + log(-
2/(exp(2*a)*exp(2*b*x) - 1)) + 2*b*x) + 4*a^2) + (96*b^2*x^2)/((log(-2/(exp
(2*a)*exp(2*b*x) - 1)) - log((2*exp(2*a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x) -
 1)) + 2*b*x)*((2*a - log((2*exp(2*a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x) - 1)
) + log(-2/(exp(2*a)*exp(2*b*x) - 1)) + 2*b*x)^2 - 4*a*(2*a - log((2*exp(2*
a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x) - 1)) + log(-2/(exp(2*a)*exp(2*b*x) - 1
)) + 2*b*x) + 4*a^2)))/(x*((2*a - log((2*exp(2*a)*exp(2*b*x))/(exp(2*a)*exp
(2*b*x) - 1)) + log(-2/(exp(2*a)*exp(2*b*x) - 1)) + 2*b*x)^2 - 4*a*(2*a - l
og((2*exp(2*a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x) - 1)) + log(-2/(exp(2*a)*ex
p(2*b*x) - 1)) + 2*b*x) + 4*a^2) + x^2*(8*a*b - 4*b*(2*a - log((2*exp(2*a)*
exp(2*b*x))/(exp(2*a)*exp(2*b*x) - 1)) + log(-2/(exp(2*a)*exp(2*b*x) - 1))
+ 2*b*x)) + 4*b^2*x^3) + (96*b*atanh(((2*a - log((2*exp(2*a)*exp(2*b*x))/(e
xp(2*a)*exp(2*b*x) - 1)) + log(-2/(exp(2*a)*exp(2*b*x) - 1)) + 2*b*x)^4 + 2
4*a^2*(2*a - log((2*exp(2*a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x) - 1)) + log(-
2/(exp(2*a)*exp(2*b*x) - 1)) + 2*b*x)^2 + 16*a^4 - 8*a*(2*a - log((2*exp(2*
a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x) - 1)) + log(-2/(exp(2*a)*exp(2*b*x) - 1
)) + 2*b*x)^3 - 32*a^3*(2*a - log((2*exp(2*a)*exp(2*b*x))/(exp(2*a)*exp(2*b
*x) - 1)) + log(-2/(exp(2*a)*exp(2*b*x) - 1)) + 2*b*x))/(log(-2/(exp(2*a)*e
xp(2*b*x) - 1)) - log((2*exp(2*a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x) - 1)) +
2*b*x)^4 - (4*b*x*((2*a - log((2*exp(2*a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x)
- 1)) + log(-2/(exp(2*a)*exp(2*b*x) - 1)) + 2*b*x)^2 - 4*a*(2*a - log((2*ex
p(2*a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x) - 1)) + log(-2/(exp(2*a)*exp(2*b*x)
 - 1)) + 2*b*x) + 4*a^2))/(log(-2/(exp(2*a)*exp(2*b*x) - 1)) - log((2*exp(2
*a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x) - 1)) + 2*b*x)^3))/(log(-2/(exp(2*a)*e
xp(2*b*x) - 1)) - log((2*exp(2*a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x) - 1)) +
2*b*x)^4
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{1}{x^2 \operatorname{acoth}^3(\tanh(a+bx))}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/x**2/acoth(tanh(b*x+a))**3,x)
```

```
[Out] Integral(1/(x**2*acoth(tanh(a + b*x))**3), x)
```

## 3.183 $\int \frac{1}{x^3 \coth^{-1}(\tanh(a+bx))^3} dx$

**Optimal**. Leaf size=170

$$\frac{6b^2}{\left(bx-\coth^{-1}(\tanh(a+bx))\right)^4 \coth^{-1}(\tanh(a+bx))}-\frac{3b^2}{\left(bx-\coth^{-1}(\tanh(a+bx))\right)^3 \coth^{-1}(\tanh(a+bx))^2}-\cdots$$

```
[Out] -3*b^2/(b*x-arccoth(tanh(b*x+a)))^3/arccoth(tanh(b*x+a))^2+2*b/x/(b*x-arcco
th(tanh(b*x+a)))^2/arccoth(tanh(b*x+a))^2+1/2/x^2/(b*x-arccoth(tanh(b*x+a))
)/arccoth(tanh(b*x+a))^2+6*b^2/(b*x-arccoth(tanh(b*x+a)))^4/arccoth(tanh(b*
x+a))-6*b^2*ln(x)/(b*x-arccoth(tanh(b*x+a)))^5+6*b^2*ln(arccoth(tanh(b*x+a)
))/(b*x-arccoth(tanh(b*x+a)))^5
```

**Rubi [A]** time = 0.13, antiderivative size = 170, normalized size of antiderivative = 1.00, number of steps used = 8, number of rules used = 5, integrand size = 13, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.385, Rules used = {2171, 2163, 2160, 2157, 29}

$$\frac{6b^2}{\left(bx-\coth^{-1}(\tanh(a+bx))\right)^4 \coth^{-1}(\tanh(a+bx))}-\frac{3b^2}{\left(bx-\coth^{-1}(\tanh(a+bx))\right)^3 \coth^{-1}(\tanh(a+bx))^2}-\cdots$$

Antiderivative was successfully verified.

```
[In] Int[1/(x^3*ArcCoth[Tanh[a + b*x]]^3),x]
```

```
[Out] (-3*b^2)/((b*x - ArcCoth[Tanh[a + b*x]])^3*ArcCoth[Tanh[a + b*x]]^2) + (2*b
)/(x*(b*x - ArcCoth[Tanh[a + b*x]])^2*ArcCoth[Tanh[a + b*x]]^2) + 1/(2*x^2*
(b*x - ArcCoth[Tanh[a + b*x]])*ArcCoth[Tanh[a + b*x]]^2) + (6*b^2)/((b*x -
ArcCoth[Tanh[a + b*x]])^4*ArcCoth[Tanh[a + b*x]]) - (6*b^2*Log[x])/(b*x - A
rcCoth[Tanh[a + b*x]])^5 + (6*b^2*Log[ArcCoth[Tanh[a + b*x]]])/(b*x - ArcCo
th[Tanh[a + b*x]])^5
```

Rule 29

```
Int[(x_)^(-1), x_Symbol] :> Simp[Log[x], x]
```

Rule 2157

```
Int[(u_)^(m_.), x_Symbol] :> With[{c = Simplify[D[u, x]]}, Dist[1/c, Subst[
Int[x^m, x], x, u], x]] /; FreeQ[m, x] && PiecewiseLinearQ[u, x]
```

Rule 2160

```
Int[1/((u_)*(v_)), x_Symbol] :> With[{a = Simplify[D[u, x]], b = Simplify[D
[v, x]]}, Dist[b/(b*u - a*v), Int[1/v, x], x] - Dist[a/(b*u - a*v), Int[1/u
, x], x] /; NeQ[b*u - a*v, 0]] /; PiecewiseLinearQ[u, v, x]
```

Rule 2163

```
Int[(v_)^(n_)/(u_), x_Symbol] :> With[{a = Simplify[D[u, x]], b = Simplify[
D[v, x]]}, Simp[v^(n + 1)/((n + 1)*(b*u - a*v)), x] - Dist[(a*(n + 1))/((n
+ 1)*(b*u - a*v)), Int[v^(n + 1)/u, x], x] /; NeQ[b*u - a*v, 0]] /; Piecewi
seLinearQ[u, v, x] && LtQ[n, -1]
```

Rule 2171

```
Int[(u_)^(m_)*(v_)^(n_), x_Symbol] :> With[{a = Simplify[D[u, x]], b = Simp
lify[D[v, x]]}, -Simp[(u^(m + 1)*v^(n + 1))/((m + 1)*(b*u - a*v)), x] + Dis
t[(b*(m + n + 2))/((m + 1)*(b*u - a*v)), Int[u^(m + 1)*v^n, x], x] /; NeQ[b
```

```
*u - a*v, 0]] /; PiecewiseLinearQ[u, v, x] && NeQ[m + n + 2, 0] && LtQ[m, -
1]
```

Rubi steps

$$\int \frac{1}{x^3 \coth^{-1}(\tanh(a+bx))^3} dx = \frac{1}{2x^2 \left(bx - \coth^{-1}(\tanh(a+bx))\right) \coth^{-1}(\tanh(a+bx))^2} + \frac{(2b) \int \frac{1}{x^2 \coth^{-1}(\tanh(}}{bx - \coth^{-1}(\tanh(}$$

$$= \frac{2b}{x \left(bx - \coth^{-1}(\tanh(a+bx))\right)^2 \coth^{-1}(\tanh(a+bx))^2} + \frac{}{2x^2 \left(bx - \coth^{-1}(\tan\right.}$$

$$= -\frac{3b^2}{\left(bx - \coth^{-1}(\tanh(a+bx))\right)^3 \coth^{-1}(\tanh(a+bx))^2} + \frac{}{x \left(bx - \coth^{-1}(\tanh\right.}$$

$$= -\frac{3b^2}{\left(bx - \coth^{-1}(\tanh(a+bx))\right)^3 \coth^{-1}(\tanh(a+bx))^2} + \frac{}{x \left(bx - \coth^{-1}(\tanh\right.}$$

$$= -\frac{3b^2}{\left(bx - \coth^{-1}(\tanh(a+bx))\right)^3 \coth^{-1}(\tanh(a+bx))^2} + \frac{}{x \left(bx - \coth^{-1}(\tanh\right.}$$

$$= -\frac{3b^2}{\left(bx - \coth^{-1}(\tanh(a+bx))\right)^3 \coth^{-1}(\tanh(a+bx))^2} + \frac{}{x \left(bx - \coth^{-1}(\tanh\right.}$$

$$= -\frac{3b^2}{\left(bx - \coth^{-1}(\tanh(a+bx))\right)^3 \coth^{-1}(\tanh(a+bx))^2} + \frac{}{x \left(bx - \coth^{-1}(\tanh\right.}$$

**Mathematica [A]** time = 0.05, size = 107, normalized size = 0.63

$$\frac{8b^3x^3 \coth^{-1}(\tanh(a+bx)) - 12b^2x^2 \coth^{-1}(\tanh(a+bx))^2 \left(\log(x) - \log\left(\coth^{-1}(\tanh(a+bx))\right)\right) - 8bx \coth^{-1}(}{2x^2 \left(bx - \coth^{-1}(\tanh(a+bx))\right)^5 \coth^{-1}(\tanh(a+bx))^2}$$

Antiderivative was successfully verified.

```
[In] Integrate[1/(x^3*ArcCoth[Tanh[a + b*x]]^3),x]
```

```
[Out] (-(b^4*x^4) + 8*b^3*x^3*ArcCoth[Tanh[a + b*x]] - 8*b*x*ArcCoth[Tanh[a + b*x
]]^3 + ArcCoth[Tanh[a + b*x]]^4 - 12*b^2*x^2*ArcCoth[Tanh[a + b*x]]^2*(Log[
x] - Log[ArcCoth[Tanh[a + b*x]]]))/(2*x^2*(b*x - ArcCoth[Tanh[a + b*x]])^5*
ArcCoth[Tanh[a + b*x]]^2)
```

**fricas [B]** time = 0.62, size = 1316, normalized size = 7.74

result too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/x^3/arccoth(tanh(b*x+a))^3,x, algorithm="fricas")
```

```
[Out] 8*(3*pi^10*a + 44*pi^8*a^3 + 224*pi^6*a^5 + 384*pi^4*a^7 - 256*pi^2*a^9 - 1
024*a^11 + 192*(pi^6*b^5 - 20*pi^4*a^2*b^5 - 80*pi^2*a^4*b^5 + 64*a^6*b^5)*
x^5 + 96*(11*pi^6*a*b^4 - 140*pi^4*a^3*b^4 - 624*pi^2*a^5*b^4 + 448*a^7*b^4
)*x^4 + 16*(5*pi^8*b^3 + 16*pi^6*a^2*b^3 - 1440*pi^4*a^4*b^3 - 4864*pi^2*a^
6*b^3 + 3328*a^8*b^3)*x^3 + 4*(65*pi^8*a*b^2 - 272*pi^6*a^3*b^2 - 4896*pi^4
```

```
*a^5*b^2 - 9472*pi^2*a^7*b^2 + 6400*a^9*b^2)*x^2 + 2*(3*pi^10*b - 12*pi^8*a
^2*b - 416*pi^6*a^4*b - 1920*pi^4*a^6*b - 2304*pi^2*a^8*b + 1024*a^10*b)*x
- 48*(16*(pi^5*b^6 - 40*pi^3*a^2*b^6 + 80*pi*a^4*b^6)*x^6 + 64*(pi^5*a*b^5
- 40*pi^3*a^3*b^5 + 80*pi*a^5*b^5)*x^5 + 8*(pi^7*b^4 - 28*pi^5*a^2*b^4 - 40
0*pi^3*a^4*b^4 + 960*pi*a^6*b^4)*x^4 + 16*(pi^7*a*b^3 - 36*pi^5*a^3*b^3 - 8
0*pi^3*a^5*b^3 + 320*pi*a^7*b^3)*x^3 + (pi^9*b^2 - 32*pi^7*a^2*b^2 - 224*pi
^5*a^4*b^2 + 1280*pi*a^8*b^2)*x^2)*arctan(-(2*b*x + 2*a - sqrt(4*b^2*x^2 +
8*a*b*x + pi^2 + 4*a^2))/pi) - 24*(16*(5*pi^4*a*b^6 - 40*pi^2*a^3*b^6 + 16*
a^5*b^6)*x^6 + 64*(5*pi^4*a^2*b^5 - 40*pi^2*a^4*b^5 + 16*a^6*b^5)*x^5 + 8*(
5*pi^6*a*b^4 + 20*pi^4*a^3*b^4 - 464*pi^2*a^5*b^4 + 192*a^7*b^4)*x^4 + 16*(
5*pi^6*a^2*b^3 - 20*pi^4*a^4*b^3 - 144*pi^2*a^6*b^3 + 64*a^8*b^3)*x^3 + (5*
pi^8*a*b^2 - 224*pi^4*a^5*b^2 - 512*pi^2*a^7*b^2 + 256*a^9*b^2)*x^2)*log(4*
b^2*x^2 + 8*a*b*x + pi^2 + 4*a^2) + 48*(16*(5*pi^4*a*b^6 - 40*pi^2*a^3*b^6
+ 16*a^5*b^6)*x^6 + 64*(5*pi^4*a^2*b^5 - 40*pi^2*a^4*b^5 + 16*a^6*b^5)*x^5
+ 8*(5*pi^6*a*b^4 + 20*pi^4*a^3*b^4 - 464*pi^2*a^5*b^4 + 192*a^7*b^4)*x^4 +
 16*(5*pi^6*a^2*b^3 - 20*pi^4*a^4*b^3 - 144*pi^2*a^6*b^3 + 64*a^8*b^3)*x^3
+ (5*pi^8*a*b^2 - 224*pi^4*a^5*b^2 - 512*pi^2*a^7*b^2 + 256*a^9*b^2)*x^2)*l
og(x))/(16*(pi^10*b^4 + 20*pi^8*a^2*b^4 + 160*pi^6*a^4*b^4 + 640*pi^4*a^6*b
^4 + 1280*pi^2*a^8*b^4 + 1024*a^10*b^4)*x^6 + 64*(pi^10*a*b^3 + 20*pi^8*a^3
*b^3 + 160*pi^6*a^5*b^3 + 640*pi^4*a^7*b^3 + 1280*pi^2*a^9*b^3 + 1024*a^11*
b^3)*x^5 + 8*(pi^12*b^2 + 32*pi^10*a^2*b^2 + 400*pi^8*a^4*b^2 + 2560*pi^6*a
^6*b^2 + 8960*pi^4*a^8*b^2 + 16384*pi^2*a^10*b^2 + 12288*a^12*b^2)*x^4 + 16
*(pi^12*a*b + 24*pi^10*a^3*b + 240*pi^8*a^5*b + 1280*pi^6*a^7*b + 3840*pi^4
*a^9*b + 6144*pi^2*a^11*b + 4096*a^13*b)*x^3 + (pi^14 + 28*pi^12*a^2 + 336*
pi^10*a^4 + 2240*pi^8*a^6 + 8960*pi^6*a^8 + 21504*pi^4*a^10 + 28672*pi^2*a^
12 + 16384*a^14)*x^2)
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{1}{x^3 \operatorname{arcoth}(\tanh(bx+a))^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/x^3/arccoth(tanh(b*x+a))^3,x, algorithm="giac")
```

```
[Out] integrate(1/(x^3*arccoth(tanh(b*x + a))^3), x)
```

**maple [F(-1)]** time = 180.00, size = 0, normalized size = 0.00

$$\int \frac{1}{x^3 \operatorname{arccoth}(\tanh(bx+a))^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(1/x^3/arccoth(tanh(b*x+a))^3,x)
```

```
[Out] int(1/x^3/arccoth(tanh(b*x+a))^3,x)
```

**maxima [C]** time = 1.15, size = 332, normalized size = 1.95

$$\frac{192\,b^2\log(-i\pi+2\,bx+2\,a)}{i\,\pi^5-10\,\pi^4a-40i\,\pi^3a^2+80\,\pi^2a^3+80i\,\pi a^4-32\,a^5}-\frac{192\,b^2\log(x)}{i\,\pi^5-10\,\pi^4a-40i\,\pi^3a^2+80\,\pi^2a^3+80i\,\pi a^4-32\,a^5}+$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/x^3/arccoth(tanh(b*x+a))^3,x, algorithm="maxima")
```

```
[Out] 192*b^2*log(-I*pi + 2*b*x + 2*a)/(I*pi^5 - 10*pi^4*a - 40*I*pi^3*a^2 + 80*p
i^2*a^3 + 80*I*pi*a^4 - 32*a^5) - 192*b^2*log(x)/(I*pi^5 - 10*pi^4*a - 40*I
*pi^3*a^2 + 80*pi^2*a^3 + 80*I*pi*a^4 - 32*a^5) + 8*(96*b^3*x^3 - I*pi^3 +
```

```
6*pi^2*a + 12*I*pi*a^2 - 8*a^3 + (-72*I*pi*b^2 + 144*a*b^2)*x^2 - (8*pi^2*b
 + 32*I*pi*a*b - 32*a^2*b)*x)/((8*pi^4*b^2 + 64*I*pi^3*a*b^2 - 192*pi^2*a^2
*b^2 - 256*I*pi*a^3*b^2 + 128*a^4*b^2)*x^4 + (-8*I*pi^5*b + 80*pi^4*a*b + 3
20*I*pi^3*a^2*b - 640*pi^2*a^3*b - 640*I*pi*a^4*b + 256*a^5*b)*x^3 - (2*pi^
6 + 24*I*pi^5*a - 120*pi^4*a^2 - 320*I*pi^3*a^3 + 480*pi^2*a^4 + 384*I*pi*a
^5 - 128*a^6)*x^2)
```

**mupad [B]** time = 8.12, size = 1251, normalized size = 7.36

result too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(1/(x^3*acoth(tanh(a + b*x))^3),x)
```

```
[Out] (4/(log(-2/(exp(2*a)*exp(2*b*x) - 1)) - log((2*exp(2*a)*exp(2*b*x))/(exp(2*
a)*exp(2*b*x) - 1)) + 2*b*x) + (32*b*x)/(log(-2/(exp(2*a)*exp(2*b*x) - 1))
- log((2*exp(2*a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x) - 1)) + 2*b*x)^2 - (288*
b^2*x^2)/((log(-2/(exp(2*a)*exp(2*b*x) - 1)) - log((2*exp(2*a)*exp(2*b*x))/
(exp(2*a)*exp(2*b*x) - 1)) + 2*b*x)*((2*a - log((2*exp(2*a)*exp(2*b*x))/(ex
p(2*a)*exp(2*b*x) - 1)) + log(-2/(exp(2*a)*exp(2*b*x) - 1)) + 2*b*x)^2 - 4*
a*(2*a - log((2*exp(2*a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x) - 1)) + log(-2/(e
xp(2*a)*exp(2*b*x) - 1)) + 2*b*x) + 4*a^2)) + (384*b^3*x^3)/((log(-2/(exp(2
*a)*exp(2*b*x) - 1)) - log((2*exp(2*a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x) - 1
)) + 2*b*x)^2*((2*a - log((2*exp(2*a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x) - 1)
) + log(-2/(exp(2*a)*exp(2*b*x) - 1)) + 2*b*x)^2 - 4*a*(2*a - log((2*exp(2*
a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x) - 1)) + log(-2/(exp(2*a)*exp(2*b*x) - 1
)) + 2*b*x) + 4*a^2)))/(x^3*(8*a*b - 4*b*(2*a - log((2*exp(2*a)*exp(2*b*x))
/(exp(2*a)*exp(2*b*x) - 1)) + log(-2/(exp(2*a)*exp(2*b*x) - 1)) + 2*b*x)) +
 x^2*((2*a - log((2*exp(2*a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x) - 1)) + log(-
2/(exp(2*a)*exp(2*b*x) - 1)) + 2*b*x)^2 - 4*a*(2*a - log((2*exp(2*a)*exp(2*
b*x))/(exp(2*a)*exp(2*b*x) - 1)) + log(-2/(exp(2*a)*exp(2*b*x) - 1)) + 2*b*
x) + 4*a^2) + 4*b^2*x^4) - (384*b^2*atanh((4*b*x*((2*a - log((2*exp(2*a)*ex
p(2*b*x))/(exp(2*a)*exp(2*b*x) - 1)) + log(-2/(exp(2*a)*exp(2*b*x) - 1)) +
2*b*x)^2 - 4*a*(2*a - log((2*exp(2*a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x) - 1)
) + log(-2/(exp(2*a)*exp(2*b*x) - 1)) + 2*b*x) + 4*a^2))/(log(-2/(exp(2*a)*
exp(2*b*x) - 1)) - log((2*exp(2*a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x) - 1)) +
 2*b*x)^3 - ((2*a - log((2*exp(2*a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x) - 1))
+ log(-2/(exp(2*a)*exp(2*b*x) - 1)) + 2*b*x)^5 + 40*a^2*(2*a - log((2*exp(2
*a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x) - 1)) + log(-2/(exp(2*a)*exp(2*b*x) -
1)) + 2*b*x)^3 - 80*a^3*(2*a - log((2*exp(2*a)*exp(2*b*x))/(exp(2*a)*exp(2*
b*x) - 1)) + log(-2/(exp(2*a)*exp(2*b*x) - 1)) + 2*b*x)^2 - 32*a^5 - 10*a*(
2*a - log((2*exp(2*a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x) - 1)) + log(-2/(exp(
2*a)*exp(2*b*x) - 1)) + 2*b*x)^4 + 80*a^4*(2*a - log((2*exp(2*a)*exp(2*b*x)
)/(exp(2*a)*exp(2*b*x) - 1)) + log(-2/(exp(2*a)*exp(2*b*x) - 1)) + 2*b*x))/
(log(-2/(exp(2*a)*exp(2*b*x) - 1)) - log((2*exp(2*a)*exp(2*b*x))/(exp(2*a)*
exp(2*b*x) - 1)) + 2*b*x)^5))/(log(-2/(exp(2*a)*exp(2*b*x) - 1)) - log((2*e
xp(2*a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x) - 1)) + 2*b*x)^5
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{1}{x^3 \operatorname{acoth}^3(\tanh(a+bx))}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/x**3/acoth(tanh(b*x+a))**3,x)
```

```
[Out] Integral(1/(x**3*acoth(tanh(a + b*x))**3), x)
```

# 3.184 $\int x^m \coth^{-1}(\tanh(a+bx))^n \, dx$

**Optimal**. Leaf size=79

$$\frac{x^m \left(\frac{bx}{bx-\coth^{-1}(\tanh(a+bx))}\right)^{-m} \coth^{-1}(\tanh(a+bx))^{n+1} {}_2F_1\left(-m,n+1;n+2;-\frac{\coth^{-1}(\tanh(a+bx))}{bx-\coth^{-1}(\tanh(a+bx))}\right)}{b(n+1)}$$

```
[Out] x^m*arccoth(tanh(b*x+a))^(1+n)*hypergeom([-m, 1+n],[2+n],-arccoth(tanh(b*x+
a))/(b*x-arccoth(tanh(b*x+a))))/b/(1+n)/((b*x/(b*x-arccoth(tanh(b*x+a))))^m
)
```

**Rubi [A]** time = 0.05, antiderivative size = 79, normalized size of antiderivative = 1.00, number of steps used = 1, number of rules used = 1, integrand size = 13, $\frac{\text{number of rules}}{\text{integrand size}} = 0.077$, Rules used = {2173}

$$\frac{x^m \left(\frac{bx}{bx-\coth^{-1}(\tanh(a+bx))}\right)^{-m} \coth^{-1}(\tanh(a+bx))^{n+1} {}_2F_1\left(-m,n+1;n+2;-\frac{\coth^{-1}(\tanh(a+bx))}{bx-\coth^{-1}(\tanh(a+bx))}\right)}{b(n+1)}$$

Antiderivative was successfully verified.

```
[In] Int[x^m*ArcCoth[Tanh[a + b*x]]^n,x]
```

```
[Out] (x^m*ArcCoth[Tanh[a + b*x]]^(1 + n)*Hypergeometric2F1[-m, 1 + n, 2 + n, -(A
rcCoth[Tanh[a + b*x]]/(b*x - ArcCoth[Tanh[a + b*x]]))])/(b*(1 + n)*((b*x)/(
b*x - ArcCoth[Tanh[a + b*x]]))^m)
```

Rule 2173

```
Int[(u_)^(m_)*(v_)^(n_), x_Symbol] :> With[{a = Simplify[D[u, x]], b = Simp
lify[D[v, x]]}, Simp[(u^m*v^(n + 1)*Hypergeometric2F1[-m, n + 1, n + 2, -((
a*v)/(b*u - a*v))])/(b*(n + 1)*((b*u)/(b*u - a*v))^m), x] /; NeQ[b*u - a*v,
 0]] /; PiecewiseLinearQ[u, v, x] && !IntegerQ[m] && !IntegerQ[n]
```

Rubi steps

$$\int x^m \coth^{-1}(\tanh(a+bx))^n \, dx = \frac{x^m \left(\frac{bx}{bx-\coth^{-1}(\tanh(a+bx))}\right)^{-m} \coth^{-1}(\tanh(a+bx))^{1+n} {}_2F_1\left(-m,1+n;2+n;-\right.}{b(1+n)}$$

**Mathematica [A]** time = 0.14, size = 71, normalized size = 0.90

$$\frac{x^{m+1} \coth^{-1}(\tanh(a+bx))^n \left(\frac{bx}{\coth^{-1}(\tanh(a+bx))-bx}+1\right)^{-n} {}_2F_1\left(m+1,-n;m+2;-\frac{bx}{\coth^{-1}(\tanh(a+bx))-bx}\right)}{m+1}$$

Antiderivative was successfully verified.

```
[In] Integrate[x^m*ArcCoth[Tanh[a + b*x]]^n,x]
```

```
[Out] (x^(1 + m)*ArcCoth[Tanh[a + b*x]]^n*Hypergeometric2F1[1 + m, -n, 2 + m, -((
b*x)/(-(b*x) + ArcCoth[Tanh[a + b*x]]))])/((1 + m)*(1 + (b*x)/(-(b*x) + Arc
Coth[Tanh[a + b*x]]))^n)
```

**fricas [F]** time = 0.42, size = 0, normalized size = 0.00

$$\text{integral}\left(x^m \operatorname{arcoth}\left(\tanh\left(bx+a\right)\right)^n, x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^m*arccoth(tanh(b*x+a))^n,x, algorithm="fricas")
[Out] integral(x^m*arccoth(tanh(b*x + a))^n, x)
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int x^m \operatorname{arcoth}\left(\tanh\left(bx+a\right)\right)^n \,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^m*arccoth(tanh(b*x+a))^n,x, algorithm="giac")
[Out] integrate(x^m*arccoth(tanh(b*x + a))^n, x)
```

**maple [F]** time = 14.58, size = 0, normalized size = 0.00

$$\int x^m \mathrm{arccoth}\left(\tanh\left(bx+a\right)\right)^n \,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^m*arccoth(tanh(b*x+a))^n,x)
[Out] int(x^m*arccoth(tanh(b*x+a))^n,x)
```

**maxima [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int x^m \operatorname{arcoth}\left(\tanh\left(bx+a\right)\right)^n \,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^m*arccoth(tanh(b*x+a))^n,x, algorithm="maxima")
[Out] integrate(x^m*arccoth(tanh(b*x + a))^n, x)
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.01

$$\int x^m \,\mathrm{acoth}\left(\tanh\left(a+b\,x\right)\right)^n \,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^m*acoth(tanh(a + b*x))^n,x)
[Out] int(x^m*acoth(tanh(a + b*x))^n, x)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int x^{m} \operatorname{acoth}^{n}{\left(\tanh{\left(a + bx \right)} \right)}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**m*acoth(tanh(b*x+a))**n,x)
[Out] Integral(x**m*acoth(tanh(a + b*x))**n, x)
```

# 3.185 $\int x^4 \coth^{-1}(\tanh(a+bx))^n \, dx$

**Optimal**. Leaf size=165

$$\frac{24\coth^{-1}(\tanh(a+bx))^{n+5}}{b^5(n+1)(n+2)(n+3)(n+4)(n+5)}-\frac{24x\coth^{-1}(\tanh(a+bx))^{n+4}}{b^4(n+1)(n+2)(n+3)(n+4)}+\frac{12x^2\coth^{-1}(\tanh(a+bx))^{n+3}}{b^3(n+1)(n+2)(n+3)}-\frac{4x^3\,\mathrm{co}}{}$$

```
[Out] x^4*arccoth(tanh(b*x+a))^(1+n)/b/(1+n)-4*x^3*arccoth(tanh(b*x+a))^(2+n)/b^2
/(1+n)/(2+n)+12*x^2*arccoth(tanh(b*x+a))^(3+n)/b^3/(3+n)/(n^2+3*n+2)-24*x*a
rccoth(tanh(b*x+a))^(4+n)/b^4/(n^2+5*n+4)/(n^2+5*n+6)+24*arccoth(tanh(b*x+a
))^(5+n)/b^5/(n^2+7*n+12)/(n^3+8*n^2+17*n+10)
```

**Rubi** [A] time = 0.13, antiderivative size = 165, normalized size of antiderivative = 1.00, number of steps used = 6, number of rules used = 3, integrand size = 13, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.231, Rules used = {2168, 2157, 30}

$$-\frac{4x^3\coth^{-1}(\tanh(a+bx))^{n+2}}{b^2(n+1)(n+2)}+\frac{12x^2\coth^{-1}(\tanh(a+bx))^{n+3}}{b^3(n+1)(n+2)(n+3)}-\frac{24x\coth^{-1}(\tanh(a+bx))^{n+4}}{b^4(n+1)(n+2)(n+3)(n+4)}+\frac{24\,\mathrm{coth}}{b^5(n+1)(n+}$$

Antiderivative was successfully verified.

```
[In] Int[x^4*ArcCoth[Tanh[a + b*x]]^n,x]
```

```
[Out] (x^4*ArcCoth[Tanh[a + b*x]]^(1 + n))/(b*(1 + n)) - (4*x^3*ArcCoth[Tanh[a +
b*x]]^(2 + n))/(b^2*(1 + n)*(2 + n)) + (12*x^2*ArcCoth[Tanh[a + b*x]]^(3 +
n))/(b^3*(1 + n)*(2 + n)*(3 + n)) - (24*x*ArcCoth[Tanh[a + b*x]]^(4 + n))/(
b^4*(1 + n)*(2 + n)*(3 + n)*(4 + n)) + (24*ArcCoth[Tanh[a + b*x]]^(5 + n))/
(b^5*(1 + n)*(2 + n)*(3 + n)*(4 + n)*(5 + n))
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 2157

```
Int[(u_)^(m_.), x_Symbol] :> With[{c = Simplify[D[u, x]]}, Dist[1/c, Subst[
Int[x^m, x], x, u], x]] /; FreeQ[m, x] && PiecewiseLinearQ[u, x]
```

Rule 2168

```
Int[(u_)^(m_)*(v_)^(n_.), x_Symbol] :> With[{a = Simplify[D[u, x]], b = Sim
plify[D[v, x]]}, Simp[(u^(m + 1)*v^n)/(a*(m + 1)), x] - Dist[(b*n)/(a*(m +
1)), Int[u^(m + 1)*v^(n - 1), x], x] /; NeQ[b*u - a*v, 0]] /; FreeQ[{m, n},
 x] && PiecewiseLinearQ[u, v, x] && NeQ[m, -1] && ((LtQ[m, -1] && GtQ[n, 0]
 &&  !(ILtQ[m + n, -2] && (FractionQ[m] || GeQ[2*n + m + 1, 0]))) || (IGtQ[
n, 0] && IGtQ[m, 0] && LeQ[n, m]) || (IGtQ[n, 0] &&  !IntegerQ[m]) || (ILtQ
[m, 0] &&  !IntegerQ[n]))
```

Rubi steps

$$\int x^4 \coth^{-1}(\tanh(a+bx))^n\,dx = \frac{x^4 \coth^{-1}(\tanh(a+bx))^{1+n}}{b(1+n)} - \frac{4\int x^3 \coth^{-1}(\tanh(a+bx))^{1+n}\,dx}{b(1+n)}$$
$$= \frac{x^4 \coth^{-1}(\tanh(a+bx))^{1+n}}{b(1+n)} - \frac{4x^3 \coth^{-1}(\tanh(a+bx))^{2+n}}{b^2(1+n)(2+n)} + \frac{12\int x^2 \coth^{-1}(\text{t}}{b^2(1+}$$
$$= \frac{x^4 \coth^{-1}(\tanh(a+bx))^{1+n}}{b(1+n)} - \frac{4x^3 \coth^{-1}(\tanh(a+bx))^{2+n}}{b^2(1+n)(2+n)} + \frac{12x^2 \coth^{-1}(\text{tan}}{b^3(1+n)(2+}$$
$$= \frac{x^4 \coth^{-1}(\tanh(a+bx))^{1+n}}{b(1+n)} - \frac{4x^3 \coth^{-1}(\tanh(a+bx))^{2+n}}{b^2(1+n)(2+n)} + \frac{12x^2 \coth^{-1}(\text{tan}}{b^3(1+n)(2+}$$
$$= \frac{x^4 \coth^{-1}(\tanh(a+bx))^{1+n}}{b(1+n)} - \frac{4x^3 \coth^{-1}(\tanh(a+bx))^{2+n}}{b^2(1+n)(2+n)} + \frac{12x^2 \coth^{-1}(\text{tan}}{b^3(1+n)(2+}$$
$$= \frac{x^4 \coth^{-1}(\tanh(a+bx))^{1+n}}{b(1+n)} - \frac{4x^3 \coth^{-1}(\tanh(a+bx))^{2+n}}{b^2(1+n)(2+n)} + \frac{12x^2 \coth^{-1}(\text{tan}}{b^3(1+n)(2+}$$

**Mathematica [A]** time = 0.11, size = 146, normalized size = 0.88

$$\frac{\coth^{-1}(\tanh(a+bx))^{n+1}\left(-4b^3\left(n^3+12n^2+47n+60\right)x^3\coth^{-1}(\tanh(a+bx))+12b^2\left(n^2+9n+20\right)x^2\coth^{-1}}{b^5(n+1)(n+}$$

Antiderivative was successfully verified.

```
[In] Integrate[x^4*ArcCoth[Tanh[a + b*x]]^n,x]
```

```
[Out] (ArcCoth[Tanh[a + b*x]]^(1 + n)*(b^4*(120 + 154*n + 71*n^2 + 14*n^3 + n^4)*
x^4 - 4*b^3*(60 + 47*n + 12*n^2 + n^3)*x^3*ArcCoth[Tanh[a + b*x]] + 12*b^2*
(20 + 9*n + n^2)*x^2*ArcCoth[Tanh[a + b*x]]^2 - 24*b*(5 + n)*x*ArcCoth[Tanh
[a + b*x]]^3 + 24*ArcCoth[Tanh[a + b*x]]^4))/(b^5*(1 + n)*(2 + n)*(3 + n)*(
4 + n)*(5 + n))
```

**fricas [B]** time = 0.72, size = 583, normalized size = 3.53

$$\frac{2\left(2\left(b^5n^4+10\,b^5n^3+35\,b^5n^2+50\,b^5n+24\,b^5\right)x^5+15\,\pi^4a-120\,\pi^2a^3+48\,a^5+2\left(ab^4n^4+6\,ab^4n^3+11\,ab^4n^2\right.}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^4*arccoth(tanh(b*x+a))^n,x, algorithm="fricas")
```

```
[Out] 1/4*(2*(2*(b^5*n^4 + 10*b^5*n^3 + 35*b^5*n^2 + 50*b^5*n + 24*b^5)*x^5 + 15*
pi^4*a - 120*pi^2*a^3 + 48*a^5 + 2*(a*b^4*n^4 + 6*a*b^4*n^3 + 11*a*b^4*n^2
+ 6*a*b^4*n)*x^4 - 2*(4*a^2*b^3*n^3 + 12*a^2*b^3*n^2 + 8*a^2*b^3*n - pi^2*(
b^3*n^3 + 3*b^3*n^2 + 2*b^3*n))*x^3 + 6*(4*a^3*b^2*n^2 + 4*a^3*b^2*n - 3*pi
^2*(a*b^2*n^2 + a*b^2*n))*x^2 - 3*(pi^4*b*n - 24*pi^2*a^2*b*n + 16*a^4*b*n)
*x)*(b^2*x^2 + 2*a*b*x + 1/4*pi^2 + a^2)^(1/2*n)*cos(2*n*arctan(-2*b*x/pi -
 2*a/pi + sqrt(4*b^2*x^2 + 8*a*b*x + pi^2 + 4*a^2)/pi)) - (2*pi*(b^4*n^4 +
6*b^4*n^3 + 11*b^4*n^2 + 6*b^4*n)*x^4 + 3*pi^5 - 120*pi^3*a^2 + 240*pi*a^4
- 16*pi*(a*b^3*n^3 + 3*a*b^3*n^2 + 2*a*b^3*n)*x^3 - 6*(pi^3*(b^2*n^2 + b^2*
n) - 12*pi*(a^2*b^2*n^2 + a^2*b^2*n))*x^2 + 48*(pi^3*a*b*n - 4*pi*a^3*b*n)*
x)*(b^2*x^2 + 2*a*b*x + 1/4*pi^2 + a^2)^(1/2*n)*sin(2*n*arctan(-2*b*x/pi -
2*a/pi + sqrt(4*b^2*x^2 + 8*a*b*x + pi^2 + 4*a^2)/pi)))/(b^5*n^5 + 15*b^5*n
^4 + 85*b^5*n^3 + 225*b^5*n^2 + 274*b^5*n + 120*b^5)
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int x^4 \operatorname{arcoth}\left(\tanh\left(bx+a\right)\right)^n\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^4*arccoth(tanh(b*x+a))^n,x, algorithm="giac")
```

```
[Out] integrate(x^4*arccoth(tanh(b*x + a))^n, x)
```

**maple** [B] time = 33.06, size = 504228, normalized size = 3055.93

output too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^4*arccoth(tanh(b*x+a))^n,x)
```

```
[Out] result too large to display
```

**maxima** [C] time = 0.54, size = 380, normalized size = 2.30

$$\left(4\left(n^4+10\,n^3+35\,n^2+50\,n+24\right)b^5x^5-3i\,\pi^5+30\,\pi^4a+120i\,\pi^3a^2-240\,\pi^2a^3-240i\,\pi a^4+96\,a^5-2\left(i\,\pi(\right.\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^4*arccoth(tanh(b*x+a))^n,x, algorithm="maxima")
```

```
[Out] (4*(n^4 + 10*n^3 + 35*n^2 + 50*n + 24)*b^5*x^5 - 3*I*pi^5 + 30*pi^4*a + 120
*I*pi^3*a^2 - 240*pi^2*a^3 - 240*I*pi*a^4 + 96*a^5 - 2*(I*pi*(n^4 + 6*n^3 +
 11*n^2 + 6*n)*b^4 - 2*(n^4 + 6*n^3 + 11*n^2 + 6*n)*a*b^4)*x^4 + (4*pi^2*(n
^3 + 3*n^2 + 2*n)*b^3 + 16*I*pi*(n^3 + 3*n^2 + 2*n)*a*b^3 - 16*(n^3 + 3*n^2
 + 2*n)*a^2*b^3)*x^3 + (6*I*pi^3*(n^2 + n)*b^2 - 36*pi^2*(n^2 + n)*a*b^2 -
72*I*pi*(n^2 + n)*a^2*b^2 + 48*(n^2 + n)*a^3*b^2)*x^2 - (6*pi^4*b*n + 48*I*
pi^3*a*b*n - 144*pi^2*a^2*b*n - 192*I*pi*a^3*b*n + 96*a^4*b*n)*x)*(cosh(-n*
log(-I*pi + 2*b*x + 2*a)) - sinh(-n*log(-I*pi + 2*b*x + 2*a)))/((2^(n + 2)*
n^5 + 15*2^(n + 2)*n^4 + 85*2^(n + 2)*n^3 + 225*2^(n + 2)*n^2 + 137*2^(n +
3)*n + 15*2^(n + 5))*b^5)
```

**mupad** [B] time = 2.19, size = 546, normalized size = 3.31

$$-\left(\frac{\ln\left(\frac{2\,e^{2\,a}\,e^{2\,b\,x}}{e^{2\,a}\,e^{2\,b\,x}-1}\right)}{2}-\frac{\ln\left(-\frac{2}{e^{2\,a}\,e^{2\,b\,x}-1}\right)}{2}\right)^n\left(\frac{3\left(\ln\left(-\frac{2}{e^{2\,a}\,e^{2\,b\,x}-1}\right)-\ln\left(\frac{2\,e^{2\,a}\,e^{2\,b\,x}}{e^{2\,a}\,e^{2\,b\,x}-1}\right)+2\,b\,x\right)^5}{4\,b^5\,\left(n^5+15\,n^4+85\,n^3+225\,n^2+274\,n+120\right)}-\frac{x^5\,\left(n^4+10\,n^3\right.}{n^5+15\,n^4+85\,n^3}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^4*acoth(tanh(a + b*x))^n,x)
```

```
[Out] -(log((2*exp(2*a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x) - 1))/2 - log(-2/(exp(2*
a)*exp(2*b*x) - 1))/2)^n*((3*(log(-2/(exp(2*a)*exp(2*b*x) - 1)) - log((2*ex
p(2*a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x) - 1)) + 2*b*x)^5)/(4*b^5*(274*n + 2
25*n^2 + 85*n^3 + 15*n^4 + n^5 + 120)) - (x^5*(50*n + 35*n^2 + 10*n^3 + n^4
 + 24))/(274*n + 225*n^2 + 85*n^3 + 15*n^4 + n^5 + 120) + (3*n*x*(log(-2/(e
xp(2*a)*exp(2*b*x) - 1)) - log((2*exp(2*a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x)
 - 1)) + 2*b*x)^4)/(2*b^4*(274*n + 225*n^2 + 85*n^3 + 15*n^4 + n^5 + 120))
+ (n*x^4*(log(-2/(exp(2*a)*exp(2*b*x) - 1)) - log((2*exp(2*a)*exp(2*b*x))/(
exp(2*a)*exp(2*b*x) - 1)) + 2*b*x)*(11*n + 6*n^2 + n^3 + 6))/(2*b*(274*n +
225*n^2 + 85*n^3 + 15*n^4 + n^5 + 120)) + (3*n*x^2*(n + 1)*(log(-2/(exp(2*a
)*exp(2*b*x) - 1)) - log((2*exp(2*a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x) - 1))
 + 2*b*x)^3)/(2*b^3*(274*n + 225*n^2 + 85*n^3 + 15*n^4 + n^5 + 120)) + (n*x
^3*(log(-2/(exp(2*a)*exp(2*b*x) - 1)) - log((2*exp(2*a)*exp(2*b*x))/(exp(2*
a)*exp(2*b*x) - 1)) + 2*b*x)^2*(3*n + n^2 + 2))/(b^2*(274*n + 225*n^2 + 85*
n^3 + 15*n^4 + n^5 + 120)))
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

result too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**4*acoth(tanh(b*x+a))**n,x)
```

```
[Out] Piecewise((x**5*acoth(tanh(a))**n/5, Eq(b, 0)), (-x**4/(4*b*acoth(tanh(a +
b*x))**4) - x**3/(3*b**2*acoth(tanh(a + b*x))**3) - x**2/(2*b**3*acoth(tanh
(a + b*x))**2) - x/(b**4*acoth(tanh(a + b*x))) + log(acoth(tanh(a + b*x)))/
b**5, Eq(n, -5)), (Integral(x**4/acoth(tanh(a + b*x))**4, x), Eq(n, -4)), (
Integral(x**4/acoth(tanh(a + b*x))**3, x), Eq(n, -3)), (Integral(x**4/acoth
(tanh(a + b*x))**2, x), Eq(n, -2)), (Integral(x**4/acoth(tanh(a + b*x)), x)
, Eq(n, -1)), (b**4*n**4*x**4*acoth(tanh(a + b*x))*acoth(tanh(a + b*x))**n/
(b**5*n**5 + 15*b**5*n**4 + 85*b**5*n**3 + 225*b**5*n**2 + 274*b**5*n + 120
*b**5) + 14*b**4*n**3*x**4*acoth(tanh(a + b*x))*acoth(tanh(a + b*x))**n/(b*
*5*n**5 + 15*b**5*n**4 + 85*b**5*n**3 + 225*b**5*n**2 + 274*b**5*n + 120*b*
*5) + 71*b**4*n**2*x**4*acoth(tanh(a + b*x))*acoth(tanh(a + b*x))**n/(b**5*
n**5 + 15*b**5*n**4 + 85*b**5*n**3 + 225*b**5*n**2 + 274*b**5*n + 120*b**5)
 + 154*b**4*n*x**4*acoth(tanh(a + b*x))*acoth(tanh(a + b*x))**n/(b**5*n**5
+ 15*b**5*n**4 + 85*b**5*n**3 + 225*b**5*n**2 + 274*b**5*n + 120*b**5) + 12
0*b**4*x**4*acoth(tanh(a + b*x))*acoth(tanh(a + b*x))**n/(b**5*n**5 + 15*b*
*5*n**4 + 85*b**5*n**3 + 225*b**5*n**2 + 274*b**5*n + 120*b**5) - 4*b**3*n*
*3*x**3*acoth(tanh(a + b*x))**2*acoth(tanh(a + b*x))**n/(b**5*n**5 + 15*b**
5*n**4 + 85*b**5*n**3 + 225*b**5*n**2 + 274*b**5*n + 120*b**5) - 48*b**3*n*
*2*x**3*acoth(tanh(a + b*x))**2*acoth(tanh(a + b*x))**n/(b**5*n**5 + 15*b**
5*n**4 + 85*b**5*n**3 + 225*b**5*n**2 + 274*b**5*n + 120*b**5) - 188*b**3*n
*x**3*acoth(tanh(a + b*x))**2*acoth(tanh(a + b*x))**n/(b**5*n**5 + 15*b**5*
n**4 + 85*b**5*n**3 + 225*b**5*n**2 + 274*b**5*n + 120*b**5) - 240*b**3*x**
3*acoth(tanh(a + b*x))**2*acoth(tanh(a + b*x))**n/(b**5*n**5 + 15*b**5*n**4
 + 85*b**5*n**3 + 225*b**5*n**2 + 274*b**5*n + 120*b**5) + 12*b**2*n**2*x**
2*acoth(tanh(a + b*x))**3*acoth(tanh(a + b*x))**n/(b**5*n**5 + 15*b**5*n**4
 + 85*b**5*n**3 + 225*b**5*n**2 + 274*b**5*n + 120*b**5) + 108*b**2*n*x**2*
acoth(tanh(a + b*x))**3*acoth(tanh(a + b*x))**n/(b**5*n**5 + 15*b**5*n**4 +
 85*b**5*n**3 + 225*b**5*n**2 + 274*b**5*n + 120*b**5) + 240*b**2*x**2*acot
h(tanh(a + b*x))**3*acoth(tanh(a + b*x))**n/(b**5*n**5 + 15*b**5*n**4 + 85*
b**5*n**3 + 225*b**5*n**2 + 274*b**5*n + 120*b**5) - 24*b*n*x*acoth(tanh(a
+ b*x))**4*acoth(tanh(a + b*x))**n/(b**5*n**5 + 15*b**5*n**4 + 85*b**5*n**3
 + 225*b**5*n**2 + 274*b**5*n + 120*b**5) - 120*b*x*acoth(tanh(a + b*x))**4
*acoth(tanh(a + b*x))**n/(b**5*n**5 + 15*b**5*n**4 + 85*b**5*n**3 + 225*b**
5*n**2 + 274*b**5*n + 120*b**5) + 24*acoth(tanh(a + b*x))**5*acoth(tanh(a +
 b*x))**n/(b**5*n**5 + 15*b**5*n**4 + 85*b**5*n**3 + 225*b**5*n**2 + 274*b*
*5*n + 120*b**5), True))
```

## 3.186 $\int x^3 \coth^{-1}(\tanh(a+bx))^n \, dx$

**Optimal**. Leaf size=121

$$-\frac{6\coth^{-1}(\tanh(a+bx))^{n+4}}{b^4(n+1)(n+2)(n+3)(n+4)}+\frac{6x\coth^{-1}(\tanh(a+bx))^{n+3}}{b^3(n+1)(n+2)(n+3)}-\frac{3x^2\coth^{-1}(\tanh(a+bx))^{n+2}}{b^2(n+1)(n+2)}+\frac{x^3\coth^{-1}(\tanh}{b(n+}$$

```
[Out] x^3*arccoth(tanh(b*x+a))^(1+n)/b/(1+n)-3*x^2*arccoth(tanh(b*x+a))^(2+n)/b^2
/(1+n)/(2+n)+6*x*arccoth(tanh(b*x+a))^(3+n)/b^3/(3+n)/(n^2+3*n+2)-6*arccoth
(tanh(b*x+a))^(4+n)/b^4/(n^2+5*n+4)/(n^2+5*n+6)
```

**Rubi [A]** time = 0.08, antiderivative size = 121, normalized size of antiderivative = 1.00, number of steps used = 5, number of rules used = 3, integrand size = 13, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.231, Rules used = {2168, 2157, 30}

$$-\frac{3x^2\coth^{-1}(\tanh(a+bx))^{n+2}}{b^2(n+1)(n+2)}+\frac{6x\coth^{-1}(\tanh(a+bx))^{n+3}}{b^3(n+1)(n+2)(n+3)}-\frac{6\coth^{-1}(\tanh(a+bx))^{n+4}}{b^4(n+1)(n+2)(n+3)(n+4)}+\frac{x^3\coth^{-1}(\tanh}{b(n+}$$

Antiderivative was successfully verified.

```
[In] Int[x^3*ArcCoth[Tanh[a + b*x]]^n,x]
```

```
[Out] (x^3*ArcCoth[Tanh[a + b*x]]^(1 + n))/(b*(1 + n)) - (3*x^2*ArcCoth[Tanh[a +
b*x]]^(2 + n))/(b^2*(1 + n)*(2 + n)) + (6*x*ArcCoth[Tanh[a + b*x]]^(3 + n))
/(b^3*(1 + n)*(2 + n)*(3 + n)) - (6*ArcCoth[Tanh[a + b*x]]^(4 + n))/(b^4*(1
 + n)*(2 + n)*(3 + n)*(4 + n))
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 2157

```
Int[(u_)^(m_.), x_Symbol] :> With[{c = Simplify[D[u, x]]}, Dist[1/c, Subst[
Int[x^m, x], x, u], x]] /; FreeQ[m, x] && PiecewiseLinearQ[u, x]
```

Rule 2168

```
Int[(u_)^(m_)*(v_)^(n_.), x_Symbol] :> With[{a = Simplify[D[u, x]], b = Sim
plify[D[v, x]]}, Simp[(u^(m + 1)*v^n)/(a*(m + 1)), x] - Dist[(b*n)/(a*(m +
1)), Int[u^(m + 1)*v^(n - 1), x], x] /; NeQ[b*u - a*v, 0]] /; FreeQ[{m, n},
 x] && PiecewiseLinearQ[u, v, x] && NeQ[m, -1] && ((LtQ[m, -1] && GtQ[n, 0]
 &&  !(ILtQ[m + n, -2] && (FractionQ[m] || GeQ[2*n + m + 1, 0]))) || (IGtQ[
n, 0] && IGtQ[m, 0] && LeQ[n, m]) || (IGtQ[n, 0] &&  !IntegerQ[m]) || (ILtQ
[m, 0] &&  !IntegerQ[n]))
```

Rubi steps

$$\int x^3\coth^{-1}(\tanh(a+bx))^n\,dx = \frac{x^3\coth^{-1}(\tanh(a+bx))^{1+n}}{b(1+n)} - \frac{3\int x^2\coth^{-1}(\tanh(a+bx))^{1+n}\,dx}{b(1+n)}$$
$$= \frac{x^3\coth^{-1}(\tanh(a+bx))^{1+n}}{b(1+n)} - \frac{3x^2\coth^{-1}(\tanh(a+bx))^{2+n}}{b^2(1+n)(2+n)} + \frac{6\int x\coth^{-1}(\tan}{b^2(1+}$$
$$= \frac{x^3\coth^{-1}(\tanh(a+bx))^{1+n}}{b(1+n)} - \frac{3x^2\coth^{-1}(\tanh(a+bx))^{2+n}}{b^2(1+n)(2+n)} + \frac{6x\coth^{-1}(\tanh}{b^3(1+n)(2+}$$
$$= \frac{x^3\coth^{-1}(\tanh(a+bx))^{1+n}}{b(1+n)} - \frac{3x^2\coth^{-1}(\tanh(a+bx))^{2+n}}{b^2(1+n)(2+n)} + \frac{6x\coth^{-1}(\tanh}{b^3(1+n)(2+}$$
$$= \frac{x^3\coth^{-1}(\tanh(a+bx))^{1+n}}{b(1+n)} - \frac{3x^2\coth^{-1}(\tanh(a+bx))^{2+n}}{b^2(1+n)(2+n)} + \frac{6x\coth^{-1}(\tanh}{b^3(1+n)(2+}$$

**Mathematica [A]** time = 0.08, size = 106, normalized size = 0.88

$$\frac{\coth^{-1}(\tanh(a+bx))^{n+1}\left(-3b^2\left(n^2+7n+12\right)x^2\coth^{-1}(\tanh(a+bx))+6b(n+4)x\coth^{-1}(\tanh(a+bx))^2-6c\right.}{b^4(n+1)(n+2)(n+3)(n+4)}$$

Antiderivative was successfully verified.

```
[In] Integrate[x^3*ArcCoth[Tanh[a + b*x]]^n,x]
```

```
[Out] (ArcCoth[Tanh[a + b*x]]^(1 + n)*(b^3*(24 + 26*n + 9*n^2 + n^3)*x^3 - 3*b^2*
(12 + 7*n + n^2)*x^2*ArcCoth[Tanh[a + b*x]] + 6*b*(4 + n)*x*ArcCoth[Tanh[a
+ b*x]]^2 - 6*ArcCoth[Tanh[a + b*x]]^3))/(b^4*(1 + n)*(2 + n)*(3 + n)*(4 +
n))
```

**fricas [B]** time = 1.48, size = 411, normalized size = 3.40

$$\frac{\left(8\left(b^4n^3+6\,b^4n^2+11\,b^4n+6\,b^4\right)x^4-3\,\pi^4+72\,\pi^2a^2-48\,a^4+8\left(ab^3n^3+3\,ab^3n^2+2\,ab^3n\right)x^3-6\left(4\,a^2b^2n^2+4\right.\right.}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^3*arccoth(tanh(b*x+a))^n,x, algorithm="fricas")
```

```
[Out] 1/8*((8*(b^4*n^3 + 6*b^4*n^2 + 11*b^4*n + 6*b^4)*x^4 - 3*pi^4 + 72*pi^2*a^2
 - 48*a^4 + 8*(a*b^3*n^3 + 3*a*b^3*n^2 + 2*a*b^3*n)*x^3 - 6*(4*a^2*b^2*n^2
+ 4*a^2*b^2*n - pi^2*(b^2*n^2 + b^2*n))*x^2 - 12*(3*pi^2*a*b*n - 4*a^3*b*n)
*x)*(b^2*x^2 + 2*a*b*x + 1/4*pi^2 + a^2)^(1/2*n)*cos(2*n*arctan(-2*b*x/pi -
 2*a/pi + sqrt(4*b^2*x^2 + 8*a*b*x + pi^2 + 4*a^2)/pi)) - 2*(2*pi*(b^3*n^3
+ 3*b^3*n^2 + 2*b^3*n)*x^3 + 12*pi^3*a - 48*pi*a^3 - 12*pi*(a*b^2*n^2 + a*b
^2*n)*x^2 - 3*(pi^3*b*n - 12*pi*a^2*b*n)*x)*(b^2*x^2 + 2*a*b*x + 1/4*pi^2 +
 a^2)^(1/2*n)*sin(2*n*arctan(-2*b*x/pi - 2*a/pi + sqrt(4*b^2*x^2 + 8*a*b*x
+ pi^2 + 4*a^2)/pi)))/(b^4*n^4 + 10*b^4*n^3 + 35*b^4*n^2 + 50*b^4*n + 24*b^
4)
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int x^3\,\mathrm{arcoth}\left(\tanh\left(bx+a\right)\right)^n\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^3*arccoth(tanh(b*x+a))^n,x, algorithm="giac")
```

```
[Out] integrate(x^3*arccoth(tanh(b*x + a))^n, x)
```

**maple [C]** time = 18.41, size = 129477, normalized size = 1070.06

output too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^3*arccoth(tanh(b*x+a))^n,x)
```

```
[Out] result too large to display
```

**maxima [C]** time = 0.53, size = 255, normalized size = 2.11

$$\frac{\left(8\left(n^3+6\,n^2+11\,n+6\right)b^4x^4-3\,\pi^4-24i\,\pi^3a+72\,\pi^2a^2+96i\,\pi a^3-48\,a^4+\left(-4i\,\pi\left(n^3+3\,n^2+2\,n\right)b^3+8\,(n\right.\right.}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^3*arccoth(tanh(b*x+a))^n,x, algorithm="maxima")
```

```
[Out] (8*(n^3 + 6*n^2 + 11*n + 6)*b^4*x^4 - 3*pi^4 - 24*I*pi^3*a + 72*pi^2*a^2 +
96*I*pi*a^3 - 48*a^4 + (-4*I*pi*(n^3 + 3*n^2 + 2*n)*b^3 + 8*(n^3 + 3*n^2 +
2*n)*a*b^3)*x^3 + (6*pi^2*(n^2 + n)*b^2 + 24*I*pi*(n^2 + n)*a*b^2 - 24*(n^2
 + n)*a^2*b^2)*x^2 + (6*I*pi^3*b*n - 36*pi^2*a*b*n - 72*I*pi*a^2*b*n + 48*a
^3*b*n)*x)*(cosh(-n*log(-I*pi + 2*b*x + 2*a)) - sinh(-n*log(-I*pi + 2*b*x +
 2*a)))/((2^(n + 3)*n^4 + 5*2^(n + 4)*n^3 + 35*2^(n + 3)*n^2 + 25*2^(n + 4)
*n + 3*2^(n + 6))*b^4)
```

**mupad [B]** time = 1.50, size = 418, normalized size = 3.45

$$-\left(\frac{\ln\left(\frac{2\,e^{2\,a}\,e^{2\,b\,x}}{e^{2\,a}\,e^{2\,b\,x}-1}\right)}{2}-\frac{\ln\left(-\frac{2}{e^{2\,a}\,e^{2\,b\,x}-1}\right)}{2}\right)^n\left(\frac{3\left(\ln\left(-\frac{2}{e^{2\,a}\,e^{2\,b\,x}-1}\right)-\ln\left(\frac{2\,e^{2\,a}\,e^{2\,b\,x}}{e^{2\,a}\,e^{2\,b\,x}-1}\right)+2\,b\,x\right)^4}{8\,b^4\,\left(n^4+10\,n^3+35\,n^2+50\,n+24\right)}-\frac{x^4\,\left(n^3+6\,n^2+11\,n\right.}{n^4+10\,n^3+35\,n^2+50}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^3*acoth(tanh(a + b*x))^n,x)
```

```
[Out] -(log((2*exp(2*a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x) - 1))/2 - log(-2/(exp(2*
a)*exp(2*b*x) - 1))/2)^n*((3*(log(-2/(exp(2*a)*exp(2*b*x) - 1)) - log((2*ex
p(2*a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x) - 1)) + 2*b*x)^4)/(8*b^4*(50*n + 35
*n^2 + 10*n^3 + n^4 + 24)) - (x^4*(11*n + 6*n^2 + n^3 + 6))/(50*n + 35*n^2
+ 10*n^3 + n^4 + 24) + (3*n*x*(log(-2/(exp(2*a)*exp(2*b*x) - 1)) - log((2*e
xp(2*a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x) - 1)) + 2*b*x)^3)/(4*b^3*(50*n + 3
5*n^2 + 10*n^3 + n^4 + 24)) + (n*x^3*(log(-2/(exp(2*a)*exp(2*b*x) - 1)) - l
og((2*exp(2*a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x) - 1)) + 2*b*x)*(3*n + n^2 +
 2))/(2*b*(50*n + 35*n^2 + 10*n^3 + n^4 + 24)) + (3*n*x^2*(n + 1)*(log(-2/(
exp(2*a)*exp(2*b*x) - 1)) - log((2*exp(2*a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x
) - 1)) + 2*b*x)^2)/(4*b^2*(50*n + 35*n^2 + 10*n^3 + n^4 + 24)))
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

result too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**3*acoth(tanh(b*x+a))**n,x)
```

```
[Out] Piecewise((x**4*acoth(tanh(a))**n/4, Eq(b, 0)), (-x**3/(3*b*acoth(tanh(a +
b*x))**3) - x**2/(2*b**2*acoth(tanh(a + b*x))**2) - x/(b**3*acoth(tanh(a +
b*x))) + log(acoth(tanh(a + b*x)))/b**4, Eq(n, -4)), (Integral(x**3/acoth(t
anh(a + b*x))**3, x), Eq(n, -3)), (Integral(x**3/acoth(tanh(a + b*x))**2, x
```

```
), Eq(n, -2)), (Integral(x**3/acoth(tanh(a + b*x)), x), Eq(n, -1)), (b**3*n
**3*x**3*acoth(tanh(a + b*x))*acoth(tanh(a + b*x))**n/(b**4*n**4 + 10*b**4*
n**3 + 35*b**4*n**2 + 50*b**4*n + 24*b**4) + 9*b**3*n**2*x**3*acoth(tanh(a
 + b*x))*acoth(tanh(a + b*x))**n/(b**4*n**4 + 10*b**4*n**3 + 35*b**4*n**2 +
50*b**4*n + 24*b**4) + 26*b**3*n*x**3*acoth(tanh(a + b*x))*acoth(tanh(a + b
*x))**n/(b**4*n**4 + 10*b**4*n**3 + 35*b**4*n**2 + 50*b**4*n + 24*b**4) + 2
4*b**3*x**3*acoth(tanh(a + b*x))*acoth(tanh(a + b*x))**n/(b**4*n**4 + 10*b*
*4*n**3 + 35*b**4*n**2 + 50*b**4*n + 24*b**4) - 3*b**2*n**2*x**2*acoth(tanh
(a + b*x))**2*acoth(tanh(a + b*x))**n/(b**4*n**4 + 10*b**4*n**3 + 35*b**4*n
**2 + 50*b**4*n + 24*b**4) - 21*b**2*n*x**2*acoth(tanh(a + b*x))**2*acoth(t
anh(a + b*x))**n/(b**4*n**4 + 10*b**4*n**3 + 35*b**4*n**2 + 50*b**4*n + 24*
b**4) - 36*b**2*x**2*acoth(tanh(a + b*x))**2*acoth(tanh(a + b*x))**n/(b**4*
n**4 + 10*b**4*n**3 + 35*b**4*n**2 + 50*b**4*n + 24*b**4) + 6*b*n*x*acoth(t
anh(a + b*x))**3*acoth(tanh(a + b*x))**n/(b**4*n**4 + 10*b**4*n**3 + 35*b**
4*n**2 + 50*b**4*n + 24*b**4) + 24*b*x*acoth(tanh(a + b*x))**3*acoth(tanh(a
 + b*x))**n/(b**4*n**4 + 10*b**4*n**3 + 35*b**4*n**2 + 50*b**4*n + 24*b**4)
 - 6*acoth(tanh(a + b*x))**4*acoth(tanh(a + b*x))**n/(b**4*n**4 + 10*b**4*n
**3 + 35*b**4*n**2 + 50*b**4*n + 24*b**4), True))
```

## 3.187 $\int x^2 \coth^{-1}(\tanh(a+bx))^n \, dx$

**Optimal**. Leaf size=82

$$\frac{2\coth^{-1}(\tanh(a+bx))^{n+3}}{b^3(n+1)(n+2)(n+3)}-\frac{2x\coth^{-1}(\tanh(a+bx))^{n+2}}{b^2(n+1)(n+2)}+\frac{x^2\coth^{-1}(\tanh(a+bx))^{n+1}}{b(n+1)}$$

```
[Out] x^2*arccoth(tanh(b*x+a))^(1+n)/b/(1+n)-2*x*arccoth(tanh(b*x+a))^(2+n)/b^2/(
1+n)/(2+n)+2*arccoth(tanh(b*x+a))^(3+n)/b^3/(3+n)/(n^2+3*n+2)
```

**Rubi [A]** time = 0.05, antiderivative size = 82, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 3, integrand size = 13, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.231, Rules used = {2168, 2157, 30}

$$-\frac{2x\coth^{-1}(\tanh(a+bx))^{n+2}}{b^2(n+1)(n+2)}+\frac{2\coth^{-1}(\tanh(a+bx))^{n+3}}{b^3(n+1)(n+2)(n+3)}+\frac{x^2\coth^{-1}(\tanh(a+bx))^{n+1}}{b(n+1)}$$

Antiderivative was successfully verified.

```
[In] Int[x^2*ArcCoth[Tanh[a + b*x]]^n,x]
```

```
[Out] (x^2*ArcCoth[Tanh[a + b*x]]^(1 + n))/(b*(1 + n)) - (2*x*ArcCoth[Tanh[a + b*
x]]^(2 + n))/(b^2*(1 + n)*(2 + n)) + (2*ArcCoth[Tanh[a + b*x]]^(3 + n))/(b^
3*(1 + n)*(2 + n)*(3 + n))
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 2157

```
Int[(u_)^(m_.), x_Symbol] :> With[{c = Simplify[D[u, x]]}, Dist[1/c, Subst[
Int[x^m, x], x, u], x]] /; FreeQ[m, x] && PiecewiseLinearQ[u, x]
```

Rule 2168

```
Int[(u_)^(m_)*(v_)^(n_.), x_Symbol] :> With[{a = Simplify[D[u, x]], b = Sim
plify[D[v, x]]}, Simp[(u^(m + 1)*v^n)/(a*(m + 1)), x] - Dist[(b*n)/(a*(m +
1)), Int[u^(m + 1)*v^(n - 1), x], x] /; NeQ[b*u - a*v, 0]] /; FreeQ[{m, n},
 x] && PiecewiseLinearQ[u, v, x] && NeQ[m, -1] && ((LtQ[m, -1] && GtQ[n, 0]
 && !(ILtQ[m + n, -2] && (FractionQ[m] || GeQ[2*n + m + 1, 0]))) || (IGtQ[
n, 0] && IGtQ[m, 0] && LeQ[n, m]) || (IGtQ[n, 0] && !IntegerQ[m]) || (ILtQ
[m, 0] && !IntegerQ[n]))
```

Rubi steps

$$\begin{aligned}\int x^2\coth^{-1}(\tanh(a+bx))^n\,dx &= \frac{x^2\coth^{-1}(\tanh(a+bx))^{1+n}}{b(1+n)}-\frac{2\int x\coth^{-1}(\tanh(a+bx))^{1+n}\,dx}{b(1+n)}\\ &= \frac{x^2\coth^{-1}(\tanh(a+bx))^{1+n}}{b(1+n)}-\frac{2x\coth^{-1}(\tanh(a+bx))^{2+n}}{b^2(1+n)(2+n)}+\frac{2\int\coth^{-1}(\tan\ldots}{b^2(1+\ldots}\\ &= \frac{x^2\coth^{-1}(\tanh(a+bx))^{1+n}}{b(1+n)}-\frac{2x\coth^{-1}(\tanh(a+bx))^{2+n}}{b^2(1+n)(2+n)}+\frac{2\,\text{Subst}\left(\int x^{2\ldots}\right.}{\ldots}\\ &= \frac{x^2\coth^{-1}(\tanh(a+bx))^{1+n}}{b(1+n)}-\frac{2x\coth^{-1}(\tanh(a+bx))^{2+n}}{b^2(1+n)(2+n)}+\frac{2\coth^{-1}(\tanh\ldots}{b^3(1+n)(2\ldots}\end{aligned}$$

**Mathematica [A]** time = 0.07, size = 71, normalized size = 0.87

$$\frac{\coth^{-1}(\tanh(a+bx))^{n+1}\left(-2b(n+3)x\coth^{-1}(\tanh(a+bx))+2\coth^{-1}(\tanh(a+bx))^2+b^2\left(n^2+5n+6\right)x^2\right)}{b^3(n+1)(n+2)(n+3)}$$

Antiderivative was successfully verified.

```
[In] Integrate[x^2*ArcCoth[Tanh[a + b*x]]^n,x]
```

```
[Out] (ArcCoth[Tanh[a + b*x]]^(1 + n)*(b^2*(6 + 5*n + n^2)*x^2 - 2*b*(3 + n)*x*Ar
cCoth[Tanh[a + b*x]] + 2*ArcCoth[Tanh[a + b*x]]^2))/(b^3*(1 + n)*(2 + n)*(3
 + n))
```

**fricas [B]** time = 0.46, size = 287, normalized size = 3.50

$$\frac{2\left(2\left(b^3n^2+3\,b^3n+2\,b^3\right)x^3-3\,\pi^2a+4\,a^3+2\left(ab^2n^2+ab^2n\right)x^2+\left(\pi^2bn-4\,a^2bn\right)x\right)\left(b^2x^2+2\,abx+\frac{1}{4}\,\pi^2+a^2\right)}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*arccoth(tanh(b*x+a))^n,x, algorithm="fricas")
```

```
[Out] 1/4*(2*(2*(b^3*n^2 + 3*b^3*n + 2*b^3)*x^3 - 3*pi^2*a + 4*a^3 + 2*(a*b^2*n^2
 + a*b^2*n)*x^2 + (pi^2*b*n - 4*a^2*b*n)*x)*(b^2*x^2 + 2*a*b*x + 1/4*pi^2 +
 a^2)^(1/2*n)*cos(2*n*arctan(-2*b*x/pi - 2*a/pi + sqrt(4*b^2*x^2 + 8*a*b*x
+ pi^2 + 4*a^2)/pi)) + (8*pi*a*b*n*x - 2*pi*(b^2*n^2 + b^2*n)*x^2 + pi^3 -
12*pi*a^2)*(b^2*x^2 + 2*a*b*x + 1/4*pi^2 + a^2)^(1/2*n)*sin(2*n*arctan(-2*b
*x/pi - 2*a/pi + sqrt(4*b^2*x^2 + 8*a*b*x + pi^2 + 4*a^2)/pi)))/(b^3*n^3 +
6*b^3*n^2 + 11*b^3*n + 6*b^3)
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int x^2\,\mathrm{arcoth}\left(\tanh\left(bx+a\right)\right)^n\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*arccoth(tanh(b*x+a))^n,x, algorithm="giac")
```

```
[Out] integrate(x^2*arccoth(tanh(b*x + a))^n, x)
```

**maple [C]** time = 14.73, size = 25561, normalized size = 311.72

output too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^2*arccoth(tanh(b*x+a))^n,x)
```

```
[Out] result too large to display
```

**maxima [C]** time = 0.54, size = 166, normalized size = 2.02

$$\frac{\left(4\left(n^2+3\,n+2\right)b^3x^3+i\,\pi^3-6\,\pi^2a-12i\,\pi a^2+8\,a^3-2\left(i\,\pi\left(n^2+n\right)b^2-2\left(n^2+n\right)ab^2\right)x^2+\left(2\,\pi^2bn+8i\,\pi abn\right.}{\left(2^{n+2}n^3+3\cdot2^{n+3}n^2+11\cdot2^{n+2}n+3\cdot\right.}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*arccoth(tanh(b*x+a))^n,x, algorithm="maxima")
```

```
[Out] (4*(n^2 + 3*n + 2)*b^3*x^3 + I*pi^3 - 6*pi^2*a - 12*I*pi*a^2 + 8*a^3 - 2*(I
*pi*(n^2 + n)*b^2 - 2*(n^2 + n)*a*b^2)*x^2 + (2*pi^2*b*n + 8*I*pi*a*b*n - 8
```

```
*a^2*b*n)*x)*(cosh(-n*log(-I*pi + 2*b*x + 2*a)) - sinh(-n*log(-I*pi + 2*b*x
 + 2*a)))/((2^(n + 2)*n^3 + 3*2^(n + 3)*n^2 + 11*2^(n + 2)*n + 3*2^(n + 3))
*b^3)
```

**mupad** [B] time = 1.36, size = 304, normalized size = 3.71

$$-\left(\frac{\ln\left(\frac{2\,e^{2\,a}\,e^{2\,b\,x}}{e^{2\,a}\,e^{2\,b\,x}-1}\right)}{2}-\frac{\ln\left(-\frac{2}{e^{2\,a}\,e^{2\,b\,x}-1}\right)}{2}\right)^n\left(\frac{\left(\ln\left(-\frac{2}{e^{2\,a}\,e^{2\,b\,x}-1}\right)-\ln\left(\frac{2\,e^{2\,a}\,e^{2\,b\,x}}{e^{2\,a}\,e^{2\,b\,x}-1}\right)+2\,b\,x\right)^3}{4\,b^3\,\left(n^3+6\,n^2+11\,n+6\right)}-\frac{x^3\,\left(n^2+3\,n+2\right)}{n^3+6\,n^2+11\,n+6}+\frac{n}{}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^2*acoth(tanh(a + b*x))^n,x)
```

```
[Out] -(log((2*exp(2*a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x) - 1))/2 - log(-2/(exp(2*
a)*exp(2*b*x) - 1))/2)^n*((log(-2/(exp(2*a)*exp(2*b*x) - 1)) - log((2*exp(2
*a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x) - 1)) + 2*b*x)^3/(4*b^3*(11*n + 6*n^2
+ n^3 + 6)) - (x^3*(3*n + n^2 + 2))/(11*n + 6*n^2 + n^3 + 6) + (n*x*(log(-2
/(exp(2*a)*exp(2*b*x) - 1)) - log((2*exp(2*a)*exp(2*b*x))/(exp(2*a)*exp(2*b
*x) - 1)) + 2*b*x)^2)/(2*b^2*(11*n + 6*n^2 + n^3 + 6)) + (n*x^2*(n + 1)*(lo
g(-2/(exp(2*a)*exp(2*b*x) - 1)) - log((2*exp(2*a)*exp(2*b*x))/(exp(2*a)*exp
(2*b*x) - 1)) + 2*b*x))/(2*b*(11*n + 6*n^2 + n^3 + 6)))
```

**sympy** [F] time = 0.00, size = 0, normalized size = 0.00

$$\begin{cases} \frac{x^3 \operatorname{acoth}^n(\tanh(a))}{3} \\ -\frac{x^2}{2b \operatorname{acoth}^2(\tanh(a+bx))} - \frac{x}{b^2 \operatorname{acoth}(\tanh(a+bx))} + \frac{\log(\operatorname{acoth}(\tanh(a+bx)))}{b^3} \\ \int \frac{x^2}{\operatorname{acoth}^2(\tanh(a+bx))}\, dx \\ \int \frac{x^2}{\operatorname{acoth}(\tanh(a+bx))}\, dx \\ \frac{b^2n^2x^2 \operatorname{acoth}(\tanh(a+bx)) \operatorname{acoth}^n(\tanh(a+bx))}{b^3n^3+6b^3n^2+11b^3n+6b^3} + \frac{5b^2nx^2 \operatorname{acoth}(\tanh(a+bx)) \operatorname{acoth}^n(\tanh(a+bx))}{b^3n^3+6b^3n^2+11b^3n+6b^3} + \frac{6b^2x^2 \operatorname{acoth}(\tanh(a+bx)) \operatorname{acoth}^n(\tan}{b^3n^3+6b^3n^2+11b^3n+6b^3} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**2*acoth(tanh(b*x+a))**n,x)
```

```
[Out] Piecewise((x**3*acoth(tanh(a))**n/3, Eq(b, 0)), (-x**2/(2*b*acoth(tanh(a +
b*x))**2) - x/(b**2*acoth(tanh(a + b*x))) + log(acoth(tanh(a + b*x)))/b**3,
 Eq(n, -3)), (Integral(x**2/acoth(tanh(a + b*x))**2, x), Eq(n, -2)), (Integ
ral(x**2/acoth(tanh(a + b*x)), x), Eq(n, -1)), (b**2*n**2*x**2*acoth(tanh(a
 + b*x))*acoth(tanh(a + b*x))**n/(b**3*n**3 + 6*b**3*n**2 + 11*b**3*n + 6*b
**3) + 5*b**2*n*x**2*acoth(tanh(a + b*x))*acoth(tanh(a + b*x))**n/(b**3*n**
3 + 6*b**3*n**2 + 11*b**3*n + 6*b**3) + 6*b**2*x**2*acoth(tanh(a + b*x))*ac
oth(tanh(a + b*x))**n/(b**3*n**3 + 6*b**3*n**2 + 11*b**3*n + 6*b**3) - 2*b*
n*x*acoth(tanh(a + b*x))**2*acoth(tanh(a + b*x))**n/(b**3*n**3 + 6*b**3*n**
2 + 11*b**3*n + 6*b**3) - 6*b*x*acoth(tanh(a + b*x))**2*acoth(tanh(a + b*x)
)**n/(b**3*n**3 + 6*b**3*n**2 + 11*b**3*n + 6*b**3) + 2*acoth(tanh(a + b*x)
)**3*acoth(tanh(a + b*x))**n/(b**3*n**3 + 6*b**3*n**2 + 11*b**3*n + 6*b**3)
, True))
```

# 3.188 $\int x \coth^{-1}(\tanh(a+bx))^n \, dx$

**Optimal**. Leaf size=48

$$\frac{x\coth^{-1}(\tanh(a+bx))^{n+1}}{b(n+1)}-\frac{\coth^{-1}(\tanh(a+bx))^{n+2}}{b^2(n+1)(n+2)}$$

```
[Out] x*arccoth(tanh(b*x+a))^(1+n)/b/(1+n)-arccoth(tanh(b*x+a))^(2+n)/b^2/(1+n)/(
2+n)
```

**Rubi [A]** time = 0.02, antiderivative size = 48, normalized size of antiderivative = 1.00, number of steps used = 3, number of rules used = 3, integrand size = 11, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.273, Rules used = {2168, 2157, 30}

$$\frac{x\coth^{-1}(\tanh(a+bx))^{n+1}}{b(n+1)}-\frac{\coth^{-1}(\tanh(a+bx))^{n+2}}{b^2(n+1)(n+2)}$$

Antiderivative was successfully verified.

```
[In] Int[x*ArcCoth[Tanh[a + b*x]]^n,x]
```

```
[Out] (x*ArcCoth[Tanh[a + b*x]]^(1 + n))/(b*(1 + n)) - ArcCoth[Tanh[a + b*x]]^(2
+ n)/(b^2*(1 + n)*(2 + n))
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 2157

```
Int[(u_)^(m_.), x_Symbol] :> With[{c = Simplify[D[u, x]]}, Dist[1/c, Subst[
Int[x^m, x], x, u], x]] /; FreeQ[m, x] && PiecewiseLinearQ[u, x]
```

Rule 2168

```
Int[(u_)^(m_)*(v_)^(n_.), x_Symbol] :> With[{a = Simplify[D[u, x]], b = Sim
plify[D[v, x]]}, Simp[(u^(m + 1)*v^n)/(a*(m + 1)), x] - Dist[(b*n)/(a*(m +
1)), Int[u^(m + 1)*v^(n - 1), x], x] /; NeQ[b*u - a*v, 0]] /; FreeQ[{m, n},
 x] && PiecewiseLinearQ[u, v, x] && NeQ[m, -1] && ((LtQ[m, -1] && GtQ[n, 0]
 && !(ILtQ[m + n, -2] && (FractionQ[m] || GeQ[2*n + m + 1, 0]))) || (IGtQ[
n, 0] && IGtQ[m, 0] && LeQ[n, m]) || (IGtQ[n, 0] && !IntegerQ[m]) || (ILtQ
[m, 0] && !IntegerQ[n]))
```

Rubi steps

$$\begin{aligned}
\int x\coth^{-1}(\tanh(a+bx))^n\,dx &= \frac{x\coth^{-1}(\tanh(a+bx))^{1+n}}{b(1+n)}-\frac{\int \coth^{-1}(\tanh(a+bx))^{1+n}\,dx}{b(1+n)}\\
&= \frac{x\coth^{-1}(\tanh(a+bx))^{1+n}}{b(1+n)}-\frac{\operatorname{Subst}\left(\int x^{1+n}\,dx, x, \coth^{-1}(\tanh(a+bx))\right)}{b^2(1+n)}\\
&= \frac{x\coth^{-1}(\tanh(a+bx))^{1+n}}{b(1+n)}-\frac{\coth^{-1}(\tanh(a+bx))^{2+n}}{b^2(1+n)(2+n)}
\end{aligned}$$

**Mathematica [A]** time = 0.04, size = 41, normalized size = 0.85

$$\frac{\left(b(n+2)x-\coth^{-1}(\tanh(a+bx))\right)\coth^{-1}(\tanh(a+bx))^{n+1}}{b^2(n+1)(n+2)}$$

Antiderivative was successfully verified.

```
[In] Integrate[x*ArcCoth[Tanh[a + b*x]]^n,x]
```

```
[Out] ((b*(2 + n)*x - ArcCoth[Tanh[a + b*x]])*ArcCoth[Tanh[a + b*x]]^(1 + n))/(b^
2*(1 + n)*(2 + n))
```

**fricas [B]** time = 0.57, size = 210, normalized size = 4.38

$$\frac{\left(4\,abnx + 4\left(b^2n + b^2\right)x^2 + \pi^2 - 4\,a^2\right)\left(b^2x^2 + 2\,abx + \frac{1}{4}\,\pi^2 + a^2\right)^{\frac{1}{2}\,n}\cos\left(2\,n\arctan\left(-\frac{2\,bx}{\pi} - \frac{2\,a}{\pi} + \frac{\sqrt{4\,b^2x^2+8\,abx+}}{\pi}\right.\right.}{4\left(b^2n^2 + 3\right.}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*arccoth(tanh(b*x+a))^n,x, algorithm="fricas")
```

```
[Out] 1/4*((4*a*b*n*x + 4*(b^2*n + b^2)*x^2 + pi^2 - 4*a^2)*(b^2*x^2 + 2*a*b*x +
1/4*pi^2 + a^2)^(1/2*n)*cos(2*n*arctan(-2*b*x/pi - 2*a/pi + sqrt(4*b^2*x^2
+ 8*a*b*x + pi^2 + 4*a^2)/pi)) - 2*(pi*b*n*x - 2*pi*a)*(b^2*x^2 + 2*a*b*x +
 1/4*pi^2 + a^2)^(1/2*n)*sin(2*n*arctan(-2*b*x/pi - 2*a/pi + sqrt(4*b^2*x^2
 + 8*a*b*x + pi^2 + 4*a^2)/pi)))/(b^2*n^2 + 3*b^2*n + 2*b^2)
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int x\,\mathrm{arcoth}\left(\tanh\left(bx + a\right)\right)^n\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*arccoth(tanh(b*x+a))^n,x, algorithm="giac")
```

```
[Out] integrate(x*arccoth(tanh(b*x + a))^n, x)
```

**maple [C]** time = 13.67, size = 480, normalized size = 10.00

$$\frac{\left(\frac{1}{2}\right)^n\left(2\ln\left(e^{bx+a}\right) - \frac{i\pi\,\mathrm{csgn}\left(ie^{2bx+2a}\right)\left(-\mathrm{csgn}\left(ie^{2bx+2a}\right)+\mathrm{csgn}\left(ie^{bx+a}\right)\right)^2}{2} - \frac{i\pi\,\mathrm{csgn}\left(\frac{ie^{2bx+2a}}{e^{2bx+2a}+1}\right)\left(-\mathrm{csgn}\left(\frac{ie^{2bx+2a}}{e^{2bx+2a}+1}\right)+\mathrm{csgn}\left(ie^{2bx+2a}\right)\right)\left(-\mathrm{csg}\right.}{2}\right.}{2b\left(1 + n\right)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x*arccoth(tanh(b*x+a))^n,x)
```

```
[Out] 1/2/b*(1/2)^n*(2*ln(exp(b*x+a))-1/2*I*Pi*csgn(I*exp(2*b*x+2*a))*(-csgn(I*ex
p(2*b*x+2*a))+csgn(I*exp(b*x+a)))^2-1/2*I*Pi*csgn(I*exp(2*b*x+2*a)/(exp(2*b
*x+2*a)+1))*(-csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))+csgn(I*exp(2*b*x+2*
a)))*(-csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))+csgn(I/(exp(2*b*x+2*a)+1))
)-I*Pi-I*Pi*csgn(I/(exp(2*b*x+2*a)+1))^2*(csgn(I/(exp(2*b*x+2*a)+1))-1))^(1
+n)/(1+n)*x-1/4/b^2*(1/2)^n/(1+n)*(2*ln(exp(b*x+a))-1/2*I*Pi*csgn(I*exp(2*b
*x+2*a))*(-csgn(I*exp(2*b*x+2*a))+csgn(I*exp(b*x+a)))^2-1/2*I*Pi*csgn(I*exp
(2*b*x+2*a)/(exp(2*b*x+2*a)+1))*(-csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))
+csgn(I*exp(2*b*x+2*a)))*(-csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))+csgn(I
/(exp(2*b*x+2*a)+1)))-I*Pi-I*Pi*csgn(I/(exp(2*b*x+2*a)+1))^2*(csgn(I/(exp(2
*b*x+2*a)+1))-1))^(2+n)/(2+n)
```

**maxima [C]** time = 0.54, size = 101, normalized size = 2.10

$$\frac{\left(4\,b^2(n+1)x^2 + \pi^2 + 4i\,\pi a - 4\,a^2 + (-2i\,\pi bn + 4\,abn)x\right)\left(\cosh\left(-n\log\left(-i\,\pi + 2\,bx + 2\,a\right)\right) - \sinh\left(-n\log\left(-i\right.\right.\right.}{\left(2^{n+2}n^2 + 3\cdot 2^{n+2}n + 2^{n+3}\right)b^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*arccoth(tanh(b*x+a))^n,x, algorithm="maxima")
```

```
[Out] (4*b^2*(n + 1)*x^2 + pi^2 + 4*I*pi*a - 4*a^2 + (-2*I*pi*b*n + 4*a*b*n)*x)*(
cosh(-n*log(-I*pi + 2*b*x + 2*a)) - sinh(-n*log(-I*pi + 2*b*x + 2*a)))/((2^
(n + 2)*n^2 + 3*2^(n + 2)*n + 2^(n + 3))*b^2)
```

**mupad [B]** time = 1.31, size = 205, normalized size = 4.27

$$-\left(\frac{\ln\left(\frac{2\,e^{2\,a}\,e^{2\,b\,x}}{e^{2\,a}\,e^{2\,b\,x}-1}\right)}{2}-\frac{\ln\left(-\frac{2}{e^{2\,a}\,e^{2\,b\,x}-1}\right)}{2}\right)^n\,\left(\frac{\left(\ln\left(-\frac{2}{e^{2\,a}\,e^{2\,b\,x}-1}\right)-\ln\left(\frac{2\,e^{2\,a}\,e^{2\,b\,x}}{e^{2\,a}\,e^{2\,b\,x}-1}\right)+2\,b\,x\right)^2}{4\,b^2\,\left(n^2+3\,n+2\right)}-\frac{x^2\,\left(n+1\right)}{n^2+3\,n+2}+\frac{n\,x\,\left(\ln\left(-\frac{2}{e^{2}}\right.\right.}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x*acoth(tanh(a + b*x))^n,x)
```

```
[Out] -(log((2*exp(2*a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x) - 1))/2 - log(-2/(exp(2*
a)*exp(2*b*x) - 1))/2)^n*((log(-2/(exp(2*a)*exp(2*b*x) - 1)) - log((2*exp(2
*a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x) - 1)) + 2*b*x)^2/(4*b^2*(3*n + n^2 + 2
)) - (x^2*(n + 1))/(3*n + n^2 + 2) + (n*x*(log(-2/(exp(2*a)*exp(2*b*x) - 1)
) - log((2*exp(2*a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x) - 1)) + 2*b*x))/(2*b*(
3*n + n^2 + 2)))
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\begin{cases} \frac{x^2\operatorname{acoth}^n(\tanh(a))}{2} & \text{fo} \\ -\frac{x}{b\operatorname{acoth}(\tanh(a+bx))}+\frac{\log(\operatorname{acoth}(\tanh(a+bx)))}{b^2} & \text{fo} \\ \int\frac{x}{\operatorname{acoth}(\tanh(a+bx))}\,dx & \text{fo} \\ \frac{bnx\operatorname{acoth}(\tanh(a+bx))\operatorname{acoth}^n(\tanh(a+bx))}{b^2n^2+3b^2n+2b^2}+\frac{2bx\operatorname{acoth}(\tanh(a+bx))\operatorname{acoth}^n(\tanh(a+bx))}{b^2n^2+3b^2n+2b^2}-\frac{\operatorname{acoth}^2(\tanh(a+bx))\operatorname{acoth}^n(\tanh(a+bx))}{b^2n^2+3b^2n+2b^2} & \text{ot} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*acoth(tanh(b*x+a))**n,x)
```

```
[Out] Piecewise((x**2*acoth(tanh(a))**n/2, Eq(b, 0)), (-x/(b*acoth(tanh(a + b*x))
) + log(acoth(tanh(a + b*x)))/b**2, Eq(n, -2)), (Integral(x/acoth(tanh(a +
b*x)), x), Eq(n, -1)), (b*n*x*acoth(tanh(a + b*x))*acoth(tanh(a + b*x))**n/
(b**2*n**2 + 3*b**2*n + 2*b**2) + 2*b*x*acoth(tanh(a + b*x))*acoth(tanh(a +
 b*x))**n/(b**2*n**2 + 3*b**2*n + 2*b**2) - acoth(tanh(a + b*x))**2*acoth(t
anh(a + b*x))**n/(b**2*n**2 + 3*b**2*n + 2*b**2), True))
```

# 3.189 $\int \coth^{-1}(\tanh(a+bx))^n\,dx$

**Optimal**. Leaf size=20

$$\frac{\coth^{-1}(\tanh(a+bx))^{n+1}}{b(n+1)}$$

```
[Out] arccoth(tanh(b*x+a))^(1+n)/b/(1+n)
```

**Rubi [A]** time = 0.01, antiderivative size = 20, normalized size of antiderivative = 1.00, number of steps used = 2, number of rules used = 2, integrand size = 9, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.222, Rules used = {2157, 30}

$$\frac{\coth^{-1}(\tanh(a+bx))^{n+1}}{b(n+1)}$$

Antiderivative was successfully verified.

```
[In] Int[ArcCoth[Tanh[a + b*x]]^n,x]
```

```
[Out] ArcCoth[Tanh[a + b*x]]^(1 + n)/(b*(1 + n))
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 2157

```
Int[(u_)^(m_.), x_Symbol] :> With[{c = Simplify[D[u, x]]}, Dist[1/c, Subst[
Int[x^m, x], x, u], x]] /; FreeQ[m, x] && PiecewiseLinearQ[u, x]
```

Rubi steps

$$\begin{aligned}\int \coth^{-1}(\tanh(a+bx))^n\,dx &= \frac{\text{Subst}\left(\int x^n\,dx, x, \coth^{-1}(\tanh(a+bx))\right)}{b}\\ &= \frac{\coth^{-1}(\tanh(a+bx))^{1+n}}{b(1+n)}\end{aligned}$$

**Mathematica [A]** time = 0.02, size = 20, normalized size = 1.00

$$\frac{\coth^{-1}(\tanh(a+bx))^{n+1}}{b(n+1)}$$

Antiderivative was successfully verified.

```
[In] Integrate[ArcCoth[Tanh[a + b*x]]^n,x]
```

```
[Out] ArcCoth[Tanh[a + b*x]]^(1 + n)/(b*(1 + n))
```

**fricas [B]** time = 0.57, size = 164, normalized size = 8.20

$$\frac{2\,(bx+a)\left(b^2x^2+2\,abx+\frac{1}{4}\,\pi^2+a^2\right)^{\frac{1}{2}\,n}\cos\left(2\,n\arctan\left(-\frac{2\,bx}{\pi}-\frac{2\,a}{\pi}+\frac{\sqrt{4\,b^2x^2+8\,abx+\pi^2+4\,a^2}}{\pi}\right)\right)-\pi\left(b^2x^2+2\,abx\right.}{2\,(bn+b)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(tanh(b*x+a))^n,x, algorithm="fricas")
```

```
[Out] 1/2*(2*(b*x + a)*(b^2*x^2 + 2*a*b*x + 1/4*pi^2 + a^2)^(1/2*n)*cos(2*n*arcta
n(-2*b*x/pi - 2*a/pi + sqrt(4*b^2*x^2 + 8*a*b*x + pi^2 + 4*a^2)/pi)) - pi*(
b^2*x^2 + 2*a*b*x + 1/4*pi^2 + a^2)^(1/2*n)*sin(2*n*arctan(-2*b*x/pi - 2*a/
pi + sqrt(4*b^2*x^2 + 8*a*b*x + pi^2 + 4*a^2)/pi)))/(b*n + b)
```

**giac** [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \operatorname{arccoth}\left(\tanh\left(bx+a\right)\right)^{n}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(tanh(b*x+a))^n,x, algorithm="giac")
```

```
[Out] integrate(arccoth(tanh(b*x + a))^n, x)
```

**maple** [A] time = 0.08, size = 21, normalized size = 1.05

$$\frac{\operatorname{arccoth}\left(\tanh\left(bx+a\right)\right)^{1+n}}{b\left(1+n\right)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(arccoth(tanh(b*x+a))^n,x)
```

```
[Out] arccoth(tanh(b*x+a))^(1+n)/b/(1+n)
```

**maxima** [C] time = 0.53, size = 65, normalized size = 3.25

$$\frac{\left(-i\,\pi+2\,bx+2\,a\right)\left(\cosh\left(-n\log\left(-i\,\pi+2\,bx+2\,a\right)\right)-\sinh\left(-n\log\left(-i\,\pi+2\,bx+2\,a\right)\right)\right)}{\left(2^{n+1}n+2^{n+1}\right)b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(tanh(b*x+a))^n,x, algorithm="maxima")
```

```
[Out] (-I*pi + 2*b*x + 2*a)*(cosh(-n*log(-I*pi + 2*b*x + 2*a)) - sinh(-n*log(-I*p
i + 2*b*x + 2*a)))/((2^(n + 1)*n + 2^(n + 1))*b)
```

**mupad** [B] time = 1.27, size = 121, normalized size = 6.05

$$\left(\frac{1}{2}\right)^{n}\left(\frac{x}{n+1}-\frac{\frac{\ln\left(-\frac{2}{e^{2\,a}\,e^{2\,b\,x}-1}\right)}{2}-\frac{\ln\left(\frac{2\,e^{2\,a}\,e^{2\,b\,x}}{e^{2\,a}\,e^{2\,b\,x}-1}\right)}{2}+b\,x}{b\,\left(n+1\right)}\right)\left(\ln\left(\frac{2\,e^{2\,a}\,e^{2\,b\,x}}{e^{2\,a}\,e^{2\,b\,x}-1}\right)-\ln\left(-\frac{2}{e^{2\,a}\,e^{2\,b\,x}-1}\right)\right)^{n}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(tanh(a + b*x))^n,x)
```

```
[Out] (1/2)^n*(x/(n + 1) - (log(-2/(exp(2*a)*exp(2*b*x) - 1))/2 - log((2*exp(2*a)
*exp(2*b*x))/(exp(2*a)*exp(2*b*x) - 1))/2 + b*x)/(b*(n + 1)))*(log((2*exp(2
*a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x) - 1)) - log(-2/(exp(2*a)*exp(2*b*x) -
1)))^n
```

**sympy** [A] time = 0.74, size = 51, normalized size = 2.55

$$\begin{cases} \frac{x}{\operatorname{acoth}\left(\tanh\left(a\right)\right)} & \text{for}\: b = 0 \wedge n = -1 \\ x \operatorname{acoth}^{n}\left(\tanh\left(a\right)\right) & \text{for}\: b = 0 \\ \frac{\log\left(\operatorname{acoth}\left(\tanh\left(a+bx\right)\right)\right)}{b} & \text{for}\: n = -1 \\ \frac{\operatorname{acoth}\left(\tanh\left(a+bx\right)\right)\operatorname{acoth}^{n}\left(\tanh\left(a+bx\right)\right)}{bn+b} & \text{otherwise} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(tanh(b*x+a))**n,x)
```

```
[Out] Piecewise((x/acoth(tanh(a)), Eq(b, 0) & Eq(n, -1)), (x*acoth(tanh(a))**n, E
q(b, 0)), (log(acoth(tanh(a + b*x)))/b, Eq(n, -1)), (acoth(tanh(a + b*x))*a
coth(tanh(a + b*x))**n/(b*n + b), True))
```

# 3.190 $\int \frac{\coth^{-1}(\tanh(a+bx))^n}{x}\,dx$

**Optimal**. Leaf size=64

$$\frac{\coth^{-1}(\tanh(a+bx))^{n+1}\,{}_2F_1\left(1,n+1;n+2;-\frac{\coth^{-1}(\tanh(a+bx))}{bx-\coth^{-1}(\tanh(a+bx))}\right)}{(n+1)\left(bx-\coth^{-1}(\tanh(a+bx))\right)}$$

```
[Out] arccoth(tanh(b*x+a))^(1+n)*hypergeom([1, 1+n],[2+n],-arccoth(tanh(b*x+a))/(
b*x-arccoth(tanh(b*x+a))))/(1+n)/(b*x-arccoth(tanh(b*x+a)))
```

**Rubi [A]** time = 0.02, antiderivative size = 64, normalized size of antiderivative = 1.00, number of steps used = 1, number of rules used = 1, integrand size = 13, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.077, Rules used = {2164}

$$\frac{\coth^{-1}(\tanh(a+bx))^{n+1}\,{}_2F_1\left(1,n+1;n+2;-\frac{\coth^{-1}(\tanh(a+bx))}{bx-\coth^{-1}(\tanh(a+bx))}\right)}{(n+1)\left(bx-\coth^{-1}(\tanh(a+bx))\right)}$$

Antiderivative was successfully verified.

```
[In] Int[ArcCoth[Tanh[a + b*x]]^n/x,x]
```

```
[Out] (ArcCoth[Tanh[a + b*x]]^(1 + n)*Hypergeometric2F1[1, 1 + n, 2 + n, -(ArcCot
h[Tanh[a + b*x]]/(b*x - ArcCoth[Tanh[a + b*x]]))])/((1 + n)*(b*x - ArcCoth[
Tanh[a + b*x]]))
```

Rule 2164

```
Int[(v_)^(n_)/(u_), x_Symbol] :> With[{a = Simplify[D[u, x]], b = Simplify[
D[v, x]]}, Simp[(v^(n + 1)*Hypergeometric2F1[1, n + 1, n + 2, -((a*v)/(b*u
- a*v))])/((n + 1)*(b*u - a*v)), x] /; NeQ[b*u - a*v, 0]] /; PiecewiseLinea
rQ[u, v, x] &&  !IntegerQ[n]
```

Rubi steps

$$\int \frac{\coth^{-1}(\tanh(a+bx))^n}{x}\,dx=\frac{\coth^{-1}(\tanh(a+bx))^{1+n}\,{}_2F_1\left(1,1+n;2+n;-\frac{\coth^{-1}(\tanh(a+bx))}{bx-\coth^{-1}(\tanh(a+bx))}\right)}{(1+n)\left(bx-\coth^{-1}(\tanh(a+bx))\right)}$$

**Mathematica [A]** time = 0.09, size = 60, normalized size = 0.94

$$\frac{\coth^{-1}(\tanh(a+bx))^n\left(\frac{\coth^{-1}(\tanh(a+bx))}{bx}\right)^{-n}\,{}_2F_1\left(-n,-n;1-n;1-\frac{\coth^{-1}(\tanh(a+bx))}{bx}\right)}{n}$$

Antiderivative was successfully verified.

```
[In] Integrate[ArcCoth[Tanh[a + b*x]]^n/x,x]
```

```
[Out] (ArcCoth[Tanh[a + b*x]]^n*Hypergeometric2F1[-n, -n, 1 - n, 1 - ArcCoth[Tanh
[a + b*x]]/(b*x)])/(n*(ArcCoth[Tanh[a + b*x]]/(b*x))^n)
```

**fricas [F]** time = 0.92, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{\operatorname{arcoth}\left(\tanh\left(bx+a\right)\right)^n}{x},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(tanh(b*x+a))^n/x,x, algorithm="fricas")
[Out] integral(arccoth(tanh(b*x + a))^n/x, x)
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{arcoth}\left(\tanh\left(bx+a\right)\right)^{n}}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(tanh(b*x+a))^n/x,x, algorithm="giac")
[Out] integrate(arccoth(tanh(b*x + a))^n/x, x)
```

**maple [F]** time = 0.68, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{arccoth}\left(\tanh\left(bx+a\right)\right)^{n}}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(arccoth(tanh(b*x+a))^n/x,x)
[Out] int(arccoth(tanh(b*x+a))^n/x,x)
```

**maxima [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{arcoth}\left(\tanh\left(bx+a\right)\right)^{n}}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(tanh(b*x+a))^n/x,x, algorithm="maxima")
[Out] integrate(arccoth(tanh(b*x + a))^n/x, x)
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.02

$$\int \frac{\operatorname{acoth}\left(\tanh\left(a+b\,x\right)\right)^{n}}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(tanh(a + b*x))^n/x,x)
[Out] int(acoth(tanh(a + b*x))^n/x, x)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{acoth}^{n}\left(\tanh\left(a+bx\right)\right)}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(tanh(b*x+a))**n/x,x)
[Out] Integral(acoth(tanh(a + b*x))**n/x, x)
```

# 3.191 $\int \frac{\coth^{-1}(\tanh(a+bx))^n}{x^2}\,dx$

**Optimal**. Leaf size=71

$$\frac{b\coth^{-1}(\tanh(a+bx))^n\,{}_2F_1\left(1,n;n+1;-\frac{\coth^{-1}(\tanh(a+bx))}{bx-\coth^{-1}(\tanh(a+bx))}\right)}{bx-\coth^{-1}(\tanh(a+bx))}-\frac{\coth^{-1}(\tanh(a+bx))^n}{x}$$

```
[Out] -arccoth(tanh(b*x+a))^n/x+b*arccoth(tanh(b*x+a))^n*hypergeom([1, n],[1+n],-
arccoth(tanh(b*x+a))/(b*x-arccoth(tanh(b*x+a))))/(b*x-arccoth(tanh(b*x+a)))
```

**Rubi [A]** time = 0.04, antiderivative size = 71, normalized size of antiderivative = 1.00, number of steps used = 2, number of rules used = 2, integrand size = 13, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.154, Rules used = {2168, 2164}

$$\frac{b\coth^{-1}(\tanh(a+bx))^n\,{}_2F_1\left(1,n;n+1;-\frac{\coth^{-1}(\tanh(a+bx))}{bx-\coth^{-1}(\tanh(a+bx))}\right)}{bx-\coth^{-1}(\tanh(a+bx))}-\frac{\coth^{-1}(\tanh(a+bx))^n}{x}$$

Antiderivative was successfully verified.

```
[In] Int[ArcCoth[Tanh[a + b*x]]^n/x^2,x]
```

```
[Out] -(ArcCoth[Tanh[a + b*x]]^n/x) + (b*ArcCoth[Tanh[a + b*x]]^n*Hypergeometric2
F1[1, n, 1 + n, -(ArcCoth[Tanh[a + b*x]]/(b*x - ArcCoth[Tanh[a + b*x]]))])/
(b*x - ArcCoth[Tanh[a + b*x]])
```

Rule 2164

```
Int[(v_)^(n_)/(u_), x_Symbol] :> With[{a = Simplify[D[u, x]], b = Simplify[
D[v, x]]}, Simp[(v^(n + 1)*Hypergeometric2F1[1, n + 1, n + 2, -((a*v)/(b*u
- a*v))])/((n + 1)*(b*u - a*v)), x] /; NeQ[b*u - a*v, 0]] /; PiecewiseLinea
rQ[u, v, x] &&  !IntegerQ[n]
```

Rule 2168

```
Int[(u_)^(m_)*(v_)^(n_.), x_Symbol] :> With[{a = Simplify[D[u, x]], b = Sim
plify[D[v, x]]}, Simp[(u^(m + 1)*v^n)/(a*(m + 1)), x] - Dist[(b*n)/(a*(m +
1)), Int[u^(m + 1)*v^(n - 1), x], x] /; NeQ[b*u - a*v, 0]] /; FreeQ[{m, n},
 x] && PiecewiseLinearQ[u, v, x] && NeQ[m, -1] && ((LtQ[m, -1] && GtQ[n, 0]
 &&  !(ILtQ[m + n, -2] && (FractionQ[m] || GeQ[2*n + m + 1, 0]))) || (IGtQ[
n, 0] && IGtQ[m, 0] && LeQ[n, m]) || (IGtQ[n, 0] &&  !IntegerQ[m]) || (ILtQ
[m, 0] &&  !IntegerQ[n]))
```

Rubi steps

$$\begin{aligned}\int \frac{\coth^{-1}(\tanh(a+bx))^n}{x^2}\,dx &= -\frac{\coth^{-1}(\tanh(a+bx))^n}{x}+(bn)\int \frac{\coth^{-1}(\tanh(a+bx))^{-1+n}}{x}\,dx\\ &= -\frac{\coth^{-1}(\tanh(a+bx))^n}{x}+\frac{b\coth^{-1}(\tanh(a+bx))^n\,{}_2F_1\left(1,n;1+n;-\frac{\coth^{-1}(\tanh(a+bx))}{bx-\coth^{-1}(\tanh(a+bx))}\right)}{bx-\coth^{-1}(\tanh(a+bx))}\end{aligned}$$

**Mathematica [A]** time = 0.04, size = 67, normalized size = 0.94

$$\frac{\coth^{-1}(\tanh(a+bx))^n\left(\frac{\coth^{-1}(\tanh(a+bx))}{bx}\right)^{-n}\,{}_2F_1\left(1-n,-n;2-n;1-\frac{\coth^{-1}(\tanh(a+bx))}{bx}\right)}{(n-1)x}$$

Antiderivative was successfully verified.

```
[In] Integrate[ArcCoth[Tanh[a + b*x]]^n/x^2,x]
```

```
[Out] (ArcCoth[Tanh[a + b*x]]^n*Hypergeometric2F1[1 - n, -n, 2 - n, 1 - ArcCoth[T
anh[a + b*x]]/(b*x)])/((-1 + n)*x*(ArcCoth[Tanh[a + b*x]]/(b*x))^n)
```

**fricas [F]** time = 0.54, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{\operatorname{arcoth}\left(\tanh\left(bx+a\right)\right)^{n}}{x^{2}},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(tanh(b*x+a))^n/x^2,x, algorithm="fricas")
```

```
[Out] integral(arccoth(tanh(b*x + a))^n/x^2, x)
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{arcoth}\left(\tanh\left(bx+a\right)\right)^{n}}{x^{2}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(tanh(b*x+a))^n/x^2,x, algorithm="giac")
```

```
[Out] integrate(arccoth(tanh(b*x + a))^n/x^2, x)
```

**maple [F]** time = 13.99, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{arccoth}\left(\tanh\left(bx+a\right)\right)^{n}}{x^{2}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(arccoth(tanh(b*x+a))^n/x^2,x)
```

```
[Out] int(arccoth(tanh(b*x+a))^n/x^2,x)
```

**maxima [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{arcoth}\left(\tanh\left(bx+a\right)\right)^{n}}{x^{2}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(tanh(b*x+a))^n/x^2,x, algorithm="maxima")
```

```
[Out] integrate(arccoth(tanh(b*x + a))^n/x^2, x)
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.01

$$\int \frac{\operatorname{acoth}\left(\tanh\left(a+b\,x\right)\right)^{n}}{x^{2}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(tanh(a + b*x))^n/x^2,x)
```

```
[Out] int(acoth(tanh(a + b*x))^n/x^2, x)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{acoth}^{n}\left(\tanh\left(a+bx\right)\right)}{x^{2}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(tanh(b*x+a))**n/x**2,x)
```

```
[Out] Integral(acoth(tanh(a + b*x))**n/x**2, x)
```

## 3.192 $\int \frac{\coth^{-1}(\tanh(a+bx))^n}{x^3}\,dx$

**Optimal**. Leaf size=101

$$\frac{b^2 n \coth^{-1}(\tanh(a+bx))^{n-1}\,{}_2F_1\left(1,n-1;n;-\frac{\coth^{-1}(\tanh(a+bx))}{bx-\coth^{-1}(\tanh(a+bx))}\right)}{2\left(bx-\coth^{-1}(\tanh(a+bx))\right)}-\frac{\coth^{-1}(\tanh(a+bx))^n}{2x^2}-\frac{bn\coth^{-1}(\tanh(a+bx))^{n-1}}{2x}$$

```
[Out] -1/2*b*n*arccoth(tanh(b*x+a))^(-1+n)/x-1/2*arccoth(tanh(b*x+a))^n/x^2+1/2*b
^2*n*arccoth(tanh(b*x+a))^(-1+n)*hypergeom([1, -1+n],[n],-arccoth(tanh(b*x+
a))/(b*x-arccoth(tanh(b*x+a))))/(b*x-arccoth(tanh(b*x+a)))
```

**Rubi [A]** time = 0.07, antiderivative size = 101, normalized size of antiderivative = 1.00, number of steps used = 3, number of rules used = 2, integrand size = 13, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.154, Rules used = {2168, 2164}

$$\frac{b^2 n \coth^{-1}(\tanh(a+bx))^{n-1}\,{}_2F_1\left(1,n-1;n;-\frac{\coth^{-1}(\tanh(a+bx))}{bx-\coth^{-1}(\tanh(a+bx))}\right)}{2\left(bx-\coth^{-1}(\tanh(a+bx))\right)}-\frac{\coth^{-1}(\tanh(a+bx))^n}{2x^2}-\frac{bn\coth^{-1}(\tanh(a+bx))^{n-1}}{2x}$$

Antiderivative was successfully verified.

```
[In] Int[ArcCoth[Tanh[a + b*x]]^n/x^3,x]
```

```
[Out] -(b*n*ArcCoth[Tanh[a + b*x]]^(-1 + n))/(2*x) - ArcCoth[Tanh[a + b*x]]^n/(2*
x^2) + (b^2*n*ArcCoth[Tanh[a + b*x]]^(-1 + n)*Hypergeometric2F1[1, -1 + n,
n, -(ArcCoth[Tanh[a + b*x]]/(b*x - ArcCoth[Tanh[a + b*x]]))])/(2*(b*x - Arc
Coth[Tanh[a + b*x]]))
```

Rule 2164

```
Int[(v_)^(n_)/(u_), x_Symbol] :> With[{a = Simplify[D[u, x]], b = Simplify[
D[v, x]]}, Simp[(v^(n + 1)*Hypergeometric2F1[1, n + 1, n + 2, -((a*v)/(b*u
- a*v))])/((n + 1)*(b*u - a*v)), x] /; NeQ[b*u - a*v, 0]] /; PiecewiseLinea
rQ[u, v, x] &&  !IntegerQ[n]
```

Rule 2168

```
Int[(u_)^(m_)*(v_)^(n_.), x_Symbol] :> With[{a = Simplify[D[u, x]], b = Sim
plify[D[v, x]]}, Simp[(u^(m + 1)*v^n)/(a*(m + 1)), x] - Dist[(b*n)/(a*(m +
1)), Int[u^(m + 1)*v^(n - 1), x], x] /; NeQ[b*u - a*v, 0]] /; FreeQ[{m, n},
 x] && PiecewiseLinearQ[u, v, x] && NeQ[m, -1] && ((LtQ[m, -1] && GtQ[n, 0]
 &&  !(ILtQ[m + n, -2] && (FractionQ[m] || GeQ[2*n + m + 1, 0]))) || (IGtQ[
n, 0] && IGtQ[m, 0] && LeQ[n, m]) || (IGtQ[n, 0] &&  !IntegerQ[m]) || (ILtQ
[m, 0] &&  !IntegerQ[n]))
```

Rubi steps

$$\begin{aligned}\int \frac{\coth^{-1}(\tanh(a+bx))^n}{x^3}\,dx &= -\frac{\coth^{-1}(\tanh(a+bx))^n}{2x^2}+\frac{1}{2}(bn)\int \frac{\coth^{-1}(\tanh(a+bx))^{-1+n}}{x^2}\,dx\\ &= -\frac{bn\coth^{-1}(\tanh(a+bx))^{-1+n}}{2x}-\frac{\coth^{-1}(\tanh(a+bx))^n}{2x^2}-\frac{1}{2}\left(b^2(1-n)n\right)\int \\ &= -\frac{bn\coth^{-1}(\tanh(a+bx))^{-1+n}}{2x}-\frac{\coth^{-1}(\tanh(a+bx))^n}{2x^2}+\frac{b^2n\coth^{-1}(\tanh(a}{}\end{aligned}$$

**Mathematica** [A] time = 0.04, size = 67, normalized size = 0.66

$$\frac{\coth^{-1}(\tanh(a+bx))^n \left(\frac{\coth^{-1}(\tanh(a+bx))}{bx}\right)^{-n} {}_2F_1\left(2-n,-n;3-n;1-\frac{\coth^{-1}(\tanh(a+bx))}{bx}\right)}{(n-2)x^2}$$

Antiderivative was successfully verified.

```
[In] Integrate[ArcCoth[Tanh[a + b*x]]^n/x^3,x]
```

```
[Out] (ArcCoth[Tanh[a + b*x]]^n*Hypergeometric2F1[2 - n, -n, 3 - n, 1 - ArcCoth[T
anh[a + b*x]]/(b*x)])/((-2 + n)*x^2*(ArcCoth[Tanh[a + b*x]]/(b*x))^n)
```

**fricas** [F] time = 0.59, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{\text{arcoth}\left(\tanh\left(bx+a\right)\right)^n}{x^3}, x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(tanh(b*x+a))^n/x^3,x, algorithm="fricas")
```

```
[Out] integral(arccoth(tanh(b*x + a))^n/x^3, x)
```

**giac** [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\text{arcoth}\left(\tanh\left(bx+a\right)\right)^n}{x^3}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(tanh(b*x+a))^n/x^3,x, algorithm="giac")
```

```
[Out] integrate(arccoth(tanh(b*x + a))^n/x^3, x)
```

**maple** [F] time = 13.91, size = 0, normalized size = 0.00

$$\int \frac{\text{arccoth}\left(\tanh\left(bx+a\right)\right)^n}{x^3}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(arccoth(tanh(b*x+a))^n/x^3,x)
```

```
[Out] int(arccoth(tanh(b*x+a))^n/x^3,x)
```

**maxima** [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\text{arcoth}\left(\tanh\left(bx+a\right)\right)^n}{x^3}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(tanh(b*x+a))^n/x^3,x, algorithm="maxima")
```

```
[Out] integrate(arccoth(tanh(b*x + a))^n/x^3, x)
```

**mupad** [F] time = 0.00, size = -1, normalized size = -0.01

$$\int \frac{\text{acoth}\left(\tanh\left(a+b\,x\right)\right)^n}{x^3}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(tanh(a + b*x))^n/x^3,x)
```

```
[Out] int(acoth(tanh(a + b*x))^n/x^3, x)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{acoth}^n\left(\tanh\left(a+bx\right)\right)}{x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(tanh(b*x+a))**n/x**3,x)
```

```
[Out] Integral(acoth(tanh(a + b*x))**n/x**3, x)
```

## 3.193 $\int x^m \coth^{-1}(\tanh(a+bx))\,dx$

**Optimal**. Leaf size=37

$$\frac{x^{m+1}\coth^{-1}(\tanh(a+bx))}{m+1}-\frac{bx^{m+2}}{m^2+3m+2}$$

```
[Out] -b*x^(2+m)/(m^2+3*m+2)+x^(1+m)*arccoth(tanh(b*x+a))/(1+m)
```

**Rubi [A]** time = 0.01, antiderivative size = 37, normalized size of antiderivative = 1.00, number of steps used = 2, number of rules used = 2, integrand size = 11, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.182, Rules used = {2168, 30}

$$\frac{x^{m+1}\coth^{-1}(\tanh(a+bx))}{m+1}-\frac{bx^{m+2}}{m^2+3m+2}$$

Antiderivative was successfully verified.

```
[In] Int[x^m*ArcCoth[Tanh[a + b*x]],x]
```

```
[Out] -((b*x^(2 + m))/(2 + 3*m + m^2)) + (x^(1 + m)*ArcCoth[Tanh[a + b*x]])/(1 +
m)
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 2168

```
Int[(u_)^(m_)*(v_)^(n_.), x_Symbol] :> With[{a = Simplify[D[u, x]], b = Sim
plify[D[v, x]]}, Simp[(u^(m + 1)*v^n)/(a*(m + 1)), x] - Dist[(b*n)/(a*(m +
1)), Int[u^(m + 1)*v^(n - 1), x], x] /; NeQ[b*u - a*v, 0]] /; FreeQ[{m, n},
 x] && PiecewiseLinearQ[u, v, x] && NeQ[m, -1] && ((LtQ[m, -1] && GtQ[n, 0]
 &&  !(ILtQ[m + n, -2] && (FractionQ[m] || GeQ[2*n + m + 1, 0]))) || (IGtQ[
n, 0] && IGtQ[m, 0] && LeQ[n, m]) || (IGtQ[n, 0] &&  !IntegerQ[m]) || (ILtQ
[m, 0] &&  !IntegerQ[n]))
```

Rubi steps

$$\begin{aligned}\int x^m \coth^{-1}(\tanh(a+bx))\,dx &= \frac{x^{1+m}\coth^{-1}(\tanh(a+bx))}{1+m}-\frac{b\int x^{1+m}\,dx}{1+m}\\ &= -\frac{bx^{2+m}}{2+3m+m^2}+\frac{x^{1+m}\coth^{-1}(\tanh(a+bx))}{1+m}\end{aligned}$$

**Mathematica [A]** time = 0.04, size = 34, normalized size = 0.92

$$x^m\left(\frac{x\left(\coth^{-1}(\tanh(a+bx))-bx\right)}{m+1}+\frac{bx^2}{m+2}\right)$$

Antiderivative was successfully verified.

```
[In] Integrate[x^m*ArcCoth[Tanh[a + b*x]],x]
```

```
[Out] x^m*((b*x^2)/(2 + m) + (x*(-(b*x) + ArcCoth[Tanh[a + b*x]]))/(1 + m))
```

**fricas [A]** time = 0.47, size = 33, normalized size = 0.89

$$\frac{\left((bm+b)x^2+(am+2\,a)x\right)x^m}{m^2+3\,m+2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^m*arccoth(tanh(b*x+a)),x, algorithm="fricas")
[Out] ((b*m + b)*x^2 + (a*m + 2*a)*x)*x^m/(m^2 + 3*m + 2)
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int x^m \operatorname{arcoth}(\tanh(bx+a))\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^m*arccoth(tanh(b*x+a)),x, algorithm="giac")
[Out] integrate(x^m*arccoth(tanh(b*x + a)), x)
```

**maple [C]** time = 0.16, size = 676, normalized size = 18.27

$$\frac{x\,x^m\ln\left(e^{bx+a}\right)}{1+m}-\frac{x\left(2i\pi\operatorname{csgn}\left(\frac{i}{e^{2bx+2a}+1}\right)\operatorname{csgn}\left(ie^{2bx+2a}\right)\operatorname{csgn}\left(\frac{ie^{2bx+2a}}{e^{2bx+2a}+1}\right)-i\pi\operatorname{csgn}\left(\frac{i}{e^{2bx+2a}+1}\right)\operatorname{csgn}\left(\frac{ie^{2bx+2a}}{e^{2bx+2a}+1}\right)^2\right.}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^m*arccoth(tanh(b*x+a)),x)
[Out] 1/(1+m)*x*x^m*ln(exp(b*x+a))-1/4*x*(2*I*Pi*csgn(I/(exp(2*b*x+2*a)+1))*csgn(
I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))-I*Pi*csgn(I/(ex
p(2*b*x+2*a)+1))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2*m-2*I*Pi*csgn(
I/(exp(2*b*x+2*a)+1))^2*m-I*Pi*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)
/(exp(2*b*x+2*a)+1))^2*m+4*I*Pi-2*I*Pi*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*ex
p(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2+4*I*Pi*csgn(I/(exp(2*b*x+2*a)+1))^3-2*I*
Pi*csgn(I*exp(b*x+a))*csgn(I*exp(2*b*x+2*a))^2*m-4*I*Pi*csgn(I/(exp(2*b*x+2
*a)+1))^2-4*I*Pi*csgn(I*exp(b*x+a))*csgn(I*exp(2*b*x+2*a))^2+I*Pi*csgn(I/(e
xp(2*b*x+2*a)+1))*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2
*a)+1))*m+2*I*Pi*csgn(I*exp(b*x+a))^2*csgn(I*exp(2*b*x+2*a))+I*Pi*csgn(I*ex
p(b*x+a))^2*csgn(I*exp(2*b*x+2*a))*m+2*I*Pi*csgn(I/(exp(2*b*x+2*a)+1))^3*m+
I*Pi*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^3*m+2*I*Pi*csgn(I*exp(2*b*x+
2*a)/(exp(2*b*x+2*a)+1))^3+2*I*Pi*m+4*b*x-2*I*Pi*csgn(I*exp(2*b*x+2*a))*csg
n(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2+2*I*Pi*csgn(I*exp(2*b*x+2*a))^3+I*
Pi*csgn(I*exp(2*b*x+2*a))^3*m)/(1+m)/(2+m)*x^m
```

**maxima [A]** time = 0.32, size = 38, normalized size = 1.03

$$-\frac{bx^2x^m}{(m+2)(m+1)}+\frac{x^{m+1}\operatorname{arcoth}(\tanh(bx+a))}{m+1}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^m*arccoth(tanh(b*x+a)),x, algorithm="maxima")
[Out] -b*x^2*x^m/((m + 2)*(m + 1)) + x^(m + 1)*arccoth(tanh(b*x + a))/(m + 1)
```

**mupad [B]** time = 0.00, size = 96, normalized size = 2.59

$$\frac{2\,b\,x^m\,x^2\,(m+1)}{2\,m^2+6\,m+4}-\frac{x\,x^m\,(m+2)\left(\ln\left(-\frac{2}{e^{2\,a}\,e^{2\,b\,x}-1}\right)-\ln\left(\frac{2\,e^{2\,a}\,e^{2\,b\,x}}{e^{2\,a}\,e^{2\,b\,x}-1}\right)+2\,b\,x\right)}{2\,m^2+6\,m+4}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^m*acoth(tanh(a + b*x)),x)
```

```
[Out] (2*b*x^m*x^2*(m + 1))/(6*m + 2*m^2 + 4) - (x*x^m*(m + 2)*(log(-2/(exp(2*a)*
exp(2*b*x) - 1)) - log((2*exp(2*a)*exp(2*b*x))/(exp(2*a)*exp(2*b*x) - 1)) +
 2*b*x))/(6*m + 2*m^2 + 4)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\begin{cases} b\log(x) - \frac{\operatorname{acoth}(\tanh(a+bx))}{x} & \text{for}\ m = -2 \\ \int \frac{\operatorname{acoth}(\tanh(a+bx))}{x}\, dx & \text{for}\ m = -1 \\ -\frac{bx^2x^m}{m^2+3m+2} + \frac{mxx^m \operatorname{acoth}(\tanh(a+bx))}{m^2+3m+2} + \frac{2xx^m \operatorname{acoth}(\tanh(a+bx))}{m^2+3m+2} & \text{otherwise} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**m*acoth(tanh(b*x+a)),x)
```

```
[Out] Piecewise((b*log(x) - acoth(tanh(a + b*x))/x, Eq(m, -2)), (Integral(acoth(t
anh(a + b*x))/x, x), Eq(m, -1)), (-b*x**2*x**m/(m**2 + 3*m + 2) + m*x*x**m*
acoth(tanh(a + b*x))/(m**2 + 3*m + 2) + 2*x*x**m*acoth(tanh(a + b*x))/(m**2
 + 3*m + 2), True))
```

# 3.194 $\int x^2 \coth^{-1}(\coth(a+bx))\,dx$

**Optimal**. Leaf size=23

$$\frac{1}{3}x^3\coth^{-1}(\coth(a+bx))-\frac{bx^4}{12}$$

```
[Out] -1/12*b*x^4+1/3*x^3*arccoth(coth(b*x+a))
```

**Rubi** [A] time = 0.01, antiderivative size = 23, normalized size of antiderivative = 1.00, number of steps used = 2, number of rules used = 2, integrand size = 11, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.182, Rules used = {2168, 30}

$$\frac{1}{3}x^3\coth^{-1}(\coth(a+bx))-\frac{bx^4}{12}$$

Antiderivative was successfully verified.

```
[In] Int[x^2*ArcCoth[Coth[a + b*x]],x]
```

```
[Out] -(b*x^4)/12 + (x^3*ArcCoth[Coth[a + b*x]])/3
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 2168

```
Int[(u_)^(m_)*(v_)^(n_.), x_Symbol] :> With[{a = Simplify[D[u, x]], b = Sim
plify[D[v, x]]}, Simp[(u^(m + 1)*v^n)/(a*(m + 1)), x] - Dist[(b*n)/(a*(m +
1)), Int[u^(m + 1)*v^(n - 1), x], x] /; NeQ[b*u - a*v, 0]] /; FreeQ[{m, n},
 x] && PiecewiseLinearQ[u, v, x] && NeQ[m, -1] && ((LtQ[m, -1] && GtQ[n, 0]
 &&  !(ILtQ[m + n, -2] && (FractionQ[m] || GeQ[2*n + m + 1, 0]))) || (IGtQ[
n, 0] && IGtQ[m, 0] && LeQ[n, m]) || (IGtQ[n, 0] &&  !IntegerQ[m]) || (ILtQ
[m, 0] &&  !IntegerQ[n]))
```

Rubi steps

$$\begin{aligned}\int x^2\coth^{-1}(\coth(a+bx))\,dx &= \frac{1}{3}x^3\coth^{-1}(\coth(a+bx))-\frac{1}{3}b\int x^3\,dx\\ &= -\frac{bx^4}{12}+\frac{1}{3}x^3\coth^{-1}(\coth(a+bx))\end{aligned}$$

**Mathematica** [A] time = 0.04, size = 20, normalized size = 0.87

$$-\frac{1}{12}x^3\left(bx-4\coth^{-1}(\coth(a+bx))\right)$$

Antiderivative was successfully verified.

```
[In] Integrate[x^2*ArcCoth[Coth[a + b*x]],x]
```

```
[Out] -1/12*(x^3*(b*x - 4*ArcCoth[Coth[a + b*x]]))
```

**fricas** [A] time = 0.39, size = 13, normalized size = 0.57

$$\frac{1}{4}x^4b+\frac{1}{3}x^3a$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*arccoth(coth(b*x+a)),x, algorithm="fricas")
```

```
[Out] 1/4*x^4*b + 1/3*x^3*a
```

**giac** [A] time = 0.12, size = 13, normalized size = 0.57

$$\frac{1}{4}bx^4 + \frac{1}{3}ax^3$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*arccoth(coth(b*x+a)),x, algorithm="giac")
```

```
[Out] 1/4*b*x^4 + 1/3*a*x^3
```

**maple** [B] time = 0.44, size = 59, normalized size = 2.57

$$\frac{x^3\operatorname{arccoth}(\coth(bx+a))}{3} + \frac{-\frac{(bx+a)^4}{4} + (bx+a)^3 a - \frac{3a^2(bx+a)^2}{2} + (bx+a)a^3}{3b^3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^2*arccoth(coth(b*x+a)),x)
```

```
[Out] 1/3*x^3*arccoth(coth(b*x+a))+1/3/b^3*(-1/4*(b*x+a)^4+(b*x+a)^3*a-3/2*a^2*(b
*x+a)^2+(b*x+a)*a^3)
```

**maxima** [A] time = 0.31, size = 13, normalized size = 0.57

$$\frac{1}{4}bx^4 + \frac{1}{3}ax^3$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*arccoth(coth(b*x+a)),x, algorithm="maxima")
```

```
[Out] 1/4*b*x^4 + 1/3*a*x^3
```

**mupad** [B] time = 0.08, size = 19, normalized size = 0.83

$$\frac{x^3\operatorname{acoth}(\coth(a+bx))}{3} - \frac{bx^4}{12}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^2*acoth(coth(a + b*x)),x)
```

```
[Out] (x^3*acoth(coth(a + b*x)))/3 - (b*x^4)/12
```

**sympy** [A] time = 11.34, size = 39, normalized size = 1.70

$$\begin{cases} 0 & \text{for}\: a = \log\left(-e^{-bx}\right) \vee a = \log\left(e^{-bx}\right) \\ -\frac{bx^4}{12} + \frac{x^3\operatorname{acoth}\left(\frac{1}{\tanh(a+bx)}\right)}{3} & \text{otherwise} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**2*acoth(coth(b*x+a)),x)
```

```
[Out] Piecewise((0, Eq(a, log(exp(-b*x))) | Eq(a, log(-exp(-b*x)))), (-b*x**4/12
+ x**3*acoth(1/tanh(a + b*x))/3, True))
```

# 3.195 $\int x \coth^{-1}(\coth(a+bx))\,dx$

**Optimal**. Leaf size=23

$$\frac{1}{2}x^2\coth^{-1}(\coth(a+bx))-\frac{bx^3}{6}$$

```
[Out] -1/6*b*x^3+1/2*x^2*arccoth(coth(b*x+a))
```

**Rubi** [A] time = 0.01, antiderivative size = 23, normalized size of antiderivative = 1.00, number of steps used = 2, number of rules used = 2, integrand size = 9, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.222, Rules used = {6242, 30}

$$\frac{1}{2}x^2\coth^{-1}(\coth(a+bx))-\frac{bx^3}{6}$$

Antiderivative was successfully verified.

```
[In] Int[x*ArcCoth[Coth[a + b*x]],x]
```

```
[Out] -(b*x^3)/6 + (x^2*ArcCoth[Coth[a + b*x]])/2
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 6242

```
Int[ArcCoth[(c_.) + Coth[(a_.) + (b_.)*(x_)]*(d_.)]*((e_.) + (f_.)*(x_))^(m
_.), x_Symbol] :> Simp[((e + f*x)^(m + 1)*ArcCoth[c + d*Coth[a + b*x]])/(f*
(m + 1)), x] + Dist[b/(f*(m + 1)), Int[(e + f*x)^(m + 1)/(c - d - c*E^(2*a
+ 2*b*x)), x], x] /; FreeQ[{a, b, c, d, e, f}, x] && IGtQ[m, 0] && EqQ[(c -
 d)^2, 1]
```

Rubi steps

$$\begin{aligned}\int x\coth^{-1}(\coth(a+bx))\,dx&=\frac{1}{2}x^2\coth^{-1}(\coth(a+bx))-\frac{1}{2}b\int x^2\,dx\\&=-\frac{bx^3}{6}+\frac{1}{2}x^2\coth^{-1}(\coth(a+bx))\end{aligned}$$

**Mathematica** [A] time = 0.02, size = 20, normalized size = 0.87

$$-\frac{1}{6}x^2\left(bx-3\coth^{-1}(\coth(a+bx))\right)$$

Antiderivative was successfully verified.

```
[In] Integrate[x*ArcCoth[Coth[a + b*x]],x]
```

```
[Out] -1/6*(x^2*(b*x - 3*ArcCoth[Coth[a + b*x]]))
```

**fricas** [A] time = 0.36, size = 13, normalized size = 0.57

$$\frac{1}{3}x^3b+\frac{1}{2}x^2a$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*arccoth(coth(b*x+a)),x, algorithm="fricas")
```

```
[Out] 1/3*x^3*b + 1/2*x^2*a
```

**giac** [A] time = 0.13, size = 13, normalized size = 0.57

$$\frac{1}{3}\,bx^3 + \frac{1}{2}\,ax^2$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*arccoth(coth(b*x+a)),x, algorithm="giac")
```

```
[Out] 1/3*b*x^3 + 1/2*a*x^2
```

**maple** [B] time = 0.39, size = 48, normalized size = 2.09

$$\frac{x^2\mathrm{arccoth}\left(\coth\left(bx+a\right)\right)}{2} + \frac{-\frac{(bx+a)^3}{3} + (bx+a)^2\,a - a^2\,(bx+a)}{2b^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x*arccoth(coth(b*x+a)),x)
```

```
[Out] 1/2*x^2*arccoth(coth(b*x+a))+1/2/b^2*(-1/3*(b*x+a)^3+(b*x+a)^2*a-a^2*(b*x+a
))
```

**maxima** [A] time = 0.31, size = 13, normalized size = 0.57

$$\frac{1}{3}\,bx^3 + \frac{1}{2}\,ax^2$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*arccoth(coth(b*x+a)),x, algorithm="maxima")
```

```
[Out] 1/3*b*x^3 + 1/2*a*x^2
```

**mupad** [B] time = 0.06, size = 19, normalized size = 0.83

$$\frac{x^2\,\mathrm{acoth}\left(\coth\left(a+b\,x\right)\right)}{2} - \frac{b\,x^3}{6}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x*acoth(coth(a + b*x)),x)
```

```
[Out] (x^2*acoth(coth(a + b*x)))/2 - (b*x^3)/6
```

**sympy** [A] time = 5.60, size = 39, normalized size = 1.70

$$\begin{cases} 0 & \text{for}\ a = \log\left(-e^{-bx}\right) \vee a = \log\left(e^{-bx}\right) \\ -\frac{bx^3}{6} + \frac{x^2\,\mathrm{acoth}\left(\frac{1}{\tanh\left(a+bx\right)}\right)}{2} & \text{otherwise} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*acoth(coth(b*x+a)),x)
```

```
[Out] Piecewise((0, Eq(a, log(exp(-b*x))) | Eq(a, log(-exp(-b*x)))), (-b*x**3/6 +
 x**2*acoth(1/tanh(a + b*x))/2, True))
```

# 3.196 $\int \coth^{-1}(\coth(a+bx))\,dx$

**Optimal**. Leaf size=16

$$\frac{\coth^{-1}(\coth(a+bx))^2}{2b}$$

```
[Out] 1/2*arccoth(coth(b*x+a))^2/b
```

**Rubi [A]** time = 0.00, antiderivative size = 16, normalized size of antiderivative = 1.00, number of steps used = 2, number of rules used = 2, integrand size = 7, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.286, Rules used = {2157, 30}

$$\frac{\coth^{-1}(\coth(a+bx))^2}{2b}$$

Antiderivative was successfully verified.

```
[In] Int[ArcCoth[Coth[a + b*x]],x]
[Out] ArcCoth[Coth[a + b*x]]^2/(2*b)
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 2157

```
Int[(u_)^(m_.), x_Symbol] :> With[{c = Simplify[D[u, x]]}, Dist[1/c, Subst[
Int[x^m, x], x, u], x]] /; FreeQ[m, x] && PiecewiseLinearQ[u, x]
```

Rubi steps

$$\begin{aligned}\int \coth^{-1}(\coth(a+bx))\,dx &= \frac{\operatorname{Subst}\left(\int x\,dx, x, \coth^{-1}(\coth(a+bx))\right)}{b}\\ &= \frac{\coth^{-1}(\coth(a+bx))^2}{2b}\end{aligned}$$

**Mathematica [A]** time = 0.01, size = 18, normalized size = 1.12

$$x\coth^{-1}(\coth(a+bx))-\frac{bx^2}{2}$$

Antiderivative was successfully verified.

```
[In] Integrate[ArcCoth[Coth[a + b*x]],x]
[Out] -1/2*(b*x^2) + x*ArcCoth[Coth[a + b*x]]
```

**fricas [A]** time = 0.51, size = 10, normalized size = 0.62

$$\frac{1}{2}x^2b+xa$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(coth(b*x+a)),x, algorithm="fricas")
[Out] 1/2*x^2*b + x*a
```

**giac** [A] time = 0.12, size = 10, normalized size = 0.62

$$\frac{1}{2}bx^2 + ax$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(coth(b*x+a)),x, algorithm="giac")
```

```
[Out] 1/2*b*x^2 + a*x
```

**maple** [B] time = 0.06, size = 32, normalized size = 2.00

$$\frac{\operatorname{arctanh}(\coth(bx+a))\operatorname{arccoth}(\coth(bx+a)) - \frac{\operatorname{arctanh}(\coth(bx+a))^2}{2}}{b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(arccoth(coth(b*x+a)),x)
```

```
[Out] 1/b*(arctanh(coth(b*x+a))*arccoth(coth(b*x+a))-1/2*arctanh(coth(b*x+a))^2)
```

**maxima** [A] time = 0.31, size = 10, normalized size = 0.62

$$\frac{1}{2}bx^2 + ax$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(coth(b*x+a)),x, algorithm="maxima")
```

```
[Out] 1/2*b*x^2 + a*x
```

**mupad** [B] time = 1.21, size = 16, normalized size = 1.00

$$x\operatorname{acoth}(\coth(a+bx)) - \frac{bx^2}{2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(coth(a + b*x)),x)
```

```
[Out] x*acoth(coth(a + b*x)) - (b*x^2)/2
```

**sympy** [A] time = 2.93, size = 37, normalized size = 2.31

$$\begin{cases} x\operatorname{acoth}(\coth(a)) & \text{for } b = 0 \\ 0 & \text{for } a = \log\left(-e^{-bx}\right) \vee a = \log\left(e^{-bx}\right) \\ \frac{\operatorname{acoth}^2\left(\frac{1}{\tanh(a+bx)}\right)}{2b} & \text{otherwise} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(coth(b*x+a)),x)
```

```
[Out] Piecewise((x*acoth(coth(a)), Eq(b, 0)), (0, Eq(a, log(exp(-b*x))) | Eq(a, l
og(-exp(-b*x)))), (acoth(1/tanh(a + b*x))**2/(2*b), True))
```

## 3.197 $\int \frac{\coth^{-1}(\coth(a+bx))}{x} dx$

**Optimal**. Leaf size=21

$$bx - \log(x)\left(bx - \coth^{-1}(\coth(a+bx))\right)$$

[Out] b*x-(b*x-arccoth(coth(b*x+a)))*ln(x)

**Rubi [A]** time = 0.03, antiderivative size = 21, normalized size of antiderivative = 1.00, number of steps used = 2, number of rules used = 2, integrand size = 11, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.182, Rules used = {2158, 29}

$$bx - \log(x)\left(bx - \coth^{-1}(\coth(a+bx))\right)$$

Antiderivative was successfully verified.

[In] Int[ArcCoth[Coth[a + b*x]]/x,x]

[Out] b*x - (b*x - ArcCoth[Coth[a + b*x]])*Log[x]

Rule 29

```
Int[(x_)^(-1), x_Symbol] :> Simp[Log[x], x]
```

Rule 2158

```
Int[(v_)/(u_), x_Symbol] :> With[{a = Simplify[D[u, x]], b = Simplify[D[v,
x]]}, Simp[(b*x)/a, x] - Dist[(b*u - a*v)/a, Int[1/u, x], x] /; NeQ[b*u - a
*v, 0]] /; PiecewiseLinearQ[u, v, x]
```

Rubi steps

$$\begin{aligned}\int \frac{\coth^{-1}(\coth(a+bx))}{x}\,dx &= bx - \left(bx - \coth^{-1}(\coth(a+bx))\right)\int \frac{1}{x}\,dx\\ &= bx - \left(bx - \coth^{-1}(\coth(a+bx))\right)\log(x)\end{aligned}$$

**Mathematica [A]** time = 0.02, size = 19, normalized size = 0.90

$$\log(x)\left(\coth^{-1}(\coth(a+bx)) - bx\right) + bx$$

Antiderivative was successfully verified.

[In] Integrate[ArcCoth[Coth[a + b*x]]/x,x]

[Out] b*x + (-(b*x) + ArcCoth[Coth[a + b*x]])*Log[x]

**fricas [A]** time = 0.50, size = 8, normalized size = 0.38

$$bx + a\log(x)$$

Verification of antiderivative is not currently implemented for this CAS.

[In] integrate(arccoth(coth(b*x+a))/x,x, algorithm="fricas")

[Out] b*x + a*log(x)

**giac [A]** time = 0.13, size = 9, normalized size = 0.43

$$bx + a\log(|x|)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(coth(b*x+a))/x,x, algorithm="giac")
```

```
[Out] b*x + a*log(abs(x))
```

**maple** [A] time = 0.31, size = 27, normalized size = 1.29

$$bx + a\ln(x) + \ln(x)\left(\operatorname{arccoth}\left(\coth\left(bx + a\right)\right) - bx - a\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(arccoth(coth(b*x+a))/x,x)
```

```
[Out] b*x+a*ln(x)+ln(x)*(arccoth(coth(b*x+a))-b*x-a)
```

**maxima** [A] time = 0.31, size = 8, normalized size = 0.38

$$bx + a\log(x)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(coth(b*x+a))/x,x, algorithm="maxima")
```

```
[Out] b*x + a*log(x)
```

**mupad** [B] time = 0.55, size = 58, normalized size = 2.76

$$b\,x - \frac{\ln\left(\frac{1}{\mathrm{e}^{2\,a}\,\mathrm{e}^{2\,b\,x}+1}\right)\,\ln(x)}{2} + \frac{\ln\left(\frac{\mathrm{e}^{2\,a}\,\mathrm{e}^{2\,b\,x}}{\mathrm{e}^{2\,a}\,\mathrm{e}^{2\,b\,x}+1}\right)\,\ln(x)}{2} - b\,x\,\ln(x)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(coth(a + b*x))/x,x)
```

```
[Out] b*x - (log(1/(exp(2*a)*exp(2*b*x) + 1))*log(x))/2 + (log((exp(2*a)*exp(2*b*
x))/(exp(2*a)*exp(2*b*x) + 1))*log(x))/2 - b*x*log(x)
```

**sympy** [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{acoth}\left(\coth\left(a + bx\right)\right)}{x}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(coth(b*x+a))/x,x)
```

```
[Out] Integral(acoth(coth(a + b*x))/x, x)
```

# 3.198 $\int \frac{\coth^{-1}(\coth(a+bx))}{x^2} dx$

**Optimal**. Leaf size=17

$$b\log(x) - \frac{\coth^{-1}(\coth(a+bx))}{x}$$

```
[Out] -arccoth(coth(b*x+a))/x+b*ln(x)
```

**Rubi [A]** time = 0.01, antiderivative size = 17, normalized size of antiderivative = 1.00, number of steps used = 2, number of rules used = 2, integrand size = 11, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.182, Rules used = {2168, 29}

$$b\log(x) - \frac{\coth^{-1}(\coth(a+bx))}{x}$$

Antiderivative was successfully verified.

```
[In] Int[ArcCoth[Coth[a + b*x]]/x^2,x]
```

```
[Out] -(ArcCoth[Coth[a + b*x]]/x) + b*Log[x]
```

Rule 29

```
Int[(x_)^(-1), x_Symbol] :> Simp[Log[x], x]
```

Rule 2168

```
Int[(u_)^(m_)*(v_)^(n_.), x_Symbol] :> With[{a = Simplify[D[u, x]], b = Sim
plify[D[v, x]]}, Simp[(u^(m + 1)*v^n)/(a*(m + 1)), x] - Dist[(b*n)/(a*(m +
1)), Int[u^(m + 1)*v^(n - 1), x], x] /; NeQ[b*u - a*v, 0]] /; FreeQ[{m, n},
 x] && PiecewiseLinearQ[u, v, x] && NeQ[m, -1] && ((LtQ[m, -1] && GtQ[n, 0]
 &&  !(ILtQ[m + n, -2] && (FractionQ[m] || GeQ[2*n + m + 1, 0]))) || (IGtQ[
n, 0] && IGtQ[m, 0] && LeQ[n, m]) || (IGtQ[n, 0] &&  !IntegerQ[m]) || (ILtQ
[m, 0] &&  !IntegerQ[n]))
```

Rubi steps

$$\begin{aligned}
\int \frac{\coth^{-1}(\coth(a+bx))}{x^2} dx &= -\frac{\coth^{-1}(\coth(a+bx))}{x} + b\int \frac{1}{x} dx \\
&= -\frac{\coth^{-1}(\coth(a+bx))}{x} + b\log(x)
\end{aligned}$$

**Mathematica [A]** time = 0.02, size = 18, normalized size = 1.06

$$-\frac{\coth^{-1}(\coth(a+bx))}{x} + b\log(x) + b$$

Antiderivative was successfully verified.

```
[In] Integrate[ArcCoth[Coth[a + b*x]]/x^2,x]
```

```
[Out] b - ArcCoth[Coth[a + b*x]]/x + b*Log[x]
```

**fricas [A]** time = 0.51, size = 13, normalized size = 0.76

$$\frac{bx\log(x) - a}{x}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(coth(b*x+a))/x^2,x, algorithm="fricas")
```

```
[Out] (b*x*log(x) - a)/x
```

**giac [A]** time = 0.14, size = 12, normalized size = 0.71

$$b\log(|x|) - \frac{a}{x}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(coth(b*x+a))/x^2,x, algorithm="giac")
```

```
[Out] b*log(abs(x)) - a/x
```

**maple [A]** time = 0.39, size = 20, normalized size = 1.18

$$-\frac{\operatorname{arccoth}(\coth(bx+a))}{x} + b\ln(bx)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(arccoth(coth(b*x+a))/x^2,x)
```

```
[Out] -arccoth(coth(b*x+a))/x+b*ln(b*x)
```

**maxima [A]** time = 0.31, size = 11, normalized size = 0.65

$$b\log(x) - \frac{a}{x}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(coth(b*x+a))/x^2,x, algorithm="maxima")
```

```
[Out] b*log(x) - a/x
```

**mupad [B]** time = 0.07, size = 17, normalized size = 1.00

$$b\ \ln(x) - \frac{\operatorname{acoth}(\coth(a+b\,x))}{x}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(coth(a + b*x))/x^2,x)
```

```
[Out] b*log(x) - acoth(coth(a + b*x))/x
```

**sympy [A]** time = 5.74, size = 34, normalized size = 2.00

$$\begin{cases} 0 & \text{for}\ a = \log\left(-e^{-bx}\right) \vee a = \log\left(e^{-bx}\right) \\ b\log(x) - \frac{\operatorname{acoth}\left(\frac{1}{\tanh(a+bx)}\right)}{x} & \text{otherwise} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(coth(b*x+a))/x**2,x)
```

```
[Out] Piecewise((0, Eq(a, log(exp(-b*x))) | Eq(a, log(-exp(-b*x)))), (b*log(x) -
acoth(1/tanh(a + b*x))/x, True))
```

## 3.199 $\int \frac{\coth^{-1}(\coth(a+bx))}{x^3}\,dx$

**Optimal**. Leaf size=23

$$-\frac{\coth^{-1}(\coth(a+bx))}{2x^2}-\frac{b}{2x}$$

```
[Out] -1/2*b/x-1/2*arccoth(coth(b*x+a))/x^2
```

**Rubi [A]** time = 0.01, antiderivative size = 23, normalized size of antiderivative = 1.00, number of steps used = 2, number of rules used = 2, integrand size = 11, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.182, Rules used = {2168, 30}

$$-\frac{\coth^{-1}(\coth(a+bx))}{2x^2}-\frac{b}{2x}$$

Antiderivative was successfully verified.

```
[In] Int[ArcCoth[Coth[a + b*x]]/x^3,x]
```

```
[Out] -b/(2*x) - ArcCoth[Coth[a + b*x]]/(2*x^2)
```

Rule 30

```
Int[(x_)^(m_.), x_Symbol] :> Simp[x^(m + 1)/(m + 1), x] /; FreeQ[m, x] && N
eQ[m, -1]
```

Rule 2168

```
Int[(u_)^(m_)*(v_)^(n_.), x_Symbol] :> With[{a = Simplify[D[u, x]], b = Sim
plify[D[v, x]]}, Simp[(u^(m + 1)*v^n)/(a*(m + 1)), x] - Dist[(b*n)/(a*(m +
1)), Int[u^(m + 1)*v^(n - 1), x], x] /; NeQ[b*u - a*v, 0]] /; FreeQ[{m, n},
 x] && PiecewiseLinearQ[u, v, x] && NeQ[m, -1] && ((LtQ[m, -1] && GtQ[n, 0]
 &&  !(ILtQ[m + n, -2] && (FractionQ[m] || GeQ[2*n + m + 1, 0]))) || (IGtQ[
n, 0] && IGtQ[m, 0] && LeQ[n, m]) || (IGtQ[n, 0] &&  !IntegerQ[m]) || (ILtQ
[m, 0] &&  !IntegerQ[n]))
```

Rubi steps

$$\begin{aligned}\int \frac{\coth^{-1}(\coth(a+bx))}{x^3}\,dx &= -\frac{\coth^{-1}(\coth(a+bx))}{2x^2}+\frac{1}{2}b\int \frac{1}{x^2}\,dx\\ &= -\frac{b}{2x}-\frac{\coth^{-1}(\coth(a+bx))}{2x^2}\end{aligned}$$

**Mathematica [A]** time = 0.02, size = 18, normalized size = 0.78

$$-\frac{\coth^{-1}(\coth(a+bx))+bx}{2x^2}$$

Antiderivative was successfully verified.

```
[In] Integrate[ArcCoth[Coth[a + b*x]]/x^3,x]
```

```
[Out] -1/2*(b*x + ArcCoth[Coth[a + b*x]])/x^2
```

**fricas [A]** time = 0.54, size = 11, normalized size = 0.48

$$-\frac{2\,bx+a}{2\,x^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(coth(b*x+a))/x^3,x, algorithm="fricas")
```

```
[Out] -1/2*(2*b*x + a)/x^2
```

**giac [A]** time = 0.12, size = 11, normalized size = 0.48

$$-\frac{2\,bx+a}{2\,x^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(coth(b*x+a))/x^3,x, algorithm="giac")
```

```
[Out] -1/2*(2*b*x + a)/x^2
```

**maple [A]** time = 0.38, size = 20, normalized size = 0.87

$$-\frac{b}{2x}-\frac{\operatorname{arccoth}\left(\coth\left(bx+a\right)\right)}{2x^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(arccoth(coth(b*x+a))/x^3,x)
```

```
[Out] -1/2*b/x-1/2*arccoth(coth(b*x+a))/x^2
```

**maxima [A]** time = 0.31, size = 11, normalized size = 0.48

$$-\frac{2\,bx+a}{2\,x^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(coth(b*x+a))/x^3,x, algorithm="maxima")
```

```
[Out] -1/2*(2*b*x + a)/x^2
```

**mupad [B]** time = 1.14, size = 16, normalized size = 0.70

$$-\frac{\operatorname{acoth}\left(\coth\left(a+b\,x\right)\right)+b\,x}{2\,x^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(coth(a + b*x))/x^3,x)
```

```
[Out] -(acoth(coth(a + b*x)) + b*x)/(2*x^2)
```

**sympy [A]** time = 10.80, size = 39, normalized size = 1.70

$$\begin{cases} 0 & \text{for}\ a=\log\left(-e^{-bx}\right)\vee a=\log\left(e^{-bx}\right) \\ -\frac{b}{2x}-\frac{\operatorname{acoth}\left(\frac{1}{\tanh\left(a+bx\right)}\right)}{2x^2} & \text{otherwise} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(coth(b*x+a))/x**3,x)
```

```
[Out] Piecewise((0, Eq(a, log(exp(-b*x))) | Eq(a, log(-exp(-b*x)))), (-b/(2*x) -
acoth(1/tanh(a + b*x))/(2*x**2), True))
```

# 3.200 $\int \coth^{-1}(\cosh(x))\,dx$

**Optimal**. Leaf size=27

$$-\text{Li}_2(-e^x)+\text{Li}_2(e^x)-2x\tanh^{-1}(e^x)+x\coth^{-1}(\cosh(x))$$

```
[Out] x*arccoth(cosh(x))-2*x*arctanh(exp(x))-polylog(2,-exp(x))+polylog(2,exp(x))
```

**Rubi [A]** time = 0.03, antiderivative size = 27, normalized size of antiderivative = 1.00, number of steps used = 6, number of rules used = 4, integrand size = 3, $\frac{\text{number of rules}}{\text{integrand size}}$ = 1.333, Rules used = {6272, 4182, 2279, 2391}

$$-\text{PolyLog}(2,-e^x)+\text{PolyLog}(2,e^x)-2x\tanh^{-1}(e^x)+x\coth^{-1}(\cosh(x))$$

Antiderivative was successfully verified.

```
[In] Int[ArcCoth[Cosh[x]],x]
```

```
[Out] x*ArcCoth[Cosh[x]] - 2*x*ArcTanh[E^x] - PolyLog[2, -E^x] + PolyLog[2, E^x]
```

Rule 2279

```
Int[Log[(a_) + (b_.)*((F_)^((e_.)*((c_.) + (d_.)*(x_))))^(n_.)], x_Symbol]
:> Dist[1/(d*e*n*Log[F]), Subst[Int[Log[a + b*x]/x, x], x, (F^(e*(c + d*x))
)^n], x] /; FreeQ[{F, a, b, c, d, e, n}, x] && GtQ[a, 0]
```

Rule 2391

```
Int[Log[(c_.)*((d_) + (e_.)*(x_)^(n_.))]/(x_), x_Symbol] :> -Simp[PolyLog[2
, -(c*e*x^n)]/n, x] /; FreeQ[{c, d, e, n}, x] && EqQ[c*d, 1]
```

Rule 4182

```
Int[csc[(e_.) + (Complex[0, fz_])*(f_.)*(x_)]*((c_.) + (d_.)*(x_))^(m_.), x
_Symbol] :> Simp[(-2*(c + d*x)^m*ArcTanh[E^(-(I*e) + f*fz*x)])/(f*fz*I), x]
 + (-Dist[(d*m)/(f*fz*I), Int[(c + d*x)^(m - 1)*Log[1 - E^(-(I*e) + f*fz*x)
], x], x] + Dist[(d*m)/(f*fz*I), Int[(c + d*x)^(m - 1)*Log[1 + E^(-(I*e) +
f*fz*x)], x], x]) /; FreeQ[{c, d, e, f, fz}, x] && IGtQ[m, 0]
```

Rule 6272

```
Int[ArcCoth[u_], x_Symbol] :> Simp[x*ArcCoth[u], x] - Int[SimplifyIntegrand
[(x*D[u, x])/(1 - u^2), x], x] /; InverseFunctionFreeQ[u, x]
```

Rubi steps

$$\begin{aligned}\int \coth^{-1}(\cosh(x))\,dx &= x\coth^{-1}(\cosh(x))+\int x\text{csch}(x)\,dx\\ &= x\coth^{-1}(\cosh(x))-2x\tanh^{-1}(e^x)-\int \log(1-e^x)\,dx+\int \log(1+e^x)\,dx\\ &= x\coth^{-1}(\cosh(x))-2x\tanh^{-1}(e^x)-\text{Subst}\left(\int \frac{\log(1-x)}{x}\,dx,x,e^x\right)+\text{Subst}\left(\int \frac{\log}{}\right.\\ &= x\coth^{-1}(\cosh(x))-2x\tanh^{-1}(e^x)-\text{Li}_2(-e^x)+\text{Li}_2(e^x)\end{aligned}$$

**Mathematica [A]** time = 0.02, size = 47, normalized size = 1.74

$$\text{Li}_2(-e^{-x})-\text{Li}_2(e^{-x})+x\left(\log(1-e^{-x})-\log(e^{-x}+1)\right)+x\coth^{-1}(\cosh(x))$$

Antiderivative was successfully verified.

```
[In] Integrate[ArcCoth[Cosh[x]],x]
```

```
[Out] x*ArcCoth[Cosh[x]] + x*(Log[1 - E^(-x)] - Log[1 + E^(-x)]) + PolyLog[2, -E^
(-x)] - PolyLog[2, E^(-x)]
```

**fricas [B]** time = 1.39, size = 57, normalized size = 2.11

$$\frac{1}{2}x\log\left(\frac{\cosh(x)+1}{\cosh(x)-1}\right)-x\log\left(\cosh(x)+\sinh(x)+1\right)+x\log\left(-\cosh(x)-\sinh(x)+1\right)+\mathrm{Li}_2\left(\cosh(x)+\sinh(x)\right)-$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(cosh(x)),x, algorithm="fricas")
```

```
[Out] 1/2*x*log((cosh(x) + 1)/(cosh(x) - 1)) - x*log(cosh(x) + sinh(x) + 1) + x*l
og(-cosh(x) - sinh(x) + 1) + dilog(cosh(x) + sinh(x)) - dilog(-cosh(x) - si
nh(x))
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \operatorname{arcoth}\left(\cosh(x)\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(cosh(x)),x, algorithm="giac")
```

```
[Out] integrate(arccoth(cosh(x)), x)
```

**maple [A]** time = 0.37, size = 21, normalized size = 0.78

$$x\,\mathrm{arccoth}\left(\cosh(x)\right)+2\,\mathrm{dilog}\left(\mathrm{e}^{-x}\right)-\frac{\mathrm{dilog}\left(\mathrm{e}^{-2x}\right)}{2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(arccoth(cosh(x)),x)
```

```
[Out] x*arccoth(cosh(x))+2*dilog(exp(-x))-1/2*dilog(exp(-2*x))
```

**maxima [A]** time = 0.37, size = 33, normalized size = 1.22

$$x\,\mathrm{arcoth}\left(\cosh(x)\right)-x\log\left(e^{x}+1\right)+x\log\left(-e^{x}+1\right)-\mathrm{Li}_2\left(-e^{x}\right)+\mathrm{Li}_2\left(e^{x}\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(cosh(x)),x, algorithm="maxima")
```

```
[Out] x*arccoth(cosh(x)) - x*log(e^x + 1) + x*log(-e^x + 1) - dilog(-e^x) + dilog
(e^x)
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.04

$$\int \mathrm{acoth}\left(\cosh(x)\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(cosh(x)),x)
```

```
[Out] int(acoth(cosh(x)), x)
```

**sympy** [**F**] time = 0.00, size = 0, normalized size = 0.00

$$\int \operatorname{acoth}(\cosh(x))\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(cosh(x)),x)
```

```
[Out] Integral(acoth(cosh(x)), x)
```

# 3.201 $\int x \coth^{-1}(\cosh(x))\,dx$

**Optimal**. Leaf size=51

$$-x\mathrm{Li}_2\left(-e^x\right)+x\mathrm{Li}_2\left(e^x\right)+\mathrm{Li}_3\left(-e^x\right)-\mathrm{Li}_3\left(e^x\right)-x^2\tanh^{-1}\left(e^x\right)+\frac{1}{2}x^2\coth^{-1}(\cosh(x))$$

```
[Out] 1/2*x^2*arccoth(cosh(x))-x^2*arctanh(exp(x))-x*polylog(2,-exp(x))+x*polylog
(2,exp(x))+polylog(3,-exp(x))-polylog(3,exp(x))
```

**Rubi [A]** time = 0.07, antiderivative size = 51, normalized size of antiderivative = 1.00, number of steps used = 8, number of rules used = 5, integrand size = 5, $\frac{\text{number of rules}}{\text{integrand size}}$ = 1.000, Rules used = {6274, 4182, 2531, 2282, 6589}

$$-x\mathrm{PolyLog}\left(2,-e^x\right)+x\mathrm{PolyLog}\left(2,e^x\right)+\mathrm{PolyLog}\left(3,-e^x\right)-\mathrm{PolyLog}\left(3,e^x\right)-x^2\tanh^{-1}\left(e^x\right)+\frac{1}{2}x^2\coth^{-1}(\cosh(x))$$

Antiderivative was successfully verified.

```
[In] Int[x*ArcCoth[Cosh[x]],x]
```

```
[Out] (x^2*ArcCoth[Cosh[x]])/2 - x^2*ArcTanh[E^x] - x*PolyLog[2, -E^x] + x*PolyLo
g[2, E^x] + PolyLog[3, -E^x] - PolyLog[3, E^x]
```

Rule 2282

```
Int[u_, x_Symbol] :> With[{v = FunctionOfExponential[u, x]}, Dist[v/D[v, x]
, Subst[Int[FunctionOfExponentialFunction[u, x]/x, x], x, v], x]] /; Functi
onOfExponentialQ[u, x] &&  !MatchQ[u, (w_)*((a_.)*(v_)^(n_))^(m_) /; FreeQ[
{a, m, n}, x] && IntegerQ[m*n]] &&  !MatchQ[u, E^((c_.)*((a_.) + (b_.)*x))*
(F_)[v_] /; FreeQ[{a, b, c}, x] && InverseFunctionQ[F[x]]]
```

Rule 2531

```
Int[Log[1 + (e_.)*((F_)^((c_.)*((a_.) + (b_.)*(x_))))^(n_.)]*((f_.) + (g_.)
*(x_))^(m_.), x_Symbol] :> -Simp[((f + g*x)^m*PolyLog[2, -(e*(F^(c*(a + b*x
)))^n)])/(b*c*n*Log[F]), x] + Dist[(g*m)/(b*c*n*Log[F]), Int[(f + g*x)^(m -
 1)*PolyLog[2, -(e*(F^(c*(a + b*x)))^n)], x], x] /; FreeQ[{F, a, b, c, e, f
, g, n}, x] && GtQ[m, 0]
```

Rule 4182

```
Int[csc[(e_.) + (Complex[0, fz_])*(f_.)*(x_)]*((c_.) + (d_.)*(x_))^(m_.), x
_Symbol] :> Simp[(-2*(c + d*x)^m*ArcTanh[E^(-(I*e) + f*fz*x)])/(f*fz*I), x]
 + (-Dist[(d*m)/(f*fz*I), Int[(c + d*x)^(m - 1)*Log[1 - E^(-(I*e) + f*fz*x)
], x], x] + Dist[(d*m)/(f*fz*I), Int[(c + d*x)^(m - 1)*Log[1 + E^(-(I*e) +
f*fz*x)], x], x]) /; FreeQ[{c, d, e, f, fz}, x] && IGtQ[m, 0]
```

Rule 6274

```
Int[((a_.) + ArcCoth[u_]*(b_.))*((c_.) + (d_.)*(x_))^(m_.), x_Symbol] :> Si
mp[((c + d*x)^(m + 1)*(a + b*ArcCoth[u]))/(d*(m + 1)), x] - Dist[b/(d*(m +
1)), Int[SimplifyIntegrand[((c + d*x)^(m + 1)*D[u, x])/(1 - u^2), x], x], x
] /; FreeQ[{a, b, c, d, m}, x] && NeQ[m, -1] && InverseFunctionFreeQ[u, x]
&&  !FunctionOfQ[(c + d*x)^(m + 1), u, x] && FalseQ[PowerVariableExpn[u, m
+ 1, x]]
```

Rule 6589

```
Int[PolyLog[n_, (c_.)*((a_.) + (b_.)*(x_))^(p_.)]/((d_.) + (e_.)*(x_)), x_S
ymbol] :> Simp[PolyLog[n + 1, c*(a + b*x)^p]/(e*p), x] /; FreeQ[{a, b, c, d
```

```
, e, n, p}, x] && EqQ[b*d, a*e]
```

Rubi steps

$$\int x\coth^{-1}(\cosh(x))\,dx=\frac{1}{2}x^2\coth^{-1}(\cosh(x))+\frac{1}{2}\int x^2\text{csch}(x)\,dx$$
$$=\frac{1}{2}x^2\coth^{-1}(\cosh(x))-x^2\tanh^{-1}(e^x)-\int x\log(1-e^x)\,dx+\int x\log(1+e^x)\,dx$$
$$=\frac{1}{2}x^2\coth^{-1}(\cosh(x))-x^2\tanh^{-1}(e^x)-x\text{Li}_2(-e^x)+x\text{Li}_2(e^x)+\int\text{Li}_2(-e^x)\,dx-\int$$
$$=\frac{1}{2}x^2\coth^{-1}(\cosh(x))-x^2\tanh^{-1}(e^x)-x\text{Li}_2(-e^x)+x\text{Li}_2(e^x)+\text{Subst}\left(\int\frac{\text{Li}_2(-x)}{x}\right.$$
$$=\frac{1}{2}x^2\coth^{-1}(\cosh(x))-x^2\tanh^{-1}(e^x)-x\text{Li}_2(-e^x)+x\text{Li}_2(e^x)+\text{Li}_3(-e^x)-\text{Li}_3(e^x)$$

**Mathematica [A]** time = 0.02, size = 81, normalized size = 1.59

$$\frac{1}{2}\left(2x\text{Li}_2(-e^{-x})-2x\text{Li}_2(e^{-x})+2\text{Li}_3(-e^{-x})-2\text{Li}_3(e^{-x})+x^2\log(1-e^{-x})-x^2\log(e^{-x}+1)+x^2\coth^{-1}(\cosh(\right.$$

Antiderivative was successfully verified.

```
[In] Integrate[x*ArcCoth[Cosh[x]],x]
```

```
[Out] (x^2*ArcCoth[Cosh[x]] + x^2*Log[1 - E^(-x)] - x^2*Log[1 + E^(-x)] + 2*x*Pol
yLog[2, -E^(-x)] - 2*x*PolyLog[2, E^(-x)] + 2*PolyLog[3, -E^(-x)] - 2*PolyL
og[3, E^(-x)])/2
```

**fricas [C]** time = 2.01, size = 87, normalized size = 1.71

$$\frac{1}{4}x^2\log\left(\frac{\cosh(x)+1}{\cosh(x)-1}\right)-\frac{1}{2}x^2\log(\cosh(x)+\sinh(x)+1)+\frac{1}{2}x^2\log(-\cosh(x)-\sinh(x)+1)+x\text{Li}_2(\cosh(x)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*arccoth(cosh(x)),x, algorithm="fricas")
```

```
[Out] 1/4*x^2*log((cosh(x) + 1)/(cosh(x) - 1)) - 1/2*x^2*log(cosh(x) + sinh(x) +
1) + 1/2*x^2*log(-cosh(x) - sinh(x) + 1) + x*dilog(cosh(x) + sinh(x)) - x*d
ilog(-cosh(x) - sinh(x)) - polylog(3, cosh(x) + sinh(x)) + polylog(3, -cosh
(x) - sinh(x))
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int x\,\text{arcoth}(\cosh(x))\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*arccoth(cosh(x)),x, algorithm="giac")
```

```
[Out] integrate(x*arccoth(cosh(x)), x)
```

**maple [C]** time = 0.52, size = 449, normalized size = 8.80

$$-\frac{i\pi\text{csgn}\left(ie^{-x}(e^x+1)^2\right)^3x^2}{8}-\frac{i\pi\,\text{csgn}\left(i(e^x+1)^2\right)\text{csgn}(ie^{-x})\,\text{csgn}\left(ie^{-x}(e^x+1)^2\right)x^2}{8}-\frac{i\pi\,\text{csgn}\left(i(e^x-1)^2\right)\text{cs}}{8}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x*arccoth(cosh(x)),x)
```

```
[Out] -1/8*I*Pi*csgn(I*exp(-x)*(exp(x)+1)^2)^3*x^2-1/8*I*Pi*csgn(I*(exp(x)+1)^2)*
csgn(I*exp(-x))*csgn(I*exp(-x)*(exp(x)+1)^2)*x^2-1/8*I*Pi*csgn(I*(exp(x)-1)
^2)*csgn(I*exp(-x)*(exp(x)-1)^2)^2*x^2-1/8*I*Pi*csgn(I*(exp(x)+1)^2)^3*x^2+
1/8*I*Pi*csgn(I*(exp(x)-1))^2*csgn(I*(exp(x)-1)^2)*x^2+1/8*I*Pi*csgn(I*exp(
-x)*(exp(x)-1)^2)^3*x^2+1/8*I*Pi*csgn(I*exp(-x))*csgn(I*exp(-x)*(exp(x)+1)^
2)^2*x^2-1/4*I*Pi*csgn(I*(exp(x)-1))*csgn(I*(exp(x)-1)^2)^2*x^2-1/8*I*Pi*cs
gn(I*exp(-x))*csgn(I*exp(-x)*(exp(x)-1)^2)^2*x^2-1/8*I*Pi*csgn(I*(exp(x)+1)
)^2*csgn(I*(exp(x)+1)^2)*x^2+1/4*I*Pi*csgn(I*(exp(x)+1))*csgn(I*(exp(x)+1)^
2)^2*x^2+1/8*I*Pi*csgn(I*(exp(x)-1)^2)*csgn(I*exp(-x))*csgn(I*exp(-x)*(exp(
x)-1)^2)*x^2+1/8*I*Pi*csgn(I*(exp(x)+1)^2)*csgn(I*exp(-x)*(exp(x)+1)^2)^2*x
^2+polylog(3,-exp(x))-polylog(3,exp(x))+1/8*I*Pi*csgn(I*(exp(x)-1)^2)^3*x^2
-1/2*x^2*ln(exp(x)-1)+1/2*x^2*ln(1-exp(x))+x*polylog(2,exp(x))-x*polylog(2,
-exp(x))
```

**maxima [A]** time = 0.38, size = 56, normalized size = 1.10

$$\frac{1}{2}x^2\operatorname{arcoth}(\cosh(x))-\frac{1}{2}x^2\log(e^x+1)+\frac{1}{2}x^2\log(-e^x+1)-x\operatorname{Li}_2(-e^x)+x\operatorname{Li}_2(e^x)+\operatorname{Li}_3(-e^x)-\operatorname{Li}_3(e^x)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*arccoth(cosh(x)),x, algorithm="maxima")
```

```
[Out] 1/2*x^2*arccoth(cosh(x)) - 1/2*x^2*log(e^x + 1) + 1/2*x^2*log(-e^x + 1) - x
*dilog(-e^x) + x*dilog(e^x) + polylog(3, -e^x) - polylog(3, e^x)
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.02

$$\int x\operatorname{acoth}(\cosh(x))\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x*acoth(cosh(x)),x)
```

```
[Out] int(x*acoth(cosh(x)), x)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int x\operatorname{acoth}(\cosh(x))\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*acoth(cosh(x)),x)
```

```
[Out] Integral(x*acoth(cosh(x)), x)
```

# 3.202 $\int x^2 \coth^{-1}(\cosh(x))\,dx$

**Optimal**. Leaf size=77

$$-x^2\text{Li}_2\left(-e^x\right)+x^2\text{Li}_2\left(e^x\right)+2x\text{Li}_3\left(-e^x\right)-2x\text{Li}_3\left(e^x\right)-2\text{Li}_4\left(-e^x\right)+2\text{Li}_4\left(e^x\right)-\frac{2}{3}x^3\tanh^{-1}\left(e^x\right)+\frac{1}{3}x^3\coth^{-1}(\cosh(x))$$

```
[Out] 1/3*x^3*arccoth(cosh(x))-2/3*x^3*arctanh(exp(x))-x^2*polylog(2,-exp(x))+x^2
*polylog(2,exp(x))+2*x*polylog(3,-exp(x))-2*x*polylog(3,exp(x))-2*polylog(4
,-exp(x))+2*polylog(4,exp(x))
```

**Rubi [A]** time = 0.09, antiderivative size = 77, normalized size of antiderivative = 1.00, number of steps used = 10, number of rules used = 6, integrand size = 7, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.857, Rules used = {6274, 4182, 2531, 6609, 2282, 6589}

$$-x^2\text{PolyLog}\left(2,-e^x\right)+x^2\text{PolyLog}\left(2,e^x\right)+2x\text{PolyLog}\left(3,-e^x\right)-2x\text{PolyLog}\left(3,e^x\right)-2\text{PolyLog}\left(4,-e^x\right)+2\text{PolyL}$$

Antiderivative was successfully verified.

```
[In] Int[x^2*ArcCoth[Cosh[x]],x]
```

```
[Out] (x^3*ArcCoth[Cosh[x]])/3 - (2*x^3*ArcTanh[E^x])/3 - x^2*PolyLog[2, -E^x] +
x^2*PolyLog[2, E^x] + 2*x*PolyLog[3, -E^x] - 2*x*PolyLog[3, E^x] - 2*PolyLo
g[4, -E^x] + 2*PolyLog[4, E^x]
```

Rule 2282

```
Int[u_, x_Symbol] :> With[{v = FunctionOfExponential[u, x]}, Dist[v/D[v, x]
, Subst[Int[FunctionOfExponentialFunction[u, x]/x, x], x, v], x]] /; Functi
onOfExponentialQ[u, x] &&  !MatchQ[u, (w_)*((a_.)*(v_)^(n_))^(m_) /; FreeQ[
{a, m, n}, x] && IntegerQ[m*n]] &&  !MatchQ[u, E^((c_.)*((a_.) + (b_.)*x))*
(F_)[v_] /; FreeQ[{a, b, c}, x] && InverseFunctionQ[F[x]]]
```

Rule 2531

```
Int[Log[1 + (e_.)*((F_)^((c_.)*((a_.) + (b_.)*(x_))))^(n_.)]*((f_.) + (g_.)
*(x_))^(m_.), x_Symbol] :> -Simp[((f + g*x)^m*PolyLog[2, -(e*(F^(c*(a + b*x
)))^n)])/(b*c*n*Log[F]), x] + Dist[(g*m)/(b*c*n*Log[F]), Int[(f + g*x)^(m -
 1)*PolyLog[2, -(e*(F^(c*(a + b*x)))^n)], x], x] /; FreeQ[{F, a, b, c, e, f
, g, n}, x] && GtQ[m, 0]
```

Rule 4182

```
Int[csc[(e_.) + (Complex[0, fz_])*(f_.)*(x_)]*((c_.) + (d_.)*(x_))^(m_.), x
_Symbol] :> Simp[(-2*(c + d*x)^m*ArcTanh[E^(-(I*e) + f*fz*x)])/(f*fz*I), x]
 + (-Dist[(d*m)/(f*fz*I), Int[(c + d*x)^(m - 1)*Log[1 - E^(-(I*e) + f*fz*x)
], x], x] + Dist[(d*m)/(f*fz*I), Int[(c + d*x)^(m - 1)*Log[1 + E^(-(I*e) +
f*fz*x)], x], x]) /; FreeQ[{c, d, e, f, fz}, x] && IGtQ[m, 0]
```

Rule 6274

```
Int[((a_.) + ArcCoth[u_]*(b_.))*((c_.) + (d_.)*(x_))^(m_.), x_Symbol] :> Si
mp[((c + d*x)^(m + 1)*(a + b*ArcCoth[u]))/(d*(m + 1)), x] - Dist[b/(d*(m +
1)), Int[SimplifyIntegrand[((c + d*x)^(m + 1)*D[u, x])/(1 - u^2), x], x], x
] /; FreeQ[{a, b, c, d, m}, x] && NeQ[m, -1] && InverseFunctionFreeQ[u, x]
&&  !FunctionOfQ[(c + d*x)^(m + 1), u, x] && FalseQ[PowerVariableExpn[u, m
+ 1, x]]
```

Rule 6589

```
Int[PolyLog[n_, (c_.)*((a_.) + (b_.)*(x_))^(p_.)]/((d_.) + (e_.)*(x_)), x_S
ymbol] :> Simp[PolyLog[n + 1, c*(a + b*x)^p]/(e*p), x] /; FreeQ[{a, b, c, d
, e, n, p}, x] && EqQ[b*d, a*e]
```

Rule 6609

```
Int[((e_.) + (f_.)*(x_))^(m_.)*PolyLog[n_, (d_.)*((F_)^((c_.)*((a_.) + (b_.
)*(x_))))^(p_.)], x_Symbol] :> Simp[((e + f*x)^m*PolyLog[n + 1, d*(F^(c*(a
+ b*x)))^p])/(b*c*p*Log[F]), x] - Dist[(f*m)/(b*c*p*Log[F]), Int[(e + f*x)^
(m - 1)*PolyLog[n + 1, d*(F^(c*(a + b*x)))^p], x], x] /; FreeQ[{F, a, b, c,
 d, e, f, n, p}, x] && GtQ[m, 0]
```

Rubi steps

$$\int x^2 \coth^{-1}(\cosh(x))\,dx = \frac{1}{3}x^3\coth^{-1}(\cosh(x)) + \frac{1}{3}\int x^3\text{csch}(x)\,dx$$
$$= \frac{1}{3}x^3\coth^{-1}(\cosh(x)) - \frac{2}{3}x^3\tanh^{-1}(e^x) - \int x^2\log(1-e^x)\,dx + \int x^2\log(1+e^x)\,dx$$
$$= \frac{1}{3}x^3\coth^{-1}(\cosh(x)) - \frac{2}{3}x^3\tanh^{-1}(e^x) - x^2\text{Li}_2(-e^x) + x^2\text{Li}_2(e^x) + 2\int x\text{Li}_2(-e^x)\,d$$
$$= \frac{1}{3}x^3\coth^{-1}(\cosh(x)) - \frac{2}{3}x^3\tanh^{-1}(e^x) - x^2\text{Li}_2(-e^x) + x^2\text{Li}_2(e^x) + 2x\text{Li}_3(-e^x) - 2x$$
$$= \frac{1}{3}x^3\coth^{-1}(\cosh(x)) - \frac{2}{3}x^3\tanh^{-1}(e^x) - x^2\text{Li}_2(-e^x) + x^2\text{Li}_2(e^x) + 2x\text{Li}_3(-e^x) - 2x$$
$$= \frac{1}{3}x^3\coth^{-1}(\cosh(x)) - \frac{2}{3}x^3\tanh^{-1}(e^x) - x^2\text{Li}_2(-e^x) + x^2\text{Li}_2(e^x) + 2x\text{Li}_3(-e^x) - 2x$$

**Mathematica [A]** time = 0.03, size = 109, normalized size = 1.42

$$\frac{1}{24}\left(24x^2\text{Li}_2(-e^{-x}) + 24x^2\text{Li}_2(e^x) + 48x\text{Li}_3(-e^{-x}) - 48x\text{Li}_3(e^x) + 48\text{Li}_4(-e^{-x}) + 48\text{Li}_4(e^x) - 2x^4 - 8x^3\log(e^{-x}\right.$$

Antiderivative was successfully verified.

```
[In] Integrate[x^2*ArcCoth[Cosh[x]],x]
```

```
[Out] (Pi^4 - 2*x^4 + 8*x^3*ArcCoth[Cosh[x]] - 8*x^3*Log[1 + E^(-x)] + 8*x^3*Log[
1 - E^x] + 24*x^2*PolyLog[2, -E^(-x)] + 24*x^2*PolyLog[2, E^x] + 48*x*PolyL
og[3, -E^(-x)] - 48*x*PolyLog[3, E^x] + 48*PolyLog[4, -E^(-x)] + 48*PolyLog
[4, E^x])/24
```

**fricas [C]** time = 1.56, size = 117, normalized size = 1.52

$$\frac{1}{6}x^3\log\left(\frac{\cosh(x)+1}{\cosh(x)-1}\right) - \frac{1}{3}x^3\log(\cosh(x)+\sinh(x)+1) + \frac{1}{3}x^3\log(-\cosh(x)-\sinh(x)+1) + x^2\text{Li}_2(\cosh(x)+s$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*arccoth(cosh(x)),x, algorithm="fricas")
```

```
[Out] 1/6*x^3*log((cosh(x) + 1)/(cosh(x) - 1)) - 1/3*x^3*log(cosh(x) + sinh(x) +
1) + 1/3*x^3*log(-cosh(x) - sinh(x) + 1) + x^2*dilog(cosh(x) + sinh(x)) - x
^2*dilog(-cosh(x) - sinh(x)) - 2*x*polylog(3, cosh(x) + sinh(x)) + 2*x*poly
log(3, -cosh(x) - sinh(x)) + 2*polylog(4, cosh(x) + sinh(x)) - 2*polylog(4,
 -cosh(x) - sinh(x))
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int x^2 \text{arcoth}(\cosh(x))\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*arccoth(cosh(x)),x, algorithm="giac")
```

```
[Out] integrate(x^2*arccoth(cosh(x)), x)
```

**maple [C]** time = 0.50, size = 471, normalized size = 6.12

$$-\frac{i\pi\,\mathrm{csgn}\left(i\left(\mathrm{e}^{x}-1\right)^{2}\right)\mathrm{csgn}\left(i\mathrm{e}^{-x}\left(\mathrm{e}^{x}-1\right)^{2}\right)^{2}x^{3}}{12}+\frac{i\pi\mathrm{csgn}\left(i\mathrm{e}^{-x}\left(\mathrm{e}^{x}-1\right)^{2}\right)^{3}x^{3}}{12}+\frac{i\pi\,\mathrm{csgn}\left(i\left(\mathrm{e}^{x}-1\right)^{2}\right)\mathrm{csgn}\left(i\mathrm{e}^{-x}\right)\mathrm{c}}{12}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^2*arccoth(cosh(x)),x)
```

```
[Out] -1/12*I*Pi*csgn(I*(exp(x)-1)^2)*csgn(I*exp(-x)*(exp(x)-1)^2)^2*x^3+1/12*I*P
i*csgn(I*exp(-x)*(exp(x)-1)^2)^3*x^3+1/12*I*Pi*csgn(I*(exp(x)-1)^2)*csgn(I*
exp(-x))*csgn(I*exp(-x)*(exp(x)-1)^2)*x^3-1/12*I*Pi*csgn(I*(exp(x)+1))^2*cs
gn(I*(exp(x)+1)^2)*x^3-1/12*I*Pi*csgn(I*(exp(x)+1)^2)*csgn(I*exp(-x))*csgn(
I*exp(-x)*(exp(x)+1)^2)*x^3+1/6*I*Pi*csgn(I*(exp(x)+1))*csgn(I*(exp(x)+1)^2
)^2*x^3-1/12*I*Pi*csgn(I*exp(-x)*(exp(x)+1)^2)^3*x^3+1/12*I*Pi*csgn(I*(exp(
x)+1)^2)*csgn(I*exp(-x)*(exp(x)+1)^2)^2*x^3-1/6*I*Pi*csgn(I*(exp(x)-1))*csg
n(I*(exp(x)-1)^2)^2*x^3+1/3*x^3+1/3*x^3*ln(1-exp(x))-1/3*x^3*ln(exp(x)-1)+2*x*polyl
og(3,-exp(x))-2*x*polylog(3,exp(x))-2*polylog(4,-exp(x))+2*polylog(4,exp(x)
)+1/12*I*Pi*csgn(I*exp(-x))*csgn(I*exp(-x)*(exp(x)+1)^2)^2*x^3-1/12*I*Pi*cs
gn(I*exp(-x))*csgn(I*exp(-x)*(exp(x)-1)^2)^2*x^3+1/12*I*Pi*csgn(I*(exp(x)-1
))^2*csgn(I*(exp(x)-1)^2)*x^3+x^2*polylog(2,exp(x))-x^2*polylog(2,-exp(x))+
1/12*I*Pi*csgn(I*(exp(x)-1)^2)^3*x^3-1/12*I*Pi*csgn(I*(exp(x)+1)^2)^3*x^3
```

**maxima [A]** time = 0.37, size = 78, normalized size = 1.01

$$\frac{1}{3}x^{3}\,\mathrm{arcoth}\left(\cosh(x)\right)-\frac{1}{3}x^{3}\log\left(e^{x}+1\right)+\frac{1}{3}x^{3}\log\left(-e^{x}+1\right)-x^{2}\mathrm{Li}_{2}\left(-e^{x}\right)+x^{2}\mathrm{Li}_{2}\left(e^{x}\right)+2\,x\mathrm{Li}_{3}(-e^{x})-2\,x\mathrm{Li}_{3}(e^{x})-2$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*arccoth(cosh(x)),x, algorithm="maxima")
```

```
[Out] 1/3*x^3*arccoth(cosh(x)) - 1/3*x^3*log(e^x + 1) + 1/3*x^3*log(-e^x + 1) - x
^2*dilog(-e^x) + x^2*dilog(e^x) + 2*x*polylog(3, -e^x) - 2*x*polylog(3, e^x
) - 2*polylog(4, -e^x) + 2*polylog(4, e^x)
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.01

$$\int x^{2}\,\mathrm{acoth}\left(\cosh(x)\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^2*acoth(cosh(x)),x)
```

```
[Out] int(x^2*acoth(cosh(x)), x)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int x^{2}\,\mathrm{acoth}\left(\cosh\left(x\right)\right)dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**2*acoth(cosh(x)),x)
```

```
[Out] Integral(x**2*acoth(cosh(x)), x)
```

# 3.203 $\int x^2 \coth^{-1}(c + d \tanh(a + bx))\, dx$

**Optimal**. Leaf size=307

$$\frac{\text{Li}_4\left(-\frac{(-c-d+1)e^{2a+2bx}}{-c+d+1}\right)}{8b^3}-\frac{\text{Li}_4\left(-\frac{(c+d+1)e^{2a+2bx}}{c-d+1}\right)}{8b^3}-\frac{x\text{Li}_3\left(-\frac{(-c-d+1)e^{2a+2bx}}{-c+d+1}\right)}{4b^2}+\frac{x\text{Li}_3\left(-\frac{(c+d+1)e^{2a+2bx}}{c-d+1}\right)}{4b^2}+\frac{x^2\text{Li}_2\left(-\frac{(-c-d+1)e^{2a+2bx}}{-c+d+1}\right)}{4b}$$

```
[Out] 1/3*x^3*arccoth(c+d*tanh(b*x+a))+1/6*x^3*ln(1+(1-c-d)*exp(2*b*x+2*a)/(1-c+d
))-1/6*x^3*ln(1+(1+c+d)*exp(2*b*x+2*a)/(1+c-d))+1/4*x^2*polylog(2,-(1-c-d)*
exp(2*b*x+2*a)/(1-c+d))/b-1/4*x^2*polylog(2,-(1+c+d)*exp(2*b*x+2*a)/(1+c-d)
)/b-1/4*x*polylog(3,-(1-c-d)*exp(2*b*x+2*a)/(1-c+d))/b^2+1/4*x*polylog(3,-(
1+c+d)*exp(2*b*x+2*a)/(1+c-d))/b^2+1/8*polylog(4,-(1-c-d)*exp(2*b*x+2*a)/(1
-c+d))/b^3-1/8*polylog(4,-(1+c+d)*exp(2*b*x+2*a)/(1+c-d))/b^3
```

**Rubi [A]** time = 0.46, antiderivative size = 307, normalized size of antiderivative = 1.00, number of steps used = 11, number of rules used = 6, integrand size = 15, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.400, Rules used = {6244, 2190, 2531, 6609, 2282, 6589}

$$-\frac{x\text{PolyLog}\left(3,-\frac{(-c-d+1)e^{2a+2bx}}{-c+d+1}\right)}{4b^2}+\frac{x\text{PolyLog}\left(3,-\frac{(c+d+1)e^{2a+2bx}}{c-d+1}\right)}{4b^2}+\frac{\text{PolyLog}\left(4,-\frac{(-c-d+1)e^{2a+2bx}}{-c+d+1}\right)}{8b^3}-\frac{\text{PolyLog}\left(4,-\frac{(c+d+1)e^{2a+2bx}}{\ldots}\right)}{8b^3}$$

Antiderivative was successfully verified.

```
[In] Int[x^2*ArcCoth[c + d*Tanh[a + b*x]],x]
```

```
[Out] (x^3*ArcCoth[c + d*Tanh[a + b*x]])/3 + (x^3*Log[1 + ((1 - c - d)*E^(2*a + 2
*b*x))/(1 - c + d)])/6 - (x^3*Log[1 + ((1 + c + d)*E^(2*a + 2*b*x))/(1 + c
- d)])/6 + (x^2*PolyLog[2, -(((1 - c - d)*E^(2*a + 2*b*x))/(1 - c + d))])/(
4*b) - (x^2*PolyLog[2, -(((1 + c + d)*E^(2*a + 2*b*x))/(1 + c - d))])/(4*b)
 - (x*PolyLog[3, -(((1 - c - d)*E^(2*a + 2*b*x))/(1 - c + d))])/(4*b^2) + (
x*PolyLog[3, -(((1 + c + d)*E^(2*a + 2*b*x))/(1 + c - d))])/(4*b^2) + PolyL
og[4, -(((1 - c - d)*E^(2*a + 2*b*x))/(1 - c + d))]/(8*b^3) - PolyLog[4, -(
((1 + c + d)*E^(2*a + 2*b*x))/(1 + c - d))]/(8*b^3)
```

Rule 2190

```
Int[(((F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m_.))/
((a_) + (b_.)*((F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)), x_Symbol] :> Simp
[((c + d*x)^m*Log[1 + (b*(F^(g*(e + f*x)))^n)/a])/(b*f*g*n*Log[F]), x] - Di
st[(d*m)/(b*f*g*n*Log[F]), Int[(c + d*x)^(m - 1)*Log[1 + (b*(F^(g*(e + f*x)
))^n)/a], x], x] /; FreeQ[{F, a, b, c, d, e, f, g, n}, x] && IGtQ[m, 0]
```

Rule 2282

```
Int[u_, x_Symbol] :> With[{v = FunctionOfExponential[u, x]}, Dist[v/D[v, x]
, Subst[Int[FunctionOfExponentialFunction[u, x]/x, x], x, v], x]] /; Functi
onOfExponentialQ[u, x] && !MatchQ[u, (w_)*((a_.)*(v_)^(n_))^(m_) /; FreeQ[
{a, m, n}, x] && IntegerQ[m*n]] && !MatchQ[u, E^((c_.)*((a_.) + (b_.)*x))*
(F_)[v_] /; FreeQ[{a, b, c}, x] && InverseFunctionQ[F[x]]]
```

Rule 2531

```
Int[Log[1 + (e_.)*((F_)^((c_.)*((a_.) + (b_.)*(x_))))^(n_.)]*((f_.) + (g_.)
*(x_))^(m_.), x_Symbol] :> -Simp[((f + g*x)^m*PolyLog[2, -(e*(F^(c*(a + b*x
)))^n)])/(b*c*n*Log[F]), x] + Dist[(g*m)/(b*c*n*Log[F]), Int[(f + g*x)^(m -
 1)*PolyLog[2, -(e*(F^(c*(a + b*x)))^n)], x], x] /; FreeQ[{F, a, b, c, e, f
, g, n}, x] && GtQ[m, 0]
```

Rule 6244

```
Int[ArcCoth[(c_.) + (d_.)*Tanh[(a_.) + (b_.)*(x_)]]*((e_.) + (f_.)*(x_))^(m
_.), x_Symbol] :> Simp[((e + f*x)^(m + 1)*ArcCoth[c + d*Tanh[a + b*x]])/(f*
(m + 1)), x] + (Dist[(b*(1 - c - d))/(f*(m + 1)), Int[((e + f*x)^(m + 1)*E^
(2*a + 2*b*x))/(1 - c + d + (1 - c - d)*E^(2*a + 2*b*x)), x], x] - Dist[(b*
(1 + c + d))/(f*(m + 1)), Int[((e + f*x)^(m + 1)*E^(2*a + 2*b*x))/(1 + c -
d + (1 + c + d)*E^(2*a + 2*b*x)), x], x]) /; FreeQ[{a, b, c, d, e, f}, x] &
& IGtQ[m, 0] && NeQ[(c - d)^2, 1]
```

Rule 6589

```
Int[PolyLog[n_, (c_.)*((a_.) + (b_.)*(x_))^(p_.)]/((d_.) + (e_.)*(x_)), x_S
ymbol] :> Simp[PolyLog[n + 1, c*(a + b*x)^p]/(e*p), x] /; FreeQ[{a, b, c, d
, e, n, p}, x] && EqQ[b*d, a*e]
```

Rule 6609

```
Int[((e_.) + (f_.)*(x_))^(m_.)*PolyLog[n_, (d_.)*((F_)^((c_.)*((a_.) + (b_.
)*(x_))))^(p_.)], x_Symbol] :> Simp[((e + f*x)^m*PolyLog[n + 1, d*(F^(c*(a
+ b*x)))^p])/(b*c*p*Log[F]), x] - Dist[(f*m)/(b*c*p*Log[F]), Int[(e + f*x)^
(m - 1)*PolyLog[n + 1, d*(F^(c*(a + b*x)))^p], x], x] /; FreeQ[{F, a, b, c,
 d, e, f, n, p}, x] && GtQ[m, 0]
```

Rubi steps

$$\int x^2 \coth^{-1}(c+d\tanh(a+bx))\,dx = \frac{1}{3}x^3\coth^{-1}(c+d\tanh(a+bx)) + \frac{1}{3}(b(1-c-d))\int \frac{e^{2a+2bx}x^3}{1-c+d+(1-c-$$

$$= \frac{1}{3}x^3\coth^{-1}(c+d\tanh(a+bx)) + \frac{1}{6}x^3\log\left(1+\frac{(1-c-d)e^{2a+2bx}}{1-c+d}\right) - \frac{1}{6}x$$

$$= \frac{1}{3}x^3\coth^{-1}(c+d\tanh(a+bx)) + \frac{1}{6}x^3\log\left(1+\frac{(1-c-d)e^{2a+2bx}}{1-c+d}\right) - \frac{1}{6}x$$

$$= \frac{1}{3}x^3\coth^{-1}(c+d\tanh(a+bx)) + \frac{1}{6}x^3\log\left(1+\frac{(1-c-d)e^{2a+2bx}}{1-c+d}\right) - \frac{1}{6}x$$

$$= \frac{1}{3}x^3\coth^{-1}(c+d\tanh(a+bx)) + \frac{1}{6}x^3\log\left(1+\frac{(1-c-d)e^{2a+2bx}}{1-c+d}\right) - \frac{1}{6}x$$

$$= \frac{1}{3}x^3\coth^{-1}(c+d\tanh(a+bx)) + \frac{1}{6}x^3\log\left(1+\frac{(1-c-d)e^{2a+2bx}}{1-c+d}\right) - \frac{1}{6}x$$

**Mathematica [A]** time = 0.50, size = 345, normalized size = 1.12

$$\frac{4b^3x^3\log\left(\frac{(c-d-1)(\cosh(2(a+bx))-\sinh(2(a+bx)))}{c+d-1}+1\right) - 4b^3x^3\log\left(\frac{(c-d+1)(\cosh(2(a+bx))-\sinh(2(a+bx)))}{c+d+1}+1\right) - 6b^2x^2\text{Li}_2\left(\frac{(c}{}\right.}{}$$

Antiderivative was successfully verified.

```
[In] Integrate[x^2*ArcCoth[c + d*Tanh[a + b*x]],x]
```

```
[Out] (x^3*ArcCoth[c + d*Tanh[a + b*x]])/3 + (4*b^3*x^3*Log[1 + ((-1 + c - d)*(Co
sh[2*(a + b*x)] - Sinh[2*(a + b*x)]))/(-1 + c + d)] - 4*b^3*x^3*Log[1 + ((1
 + c - d)*(Cosh[2*(a + b*x)] - Sinh[2*(a + b*x)]))/(1 + c + d)] - 6*b^2*x^2
*PolyLog[2, ((-1 + c - d)*(-Cosh[2*(a + b*x)] + Sinh[2*(a + b*x)]))/(-1 + c
```

```
 + d)] + 6*b^2*x^2*PolyLog[2, ((1 + c - d)*(-Cosh[2*(a + b*x)] + Sinh[2*(a
+ b*x)]))/(1 + c + d)] - 6*b*x*PolyLog[3, ((-1 + c - d)*(-Cosh[2*(a + b*x)]
 + Sinh[2*(a + b*x)]))/(-1 + c + d)] + 6*b*x*PolyLog[3, ((1 + c - d)*(-Cosh
[2*(a + b*x)] + Sinh[2*(a + b*x)]))/(1 + c + d)] - 3*PolyLog[4, ((-1 + c -
d)*(-Cosh[2*(a + b*x)] + Sinh[2*(a + b*x)]))/(-1 + c + d)] + 3*PolyLog[4, (
(1 + c - d)*(-Cosh[2*(a + b*x)] + Sinh[2*(a + b*x)]))/(1 + c + d)])/(24*b^3
)
```

**fricas [C]** time = 0.80, size = 899, normalized size = 2.93

result too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*arccoth(c+d*tanh(b*x+a)),x, algorithm="fricas")
```

```
[Out] 1/6*(b^3*x^3*log(((c + 1)*cosh(b*x + a) + d*sinh(b*x + a))/((c - 1)*cosh(b*
x + a) + d*sinh(b*x + a))) - 3*b^2*x^2*dilog(sqrt(-(c + d + 1)/(c - d + 1))
*(cosh(b*x + a) + sinh(b*x + a))) - 3*b^2*x^2*dilog(-sqrt(-(c + d + 1)/(c -
 d + 1))*(cosh(b*x + a) + sinh(b*x + a))) + 3*b^2*x^2*dilog(sqrt(-(c + d -
1)/(c - d - 1))*(cosh(b*x + a) + sinh(b*x + a))) + 3*b^2*x^2*dilog(-sqrt(-(
c + d - 1)/(c - d - 1))*(cosh(b*x + a) + sinh(b*x + a))) + a^3*log(2*(c + d
 + 1)*cosh(b*x + a) + 2*(c + d + 1)*sinh(b*x + a) + 2*(c - d + 1)*sqrt(-(c
+ d + 1)/(c - d + 1))) + a^3*log(2*(c + d + 1)*cosh(b*x + a) + 2*(c + d + 1
)*sinh(b*x + a) - 2*(c - d + 1)*sqrt(-(c + d + 1)/(c - d + 1))) - a^3*log(2
*(c + d - 1)*cosh(b*x + a) + 2*(c + d - 1)*sinh(b*x + a) + 2*(c - d - 1)*sq
rt(-(c + d - 1)/(c - d - 1))) - a^3*log(2*(c + d - 1)*cosh(b*x + a) + 2*(c
+ d - 1)*sinh(b*x + a) - 2*(c - d - 1)*sqrt(-(c + d - 1)/(c - d - 1))) + 6*
b*x*polylog(3, sqrt(-(c + d + 1)/(c - d + 1))*(cosh(b*x + a) + sinh(b*x + a
))) + 6*b*x*polylog(3, -sqrt(-(c + d + 1)/(c - d + 1))*(cosh(b*x + a) + sin
h(b*x + a))) - 6*b*x*polylog(3, sqrt(-(c + d - 1)/(c - d - 1))*(cosh(b*x +
a) + sinh(b*x + a))) - 6*b*x*polylog(3, -sqrt(-(c + d - 1)/(c - d - 1))*(co
sh(b*x + a) + sinh(b*x + a))) - (b^3*x^3 + a^3)*log(sqrt(-(c + d + 1)/(c -
d + 1))*(cosh(b*x + a) + sinh(b*x + a)) + 1) - (b^3*x^3 + a^3)*log(-sqrt(-(
c + d + 1)/(c - d + 1))*(cosh(b*x + a) + sinh(b*x + a)) + 1) + (b^3*x^3 + a
^3)*log(sqrt(-(c + d - 1)/(c - d - 1))*(cosh(b*x + a) + sinh(b*x + a)) + 1)
 + (b^3*x^3 + a^3)*log(-sqrt(-(c + d - 1)/(c - d - 1))*(cosh(b*x + a) + sin
h(b*x + a)) + 1) - 6*polylog(4, sqrt(-(c + d + 1)/(c - d + 1))*(cosh(b*x +
a) + sinh(b*x + a))) - 6*polylog(4, -sqrt(-(c + d + 1)/(c - d + 1))*(cosh(b
*x + a) + sinh(b*x + a))) + 6*polylog(4, sqrt(-(c + d - 1)/(c - d - 1))*(co
sh(b*x + a) + sinh(b*x + a))) + 6*polylog(4, -sqrt(-(c + d - 1)/(c - d - 1)
)*(cosh(b*x + a) + sinh(b*x + a))))/b^3
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int x^2 \operatorname{arcoth}\left(d \tanh\left(bx + a\right) + c\right)\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*arccoth(c+d*tanh(b*x+a)),x, algorithm="giac")
```

```
[Out] integrate(x^2*arccoth(d*tanh(b*x + a) + c), x)
```

**maple [C]** time = 10.11, size = 5294, normalized size = 17.24

output too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^2*arccoth(c+d*tanh(b*x+a)),x)
```

```
[Out] result too large to display
```

**maxima [A]** time = 0.71, size = 281, normalized size = 0.92

$$\frac{1}{3}x^3\operatorname{arcoth}\left(d\tanh\left(bx+a\right)+c\right)-\frac{1}{18}bd\left(\frac{4\,b^3x^3\log\left(\frac{(c+d+1)e^{(2\,bx+2\,a)}}{c-d+1}+1\right)+6\,b^2x^2\mathrm{Li}_2\left(-\frac{(c+d+1)e^{(2\,bx+2\,a)}}{c-d+1}\right)-6\,bx\mathrm{Li}}{b^4d}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*arccoth(c+d*tanh(b*x+a)),x, algorithm="maxima")
```

```
[Out] 1/3*x^3*arccoth(d*tanh(b*x + a) + c) - 1/18*b*d*((4*b^3*x^3*log((c + d + 1)
*e^(2*b*x + 2*a)/(c - d + 1) + 1) + 6*b^2*x^2*dilog(-(c + d + 1)*e^(2*b*x +
 2*a)/(c - d + 1)) - 6*b*x*polylog(3, -(c + d + 1)*e^(2*b*x + 2*a)/(c - d +
 1)) + 3*polylog(4, -(c + d + 1)*e^(2*b*x + 2*a)/(c - d + 1)))/(b^4*d) - (4
*b^3*x^3*log((c + d - 1)*e^(2*b*x + 2*a)/(c - d - 1) + 1) + 6*b^2*x^2*dilog
(-(c + d - 1)*e^(2*b*x + 2*a)/(c - d - 1)) - 6*b*x*polylog(3, -(c + d - 1)*
e^(2*b*x + 2*a)/(c - d - 1)) + 3*polylog(4, -(c + d - 1)*e^(2*b*x + 2*a)/(c
 - d - 1)))/(b^4*d))
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.00

$$\int x^2\operatorname{acoth}\left(c+d\tanh\left(a+b\,x\right)\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^2*acoth(c + d*tanh(a + b*x)),x)
```

```
[Out] int(x^2*acoth(c + d*tanh(a + b*x)), x)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int x^2\operatorname{acoth}\left(c+d\tanh\left(a+bx\right)\right)dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**2*acoth(c+d*tanh(b*x+a)),x)
```

```
[Out] Integral(x**2*acoth(c + d*tanh(a + b*x)), x)
```

# 3.204 $\int x \coth^{-1}(c + d\tanh(a + bx))\,dx$

**Optimal**. Leaf size=231

$$-\frac{\text{Li}_3\left(-\frac{(-c-d+1)e^{2a+2bx}}{-c+d+1}\right)}{8b^2}+\frac{\text{Li}_3\left(-\frac{(c+d+1)e^{2a+2bx}}{c-d+1}\right)}{8b^2}+\frac{x\text{Li}_2\left(-\frac{(-c-d+1)e^{2a+2bx}}{-c+d+1}\right)}{4b}-\frac{x\text{Li}_2\left(-\frac{(c+d+1)e^{2a+2bx}}{c-d+1}\right)}{4b}+\frac{1}{4}x^2\log\left(\frac{(-c-d+1}{-c+d}\right.$$

```
[Out] 1/2*x^2*arccoth(c+d*tanh(b*x+a))+1/4*x^2*ln(1+(1-c-d)*exp(2*b*x+2*a)/(1-c+d
))-1/4*x^2*ln(1+(1+c+d)*exp(2*b*x+2*a)/(1+c-d))+1/4*x*polylog(2,-(1-c-d)*ex
p(2*b*x+2*a)/(1-c+d))/b-1/4*x*polylog(2,-(1+c+d)*exp(2*b*x+2*a)/(1+c-d))/b-
1/8*polylog(3,-(1-c-d)*exp(2*b*x+2*a)/(1-c+d))/b^2+1/8*polylog(3,-(1+c+d)*e
xp(2*b*x+2*a)/(1+c-d))/b^2
```

**Rubi [A]** time = 0.38, antiderivative size = 231, normalized size of antiderivative = 1.00, number of steps used = 9, number of rules used = 5, integrand size = 13, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.385, Rules used = {6244, 2190, 2531, 2282, 6589}

$$-\frac{\text{PolyLog}\left(3,-\frac{(-c-d+1)e^{2a+2bx}}{-c+d+1}\right)}{8b^2}+\frac{\text{PolyLog}\left(3,-\frac{(c+d+1)e^{2a+2bx}}{c-d+1}\right)}{8b^2}+\frac{x\text{PolyLog}\left(2,-\frac{(-c-d+1)e^{2a+2bx}}{-c+d+1}\right)}{4b}-\frac{x\text{PolyLog}\left(2,-\frac{(c+d}{}\right.}{4b}$$

Antiderivative was successfully verified.

```
[In] Int[x*ArcCoth[c + d*Tanh[a + b*x]],x]
```

```
[Out] (x^2*ArcCoth[c + d*Tanh[a + b*x]])/2 + (x^2*Log[1 + ((1 - c - d)*E^(2*a + 2
*b*x))/(1 - c + d)])/4 - (x^2*Log[1 + ((1 + c + d)*E^(2*a + 2*b*x))/(1 + c
- d)])/4 + (x*PolyLog[2, -(((1 - c - d)*E^(2*a + 2*b*x))/(1 - c + d))])/(4*
b) - (x*PolyLog[2, -(((1 + c + d)*E^(2*a + 2*b*x))/(1 + c - d))])/(4*b) - P
olyLog[3, -(((1 - c - d)*E^(2*a + 2*b*x))/(1 - c + d))]/(8*b^2) + PolyLog[3
, -(((1 + c + d)*E^(2*a + 2*b*x))/(1 + c - d))]/(8*b^2)
```

Rule 2190

```
Int[(((F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m_.))/
((a_) + (b_.)*((F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)), x_Symbol] :> Simp
[((c + d*x)^m*Log[1 + (b*(F^(g*(e + f*x)))^n)/a])/(b*f*g*n*Log[F]), x] - Di
st[(d*m)/(b*f*g*n*Log[F]), Int[(c + d*x)^(m - 1)*Log[1 + (b*(F^(g*(e + f*x)
))^n)/a], x], x] /; FreeQ[{F, a, b, c, d, e, f, g, n}, x] && IGtQ[m, 0]
```

Rule 2282

```
Int[u_, x_Symbol] :> With[{v = FunctionOfExponential[u, x]}, Dist[v/D[v, x]
, Subst[Int[FunctionOfExponentialFunction[u, x]/x, x], x, v], x]] /; Functi
onOfExponentialQ[u, x] &&  !MatchQ[u, (w_)*((a_.)*(v_)^(n_))^(m_) /; FreeQ[
{a, m, n}, x] && IntegerQ[m*n]] &&  !MatchQ[u, E^((c_.)*((a_.) + (b_.)*x))*
(F_)[v_] /; FreeQ[{a, b, c}, x] && InverseFunctionQ[F[x]]]
```

Rule 2531

```
Int[Log[1 + (e_.)*((F_)^((c_.)*((a_.) + (b_.)*(x_))))^(n_.)]*((f_.) + (g_.)
*(x_))^(m_.), x_Symbol] :> -Simp[((f + g*x)^m*PolyLog[2, -(e*(F^(c*(a + b*x
)))^n)])/(b*c*n*Log[F]), x] + Dist[(g*m)/(b*c*n*Log[F]), Int[(f + g*x)^(m -
 1)*PolyLog[2, -(e*(F^(c*(a + b*x)))^n)], x], x] /; FreeQ[{F, a, b, c, e, f
, g, n}, x] && GtQ[m, 0]
```

Rule 6244

```
Int[ArcCoth[(c_.) + (d_.)*Tanh[(a_.) + (b_.)*(x_)]]*((e_.) + (f_.)*(x_))^(m
_.), x_Symbol] :> Simp[((e + f*x)^(m + 1)*ArcCoth[c + d*Tanh[a + b*x]])/(f*
```

```
(m + 1)), x] + (Dist[(b*(1 - c - d))/(f*(m + 1)), Int[((e + f*x)^(m + 1)*E^
(2*a + 2*b*x))/(1 - c + d + (1 - c - d)*E^(2*a + 2*b*x)), x], x] - Dist[(b*
(1 + c + d))/(f*(m + 1)), Int[((e + f*x)^(m + 1)*E^(2*a + 2*b*x))/(1 + c -
d + (1 + c + d)*E^(2*a + 2*b*x)), x], x]) /; FreeQ[{a, b, c, d, e, f}, x] &
& IGtQ[m, 0] && NeQ[(c - d)^2, 1]
```

Rule 6589

```
Int[PolyLog[n_, (c_.)*((a_.) + (b_.)*(x_))^(p_.)]/((d_.) + (e_.)*(x_)), x_S
ymbol] :> Simp[PolyLog[n + 1, c*(a + b*x)^p]/(e*p), x] /; FreeQ[{a, b, c, d
, e, n, p}, x] && EqQ[b*d, a*e]
```

Rubi steps

$$\int x\coth^{-1}(c+d\tanh(a+bx))\,dx = \frac{1}{2}x^2\coth^{-1}(c+d\tanh(a+bx)) + \frac{1}{2}(b(1-c-d))\int \frac{e^{2a+2bx}x^2}{1-c+d+(1-c-$$

$$= \frac{1}{2}x^2\coth^{-1}(c+d\tanh(a+bx)) + \frac{1}{4}x^2\log\left(1+\frac{(1-c-d)e^{2a+2bx}}{1-c+d}\right) - \frac{1}{4}x^2$$

$$= \frac{1}{2}x^2\coth^{-1}(c+d\tanh(a+bx)) + \frac{1}{4}x^2\log\left(1+\frac{(1-c-d)e^{2a+2bx}}{1-c+d}\right) - \frac{1}{4}x^2$$

$$= \frac{1}{2}x^2\coth^{-1}(c+d\tanh(a+bx)) + \frac{1}{4}x^2\log\left(1+\frac{(1-c-d)e^{2a+2bx}}{1-c+d}\right) - \frac{1}{4}x^2$$

$$= \frac{1}{2}x^2\coth^{-1}(c+d\tanh(a+bx)) + \frac{1}{4}x^2\log\left(1+\frac{(1-c-d)e^{2a+2bx}}{1-c+d}\right) - \frac{1}{4}x^2$$

**Mathematica [A]** time = 0.18, size = 259, normalized size = 1.12

$$2b^2x^2\log\left(\frac{(c-d-1)(\cosh(2(a+bx))-\sinh(2(a+bx)))}{c+d-1}+1\right) - 2b^2x^2\log\left(\frac{(c-d+1)(\cosh(2(a+bx))-\sinh(2(a+bx)))}{c+d+1}+1\right) - 2bx\mathrm{Li}_2\left(\frac{(c-d}{}\right.$$

Antiderivative was successfully verified.

```
[In] Integrate[x*ArcCoth[c + d*Tanh[a + b*x]],x]
```

```
[Out] (x^2*ArcCoth[c + d*Tanh[a + b*x]])/2 + (2*b^2*x^2*Log[1 + ((-1 + c - d)*(Co
sh[2*(a + b*x)] - Sinh[2*(a + b*x)]))/(-1 + c + d)] - 2*b^2*x^2*Log[1 + ((1
 + c - d)*(Cosh[2*(a + b*x)] - Sinh[2*(a + b*x)]))/(1 + c + d)] - 2*b*x*Pol
yLog[2, ((-1 + c - d)*(-Cosh[2*(a + b*x)] + Sinh[2*(a + b*x)]))/(-1 + c + d
)] + 2*b*x*PolyLog[2, ((1 + c - d)*(-Cosh[2*(a + b*x)] + Sinh[2*(a + b*x)])
)/(1 + c + d)] - PolyLog[3, ((-1 + c - d)*(-Cosh[2*(a + b*x)] + Sinh[2*(a +
 b*x)]))/(-1 + c + d)] + PolyLog[3, ((1 + c - d)*(-Cosh[2*(a + b*x)] + Sinh
[2*(a + b*x)]))/(1 + c + d)])/(8*b^2)
```

**fricas [C]** time = 0.75, size = 745, normalized size = 3.23

$$b^2x^2\log\left(\frac{(c+1)\cosh(bx+a)+d\sinh(bx+a)}{(c-1)\cosh(bx+a)+d\sinh(bx+a)}\right) - 2\,bx\mathrm{Li}_2\left(\sqrt{-\frac{c+d+1}{c-d+1}}\left(\cosh(bx+a)+\sinh(bx+a)\right)\right) - 2\,bx\mathrm{Li}_2\left(-\sqrt{-\frac{c+d+}{c-d+}}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*arccoth(c+d*tanh(b*x+a)),x, algorithm="fricas")
```

```
[Out] 1/4*(b^2*x^2*log(((c + 1)*cosh(b*x + a) + d*sinh(b*x + a))/((c - 1)*cosh(b*
x + a) + d*sinh(b*x + a))) - 2*b*x*dilog(sqrt(-(c + d + 1)/(c - d + 1))*(co
sh(b*x + a) + sinh(b*x + a))) - 2*b*x*dilog(-sqrt(-(c + d + 1)/(c - d + 1))
*(cosh(b*x + a) + sinh(b*x + a))) + 2*b*x*dilog(sqrt(-(c + d - 1)/(c - d -
1))*(cosh(b*x + a) + sinh(b*x + a))) + 2*b*x*dilog(-sqrt(-(c + d - 1)/(c -
d - 1))*(cosh(b*x + a) + sinh(b*x + a))) - a^2*log(2*(c + d + 1)*cosh(b*x +
 a) + 2*(c + d + 1)*sinh(b*x + a) + 2*(c - d + 1)*sqrt(-(c + d + 1)/(c - d
+ 1))) - a^2*log(2*(c + d + 1)*cosh(b*x + a) + 2*(c + d + 1)*sinh(b*x + a)
- 2*(c - d + 1)*sqrt(-(c + d + 1)/(c - d + 1))) + a^2*log(2*(c + d - 1)*cos
h(b*x + a) + 2*(c + d - 1)*sinh(b*x + a) + 2*(c - d - 1)*sqrt(-(c + d - 1)/
(c - d - 1))) + a^2*log(2*(c + d - 1)*cosh(b*x + a) + 2*(c + d - 1)*sinh(b*
x + a) - 2*(c - d - 1)*sqrt(-(c + d - 1)/(c - d - 1))) - (b^2*x^2 - a^2)*lo
g(sqrt(-(c + d + 1)/(c - d + 1))*(cosh(b*x + a) + sinh(b*x + a)) + 1) - (b^
2*x^2 - a^2)*log(-sqrt(-(c + d + 1)/(c - d + 1))*(cosh(b*x + a) + sinh(b*x
+ a)) + 1) + (b^2*x^2 - a^2)*log(sqrt(-(c + d - 1)/(c - d - 1))*(cosh(b*x +
 a) + sinh(b*x + a)) + 1) + (b^2*x^2 - a^2)*log(-sqrt(-(c + d - 1)/(c - d -
 1))*(cosh(b*x + a) + sinh(b*x + a)) + 1) + 2*polylog(3, sqrt(-(c + d + 1)/
(c - d + 1))*(cosh(b*x + a) + sinh(b*x + a))) + 2*polylog(3, -sqrt(-(c + d
+ 1)/(c - d + 1))*(cosh(b*x + a) + sinh(b*x + a))) - 2*polylog(3, sqrt(-(c
+ d - 1)/(c - d - 1))*(cosh(b*x + a) + sinh(b*x + a))) - 2*polylog(3, -sqrt
(-(c + d - 1)/(c - d - 1))*(cosh(b*x + a) + sinh(b*x + a))))/b^2
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int x \operatorname{arcoth}(d \tanh(bx + a) + c) \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*arccoth(c+d*tanh(b*x+a)),x, algorithm="giac")
```

```
[Out] integrate(x*arccoth(d*tanh(b*x + a) + c), x)
```

**maple [C]** time = 3.58, size = 4990, normalized size = 21.60

output too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x*arccoth(c+d*tanh(b*x+a)),x)
```

```
[Out] 1/4*x^2*ln((exp(2*b*x+2*a)+1)*c+(exp(2*b*x+2*a)-1)*d+exp(2*b*x+2*a)+1)-1/2/
b/(1+c+d)*ln(1-(1+c+d)*exp(2*b*x+2*a)/(-1-c+d))*x*a-1/4/b^2*c/(1+c+d)*ln(1-
(1+c+d)*exp(2*b*x+2*a)/(-1-c+d))*a^2-1/4/b^2*c/(1+c+d)*polylog(2,(1+c+d)*ex
p(2*b*x+2*a)/(-1-c+d))*a-1/4/b^2*d/(1+c+d)*ln(1-(1+c+d)*exp(2*b*x+2*a)/(-1-
c+d))*a^2-1/4/b^2*d/(1+c+d)*polylog(2,(1+c+d)*exp(2*b*x+2*a)/(-1-c+d))*a+1/
2/b^2*a^2*c/(1+c+d)*ln((-c*exp(b*x+a)-exp(b*x+a)*d+(-(1+c-d)*(1+c+d))^(1/2)
-exp(b*x+a))/(-(1+c-d)*(1+c+d))^(1/2))+1/8/b^2/(c+d-1)*polylog(3,(c+d-1)*ex
p(2*b*x+2*a)/(1-c+d))-1/4/(c+d-1)*ln(1-(c+d-1)*exp(2*b*x+2*a)/(1-c+d))*x^2-
1/4/b^2*a^2/(1+c+d)*ln(c*exp(2*b*x+2*a)+d*exp(2*b*x+2*a)+exp(2*b*x+2*a)+c-d
+1)+1/4/b^2*c*a^2/(c+d-1)*ln(c*exp(2*b*x+2*a)+d*exp(2*b*x+2*a)-exp(2*b*x+2*
a)+c-d-1)+1/4/b^2*d*a^2/(c+d-1)*ln(c*exp(2*b*x+2*a)+d*exp(2*b*x+2*a)-exp(2*
b*x+2*a)+c-d-1)+1/8*I*Pi*x^2*csgn(I*((exp(2*b*x+2*a)+1)*c+(exp(2*b*x+2*a)-1
)*d-exp(2*b*x+2*a)-1)/(exp(2*b*x+2*a)+1))^3-1/4*x^2*ln((exp(2*b*x+2*a)+1)*c
+(exp(2*b*x+2*a)-1)*d-exp(2*b*x+2*a)-1)-1/4/b^2*a^2/(c+d-1)*ln(c*exp(2*b*x+
2*a)+d*exp(2*b*x+2*a)-exp(2*b*x+2*a)+c-d-1)+1/2/b^2*a^2*c/(1+c+d)*ln((c*exp
(b*x+a)+exp(b*x+a)*d+(-(1+c-d)*(1+c+d))^(1/2)+exp(b*x+a))/(-(1+c-d)*(1+c+d)
)^(1/2))+1/8/b^2/(1+c+d)*polylog(3,(1+c+d)*exp(2*b*x+2*a)/(-1-c+d))-1/4/(1+
c+d)*ln(1-(1+c+d)*exp(2*b*x+2*a)/(-1-c+d))*x^2-1/8*I*Pi*x^2*csgn(I*((exp(2*
b*x+2*a)+1)*c+(exp(2*b*x+2*a)-1)*d+exp(2*b*x+2*a)+1)/(exp(2*b*x+2*a)+1))^3-
1/4*c/(1+c+d)*ln(1-(1+c+d)*exp(2*b*x+2*a)/(-1-c+d))*x^2-1/4*d/(1+c+d)*ln(1-
(1+c+d)*exp(2*b*x+2*a)/(-1-c+d))*x^2+1/2/b^2*a/(1+c+d)*dilog((-c*exp(b*x+a)
```

```
-exp(b*x+a)*d+(-(1+c-d)*(1+c+d))^(1/2)-exp(b*x+a))/(-(1+c-d)*(1+c+d))^(1/2)
)+1/2/b^2*a/(1+c+d)*dilog((c*exp(b*x+a)+exp(b*x+a)*d+(-(1+c-d)*(1+c+d))^(1/
2)+exp(b*x+a))/(-(1+c-d)*(1+c+d))^(1/2))+1/8/b^2*d/(1+c+d)*polylog(3,(1+c+d
)*exp(2*b*x+2*a)/(-1-c+d))+1/8/b^2*c/(1+c+d)*polylog(3,(1+c+d)*exp(2*b*x+2*
a)/(-1-c+d))+1/2/b^2*a^2/(1+c+d)*ln((-c*exp(b*x+a)-exp(b*x+a)*d+(-(1+c-d)*(
1+c+d))^(1/2)-exp(b*x+a))/(-(1+c-d)*(1+c+d))^(1/2))+1/2/b^2*a^2/(1+c+d)*ln(
(c*exp(b*x+a)+exp(b*x+a)*d+(-(1+c-d)*(1+c+d))^(1/2)+exp(b*x+a))/(-(1+c-d)*(
1+c+d))^(1/2))-1/4/b^2/(1+c+d)*ln(1-(1+c+d)*exp(2*b*x+2*a)/(-1-c+d))*a^2-1/
4/b^2/(1+c+d)*polylog(2,(1+c+d)*exp(2*b*x+2*a)/(-1-c+d))*a-1/4/b/(1+c+d)*po
lylog(2,(1+c+d)*exp(2*b*x+2*a)/(-1-c+d))*x+1/4*c/(c+d-1)*ln(1-(c+d-1)*exp(2
*b*x+2*a)/(1-c+d))*x^2+1/4*d/(c+d-1)*ln(1-(c+d-1)*exp(2*b*x+2*a)/(1-c+d))*x
^2-1/8/b^2*c/(c+d-1)*polylog(3,(c+d-1)*exp(2*b*x+2*a)/(1-c+d))-1/8/b^2*d/(c
+d-1)*polylog(3,(c+d-1)*exp(2*b*x+2*a)/(1-c+d))+1/2/b^2*a/(c+d-1)*dilog((-c
*exp(b*x+a)-exp(b*x+a)*d+(-(c-d-1)*(c+d-1))^(1/2)+exp(b*x+a))/(-(c-d-1)*(c+
d-1))^(1/2))+1/2/b^2*a/(c+d-1)*dilog((c*exp(b*x+a)+exp(b*x+a)*d+(-(c-d-1)*(
c+d-1))^(1/2)-exp(b*x+a))/(-(c-d-1)*(c+d-1))^(1/2))-1/4/b^2/(c+d-1)*ln(1-(c
+d-1)*exp(2*b*x+2*a)/(1-c+d))*a^2-1/4/b/(c+d-1)*polylog(2,(c+d-1)*exp(2*b*x
+2*a)/(1-c+d))*x-1/4/b^2/(c+d-1)*polylog(2,(c+d-1)*exp(2*b*x+2*a)/(1-c+d))*
a+1/2/b^2*a^2/(c+d-1)*ln((-c*exp(b*x+a)-exp(b*x+a)*d+(-(c-d-1)*(c+d-1))^(1/
2)+exp(b*x+a))/(-(c-d-1)*(c+d-1))^(1/2))+1/2/b^2*a^2/(c+d-1)*ln((c*exp(b*x+
a)+exp(b*x+a)*d+(-(c-d-1)*(c+d-1))^(1/2)-exp(b*x+a))/(-(c-d-1)*(c+d-1))^(1/
2))-1/2/b/(c+d-1)*ln(1-(c+d-1)*exp(2*b*x+2*a)/(1-c+d))*x*a+1/2/b*a/(c+d-1)*
ln((-c*exp(b*x+a)-exp(b*x+a)*d+(-(c-d-1)*(c+d-1))^(1/2)+exp(b*x+a))/(-(c-d-
1)*(c+d-1))^(1/2))*x+1/2/b*a/(c+d-1)*ln((c*exp(b*x+a)+exp(b*x+a)*d+(-(c-d-1
)*(c+d-1))^(1/2)-exp(b*x+a))/(-(c-d-1)*(c+d-1))^(1/2))*x-1/2/b^2*c*a^2/(c+d
-1)*ln((-c*exp(b*x+a)-exp(b*x+a)*d+(-(c-d-1)*(c+d-1))^(1/2)+exp(b*x+a))/(-(
c-d-1)*(c+d-1))^(1/2))-1/2/b^2*c*a^2/(c+d-1)*ln((c*exp(b*x+a)+exp(b*x+a)*d+
(-(c-d-1)*(c+d-1))^(1/2)-exp(b*x+a))/(-(c-d-1)*(c+d-1))^(1/2))-1/2/b^2*d*a^
2/(c+d-1)*ln((-c*exp(b*x+a)-exp(b*x+a)*d+(-(c-d-1)*(c+d-1))^(1/2)+exp(b*x+a
))/(-(c-d-1)*(c+d-1))^(1/2))-1/2/b^2*d*a^2/(c+d-1)*ln((c*exp(b*x+a)+exp(b*x
+a)*d+(-(c-d-1)*(c+d-1))^(1/2)-exp(b*x+a))/(-(c-d-1)*(c+d-1))^(1/2))-1/2/b^
2*c*a/(c+d-1)*dilog((-c*exp(b*x+a)-exp(b*x+a)*d+(-(c-d-1)*(c+d-1))^(1/2)+ex
p(b*x+a))/(-(c-d-1)*(c+d-1))^(1/2))-1/2/b^2*c*a/(c+d-1)*dilog((c*exp(b*x+a)
+exp(b*x+a)*d+(-(c-d-1)*(c+d-1))^(1/2)-exp(b*x+a))/(-(c-d-1)*(c+d-1))^(1/2)
)-1/2/b^2*d*a/(c+d-1)*dilog((-c*exp(b*x+a)-exp(b*x+a)*d+(-(c-d-1)*(c+d-1))^
(1/2)+exp(b*x+a))/(-(c-d-1)*(c+d-1))^(1/2))-1/2/b^2*d*a/(c+d-1)*dilog((c*ex
p(b*x+a)+exp(b*x+a)*d+(-(c-d-1)*(c+d-1))^(1/2)-exp(b*x+a))/(-(c-d-1)*(c+d-1
))^(1/2))+1/4/b^2*c/(c+d-1)*ln(1-(c+d-1)*exp(2*b*x+2*a)/(1-c+d))*a^2+1/4/b*
c/(c+d-1)*polylog(2,(c+d-1)*exp(2*b*x+2*a)/(1-c+d))*x+1/4/b^2*c/(c+d-1)*pol
ylog(2,(c+d-1)*exp(2*b*x+2*a)/(1-c+d))*a+1/4/b^2*d/(c+d-1)*ln(1-(c+d-1)*exp
(2*b*x+2*a)/(1-c+d))*a^2+1/4/b*d/(c+d-1)*polylog(2,(c+d-1)*exp(2*b*x+2*a)/(
1-c+d))*x+1/4/b^2*d/(c+d-1)*polylog(2,(c+d-1)*exp(2*b*x+2*a)/(1-c+d))*a-1/4
/b^2*a^2*c/(1+c+d)*ln(c*exp(2*b*x+2*a)+d*exp(2*b*x+2*a)+exp(2*b*x+2*a)+c-d+
1)-1/4/b^2*a^2*d/(1+c+d)*ln(c*exp(2*b*x+2*a)+d*exp(2*b*x+2*a)+exp(2*b*x+2*a
)+c-d+1)+1/8*I*Pi*x^2*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*((exp(2*b*x+2*a)+1)
*c+(exp(2*b*x+2*a)-1)*d+exp(2*b*x+2*a)+1)/(exp(2*b*x+2*a)+1))^2-1/8*I*Pi*x^
2*csgn(I*((exp(2*b*x+2*a)+1)*c+(exp(2*b*x+2*a)-1)*d-exp(2*b*x+2*a)-1))*csgn
(I*((exp(2*b*x+2*a)+1)*c+(exp(2*b*x+2*a)-1)*d-exp(2*b*x+2*a)-1)/(exp(2*b*x+
2*a)+1))^2+1/8*I*Pi*x^2*csgn(I*((exp(2*b*x+2*a)+1)*c+(exp(2*b*x+2*a)-1)*d+e
xp(2*b*x+2*a)+1))*csgn(I*((exp(2*b*x+2*a)+1)*c+(exp(2*b*x+2*a)-1)*d+exp(2*b
*x+2*a)+1)/(exp(2*b*x+2*a)+1))^2+1/2/b^2*a*c/(1+c+d)*dilog((c*exp(b*x+a)+ex
p(b*x+a)*d+(-(1+c-d)*(1+c+d))^(1/2)+exp(b*x+a))/(-(1+c-d)*(1+c+d))^(1/2))+1
/2/b^2*a*d/(1+c+d)*dilog((-c*exp(b*x+a)-exp(b*x+a)*d+(-(1+c-d)*(1+c+d))^(1/
2)-exp(b*x+a))/(-(1+c-d)*(1+c+d))^(1/2))+1/2/b^2*a*d/(1+c+d)*dilog((c*exp(b
*x+a)+exp(b*x+a)*d+(-(1+c-d)*(1+c+d))^(1/2)+exp(b*x+a))/(-(1+c-d)*(1+c+d))^
(1/2))+1/2/b^2*a*c/(1+c+d)*dilog((-c*exp(b*x+a)-exp(b*x+a)*d+(-(1+c-d)*(1+c
+d))^(1/2)-exp(b*x+a))/(-(1+c-d)*(1+c+d))^(1/2))+1/2/b^2*a^2*d/(1+c+d)*ln((
-c*exp(b*x+a)-exp(b*x+a)*d+(-(1+c-d)*(1+c+d))^(1/2)-exp(b*x+a))/(-(1+c-d)*(
1+c+d))^(1/2))+1/2/b^2*a^2*d/(1+c+d)*ln((c*exp(b*x+a)+exp(b*x+a)*d+(-(1+c-d
```

```
)*(1+c+d))^(1/2)+exp(b*x+a))/(-(1+c-d)*(1+c+d))^(1/2))-1/4/b*c/(1+c+d)*poly
log(2,(1+c+d)*exp(2*b*x+2*a)/(-1-c+d))*x-1/4/b*d/(1+c+d)*polylog(2,(1+c+d)*
exp(2*b*x+2*a)/(-1-c+d))*x+1/2/b*a/(1+c+d)*ln((-c*exp(b*x+a)-exp(b*x+a)*d+(
-(1+c-d)*(1+c+d))^(1/2)-exp(b*x+a))/(-(1+c-d)*(1+c+d))^(1/2))*x+1/2/b*a/(1+
c+d)*ln((c*exp(b*x+a)+exp(b*x+a)*d+(-(1+c-d)*(1+c+d))^(1/2)+exp(b*x+a))/(-(
1+c-d)*(1+c+d))^(1/2))*x-1/8*I*Pi*x^2*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*((e
xp(2*b*x+2*a)+1)*c+(exp(2*b*x+2*a)-1)*d-exp(2*b*x+2*a)-1)/(exp(2*b*x+2*a)+1
))^2-1/2/b*c/(1+c+d)*ln(1-(1+c+d)*exp(2*b*x+2*a)/(-1-c+d))*x*a-1/2/b*d/(1+c
+d)*ln(1-(1+c+d)*exp(2*b*x+2*a)/(-1-c+d))*x*a+1/2/b*a*c/(1+c+d)*ln((-c*exp(
b*x+a)-exp(b*x+a)*d+(-(1+c-d)*(1+c+d))^(1/2)-exp(b*x+a))/(-(1+c-d)*(1+c+d))
^(1/2))*x+1/2/b*a*c/(1+c+d)*ln((c*exp(b*x+a)+exp(b*x+a)*d+(-(1+c-d)*(1+c+d)
)^(1/2)+exp(b*x+a))/(-(1+c-d)*(1+c+d))^(1/2))*x+1/2/b*a*d/(1+c+d)*ln((-c*ex
p(b*x+a)-exp(b*x+a)*d+(-(1+c-d)*(1+c+d))^(1/2)-exp(b*x+a))/(-(1+c-d)*(1+c+d
))^(1/2))*x+1/2/b*a*d/(1+c+d)*ln((c*exp(b*x+a)+exp(b*x+a)*d+(-(1+c-d)*(1+c+
d))^(1/2)+exp(b*x+a))/(-(1+c-d)*(1+c+d))^(1/2))*x+1/8*I*Pi*x^2*csgn(I/(exp(
2*b*x+2*a)+1))*csgn(I*((exp(2*b*x+2*a)+1)*c+(exp(2*b*x+2*a)-1)*d-exp(2*b*x+
2*a)-1))*csgn(I*((exp(2*b*x+2*a)+1)*c+(exp(2*b*x+2*a)-1)*d-exp(2*b*x+2*a)-1
)/(exp(2*b*x+2*a)+1))-1/8*I*Pi*x^2*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*((exp(
2*b*x+2*a)+1)*c+(exp(2*b*x+2*a)-1)*d+exp(2*b*x+2*a)+1))*csgn(I*((exp(2*b*x+
2*a)+1)*c+(exp(2*b*x+2*a)-1)*d+exp(2*b*x+2*a)+1)/(exp(2*b*x+2*a)+1))+1/2/b*
c/(c+d-1)*ln(1-(c+d-1)*exp(2*b*x+2*a)/(1-c+d))*x*a+1/2/b*d/(c+d-1)*ln(1-(c+
d-1)*exp(2*b*x+2*a)/(1-c+d))*x*a-1/2/b*c*a/(c+d-1)*ln((-c*exp(b*x+a)-exp(b*
x+a)*d+(-(c-d-1)*(c+d-1))^(1/2)+exp(b*x+a))/(-(c-d-1)*(c+d-1))^(1/2))*x-1/2
/b*c*a/(c+d-1)*ln((c*exp(b*x+a)+exp(b*x+a)*d+(-(c-d-1)*(c+d-1))^(1/2)-exp(b
*x+a))/(-(c-d-1)*(c+d-1))^(1/2))*x-1/2/b*d*a/(c+d-1)*ln((-c*exp(b*x+a)-exp(
b*x+a)*d+(-(c-d-1)*(c+d-1))^(1/2)+exp(b*x+a))/(-(c-d-1)*(c+d-1))^(1/2))*x-1
/2/b*d*a/(c+d-1)*ln((c*exp(b*x+a)+exp(b*x+a)*d+(-(c-d-1)*(c+d-1))^(1/2)-exp
(b*x+a))/(-(c-d-1)*(c+d-1))^(1/2))*x
```

**maxima** [A] time = 0.71, size = 215, normalized size = 0.93

$$-\frac{1}{8}\,bd\left(\frac{2\,b^2x^2\log\left(\frac{(c+d+1)e^{(2\,bx+2\,a)}}{c-d+1}+1\right)+2\,bx\mathrm{Li}_2\left(-\frac{(c+d+1)e^{(2\,bx+2\,a)}}{c-d+1}\right)-\mathrm{Li}_3(-\frac{(c+d+1)e^{(2\,bx+2\,a)}}{c-d+1})}{b^3d}-\frac{2\,b^2x^2\log\left(\frac{(c+d-1)e^{(2\,bx}}{c-d-1}\right.}{}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*arccoth(c+d*tanh(b*x+a)),x, algorithm="maxima")
```

```
[Out] -1/8*b*d*((2*b^2*x^2*log((c + d + 1)*e^(2*b*x + 2*a)/(c - d + 1) + 1) + 2*b
*x*dilog(-(c + d + 1)*e^(2*b*x + 2*a)/(c - d + 1)) - polylog(3, -(c + d + 1
)*e^(2*b*x + 2*a)/(c - d + 1)))/(b^3*d) - (2*b^2*x^2*log((c + d - 1)*e^(2*b
*x + 2*a)/(c - d - 1) + 1) + 2*b*x*dilog(-(c + d - 1)*e^(2*b*x + 2*a)/(c -
d - 1)) - polylog(3, -(c + d - 1)*e^(2*b*x + 2*a)/(c - d - 1)))/(b^3*d)) +
1/2*x^2*arccoth(d*tanh(b*x + a) + c)
```

**mupad** [F] time = 0.00, size = -1, normalized size = -0.00

$$\int x\,\mathrm{acoth}\left(c+d\tanh\left(a+b\,x\right)\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x*acoth(c + d*tanh(a + b*x)),x)
```

```
[Out] int(x*acoth(c + d*tanh(a + b*x)), x)
```

**sympy** [F] time = 0.00, size = 0, normalized size = 0.00

$$\int x\,\mathrm{acoth}\,(c+d\tanh\,(a+bx))\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*acoth(c+d*tanh(b*x+a)),x)
[Out] Integral(x*acoth(c + d*tanh(a + b*x)), x)
```

# 3.205 $\int \coth^{-1}(c + d\tanh(a + bx))\,dx$

**Optimal**. Leaf size=150

$$\frac{\text{Li}_2\left(-\frac{(-c-d+1)e^{2a+2bx}}{-c+d+1}\right)}{4b}-\frac{\text{Li}_2\left(-\frac{(c+d+1)e^{2a+2bx}}{c-d+1}\right)}{4b}+\frac{1}{2}x\log\left(\frac{(-c-d+1)e^{2a+2bx}}{-c+d+1}+1\right)-\frac{1}{2}x\log\left(\frac{(c+d+1)e^{2a+2bx}}{c-d+1}+1\right)+x$$

```
[Out] x*arccoth(c+d*tanh(b*x+a))+1/2*x*ln(1+(1-c-d)*exp(2*b*x+2*a)/(1-c+d))-1/2*x
*ln(1+(1+c+d)*exp(2*b*x+2*a)/(1+c-d))+1/4*polylog(2,-(1-c-d)*exp(2*b*x+2*a)
/(1-c+d))/b-1/4*polylog(2,-(1+c+d)*exp(2*b*x+2*a)/(1+c-d))/b
```

**Rubi [A]** time = 0.23, antiderivative size = 150, normalized size of antiderivative = 1.00, number of steps used = 7, number of rules used = 4, integrand size = 11, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.364, Rules used = {6236, 2190, 2279, 2391}

$$\frac{\text{PolyLog}\left(2,-\frac{(-c-d+1)e^{2a+2bx}}{-c+d+1}\right)}{4b}-\frac{\text{PolyLog}\left(2,-\frac{(c+d+1)e^{2a+2bx}}{c-d+1}\right)}{4b}+\frac{1}{2}x\log\left(\frac{(-c-d+1)e^{2a+2bx}}{-c+d+1}+1\right)-\frac{1}{2}x\log\left(\frac{(c+d+1}{c-d}\right.$$

Antiderivative was successfully verified.

```
[In] Int[ArcCoth[c + d*Tanh[a + b*x]],x]
```

```
[Out] x*ArcCoth[c + d*Tanh[a + b*x]] + (x*Log[1 + ((1 - c - d)*E^(2*a + 2*b*x))/(
1 - c + d)])/2 - (x*Log[1 + ((1 + c + d)*E^(2*a + 2*b*x))/(1 + c - d)])/2 +
 PolyLog[2, -(((1 - c - d)*E^(2*a + 2*b*x))/(1 - c + d))]/(4*b) - PolyLog[2
, -(((1 + c + d)*E^(2*a + 2*b*x))/(1 + c - d))]/(4*b)
```

Rule 2190

```
Int[(((F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m_.))/
((a_) + (b_.)*((F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)), x_Symbol] :> Simp
[((c + d*x)^m*Log[1 + (b*(F^(g*(e + f*x)))^n)/a])/(b*f*g*n*Log[F]), x] - Di
st[(d*m)/(b*f*g*n*Log[F]), Int[(c + d*x)^(m - 1)*Log[1 + (b*(F^(g*(e + f*x)
))^n)/a], x], x] /; FreeQ[{F, a, b, c, d, e, f, g, n}, x] && IGtQ[m, 0]
```

Rule 2279

```
Int[Log[(a_) + (b_.)*((F_)^((e_.)*((c_.) + (d_.)*(x_))))^(n_.)], x_Symbol]
:> Dist[1/(d*e*n*Log[F]), Subst[Int[Log[a + b*x]/x, x], x, (F^(e*(c + d*x))
)^n], x] /; FreeQ[{F, a, b, c, d, e, n}, x] && GtQ[a, 0]
```

Rule 2391

```
Int[Log[(c_.)*((d_) + (e_.)*(x_)^(n_.))]/(x_), x_Symbol] :> -Simp[PolyLog[2
, -(c*e*x^n)]/n, x] /; FreeQ[{c, d, e, n}, x] && EqQ[c*d, 1]
```

Rule 6236

```
Int[ArcCoth[(c_.) + (d_.)*Tanh[(a_.) + (b_.)*(x_)]], x_Symbol] :> Simp[x*Ar
cCoth[c + d*Tanh[a + b*x]], x] + (Dist[b*(1 - c - d), Int[(x*E^(2*a + 2*b*x
))/(1 - c + d + (1 - c - d)*E^(2*a + 2*b*x)), x], x] - Dist[b*(1 + c + d),
Int[(x*E^(2*a + 2*b*x))/(1 + c - d + (1 + c + d)*E^(2*a + 2*b*x)), x], x])
/; FreeQ[{a, b, c, d}, x] && NeQ[(c - d)^2, 1]
```

Rubi steps

$$\int \coth^{-1}(c + d\tanh(a + bx))\,dx = x\coth^{-1}(c + d\tanh(a + bx)) + (b(1 - c - d))\int \frac{e^{2a+2bx}x}{1 - c + d + (1 - c - d)e^{2a+}}$$

$$= x\coth^{-1}(c + d\tanh(a + bx)) + \frac{1}{2}x\log\left(1 + \frac{(1 - c - d)e^{2a+2bx}}{1 - c + d}\right) - \frac{1}{2}x\log\Big(1$$

$$= x\coth^{-1}(c + d\tanh(a + bx)) + \frac{1}{2}x\log\left(1 + \frac{(1 - c - d)e^{2a+2bx}}{1 - c + d}\right) - \frac{1}{2}x\log\Big(1$$

$$= x\coth^{-1}(c + d\tanh(a + bx)) + \frac{1}{2}x\log\left(1 + \frac{(1 - c - d)e^{2a+2bx}}{1 - c + d}\right) - \frac{1}{2}x\log\Big(1$$

**Mathematica [A]** time = 1.42, size = 131, normalized size = 0.87

$$\frac{\text{Li}_2\left(-\frac{(c+d-1)e^{2(a+bx)}}{c-d-1}\right) - \text{Li}_2\left(-\frac{(c+d+1)e^{2(a+bx)}}{c-d+1}\right) + 2bx\left(\log\left(\frac{(c+d-1)e^{2(a+bx)}}{c-d-1} + 1\right) - \log\left(\frac{(c+d+1)e^{2(a+bx)}}{c-d+1} + 1\right)\right)}{4b} + x\coth^{-1}($$

Antiderivative was successfully verified.

```
[In] Integrate[ArcCoth[c + d*Tanh[a + b*x]],x]
```

```
[Out] x*ArcCoth[c + d*Tanh[a + b*x]] + (2*b*x*(Log[1 + ((-1 + c + d)*E^(2*(a + b*
x)))/(-1 + c - d)] - Log[1 + ((1 + c + d)*E^(2*(a + b*x)))/(1 + c - d)]) +
PolyLog[2, -(((-1 + c + d)*E^(2*(a + b*x)))/(-1 + c - d))] - PolyLog[2, -((
(1 + c + d)*E^(2*(a + b*x)))/(1 + c - d))])/(4*b)
```

**fricas [B]** time = 0.85, size = 551, normalized size = 3.67

$$\frac{bx\log\left(\frac{(c+1)\cosh(bx+a)+d\sinh(bx+a)}{(c-1)\cosh(bx+a)+d\sinh(bx+a)}\right) + a\log\Big(2\,(c + d + 1)\cosh\,(bx + a) + 2\,(c + d + 1)\sinh\,(bx + a) + 2\,(c - d +}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(c+d*tanh(b*x+a)),x, algorithm="fricas")
```

```
[Out] 1/2*(b*x*log(((c + 1)*cosh(b*x + a) + d*sinh(b*x + a))/((c - 1)*cosh(b*x +
a) + d*sinh(b*x + a))) + a*log(2*(c + d + 1)*cosh(b*x + a) + 2*(c + d + 1)*
sinh(b*x + a) + 2*(c - d + 1)*sqrt(-(c + d + 1)/(c - d + 1))) + a*log(2*(c
+ d + 1)*cosh(b*x + a) + 2*(c + d + 1)*sinh(b*x + a) - 2*(c - d + 1)*sqrt(-
(c + d + 1)/(c - d + 1))) - a*log(2*(c + d - 1)*cosh(b*x + a) + 2*(c + d -
1)*sinh(b*x + a) + 2*(c - d - 1)*sqrt(-(c + d - 1)/(c - d - 1))) - a*log(2*
(c + d - 1)*cosh(b*x + a) + 2*(c + d - 1)*sinh(b*x + a) - 2*(c - d - 1)*sqr
t(-(c + d - 1)/(c - d - 1))) - (b*x + a)*log(sqrt(-(c + d + 1)/(c - d + 1))
*(cosh(b*x + a) + sinh(b*x + a)) + 1) - (b*x + a)*log(-sqrt(-(c + d + 1)/(c
 - d + 1))*(cosh(b*x + a) + sinh(b*x + a)) + 1) + (b*x + a)*log(sqrt(-(c +
d - 1)/(c - d - 1))*(cosh(b*x + a) + sinh(b*x + a)) + 1) + (b*x + a)*log(-s
qrt(-(c + d - 1)/(c - d - 1))*(cosh(b*x + a) + sinh(b*x + a)) + 1) - dilog(
sqrt(-(c + d + 1)/(c - d + 1))*(cosh(b*x + a) + sinh(b*x + a))) - dilog(-sq
rt(-(c + d + 1)/(c - d + 1))*(cosh(b*x + a) + sinh(b*x + a))) + dilog(sqrt(
-(c + d - 1)/(c - d - 1))*(cosh(b*x + a) + sinh(b*x + a))) + dilog(-sqrt(-(
c + d - 1)/(c - d - 1))*(cosh(b*x + a) + sinh(b*x + a))))/b
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \text{arcoth}\,(d\tanh\,(bx + a) + c)\;dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(c+d*tanh(b*x+a)),x, algorithm="giac")
```

```
[Out] integrate(arccoth(d*tanh(b*x + a) + c), x)
```

**maple [B]** time = 0.35, size = 306, normalized size = 2.04

$$-\frac{\operatorname{arccoth}(c+d\tanh(bx+a))\ln(d\tanh(bx+a)-d)}{2b}+\frac{\operatorname{arccoth}(c+d\tanh(bx+a))\ln(d\tanh(bx+a)+d)}{2b}+-$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(arccoth(c+d*tanh(b*x+a)),x)
```

```
[Out] -1/2/b*arccoth(c+d*tanh(b*x+a))*ln(d*tanh(b*x+a)-d)+1/2/b*arccoth(c+d*tanh(
b*x+a))*ln(d*tanh(b*x+a)+d)+1/4/b*dilog((d*tanh(b*x+a)+c+1)/(1+c+d))+1/4/b*
ln(d*tanh(b*x+a)-d)*ln((d*tanh(b*x+a)+c+1)/(1+c+d))-1/4/b*dilog((d*tanh(b*x
+a)+c-1)/(c+d-1))-1/4/b*ln(d*tanh(b*x+a)-d)*ln((d*tanh(b*x+a)+c-1)/(c+d-1))
+1/4/b*dilog((d*tanh(b*x+a)+c-1)/(c-d-1))+1/4/b*ln(d*tanh(b*x+a)+d)*ln((d*t
anh(b*x+a)+c-1)/(c-d-1))-1/4/b*dilog((d*tanh(b*x+a)+c+1)/(1+c-d))-1/4/b*ln(
d*tanh(b*x+a)+d)*ln((d*tanh(b*x+a)+c+1)/(1+c-d))
```

**maxima [A]** time = 0.69, size = 142, normalized size = 0.95

$$-\frac{1}{4}\,bd\left(\frac{2\,bx\log\left(\frac{(c+d+1)e^{(2\,bx+2\,a)}}{c-d+1}+1\right)+\operatorname{Li}_2\left(-\frac{(c+d+1)e^{(2\,bx+2\,a)}}{c-d+1}\right)}{b^2d}-\frac{2\,bx\log\left(\frac{(c+d-1)e^{(2\,bx+2\,a)}}{c-d-1}+1\right)+\operatorname{Li}_2\left(-\frac{(c+d-1)e^{(2\,bx+2\,a)}}{c-d-1}\right.}{b^2d}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(c+d*tanh(b*x+a)),x, algorithm="maxima")
```

```
[Out] -1/4*b*d*((2*b*x*log((c + d + 1)*e^(2*b*x + 2*a)/(c - d + 1) + 1) + dilog(-
(c + d + 1)*e^(2*b*x + 2*a)/(c - d + 1)))/(b^2*d) - (2*b*x*log((c + d - 1)*
e^(2*b*x + 2*a)/(c - d - 1) + 1) + dilog(-(c + d - 1)*e^(2*b*x + 2*a)/(c -
d - 1)))/(b^2*d)) + x*arccoth(d*tanh(b*x + a) + c)
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.01

$$\int \operatorname{acoth}\left(c+d\tanh\left(a+b\,x\right)\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(c + d*tanh(a + b*x)),x)
```

```
[Out] int(acoth(c + d*tanh(a + b*x)), x)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \operatorname{acoth}\left(c+d\tanh\left(a+bx\right)\right)dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(c+d*tanh(b*x+a)),x)
```

```
[Out] Integral(acoth(c + d*tanh(a + b*x)), x)
```

## 3.206 $\int \frac{\coth^{-1}(c+d\tanh(a+bx))}{x}\,dx$

**Optimal**. Leaf size=18

$$\text{Int}\left(\frac{\coth^{-1}(d\tanh(a+bx)+c)}{x},x\right)$$

```
[Out] CannotIntegrate(arccoth(c+d*tanh(b*x+a))/x,x)
```

**Rubi [A]** time = 0.07, antiderivative size = 0, normalized size of antiderivative = 0.00, number of steps used = 0, number of rules used = 0, integrand size = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int \frac{\coth^{-1}(c+d\tanh(a+bx))}{x}\,dx$$

Verification is Not applicable to the result.

```
[In] Int[ArcCoth[c + d*Tanh[a + b*x]]/x,x]
[Out] Defer[Int][ArcCoth[c + d*Tanh[a + b*x]]/x, x]
```

Rubi steps

$$\int \frac{\coth^{-1}(c+d\tanh(a+bx))}{x}\,dx = \int \frac{\coth^{-1}(c+d\tanh(a+bx))}{x}\,dx$$

**Mathematica [A]** time = 9.54, size = 0, normalized size = 0.00

$$\int \frac{\coth^{-1}(c+d\tanh(a+bx))}{x}\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[ArcCoth[c + d*Tanh[a + b*x]]/x,x]
[Out] Integrate[ArcCoth[c + d*Tanh[a + b*x]]/x, x]
```

**fricas [A]** time = 0.77, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{\text{arcoth}\left(d\tanh\left(bx+a\right)+c\right)}{x},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(c+d*tanh(b*x+a))/x,x, algorithm="fricas")
[Out] integral(arccoth(d*tanh(b*x + a) + c)/x, x)
```

**giac [A]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\text{arcoth}\left(d\tanh\left(bx+a\right)+c\right)}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(c+d*tanh(b*x+a))/x,x, algorithm="giac")
[Out] integrate(arccoth(d*tanh(b*x + a) + c)/x, x)
```

**maple** [A] time = 0.56, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{arccoth}\left(c + d \tanh\left(bx + a\right)\right)}{x}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(arccoth(c+d*tanh(b*x+a))/x,x)
[Out] int(arccoth(c+d*tanh(b*x+a))/x,x)
```

**maxima** [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{arcoth}\left(d \tanh\left(bx + a\right) + c\right)}{x}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(c+d*tanh(b*x+a))/x,x, algorithm="maxima")
[Out] integrate(arccoth(d*tanh(b*x + a) + c)/x, x)
```

**mupad** [A] time = 0.00, size = -1, normalized size = -0.06

$$\int \frac{\operatorname{acoth}\left(c + d \tanh\left(a + b\,x\right)\right)}{x}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(c + d*tanh(a + b*x))/x,x)
[Out] int(acoth(c + d*tanh(a + b*x))/x, x)
```

**sympy** [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{acoth}\left(c + d \tanh\left(a + bx\right)\right)}{x}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(c+d*tanh(b*x+a))/x,x)
[Out] Integral(acoth(c + d*tanh(a + b*x))/x, x)
```

# 3.207 $\int x^3 \coth^{-1}(1+d+d\tanh(a+bx))\,dx$

**Optimal**. Leaf size=155

$$\frac{3\text{Li}_5\left(-\left((d+1)e^{2a+2bx}\right)\right)}{16b^4}-\frac{3x\text{Li}_4\left(-\left((d+1)e^{2a+2bx}\right)\right)}{8b^3}+\frac{3x^2\text{Li}_3\left(-\left((d+1)e^{2a+2bx}\right)\right)}{8b^2}-\frac{x^3\text{Li}_2\left(-\left((d+1)e^{2a+2bx}\right)\right)}{4b}-$$

```
[Out] 1/20*b*x^5+1/4*x^4*arccoth(1+d+d*tanh(b*x+a))-1/8*x^4*ln(1+(1+d)*exp(2*b*x+
2*a))-1/4*x^3*polylog(2,-(1+d)*exp(2*b*x+2*a))/b+3/8*x^2*polylog(3,-(1+d)*e
xp(2*b*x+2*a))/b^2-3/8*x*polylog(4,-(1+d)*exp(2*b*x+2*a))/b^3+3/16*polylog(
5,-(1+d)*exp(2*b*x+2*a))/b^4
```

**Rubi [A]** time = 0.31, antiderivative size = 155, normalized size of antiderivative = 1.00, number of steps used = 8, number of rules used = 7, integrand size = 16, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.438, Rules used = {6240, 2184, 2190, 2531, 6609, 2282, 6589}

$$\frac{3x^2\text{PolyLog}\left(3,-(d+1)e^{2a+2bx}\right)}{8b^2}-\frac{3x\text{PolyLog}\left(4,-(d+1)e^{2a+2bx}\right)}{8b^3}+\frac{3\text{PolyLog}\left(5,-(d+1)e^{2a+2bx}\right)}{16b^4}-\frac{x^3\text{PolyLo}}{}$$

Antiderivative was successfully verified.

```
[In] Int[x^3*ArcCoth[1 + d + d*Tanh[a + b*x]],x]
```

```
[Out] (b*x^5)/20 + (x^4*ArcCoth[1 + d + d*Tanh[a + b*x]])/4 - (x^4*Log[1 + (1 + d
)*E^(2*a + 2*b*x)])/8 - (x^3*PolyLog[2, -((1 + d)*E^(2*a + 2*b*x))])/(4*b)
+ (3*x^2*PolyLog[3, -((1 + d)*E^(2*a + 2*b*x))])/(8*b^2) - (3*x*PolyLog[4,
-((1 + d)*E^(2*a + 2*b*x))])/(8*b^3) + (3*PolyLog[5, -((1 + d)*E^(2*a + 2*b
*x))])/(16*b^4)
```

Rule 2184

```
Int[((c_.) + (d_.)*(x_))^(m_.)/((a_) + (b_.)*((F_)^((g_.)*((e_.) + (f_.)*(x
_))))^(n_.)), x_Symbol] :> Simp[(c + d*x)^(m + 1)/(a*d*(m + 1)), x] - Dist[
b/a, Int[((c + d*x)^m*(F^(g*(e + f*x)))^n)/(a + b*(F^(g*(e + f*x)))^n), x],
 x] /; FreeQ[{F, a, b, c, d, e, f, g, n}, x] && IGtQ[m, 0]
```

Rule 2190

```
Int[(((F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m_.))/
((a_) + (b_.)*((F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)), x_Symbol] :> Simp
[((c + d*x)^m*Log[1 + (b*(F^(g*(e + f*x)))^n)/a])/(b*f*g*n*Log[F]), x] - Di
st[(d*m)/(b*f*g*n*Log[F]), Int[(c + d*x)^(m - 1)*Log[1 + (b*(F^(g*(e + f*x)
))^n)/a], x], x] /; FreeQ[{F, a, b, c, d, e, f, g, n}, x] && IGtQ[m, 0]
```

Rule 2282

```
Int[u_, x_Symbol] :> With[{v = FunctionOfExponential[u, x]}, Dist[v/D[v, x]
, Subst[Int[FunctionOfExponentialFunction[u, x]/x, x], x, v], x]] /; Functi
onOfExponentialQ[u, x] &&  !MatchQ[u, (w_)*((a_.)*(v_)^(n_))^(m_) /; FreeQ[
{a, m, n}, x] && IntegerQ[m*n]] &&  !MatchQ[u, E^((c_.)*((a_.) + (b_.)*x))*
(F_)[v_] /; FreeQ[{a, b, c}, x] && InverseFunctionQ[F[x]]]
```

Rule 2531

```
Int[Log[1 + (e_.)*((F_)^((c_.)*((a_.) + (b_.)*(x_))))^(n_.)]*((f_.) + (g_.)
*(x_))^(m_.), x_Symbol] :> -Simp[((f + g*x)^m*PolyLog[2, -(e*(F^(c*(a + b*x
)))^n)])/(b*c*n*Log[F]), x] + Dist[(g*m)/(b*c*n*Log[F]), Int[(f + g*x)^(m -
 1)*PolyLog[2, -(e*(F^(c*(a + b*x)))^n)], x], x] /; FreeQ[{F, a, b, c, e, f
, g, n}, x] && GtQ[m, 0]
```

Rule 6240

```
Int[ArcCoth[(c_.) + (d_.)*Tanh[(a_.) + (b_.)*(x_)]]*((e_.) + (f_.)*(x_))^(m
_.), x_Symbol] :> Simp[((e + f*x)^(m + 1)*ArcCoth[c + d*Tanh[a + b*x]])/(f*
(m + 1)), x] + Dist[b/(f*(m + 1)), Int[(e + f*x)^(m + 1)/(c - d + c*E^(2*a
+ 2*b*x)), x], x] /; FreeQ[{a, b, c, d, e, f}, x] && IGtQ[m, 0] && EqQ[(c -
 d)^2, 1]
```

Rule 6589

```
Int[PolyLog[n_, (c_.)*((a_.) + (b_.)*(x_))^(p_.)]/((d_.) + (e_.)*(x_)), x_S
ymbol] :> Simp[PolyLog[n + 1, c*(a + b*x)^p]/(e*p), x] /; FreeQ[{a, b, c, d
, e, n, p}, x] && EqQ[b*d, a*e]
```

Rule 6609

```
Int[((e_.) + (f_.)*(x_))^(m_.)*PolyLog[n_, (d_.)*((F_)^((c_.)*((a_.) + (b_.
)*(x_))))^(p_.)], x_Symbol] :> Simp[((e + f*x)^m*PolyLog[n + 1, d*(F^(c*(a
+ b*x)))^p])/(b*c*p*Log[F]), x] - Dist[(f*m)/(b*c*p*Log[F]), Int[(e + f*x)^
(m - 1)*PolyLog[n + 1, d*(F^(c*(a + b*x)))^p], x], x] /; FreeQ[{F, a, b, c,
 d, e, f, n, p}, x] && GtQ[m, 0]
```

Rubi steps

$$\int x^3 \coth^{-1}(1+d+d\tanh(a+bx))\,dx = \frac{1}{4}x^4\coth^{-1}(1+d+d\tanh(a+bx)) + \frac{1}{4}b\int \frac{x^4}{1+(1+d)e^{2a+2bx}}\,dx$$

$$= \frac{bx^5}{20} + \frac{1}{4}x^4\coth^{-1}(1+d+d\tanh(a+bx)) - \frac{1}{4}(b(1+d))\int \frac{e^{2a+2bx}}{1+(1+d)}$$

$$= \frac{bx^5}{20} + \frac{1}{4}x^4\coth^{-1}(1+d+d\tanh(a+bx)) - \frac{1}{8}x^4\log\left(1+(1+d)e^{2a+2b}\right.$$

$$= \frac{bx^5}{20} + \frac{1}{4}x^4\coth^{-1}(1+d+d\tanh(a+bx)) - \frac{1}{8}x^4\log\left(1+(1+d)e^{2a+2b}\right.$$

$$= \frac{bx^5}{20} + \frac{1}{4}x^4\coth^{-1}(1+d+d\tanh(a+bx)) - \frac{1}{8}x^4\log\left(1+(1+d)e^{2a+2b}\right.$$

$$= \frac{bx^5}{20} + \frac{1}{4}x^4\coth^{-1}(1+d+d\tanh(a+bx)) - \frac{1}{8}x^4\log\left(1+(1+d)e^{2a+2b}\right.$$

$$= \frac{bx^5}{20} + \frac{1}{4}x^4\coth^{-1}(1+d+d\tanh(a+bx)) - \frac{1}{8}x^4\log\left(1+(1+d)e^{2a+2b}\right.$$

$$= \frac{bx^5}{20} + \frac{1}{4}x^4\coth^{-1}(1+d+d\tanh(a+bx)) - \frac{1}{8}x^4\log\left(1+(1+d)e^{2a+2b}\right.$$

**Mathematica [A]** time = 0.21, size = 144, normalized size = 0.93

$$\frac{1}{16}\left(\frac{3\text{Li}_5\left(-\frac{e^{-2(a+bx)}}{d+1}\right)}{b^4} + \frac{6x\text{Li}_4\left(-\frac{e^{-2(a+bx)}}{d+1}\right)}{b^3} + \frac{6x^2\text{Li}_3\left(-\frac{e^{-2(a+bx)}}{d+1}\right)}{b^2} + \frac{4x^3\text{Li}_2\left(-\frac{e^{-2(a+bx)}}{d+1}\right)}{b} - 2x^4\log\left(\frac{e^{-2(a+bx)}}{d+1}+1\right) + 4x\right.$$

Antiderivative was successfully verified.

```
[In] Integrate[x^3*ArcCoth[1 + d + d*Tanh[a + b*x]],x]
```

```
[Out] (4*x^4*ArcCoth[1 + d + d*Tanh[a + b*x]] - 2*x^4*Log[1 + 1/((1 + d)*E^(2*(a
+ b*x)))] + (4*x^3*PolyLog[2, -(1/((1 + d)*E^(2*(a + b*x))))])/b + (6*x^2*P
olyLog[3, -(1/((1 + d)*E^(2*(a + b*x))))])/b^2 + (6*x*PolyLog[4, -(1/((1 +
```

```
d)*E^(2*(a + b*x))))])/b^3 + (3*PolyLog[5, -(1/((1 + d)*E^(2*(a + b*x))))])
/b^4)/16
```

**fricas [C]** time = 1.75, size = 450, normalized size = 2.90

$$\frac{2\,b^5x^5+5\,b^4x^4\log\left(\frac{(d+2)\cosh(bx+a)+d\sinh(bx+a)}{d\cosh(bx+a)+d\sinh(bx+a)}\right)-20\,b^3x^3\mathrm{Li}_2\left(\frac{1}{2}\sqrt{-4\,d-4}\,(\cosh(bx+a)+\sinh(bx+a))\right)-20}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^3*arccoth(1+d+d*tanh(b*x+a)),x, algorithm="fricas")
```

```
[Out] 1/40*(2*b^5*x^5 + 5*b^4*x^4*log(((d + 2)*cosh(b*x + a) + d*sinh(b*x + a))/(
d*cosh(b*x + a) + d*sinh(b*x + a))) - 20*b^3*x^3*dilog(1/2*sqrt(-4*d - 4)*(
cosh(b*x + a) + sinh(b*x + a))) - 20*b^3*x^3*dilog(-1/2*sqrt(-4*d - 4)*(cos
h(b*x + a) + sinh(b*x + a))) - 5*a^4*log(2*(d + 1)*cosh(b*x + a) + 2*(d + 1
)*sinh(b*x + a) + sqrt(-4*d - 4)) - 5*a^4*log(2*(d + 1)*cosh(b*x + a) + 2*(
d + 1)*sinh(b*x + a) - sqrt(-4*d - 4)) + 60*b^2*x^2*polylog(3, 1/2*sqrt(-4*
d - 4)*(cosh(b*x + a) + sinh(b*x + a))) + 60*b^2*x^2*polylog(3, -1/2*sqrt(-
4*d - 4)*(cosh(b*x + a) + sinh(b*x + a))) - 120*b*x*polylog(4, 1/2*sqrt(-4*
d - 4)*(cosh(b*x + a) + sinh(b*x + a))) - 120*b*x*polylog(4, -1/2*sqrt(-4*d
 - 4)*(cosh(b*x + a) + sinh(b*x + a))) - 5*(b^4*x^4 - a^4)*log(1/2*sqrt(-4*
d - 4)*(cosh(b*x + a) + sinh(b*x + a)) + 1) - 5*(b^4*x^4 - a^4)*log(-1/2*sq
rt(-4*d - 4)*(cosh(b*x + a) + sinh(b*x + a)) + 1) + 120*polylog(5, 1/2*sqrt
(-4*d - 4)*(cosh(b*x + a) + sinh(b*x + a))) + 120*polylog(5, -1/2*sqrt(-4*d
 - 4)*(cosh(b*x + a) + sinh(b*x + a))))/b^4
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int x^3\,\mathrm{arcoth}\left(d\tanh\left(bx+a\right)+d+1\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^3*arccoth(1+d+d*tanh(b*x+a)),x, algorithm="giac")
```

```
[Out] integrate(x^3*arccoth(d*tanh(b*x + a) + d + 1), x)
```

**maple [C]** time = 5.74, size = 1726, normalized size = 11.14

result too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^3*arccoth(1+d+d*tanh(b*x+a)),x)
```

```
[Out] 1/16*I*x^4*Pi*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(
2*b*x+2*a)/(exp(2*b*x+2*a)+1))-1/16*I*x^4*Pi*csgn(I/(exp(2*b*x+2*a)+1))*csg
n(I*(d*exp(2*b*x+2*a)+exp(2*b*x+2*a)+1))*csgn(I/(exp(2*b*x+2*a)+1)*(d*exp(2
*b*x+2*a)+exp(2*b*x+2*a)+1))+1/16*I*x^4*Pi*csgn(I*d)*csgn(I*exp(2*b*x+2*a)/
(exp(2*b*x+2*a)+1))*csgn(I*d/(exp(2*b*x+2*a)+1)*exp(2*b*x+2*a))+3/16/b^4/(1
+d)*polylog(5,-(1+d)*exp(2*b*x+2*a))-1/8/(1+d)*ln(1+(1+d)*exp(2*b*x+2*a))*x
^4-3/8/b^3/(1+d)*polylog(4,-(1+d)*exp(2*b*x+2*a))*x+1/2/b^4*a^3/(1+d)*dilog
(1+exp(b*x+a)*(-d-1)^(1/2))-1/8*d/(1+d)*ln(1+(1+d)*exp(2*b*x+2*a))*x^4+1/2/
b^4*a^3/(1+d)*dilog(1-exp(b*x+a)*(-d-1)^(1/2))+3/16/b^4*d/(1+d)*polylog(5,-
(1+d)*exp(2*b*x+2*a))+1/2/b^4*a^4/(1+d)*ln(1+exp(b*x+a)*(-d-1)^(1/2))+1/2/b
^4*a^4/(1+d)*ln(1-exp(b*x+a)*(-d-1)^(1/2))-3/8/b^4*a^4/(1+d)*ln(1+(1+d)*exp
(2*b*x+2*a))-1/4/b^4*a^3/(1+d)*polylog(2,-(1+d)*exp(2*b*x+2*a))-1/4/b/(1+d)
*polylog(2,-(1+d)*exp(2*b*x+2*a))*x^3+3/8/b^2/(1+d)*polylog(3,-(1+d)*exp(2*
b*x+2*a))*x^2+1/2/b^4*d*a^4/(1+d)*ln(1-exp(b*x+a)*(-d-1)^(1/2))+1/2/b^3*a^3
/(1+d)*ln(1+exp(b*x+a)*(-d-1)^(1/2))*x-1/8/b^4*a^4/(1+d)*ln(d*exp(2*b*x+2*a
)+exp(2*b*x+2*a)+1)+1/20*b*x^5+1/16*I*x^4*Pi*csgn(I*d/(exp(2*b*x+2*a)+1)*ex
```

```
p(2*b*x+2*a))^3+1/2/b^4*d*a^4/(1+d)*ln(1+exp(b*x+a)*(-d-1)^(1/2))+1/8*x^4*l
n(d*exp(2*b*x+2*a)+exp(2*b*x+2*a)+1)+1/2/b^3*d*a^3/(1+d)*ln(1-exp(b*x+a)*(-
d-1)^(1/2))*x-1/2/b^3*d/(1+d)*ln(1+(1+d)*exp(2*b*x+2*a))*x*a^3+1/2/b^3*d*a^
3/(1+d)*ln(1+exp(b*x+a)*(-d-1)^(1/2))*x+1/2/b^3*a^3/(1+d)*ln(1-exp(b*x+a)*(
-d-1)^(1/2))*x-3/8/b^4*d/(1+d)*ln(1+(1+d)*exp(2*b*x+2*a))*a^4-1/4/b*d/(1+d)
*polylog(2,-(1+d)*exp(2*b*x+2*a))*x^3-1/4/b^4*d/(1+d)*polylog(2,-(1+d)*exp(
2*b*x+2*a))*a^3+3/8/b^2*d/(1+d)*polylog(3,-(1+d)*exp(2*b*x+2*a))*x^2-3/8/b^
3*d/(1+d)*polylog(4,-(1+d)*exp(2*b*x+2*a))*x-1/2/b^3*a^3/(1+d)*ln(1+(1+d)*e
xp(2*b*x+2*a))*x+1/2/b^4*d*a^3/(1+d)*dilog(1+exp(b*x+a)*(-d-1)^(1/2))+1/2/b
^4*d*a^3/(1+d)*dilog(1-exp(b*x+a)*(-d-1)^(1/2))-1/4*x^4*ln(exp(b*x+a))-1/8*
x^4*ln(d)+1/16*I*x^4*Pi*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I/(exp(2*b*x+2*a)+1
)*(d*exp(2*b*x+2*a)+exp(2*b*x+2*a)+1))^2+1/16*I*x^4*Pi*csgn(I*exp(2*b*x+2*a
))^3+1/16*I*x^4*Pi*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^3-1/16*I*x^4*P
i*csgn(I/(exp(2*b*x+2*a)+1)*(d*exp(2*b*x+2*a)+exp(2*b*x+2*a)+1))^3+1/16*I*x
^4*Pi*csgn(I*(d*exp(2*b*x+2*a)+exp(2*b*x+2*a)+1))*csgn(I/(exp(2*b*x+2*a)+1)
*(d*exp(2*b*x+2*a)+exp(2*b*x+2*a)+1))^2-1/16*I*x^4*Pi*csgn(I*d)*csgn(I*d/(e
xp(2*b*x+2*a)+1)*exp(2*b*x+2*a))^2-1/16*I*x^4*Pi*csgn(I/(exp(2*b*x+2*a)+1))
*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2-1/16*I*x^4*Pi*csgn(I*exp(2*b*x
+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2-1/16*I*x^4*Pi*csgn(I*exp
(2*b*x+2*a)/(exp(2*b*x+2*a)+1))*csgn(I*d/(exp(2*b*x+2*a)+1)*exp(2*b*x+2*a))
^2-1/8/b^4*d*a^4/(1+d)*ln(d*exp(2*b*x+2*a)+exp(2*b*x+2*a)+1)+1/16*I*x^4*Pi*
csgn(I*exp(b*x+a))^2*csgn(I*exp(2*b*x+2*a))-1/8*I*x^4*Pi*csgn(I*exp(b*x+a))
*csgn(I*exp(2*b*x+2*a))^2
```

**maxima [A]** time = 1.12, size = 149, normalized size = 0.96

$$\frac{1}{4}x^4 \operatorname{arcoth}(d\tanh(bx+a)+d+1)+\frac{1}{40}\left(\frac{2x^5}{d}-\frac{5\left(2b^4x^4\log\left((d+1)e^{(2bx+2a)}+1\right)+4b^3x^3\mathrm{Li}_2\left(-(d+1)e^{(2bx+2}\right.\right.}{}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^3*arccoth(1+d+d*tanh(b*x+a)),x, algorithm="maxima")
```

```
[Out] 1/4*x^4*arccoth(d*tanh(b*x + a) + d + 1) + 1/40*(2*x^5/d - 5*(2*b^4*x^4*log
((d + 1)*e^(2*b*x + 2*a) + 1) + 4*b^3*x^3*dilog(-(d + 1)*e^(2*b*x + 2*a)) -
 6*b^2*x^2*polylog(3, -(d + 1)*e^(2*b*x + 2*a)) + 6*b*x*polylog(4, -(d + 1)
*e^(2*b*x + 2*a)) - 3*polylog(5, -(d + 1)*e^(2*b*x + 2*a)))/(b^5*d))*b*d
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.01

$$\int x^3 \operatorname{acoth}(d+d\tanh(a+bx)+1)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^3*acoth(d + d*tanh(a + b*x) + 1),x)
```

```
[Out] int(x^3*acoth(d + d*tanh(a + b*x) + 1), x)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int x^3 \operatorname{acoth}(d\tanh(a+bx)+d+1)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**3*acoth(1+d+d*tanh(b*x+a)),x)
```

```
[Out] Integral(x**3*acoth(d*tanh(a + b*x) + d + 1), x)
```

# 3.208 $\int x^2 \coth^{-1}(1+d+d\tanh(a+bx))\,dx$

**Optimal**. Leaf size=128

$$-\frac{\text{Li}_4\left(-\left((d+1)e^{2a+2bx}\right)\right)}{8b^3}+\frac{x\text{Li}_3\left(-\left((d+1)e^{2a+2bx}\right)\right)}{4b^2}-\frac{x^2\text{Li}_2\left(-\left((d+1)e^{2a+2bx}\right)\right)}{4b}-\frac{1}{6}x^3\log\left((d+1)e^{2a+2bx}+1\right)+$$

```
[Out] 1/12*b*x^4+1/3*x^3*arccoth(1+d+d*tanh(b*x+a))-1/6*x^3*ln(1+(1+d)*exp(2*b*x+
2*a))-1/4*x^2*polylog(2,-(1+d)*exp(2*b*x+2*a))/b+1/4*x*polylog(3,-(1+d)*exp
(2*b*x+2*a))/b^2-1/8*polylog(4,-(1+d)*exp(2*b*x+2*a))/b^3
```

**Rubi [A]** time = 0.27, antiderivative size = 128, normalized size of antiderivative = 1.00, number of steps used = 7, number of rules used = 7, integrand size = 16, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.438, Rules used = {6240, 2184, 2190, 2531, 6609, 2282, 6589}

$$\frac{x\text{PolyLog}\left(3,-(d+1)e^{2a+2bx}\right)}{4b^2}-\frac{\text{PolyLog}\left(4,-(d+1)e^{2a+2bx}\right)}{8b^3}-\frac{x^2\text{PolyLog}\left(2,-(d+1)e^{2a+2bx}\right)}{4b}-\frac{1}{6}x^3\log\left((d+\right.$$

Antiderivative was successfully verified.

```
[In] Int[x^2*ArcCoth[1 + d + d*Tanh[a + b*x]],x]
```

```
[Out] (b*x^4)/12 + (x^3*ArcCoth[1 + d + d*Tanh[a + b*x]])/3 - (x^3*Log[1 + (1 + d
)*E^(2*a + 2*b*x)])/6 - (x^2*PolyLog[2, -((1 + d)*E^(2*a + 2*b*x))])/(4*b)
+ (x*PolyLog[3, -((1 + d)*E^(2*a + 2*b*x))])/(4*b^2) - PolyLog[4, -((1 + d)
*E^(2*a + 2*b*x))]/(8*b^3)
```

Rule 2184

```
Int[((c_.) + (d_.)*(x_))^(m_.)/((a_) + (b_.)*((F_)^((g_.)*((e_.) + (f_.)*(x
_))))^(n_.)), x_Symbol] :> Simp[(c + d*x)^(m + 1)/(a*d*(m + 1)), x] - Dist[
b/a, Int[((c + d*x)^m*(F^(g*(e + f*x)))^n)/(a + b*(F^(g*(e + f*x)))^n), x],
 x] /; FreeQ[{F, a, b, c, d, e, f, g, n}, x] && IGtQ[m, 0]
```

Rule 2190

```
Int[(((F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m_.))/
((a_) + (b_.)*((F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)), x_Symbol] :> Simp
[((c + d*x)^m*Log[1 + (b*(F^(g*(e + f*x)))^n)/a])/(b*f*g*n*Log[F]), x] - Di
st[(d*m)/(b*f*g*n*Log[F]), Int[(c + d*x)^(m - 1)*Log[1 + (b*(F^(g*(e + f*x)
))^n)/a], x], x] /; FreeQ[{F, a, b, c, d, e, f, g, n}, x] && IGtQ[m, 0]
```

Rule 2282

```
Int[u_, x_Symbol] :> With[{v = FunctionOfExponential[u, x]}, Dist[v/D[v, x]
, Subst[Int[FunctionOfExponentialFunction[u, x]/x, x], x, v], x]] /; Functi
onOfExponentialQ[u, x] &&  !MatchQ[u, (w_)*((a_.)*(v_)^(n_))^(m_) /; FreeQ[
{a, m, n}, x] && IntegerQ[m*n]] &&  !MatchQ[u, E^((c_.)*((a_.) + (b_.)*x))*
(F_)[v_] /; FreeQ[{a, b, c}, x] && InverseFunctionQ[F[x]]]
```

Rule 2531

```
Int[Log[1 + (e_.)*((F_)^((c_.)*((a_.) + (b_.)*(x_))))^(n_.)]*((f_.) + (g_.)
*(x_))^(m_.), x_Symbol] :> -Simp[((f + g*x)^m*PolyLog[2, -(e*(F^(c*(a + b*x
)))^n)])/(b*c*n*Log[F]), x] + Dist[(g*m)/(b*c*n*Log[F]), Int[(f + g*x)^(m -
 1)*PolyLog[2, -(e*(F^(c*(a + b*x)))^n)], x], x] /; FreeQ[{F, a, b, c, e, f
, g, n}, x] && GtQ[m, 0]
```

Rule 6240

```
Int[ArcCoth[(c_.) + (d_.)*Tanh[(a_.) + (b_.)*(x_)]]*((e_.) + (f_.)*(x_))^(m
_.), x_Symbol] :> Simp[((e + f*x)^(m + 1)*ArcCoth[c + d*Tanh[a + b*x]])/(f*
(m + 1)), x] + Dist[b/(f*(m + 1)), Int[(e + f*x)^(m + 1)/(c - d + c*E^(2*a
+ 2*b*x)), x], x] /; FreeQ[{a, b, c, d, e, f}, x] && IGtQ[m, 0] && EqQ[(c -
 d)^2, 1]
```

Rule 6589

```
Int[PolyLog[n_, (c_.)*((a_.) + (b_.)*(x_))^(p_.)]/((d_.) + (e_.)*(x_)), x_S
ymbol] :> Simp[PolyLog[n + 1, c*(a + b*x)^p]/(e*p), x] /; FreeQ[{a, b, c, d
, e, n, p}, x] && EqQ[b*d, a*e]
```

Rule 6609

```
Int[((e_.) + (f_.)*(x_))^(m_.)*PolyLog[n_, (d_.)*((F_)^((c_.)*((a_.) + (b_.
)*(x_))))^(p_.)], x_Symbol] :> Simp[((e + f*x)^m*PolyLog[n + 1, d*(F^(c*(a
+ b*x)))^p])/(b*c*p*Log[F]), x] - Dist[(f*m)/(b*c*p*Log[F]), Int[(e + f*x)^
(m - 1)*PolyLog[n + 1, d*(F^(c*(a + b*x)))^p], x], x] /; FreeQ[{F, a, b, c,
 d, e, f, n, p}, x] && GtQ[m, 0]
```

Rubi steps

$$
\begin{aligned}
\int x^2 \coth^{-1}(1+d+d\tanh(a+bx))\,dx &= \frac{1}{3}x^3\coth^{-1}(1+d+d\tanh(a+bx)) + \frac{1}{3}b\int \frac{x^3}{1+(1+d)e^{2a+2bx}}\,dx \\
&= \frac{bx^4}{12} + \frac{1}{3}x^3\coth^{-1}(1+d+d\tanh(a+bx)) - \frac{1}{3}(b(1+d))\int \frac{e^{2a+2bx}}{1+(1+d)} \\
&= \frac{bx^4}{12} + \frac{1}{3}x^3\coth^{-1}(1+d+d\tanh(a+bx)) - \frac{1}{6}x^3\log\left(1+(1+d)e^{2a+2b}\right. \\
&= \frac{bx^4}{12} + \frac{1}{3}x^3\coth^{-1}(1+d+d\tanh(a+bx)) - \frac{1}{6}x^3\log\left(1+(1+d)e^{2a+2b}\right. \\
&= \frac{bx^4}{12} + \frac{1}{3}x^3\coth^{-1}(1+d+d\tanh(a+bx)) - \frac{1}{6}x^3\log\left(1+(1+d)e^{2a+2b}\right. \\
&= \frac{bx^4}{12} + \frac{1}{3}x^3\coth^{-1}(1+d+d\tanh(a+bx)) - \frac{1}{6}x^3\log\left(1+(1+d)e^{2a+2b}\right. \\
&= \frac{bx^4}{12} + \frac{1}{3}x^3\coth^{-1}(1+d+d\tanh(a+bx)) - \frac{1}{6}x^3\log\left(1+(1+d)e^{2a+2b}\right.
\end{aligned}
$$

**Mathematica [A]** time = 0.12, size = 118, normalized size = 0.92

$$
\frac{1}{24}\left(\frac{3\text{Li}_4\left(-\frac{e^{-2(a+bx)}}{d+1}\right)}{b^3} + \frac{6x\text{Li}_3\left(-\frac{e^{-2(a+bx)}}{d+1}\right)}{b^2} + \frac{6x^2\text{Li}_2\left(-\frac{e^{-2(a+bx)}}{d+1}\right)}{b} - 4x^3\log\left(\frac{e^{-2(a+bx)}}{d+1}+1\right) + 8x^3\coth^{-1}(d\tanh(a+\right.
$$

Antiderivative was successfully verified.

```
[In] Integrate[x^2*ArcCoth[1 + d + d*Tanh[a + b*x]],x]
```

```
[Out] (8*x^3*ArcCoth[1 + d + d*Tanh[a + b*x]] - 4*x^3*Log[1 + 1/((1 + d)*E^(2*(a
+ b*x)))] + (6*x^2*PolyLog[2, -(1/((1 + d)*E^(2*(a + b*x))))])/b + (6*x*Pol
yLog[3, -(1/((1 + d)*E^(2*(a + b*x))))])/b^2 + (3*PolyLog[4, -(1/((1 + d)*E
^(2*(a + b*x))))])/b^3)/24
```

**fricas [C]** time = 3.99, size = 381, normalized size = 2.98

$$
b^4x^4 + 2\,b^3x^3\log\left(\frac{(d+2)\cosh(bx+a)+d\sinh(bx+a)}{d\cosh(bx+a)+d\sinh(bx+a)}\right) - 6\,b^2x^2\text{Li}_2\left(\frac{1}{2}\sqrt{-4\,d-4}\left(\cosh(bx+a)+\sinh(bx+a)\right)\right) - 6\,b^2x^2\text{L}
$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*arccoth(1+d+d*tanh(b*x+a)),x, algorithm="fricas")
```

```
[Out] 1/12*(b^4*x^4 + 2*b^3*x^3*log(((d + 2)*cosh(b*x + a) + d*sinh(b*x + a))/(d*
cosh(b*x + a) + d*sinh(b*x + a))) - 6*b^2*x^2*dilog(1/2*sqrt(-4*d - 4)*(cos
h(b*x + a) + sinh(b*x + a))) - 6*b^2*x^2*dilog(-1/2*sqrt(-4*d - 4)*(cosh(b*
x + a) + sinh(b*x + a))) + 2*a^3*log(2*(d + 1)*cosh(b*x + a) + 2*(d + 1)*si
nh(b*x + a) + sqrt(-4*d - 4)) + 2*a^3*log(2*(d + 1)*cosh(b*x + a) + 2*(d +
1)*sinh(b*x + a) - sqrt(-4*d - 4)) + 12*b*x*polylog(3, 1/2*sqrt(-4*d - 4)*(
cosh(b*x + a) + sinh(b*x + a))) + 12*b*x*polylog(3, -1/2*sqrt(-4*d - 4)*(co
sh(b*x + a) + sinh(b*x + a))) - 2*(b^3*x^3 + a^3)*log(1/2*sqrt(-4*d - 4)*(c
osh(b*x + a) + sinh(b*x + a)) + 1) - 2*(b^3*x^3 + a^3)*log(-1/2*sqrt(-4*d -
 4)*(cosh(b*x + a) + sinh(b*x + a)) + 1) - 12*polylog(4, 1/2*sqrt(-4*d - 4)
*(cosh(b*x + a) + sinh(b*x + a))) - 12*polylog(4, -1/2*sqrt(-4*d - 4)*(cosh
(b*x + a) + sinh(b*x + a))))/b^3
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int x^2 \operatorname{arcoth}(d\tanh(bx+a)+d+1)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*arccoth(1+d+d*tanh(b*x+a)),x, algorithm="giac")
```

```
[Out] integrate(x^2*arccoth(d*tanh(b*x + a) + d + 1), x)
```

**maple [C]** time = 5.32, size = 1667, normalized size = 13.02

result too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^2*arccoth(1+d+d*tanh(b*x+a)),x)
```

```
[Out] 1/12*I*x^3*Pi*csgn(I*exp(2*b*x+2*a))^3+1/12*I*x^3*Pi*csgn(I*exp(2*b*x+2*a)/
(exp(2*b*x+2*a)+1))^3-1/2/b^3*a^2/(1+d)*dilog(1+exp(b*x+a)*(-d-1)^(1/2))-1/
2/b^3*a^2/(1+d)*dilog(1-exp(b*x+a)*(-d-1)^(1/2))+1/3/b^3/(1+d)*ln(1+(1+d)*e
xp(2*b*x+2*a))*a^3-1/4/b/(1+d)*polylog(2,-(1+d)*exp(2*b*x+2*a))*x^2+1/4/b^3
/(1+d)*polylog(2,-(1+d)*exp(2*b*x+2*a))*a^2+1/4/b^2/(1+d)*polylog(3,-(1+d)*
exp(2*b*x+2*a))*x-1/2/b^3*a^3/(1+d)*ln(1+exp(b*x+a)*(-d-1)^(1/2))-1/2/b^3*a
^3/(1+d)*ln(1-exp(b*x+a)*(-d-1)^(1/2))+1/12*I*x^3*Pi*csgn(I*(d*exp(2*b*x+2*
a)+exp(2*b*x+2*a)+1))*csgn(I/(exp(2*b*x+2*a)+1)*(d*exp(2*b*x+2*a)+exp(2*b*x
+2*a)+1))^2-1/12*I*x^3*Pi*csgn(I/(exp(2*b*x+2*a)+1)*(d*exp(2*b*x+2*a)+exp(2
*b*x+2*a)+1))^3-1/12*I*x^3*Pi*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(2*b*x+2
*a)/(exp(2*b*x+2*a)+1))^2+1/12*b*x^4+1/12*I*x^3*Pi*csgn(I/(exp(2*b*x+2*a)+1
))*csgn(I/(exp(2*b*x+2*a)+1)*(d*exp(2*b*x+2*a)+exp(2*b*x+2*a)+1))^2+1/12*I*
x^3*Pi*csgn(I*exp(b*x+a))^2*csgn(I*exp(2*b*x+2*a))-1/6*I*x^3*Pi*csgn(I*exp(
b*x+a))*csgn(I*exp(2*b*x+2*a))^2+1/6/b^3*a^3/(1+d)*ln(d*exp(2*b*x+2*a)+exp(
2*b*x+2*a)+1)-1/3*x^3*ln(exp(b*x+a))-1/6*x^3*ln(d)+1/12*I*x^3*Pi*csgn(I*d/(
exp(2*b*x+2*a)+1)*exp(2*b*x+2*a))^3-1/12*I*x^3*Pi*csgn(I*exp(2*b*x+2*a))*cs
gn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2-1/12*I*x^3*Pi*csgn(I*exp(2*b*x+2*
a)/(exp(2*b*x+2*a)+1))*csgn(I*d/(exp(2*b*x+2*a)+1)*exp(2*b*x+2*a))^2+1/6*x^
3*ln(d*exp(2*b*x+2*a)+exp(2*b*x+2*a)+1)-1/6*d/(1+d)*ln(1+(1+d)*exp(2*b*x+2*
a))*x^3-1/8/b^3*d/(1+d)*polylog(4,-(1+d)*exp(2*b*x+2*a))-1/2/b^2*d*a^2/(1+d
)*ln(1-exp(b*x+a)*(-d-1)^(1/2))*x+1/2/b^2*d/(1+d)*ln(1+(1+d)*exp(2*b*x+2*a)
)*x*a^2-1/2/b^2*d*a^2/(1+d)*ln(1+exp(b*x+a)*(-d-1)^(1/2))*x+1/6/b^3*d*a^3/(
1+d)*ln(d*exp(2*b*x+2*a)+exp(2*b*x+2*a)+1)-1/6/(1+d)*ln(1+(1+d)*exp(2*b*x+2
*a))*x^3-1/8/b^3/(1+d)*polylog(4,-(1+d)*exp(2*b*x+2*a))+1/2/b^2/(1+d)*ln(1+
(1+d)*exp(2*b*x+2*a))*x*a^2+1/3/b^3*d/(1+d)*ln(1+(1+d)*exp(2*b*x+2*a))*a^3-
1/4/b*d/(1+d)*polylog(2,-(1+d)*exp(2*b*x+2*a))*x^2+1/4/b^3*d/(1+d)*polylog(
```

```
2,-(1+d)*exp(2*b*x+2*a))*a^2+1/4/b^2*d/(1+d)*polylog(3,-(1+d)*exp(2*b*x+2*a
))*x-1/2/b^2*a^2/(1+d)*ln(1+exp(b*x+a)*(-d-1)^(1/2))*x-1/2/b^2*a^2/(1+d)*ln
(1-exp(b*x+a)*(-d-1)^(1/2))*x-1/2/b^3*d*a^3/(1+d)*ln(1+exp(b*x+a)*(-d-1)^(1
/2))-1/2/b^3*d*a^3/(1+d)*ln(1-exp(b*x+a)*(-d-1)^(1/2))-1/2/b^3*d*a^2/(1+d)*
dilog(1+exp(b*x+a)*(-d-1)^(1/2))-1/2/b^3*d*a^2/(1+d)*dilog(1-exp(b*x+a)*(-d
-1)^(1/2))-1/12*I*x^3*Pi*csgn(I*d)*csgn(I*d/(exp(2*b*x+2*a)+1)*exp(2*b*x+2*
a))^2+1/12*I*x^3*Pi*csgn(I*d)*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))*csg
n(I*d/(exp(2*b*x+2*a)+1)*exp(2*b*x+2*a))+1/12*I*x^3*Pi*csgn(I/(exp(2*b*x+2*
a)+1))*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))-1/1
2*I*x^3*Pi*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*(d*exp(2*b*x+2*a)+exp(2*b*x+2*
a)+1))*csgn(I/(exp(2*b*x+2*a)+1)*(d*exp(2*b*x+2*a)+exp(2*b*x+2*a)+1))
```

**maxima [A]** time = 1.09, size = 125, normalized size = 0.98

$$\frac{1}{3}x^3 \operatorname{arcoth}\left(d\tanh\left(bx+a\right)+d+1\right)+\frac{1}{36}\left(\frac{3x^4}{d}-\frac{2\left(4b^3x^3\log\left((d+1)e^{(2bx+2a)}+1\right)+6b^2x^2\mathrm{Li}_2\left(-(d+1)e^{(2bx+2}\right.\right.}{b^4d}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*arccoth(1+d+d*tanh(b*x+a)),x, algorithm="maxima")
```

```
[Out] 1/3*x^3*arccoth(d*tanh(b*x + a) + d + 1) + 1/36*(3*x^4/d - 2*(4*b^3*x^3*log
((d + 1)*e^(2*b*x + 2*a) + 1) + 6*b^2*x^2*dilog(-(d + 1)*e^(2*b*x + 2*a)) -
 6*b*x*polylog(3, -(d + 1)*e^(2*b*x + 2*a)) + 3*polylog(4, -(d + 1)*e^(2*b*
x + 2*a)))/(b^4*d))*b*d
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.01

$$\int x^2\,\mathrm{acoth}\left(d+d\tanh\left(a+b\,x\right)+1\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^2*acoth(d + d*tanh(a + b*x) + 1),x)
```

```
[Out] int(x^2*acoth(d + d*tanh(a + b*x) + 1), x)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int x^2 \operatorname{acoth}\left(d\tanh\left(a+bx\right)+d+1\right)dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**2*acoth(1+d+d*tanh(b*x+a)),x)
```

```
[Out] Integral(x**2*acoth(d*tanh(a + b*x) + d + 1), x)
```

# 3.209 $\int x \coth^{-1}(1 + d + d \tanh(a + bx)) \, dx$

**Optimal**. Leaf size=101

$$\frac{\text{Li}_3\left(-\left((d+1)e^{2a+2bx}\right)\right)}{8b^2}-\frac{x\text{Li}_2\left(-\left((d+1)e^{2a+2bx}\right)\right)}{4b}-\frac{1}{4}x^2\log\left((d+1)e^{2a+2bx}+1\right)+\frac{1}{2}x^2\coth^{-1}(d\tanh(a+bx)+d\cdot$$

```
[Out] 1/6*b*x^3+1/2*x^2*arccoth(1+d+d*tanh(b*x+a))-1/4*x^2*ln(1+(1+d)*exp(2*b*x+2
*a))-1/4*x*polylog(2,-(1+d)*exp(2*b*x+2*a))/b+1/8*polylog(3,-(1+d)*exp(2*b*
x+2*a))/b^2
```

**Rubi [A]** time = 0.23, antiderivative size = 101, normalized size of antiderivative = 1.00, number of steps used = 6, number of rules used = 6, integrand size = 14, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.429, Rules used = {6240, 2184, 2190, 2531, 2282, 6589}

$$\frac{\text{PolyLog}\left(3,-(d+1)e^{2a+2bx}\right)}{8b^2}-\frac{x\text{PolyLog}\left(2,-(d+1)e^{2a+2bx}\right)}{4b}-\frac{1}{4}x^2\log\left((d+1)e^{2a+2bx}+1\right)+\frac{1}{2}x^2\coth^{-1}(d\tanh$$

Antiderivative was successfully verified.

```
[In] Int[x*ArcCoth[1 + d + d*Tanh[a + b*x]],x]
```

```
[Out] (b*x^3)/6 + (x^2*ArcCoth[1 + d + d*Tanh[a + b*x]])/2 - (x^2*Log[1 + (1 + d)
*E^(2*a + 2*b*x)])/4 - (x*PolyLog[2, -((1 + d)*E^(2*a + 2*b*x))])/(4*b) + P
olyLog[3, -((1 + d)*E^(2*a + 2*b*x))]/(8*b^2)
```

Rule 2184

```
Int[((c_.) + (d_.)*(x_))^(m_.)/((a_) + (b_.)*((F_)^((g_.)*((e_.) + (f_.)*(x
_))))^(n_.)), x_Symbol] :> Simp[(c + d*x)^(m + 1)/(a*d*(m + 1)), x] - Dist[
b/a, Int[((c + d*x)^m*(F^(g*(e + f*x)))^n)/(a + b*(F^(g*(e + f*x)))^n), x],
 x] /; FreeQ[{F, a, b, c, d, e, f, g, n}, x] && IGtQ[m, 0]
```

Rule 2190

```
Int[(((F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m_.))/
((a_) + (b_.)*((F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)), x_Symbol] :> Simp
[((c + d*x)^m*Log[1 + (b*(F^(g*(e + f*x)))^n)/a])/(b*f*g*n*Log[F]), x] - Di
st[(d*m)/(b*f*g*n*Log[F]), Int[(c + d*x)^(m - 1)*Log[1 + (b*(F^(g*(e + f*x)
))^n)/a], x], x] /; FreeQ[{F, a, b, c, d, e, f, g, n}, x] && IGtQ[m, 0]
```

Rule 2282

```
Int[u_, x_Symbol] :> With[{v = FunctionOfExponential[u, x]}, Dist[v/D[v, x]
, Subst[Int[FunctionOfExponentialFunction[u, x]/x, x], x, v], x]] /; Functi
onOfExponentialQ[u, x] &&  !MatchQ[u, (w_)*((a_.)*(v_)^(n_))^(m_) /; FreeQ[
{a, m, n}, x] && IntegerQ[m*n]] &&  !MatchQ[u, E^((c_.)*((a_.) + (b_.)*x))*
(F_)[v_] /; FreeQ[{a, b, c}, x] && InverseFunctionQ[F[x]]]
```

Rule 2531

```
Int[Log[1 + (e_.)*((F_)^((c_.)*((a_.) + (b_.)*(x_))))^(n_.)]*((f_.) + (g_.)
*(x_))^(m_.), x_Symbol] :> -Simp[((f + g*x)^m*PolyLog[2, -(e*(F^(c*(a + b*x
)))^n)])/(b*c*n*Log[F]), x] + Dist[(g*m)/(b*c*n*Log[F]), Int[(f + g*x)^(m -
 1)*PolyLog[2, -(e*(F^(c*(a + b*x)))^n)], x], x] /; FreeQ[{F, a, b, c, e, f
, g, n}, x] && GtQ[m, 0]
```

Rule 6240

```
Int[ArcCoth[(c_.) + (d_.)*Tanh[(a_.) + (b_.)*(x_)]]*((e_.) + (f_.)*(x_))^(m
_.), x_Symbol] :> Simp[((e + f*x)^(m + 1)*ArcCoth[c + d*Tanh[a + b*x]])/(f*
```

```
(m + 1)), x] + Dist[b/(f*(m + 1)), Int[(e + f*x)^(m + 1)/(c - d + c*E^(2*a
+ 2*b*x)), x], x] /; FreeQ[{a, b, c, d, e, f}, x] && IGtQ[m, 0] && EqQ[(c -
 d)^2, 1]
```

Rule 6589

```
Int[PolyLog[n_, (c_.)*((a_.) + (b_.)*(x_))^(p_.)]/((d_.) + (e_.)*(x_)), x_S
ymbol] :> Simp[PolyLog[n + 1, c*(a + b*x)^p]/(e*p), x] /; FreeQ[{a, b, c, d
, e, n, p}, x] && EqQ[b*d, a*e]
```

Rubi steps

$$\int x\coth^{-1}(1+d+d\tanh(a+bx))\,dx = \frac{1}{2}x^2\coth^{-1}(1+d+d\tanh(a+bx)) + \frac{1}{2}b\int \frac{x^2}{1+(1+d)e^{2a+2bx}}\,dx$$
$$= \frac{bx^3}{6} + \frac{1}{2}x^2\coth^{-1}(1+d+d\tanh(a+bx)) - \frac{1}{2}(b(1+d))\int \frac{e^{2a+2bx}}{1+(1+d)e}$$
$$= \frac{bx^3}{6} + \frac{1}{2}x^2\coth^{-1}(1+d+d\tanh(a+bx)) - \frac{1}{4}x^2\log\left(1+(1+d)e^{2a+2bx}\right.$$
$$= \frac{bx^3}{6} + \frac{1}{2}x^2\coth^{-1}(1+d+d\tanh(a+bx)) - \frac{1}{4}x^2\log\left(1+(1+d)e^{2a+2bx}\right.$$
$$= \frac{bx^3}{6} + \frac{1}{2}x^2\coth^{-1}(1+d+d\tanh(a+bx)) - \frac{1}{4}x^2\log\left(1+(1+d)e^{2a+2bx}\right.$$
$$= \frac{bx^3}{6} + \frac{1}{2}x^2\coth^{-1}(1+d+d\tanh(a+bx)) - \frac{1}{4}x^2\log\left(1+(1+d)e^{2a+2bx}\right.$$

**Mathematica [A]** time = 0.10, size = 91, normalized size = 0.90

$$\frac{2b^2x^2\left(2\coth^{-1}(d\tanh(a+bx)+d+1)-\log\left(\frac{e^{-2(a+bx)}}{d+1}+1\right)\right)+2bx\text{Li}_2\left(-\frac{e^{-2(a+bx)}}{d+1}\right)+\text{Li}_3\left(-\frac{e^{-2(a+bx)}}{d+1}\right)}{8b^2}$$

Antiderivative was successfully verified.

```
[In] Integrate[x*ArcCoth[1 + d + d*Tanh[a + b*x]],x]
```

```
[Out] (2*b^2*x^2*(2*ArcCoth[1 + d + d*Tanh[a + b*x]] - Log[1 + 1/((1 + d)*E^(2*(a
 + b*x)))]) + 2*b*x*PolyLog[2, -(1/((1 + d)*E^(2*(a + b*x))))] + PolyLog[3,
 -(1/((1 + d)*E^(2*(a + b*x))))])/(8*b^2)
```

**fricas [C]** time = 0.75, size = 322, normalized size = 3.19

$$\frac{2\,b^3x^3+3\,b^2x^2\log\left(\frac{(d+2)\cosh(bx+a)+d\sinh(bx+a)}{d\cosh(bx+a)+d\sinh(bx+a)}\right)-6\,bx\text{Li}_2\left(\frac{1}{2}\sqrt{-4\,d-4}\,(\cosh(bx+a)+\sinh(bx+a))\right)-6\,bx\text{Li}_2}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*arccoth(1+d+d*tanh(b*x+a)),x, algorithm="fricas")
```

```
[Out] 1/12*(2*b^3*x^3 + 3*b^2*x^2*log(((d + 2)*cosh(b*x + a) + d*sinh(b*x + a))/(
d*cosh(b*x + a) + d*sinh(b*x + a))) - 6*b*x*dilog(1/2*sqrt(-4*d - 4)*(cosh(
b*x + a) + sinh(b*x + a))) - 6*b*x*dilog(-1/2*sqrt(-4*d - 4)*(cosh(b*x + a)
 + sinh(b*x + a))) - 3*a^2*log(2*(d + 1)*cosh(b*x + a) + 2*(d + 1)*sinh(b*x
 + a) + sqrt(-4*d - 4)) - 3*a^2*log(2*(d + 1)*cosh(b*x + a) + 2*(d + 1)*sin
h(b*x + a) - sqrt(-4*d - 4)) - 3*(b^2*x^2 - a^2)*log(1/2*sqrt(-4*d - 4)*(co
sh(b*x + a) + sinh(b*x + a)) + 1) - 3*(b^2*x^2 - a^2)*log(-1/2*sqrt(-4*d -
```

```
4)*(cosh(b*x + a) + sinh(b*x + a)) + 1) + 6*polylog(3, 1/2*sqrt(-4*d - 4)*(
cosh(b*x + a) + sinh(b*x + a))) + 6*polylog(3, -1/2*sqrt(-4*d - 4)*(cosh(b*
x + a) + sinh(b*x + a))))/b^2
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int x \operatorname{arcoth}\left(d \tanh\left(bx+a\right)+d+1\right) \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*arccoth(1+d+d*tanh(b*x+a)),x, algorithm="giac")
```

```
[Out] integrate(x*arccoth(d*tanh(b*x + a) + d + 1), x)
```

**maple [C]** time = 5.09, size = 1584, normalized size = 15.68

result too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x*arccoth(1+d+d*tanh(b*x+a)),x)
```

```
[Out] 1/8*I*x^2*Pi*csgn(I*d/(exp(2*b*x+2*a)+1)*exp(2*b*x+2*a))^3+1/8*I*x^2*Pi*csg
n(I*exp(2*b*x+2*a))^3-1/2*x^2*ln(exp(b*x+a))-1/4*x^2*ln(d)+1/6*b*x^3-1/4/b^
2*d*a^2/(1+d)*ln(d*exp(2*b*x+2*a)+exp(2*b*x+2*a)+1)-1/8*I*x^2*Pi*csgn(I/(ex
p(2*b*x+2*a)+1))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2-1/4*d/(1+d)*ln
(1+(1+d)*exp(2*b*x+2*a))*x^2+1/8/b^2*d/(1+d)*polylog(3,-(1+d)*exp(2*b*x+2*a
))+1/2/b^2*a/(1+d)*dilog(1+exp(b*x+a)*(-d-1)^(1/2))-1/8*I*x^2*Pi*csgn(I*exp
(2*b*x+2*a)/(exp(2*b*x+2*a)+1))*csgn(I*d/(exp(2*b*x+2*a)+1)*exp(2*b*x+2*a))
^2-1/4/b^2*a^2/(1+d)*ln(d*exp(2*b*x+2*a)+exp(2*b*x+2*a)+1)+1/2/b^2*d*a/(1+d
)*dilog(1+exp(b*x+a)*(-d-1)^(1/2))+1/2/b^2*d*a/(1+d)*dilog(1-exp(b*x+a)*(-d
-1)^(1/2))-1/2/b*d/(1+d)*ln(1+(1+d)*exp(2*b*x+2*a))*x*a+1/2/b*d*a/(1+d)*ln(
1+exp(b*x+a)*(-d-1)^(1/2))*x+1/2/b*d*a/(1+d)*ln(1-exp(b*x+a)*(-d-1)^(1/2))*
x-1/2/b/(1+d)*ln(1+(1+d)*exp(2*b*x+2*a))*x*a-1/4/b^2*d/(1+d)*ln(1+(1+d)*exp
(2*b*x+2*a))*a^2-1/4/b*d/(1+d)*polylog(2,-(1+d)*exp(2*b*x+2*a))*x-1/4/b^2*d
/(1+d)*polylog(2,-(1+d)*exp(2*b*x+2*a))*a+1/2/b*a/(1+d)*ln(1+exp(b*x+a)*(-d
-1)^(1/2))*x+1/2/b*a/(1+d)*ln(1-exp(b*x+a)*(-d-1)^(1/2))*x+1/2/b^2*d*a^2/(1
+d)*ln(1+exp(b*x+a)*(-d-1)^(1/2))+1/2/b^2*d*a^2/(1+d)*ln(1-exp(b*x+a)*(-d-1
)^(1/2))-1/4/b^2/(1+d)*ln(1+(1+d)*exp(2*b*x+2*a))*a^2-1/4/b/(1+d)*polylog(2
,-(1+d)*exp(2*b*x+2*a))*x-1/4/b^2/(1+d)*polylog(2,-(1+d)*exp(2*b*x+2*a))*a+
1/2/b^2*a^2/(1+d)*ln(1+exp(b*x+a)*(-d-1)^(1/2))+1/2/b^2*a^2/(1+d)*ln(1-exp(
b*x+a)*(-d-1)^(1/2))+1/2/b^2*a/(1+d)*dilog(1-exp(b*x+a)*(-d-1)^(1/2))+1/8/b
^2/(1+d)*polylog(3,-(1+d)*exp(2*b*x+2*a))-1/4/(1+d)*ln(1+(1+d)*exp(2*b*x+2*
a))*x^2+1/8*I*x^2*Pi*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^3-1/8*I*x^2*
Pi*csgn(I/(exp(2*b*x+2*a)+1)*(d*exp(2*b*x+2*a)+exp(2*b*x+2*a)+1))^3+1/4*x^2
*ln(d*exp(2*b*x+2*a)+exp(2*b*x+2*a)+1)-1/4*I*x^2*Pi*csgn(I*exp(b*x+a))*csgn
(I*exp(2*b*x+2*a))^2+1/8*I*x^2*Pi*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I/(exp(2*
b*x+2*a)+1)*(d*exp(2*b*x+2*a)+exp(2*b*x+2*a)+1))^2+1/8*I*x^2*Pi*csgn(I*exp(
b*x+a))^2*csgn(I*exp(2*b*x+2*a))-1/8*I*x^2*Pi*csgn(I*d)*csgn(I*d/(exp(2*b*x
+2*a)+1)*exp(2*b*x+2*a))^2+1/8*I*x^2*Pi*csgn(I*(d*exp(2*b*x+2*a)+exp(2*b*x+
2*a)+1))*csgn(I/(exp(2*b*x+2*a)+1)*(d*exp(2*b*x+2*a)+exp(2*b*x+2*a)+1))^2-1
/8*I*x^2*Pi*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1)
)^2+1/8*I*x^2*Pi*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(2*b*x+2*a))*csgn(I*e
xp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))-1/8*I*x^2*Pi*csgn(I/(exp(2*b*x+2*a)+1))*c
sgn(I*(d*exp(2*b*x+2*a)+exp(2*b*x+2*a)+1))*csgn(I/(exp(2*b*x+2*a)+1)*(d*exp
(2*b*x+2*a)+exp(2*b*x+2*a)+1))+1/8*I*x^2*Pi*csgn(I*d)*csgn(I*exp(2*b*x+2*a)
/(exp(2*b*x+2*a)+1))*csgn(I*d/(exp(2*b*x+2*a)+1)*exp(2*b*x+2*a))
```

**maxima [A]** time = 1.10, size = 101, normalized size = 1.00

$$\frac{1}{24}\left(\frac{4\,x^3}{d} - \frac{3\left(2\,b^2x^2\log\left((d+1)e^{(2\,bx+2\,a)}+1\right)+2\,bx\mathrm{Li}_2\left(-(d+1)e^{(2\,bx+2\,a)}\right)-\mathrm{Li}_3(-(d+1)e^{(2\,bx+2\,a)})\right)}{b^3d}\right)bd+\frac{1}{2}\,x^2$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*arccoth(1+d+d*tanh(b*x+a)),x, algorithm="maxima")
```

```
[Out] 1/24*(4*x^3/d - 3*(2*b^2*x^2*log((d + 1)*e^(2*b*x + 2*a) + 1) + 2*b*x*dilog
(-(d + 1)*e^(2*b*x + 2*a)) - polylog(3, -(d + 1)*e^(2*b*x + 2*a)))/(b^3*d))
*b*d + 1/2*x^2*arccoth(d*tanh(b*x + a) + d + 1)
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.01

$$\int x \operatorname{acoth}\left(d + d \tanh\left(a + b\, x\right) + 1\right)\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x*acoth(d + d*tanh(a + b*x) + 1),x)
```

```
[Out] int(x*acoth(d + d*tanh(a + b*x) + 1), x)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int x \operatorname{acoth}{\left(d \tanh{\left(a + bx \right)} + d + 1 \right)}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*acoth(1+d+d*tanh(b*x+a)),x)
```

```
[Out] Integral(x*acoth(d*tanh(a + b*x) + d + 1), x)
```

# 3.210 $\int \coth^{-1}(1+d+d\tanh(a+bx))\,dx$

**Optimal**. Leaf size=69

$$-\frac{\text{Li}_2\left(-\left((d+1)e^{2a+2bx}\right)\right)}{4b}-\frac{1}{2}x\log\left((d+1)e^{2a+2bx}+1\right)+x\coth^{-1}(d\tanh(a+bx)+d+1)+\frac{bx^2}{2}$$

```
[Out] 1/2*b*x^2+x*arccoth(1+d+d*tanh(b*x+a))-1/2*x*ln(1+(1+d)*exp(2*b*x+2*a))-1/4
*polylog(2,-(1+d)*exp(2*b*x+2*a))/b
```

**Rubi [A]** time = 0.14, antiderivative size = 69, normalized size of antiderivative = 1.00, number of steps used = 5, number of rules used = 5, integrand size = 12, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.417, Rules used = {6232, 2184, 2190, 2279, 2391}

$$-\frac{\text{PolyLog}\left(2,-(d+1)e^{2a+2bx}\right)}{4b}-\frac{1}{2}x\log\left((d+1)e^{2a+2bx}+1\right)+x\coth^{-1}(d\tanh(a+bx)+d+1)+\frac{bx^2}{2}$$

Antiderivative was successfully verified.

```
[In] Int[ArcCoth[1 + d + d*Tanh[a + b*x]],x]
```

```
[Out] (b*x^2)/2 + x*ArcCoth[1 + d + d*Tanh[a + b*x]] - (x*Log[1 + (1 + d)*E^(2*a
+ 2*b*x)])/2 - PolyLog[2, -((1 + d)*E^(2*a + 2*b*x))]/(4*b)
```

Rule 2184

```
Int[((c_.) + (d_.)*(x_))^(m_.)/((a_) + (b_.)*((F_)^((g_.)*((e_.) + (f_.)*(x
_))))^(n_.)), x_Symbol] :> Simp[(c + d*x)^(m + 1)/(a*d*(m + 1)), x] - Dist[
b/a, Int[((c + d*x)^m*(F^(g*(e + f*x)))^n)/(a + b*(F^(g*(e + f*x)))^n), x],
 x] /; FreeQ[{F, a, b, c, d, e, f, g, n}, x] && IGtQ[m, 0]
```

Rule 2190

```
Int[(((F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m_.))/
((a_) + (b_.)*((F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)), x_Symbol] :> Simp
[((c + d*x)^m*Log[1 + (b*(F^(g*(e + f*x)))^n)/a])/(b*f*g*n*Log[F]), x] - Di
st[(d*m)/(b*f*g*n*Log[F]), Int[(c + d*x)^(m - 1)*Log[1 + (b*(F^(g*(e + f*x)
))^n)/a], x], x] /; FreeQ[{F, a, b, c, d, e, f, g, n}, x] && IGtQ[m, 0]
```

Rule 2279

```
Int[Log[(a_) + (b_.)*((F_)^((e_.)*((c_.) + (d_.)*(x_))))^(n_.)], x_Symbol]
:> Dist[1/(d*e*n*Log[F]), Subst[Int[Log[a + b*x]/x, x], x, (F^(e*(c + d*x))
)^n], x] /; FreeQ[{F, a, b, c, d, e, n}, x] && GtQ[a, 0]
```

Rule 2391

```
Int[Log[(c_.)*((d_) + (e_.)*(x_)^(n_.))]/(x_), x_Symbol] :> -Simp[PolyLog[2
, -(c*e*x^n)]/n, x] /; FreeQ[{c, d, e, n}, x] && EqQ[c*d, 1]
```

Rule 6232

```
Int[ArcCoth[(c_.) + (d_.)*Tanh[(a_.) + (b_.)*(x_)]], x_Symbol] :> Simp[x*Ar
cCoth[c + d*Tanh[a + b*x]], x] + Dist[b, Int[x/(c - d + c*E^(2*a + 2*b*x)),
 x], x] /; FreeQ[{a, b, c, d}, x] && EqQ[(c - d)^2, 1]
```

Rubi steps

$$\int \coth^{-1}(1+d+d\tanh(a+bx))\,dx = x\coth^{-1}(1+d+d\tanh(a+bx)) + b\int \frac{x}{1+(1+d)e^{2a+2bx}}\,dx$$
$$= \frac{bx^2}{2} + x\coth^{-1}(1+d+d\tanh(a+bx)) - (b(1+d))\int \frac{e^{2a+2bx}x}{1+(1+d)e^{2a+2bx}}$$
$$= \frac{bx^2}{2} + x\coth^{-1}(1+d+d\tanh(a+bx)) - \frac{1}{2}x\log\left(1+(1+d)e^{2a+2bx}\right) + \frac{1}{2}$$
$$= \frac{bx^2}{2} + x\coth^{-1}(1+d+d\tanh(a+bx)) - \frac{1}{2}x\log\left(1+(1+d)e^{2a+2bx}\right) + -$$
$$= \frac{bx^2}{2} + x\coth^{-1}(1+d+d\tanh(a+bx)) - \frac{1}{2}x\log\left(1+(1+d)e^{2a+2bx}\right) - -$$

**Mathematica [B]** time = 0.91, size = 201, normalized size = 2.91

$$-2\text{Li}_2\left(-\sqrt{-d-1}\,e^{a+bx}\right) - 2\text{Li}_2\left(\sqrt{-d-1}\,e^{a+bx}\right) - 2\log\left(e^{a+bx}\right)\log\left(1-\sqrt{-d-1}\,e^{a+bx}\right) - 2\log\left(e^{a+bx}\right)\log\left(\sqrt{-d-\right.$$

Warning: Unable to verify antiderivative.

```
[In] Integrate[ArcCoth[1 + d + d*Tanh[a + b*x]],x]
```

```
[Out] x*ArcCoth[1 + d + d*Tanh[a + b*x]] + (b^2*x^2 + Log[E^(a + b*x)]^2 - 2*Log[
E^(a + b*x)]*Log[1 - Sqrt[-1 - d]*E^(a + b*x)] - 2*Log[E^(a + b*x)]*Log[1 +
 Sqrt[-1 - d]*E^(a + b*x)] + 2*Log[E^(a + b*x)]*Log[E^(-a - b*x) + (1 + d)*
E^(a + b*x)] - 2*b*x*Log[(2 + d)*Cosh[a + b*x] + d*Sinh[a + b*x]] - 2*PolyL
og[2, -(Sqrt[-1 - d]*E^(a + b*x))] - 2*PolyLog[2, Sqrt[-1 - d]*E^(a + b*x)]
)/(4*b)
```

**fricas [B]** time = 0.97, size = 238, normalized size = 3.45

$$b^2x^2 + bx\log\left(\frac{(d+2)\cosh(bx+a)+d\sinh(bx+a)}{d\cosh(bx+a)+d\sinh(bx+a)}\right) + a\log\left(2(d+1)\cosh(bx+a) + 2(d+1)\sinh(bx+a) + \sqrt{-4d-4}\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(1+d+d*tanh(b*x+a)),x, algorithm="fricas")
```

```
[Out] 1/2*(b^2*x^2 + b*x*log(((d + 2)*cosh(b*x + a) + d*sinh(b*x + a))/(d*cosh(b*
x + a) + d*sinh(b*x + a))) + a*log(2*(d + 1)*cosh(b*x + a) + 2*(d + 1)*sinh
(b*x + a) + sqrt(-4*d - 4)) + a*log(2*(d + 1)*cosh(b*x + a) + 2*(d + 1)*sin
h(b*x + a) - sqrt(-4*d - 4)) - (b*x + a)*log(1/2*sqrt(-4*d - 4)*(cosh(b*x +
 a) + sinh(b*x + a)) + 1) - (b*x + a)*log(-1/2*sqrt(-4*d - 4)*(cosh(b*x + a
) + sinh(b*x + a)) + 1) - dilog(1/2*sqrt(-4*d - 4)*(cosh(b*x + a) + sinh(b*
x + a))) - dilog(-1/2*sqrt(-4*d - 4)*(cosh(b*x + a) + sinh(b*x + a))))/b
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \operatorname{arcoth}(d\tanh(bx+a)+d+1)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(1+d+d*tanh(b*x+a)),x, algorithm="giac")
```

```
[Out] integrate(arccoth(d*tanh(b*x + a) + d + 1), x)
```

**maple [B]** time = 0.46, size = 247, normalized size = 3.58

$$-\frac{\operatorname{arccoth}(1+d+d\tanh(bx+a))\ln(d\tanh(bx+a)-d)}{2b} + \frac{\operatorname{arccoth}(1+d+d\tanh(bx+a))\ln(d\tanh(bx+a)}{2b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(arccoth(1+d+d*tanh(b*x+a)),x)
```

```
[Out] -1/2/b*arccoth(1+d+d*tanh(b*x+a))*ln(d*tanh(b*x+a)-d)+1/2/b*arccoth(1+d+d*t
anh(b*x+a))*ln(d*tanh(b*x+a)+d)-1/4/b*dilog(1/2*(d*tanh(b*x+a)+d)/d)-1/4/b*
ln(d*tanh(b*x+a)-d)*ln(1/2*(d*tanh(b*x+a)+d)/d)+1/4/b*dilog((d*tanh(b*x+a)+
d+2)/(2*d+2))+1/4/b*ln(d*tanh(b*x+a)-d)*ln((d*tanh(b*x+a)+d+2)/(2*d+2))+1/8
/b*ln(d*tanh(b*x+a)+d)^2-1/4/b*dilog(1+1/2*d*tanh(b*x+a)+1/2*d)-1/4/b*ln(d*
tanh(b*x+a)+d)*ln(1+1/2*d*tanh(b*x+a)+1/2*d)
```

**maxima** [A] time = 1.10, size = 72, normalized size = 1.04

$$\frac{1}{4} bd\left(\frac{2 x^2}{d} - \frac{2 bx \log\left((d+1)e^{(2 bx+2 a)} + 1\right) + \mathrm{Li}_2\left(-(d+1)e^{(2 bx+2 a)}\right)}{b^2 d}\right) + x \operatorname{arcoth}\left(d \tanh\left(bx + a\right) + d + 1\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(1+d+d*tanh(b*x+a)),x, algorithm="maxima")
```

```
[Out] 1/4*b*d*(2*x^2/d - (2*b*x*log((d + 1)*e^(2*b*x + 2*a) + 1) + dilog(-(d + 1)
*e^(2*b*x + 2*a)))/(b^2*d)) + x*arccoth(d*tanh(b*x + a) + d + 1)
```

**mupad** [F] time = 0.00, size = -1, normalized size = -0.01

$$\int \operatorname{acoth}\left(d + d \tanh\left(a + b\,x\right) + 1\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(d + d*tanh(a + b*x) + 1),x)
```

```
[Out] int(acoth(d + d*tanh(a + b*x) + 1), x)
```

**sympy** [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \operatorname{acoth}\left(d \tanh\left(a + bx\right) + d + 1\right) dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(1+d+d*tanh(b*x+a)),x)
```

```
[Out] Integral(acoth(d*tanh(a + b*x) + d + 1), x)
```

## 3.211 $\int \frac{\coth^{-1}(1+d+d\tanh(a+bx))}{x}\,dx$

**Optimal**. Leaf size=19

$$\mathrm{Int}\left(\frac{\coth^{-1}(d\tanh(a+bx)+d+1)}{x},x\right)$$

```
[Out] CannotIntegrate(arccoth(1+d+d*tanh(b*x+a))/x,x)
```

**Rubi** [A] time = 0.08, antiderivative size = 0, normalized size of antiderivative = 0.00, number of steps used = 0, number of rules used = 0, integrand size = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int \frac{\coth^{-1}(1+d+d\tanh(a+bx))}{x}\,dx$$

Verification is Not applicable to the result.

```
[In] Int[ArcCoth[1 + d + d*Tanh[a + b*x]]/x,x]
[Out] Defer[Int][ArcCoth[1 + d + d*Tanh[a + b*x]]/x, x]
```

Rubi steps

$$\int \frac{\coth^{-1}(1+d+d\tanh(a+bx))}{x}\,dx = \int \frac{\coth^{-1}(1+d+d\tanh(a+bx))}{x}\,dx$$

**Mathematica** [A] time = 3.35, size = 0, normalized size = 0.00

$$\int \frac{\coth^{-1}(1+d+d\tanh(a+bx))}{x}\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[ArcCoth[1 + d + d*Tanh[a + b*x]]/x,x]
[Out] Integrate[ArcCoth[1 + d + d*Tanh[a + b*x]]/x, x]
```

**fricas** [A] time = 0.69, size = 0, normalized size = 0.00

$$\mathrm{integral}\left(\frac{\mathrm{arcoth}\left(d\tanh\left(bx+a\right)+d+1\right)}{x},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(1+d+d*tanh(b*x+a))/x,x, algorithm="fricas")
[Out] integral(arccoth(d*tanh(b*x + a) + d + 1)/x, x)
```

**giac** [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\mathrm{arcoth}\left(d\tanh\left(bx+a\right)+d+1\right)}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(1+d+d*tanh(b*x+a))/x,x, algorithm="giac")
[Out] integrate(arccoth(d*tanh(b*x + a) + d + 1)/x, x)
```

**maple** [A] time = 0.96, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{arccoth}\left(1+d+d\tanh\left(bx+a\right)\right)}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(arccoth(1+d+d*tanh(b*x+a))/x,x)
[Out] int(arccoth(1+d+d*tanh(b*x+a))/x,x)
```

**maxima** [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{arcoth}\left(d\tanh\left(bx+a\right)+d+1\right)}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(1+d+d*tanh(b*x+a))/x,x, algorithm="maxima")
[Out] integrate(arccoth(d*tanh(b*x + a) + d + 1)/x, x)
```

**mupad** [A] time = 0.00, size = -1, normalized size = -0.05

$$\int \frac{\operatorname{acoth}\left(d+d\tanh\left(a+b\,x\right)+1\right)}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(d + d*tanh(a + b*x) + 1)/x,x)
[Out] int(acoth(d + d*tanh(a + b*x) + 1)/x, x)
```

**sympy** [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{acoth}\left(d\tanh\left(a+bx\right)+d+1\right)}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(1+d+d*tanh(b*x+a))/x,x)
[Out] Integral(acoth(d*tanh(a + b*x) + d + 1)/x, x)
```

## 3.212 $\int x^3 \coth^{-1}(1-d-d\tanh(a+bx))\,dx$

**Optimal**. Leaf size=168

$$\frac{3\text{Li}_5\left(-\left((1-d)e^{2a+2bx}\right)\right)}{16b^4}-\frac{3x\text{Li}_4\left(-\left((1-d)e^{2a+2bx}\right)\right)}{8b^3}+\frac{3x^2\text{Li}_3\left(-\left((1-d)e^{2a+2bx}\right)\right)}{8b^2}-\frac{x^3\text{Li}_2\left(-\left((1-d)e^{2a+2bx}\right)\right)}{4b}-\frac{1}{8}x^4$$

```
[Out] 1/20*b*x^5+1/4*x^4*arccoth(1-d-d*tanh(b*x+a))-1/8*x^4*ln(1+(1-d)*exp(2*b*x+
2*a))-1/4*x^3*polylog(2,-(1-d)*exp(2*b*x+2*a))/b+3/8*x^2*polylog(3,-(1-d)*e
xp(2*b*x+2*a))/b^2-3/8*x*polylog(4,-(1-d)*exp(2*b*x+2*a))/b^3+3/16*polylog(
5,-(1-d)*exp(2*b*x+2*a))/b^4
```

**Rubi [A]** time = 0.30, antiderivative size = 168, normalized size of antiderivative = 1.00, number of steps used = 8, number of rules used = 7, integrand size = 19, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.368, Rules used = {6240, 2184, 2190, 2531, 6609, 2282, 6589}

$$\frac{3x^2\text{PolyLog}\left(3,-(1-d)e^{2a+2bx}\right)}{8b^2}-\frac{3x\text{PolyLog}\left(4,-(1-d)e^{2a+2bx}\right)}{8b^3}+\frac{3\text{PolyLog}\left(5,-(1-d)e^{2a+2bx}\right)}{16b^4}-\frac{x^3\text{PolyLog}(2}{}$$

Antiderivative was successfully verified.

```
[In] Int[x^3*ArcCoth[1 - d - d*Tanh[a + b*x]],x]
```

```
[Out] (b*x^5)/20 + (x^4*ArcCoth[1 - d - d*Tanh[a + b*x]])/4 - (x^4*Log[1 + (1 - d
)*E^(2*a + 2*b*x)])/8 - (x^3*PolyLog[2, -((1 - d)*E^(2*a + 2*b*x))])/(4*b)
+ (3*x^2*PolyLog[3, -((1 - d)*E^(2*a + 2*b*x))])/(8*b^2) - (3*x*PolyLog[4,
-((1 - d)*E^(2*a + 2*b*x))])/(8*b^3) + (3*PolyLog[5, -((1 - d)*E^(2*a + 2*b
*x))])/(16*b^4)
```

Rule 2184

```
Int[((c_.) + (d_.)*(x_))^(m_.)/((a_) + (b_.)*((F_)^((g_.)*((e_.) + (f_.)*(x
_))))^(n_.)), x_Symbol] :> Simp[(c + d*x)^(m + 1)/(a*d*(m + 1)), x] - Dist[
b/a, Int[((c + d*x)^m*(F^(g*(e + f*x)))^n)/(a + b*(F^(g*(e + f*x)))^n), x],
 x] /; FreeQ[{F, a, b, c, d, e, f, g, n}, x] && IGtQ[m, 0]
```

Rule 2190

```
Int[(((F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m_.))/
((a_) + (b_.)*((F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)), x_Symbol] :> Simp
[((c + d*x)^m*Log[1 + (b*(F^(g*(e + f*x)))^n)/a])/(b*f*g*n*Log[F]), x] - Di
st[(d*m)/(b*f*g*n*Log[F]), Int[(c + d*x)^(m - 1)*Log[1 + (b*(F^(g*(e + f*x)
))^n)/a], x], x] /; FreeQ[{F, a, b, c, d, e, f, g, n}, x] && IGtQ[m, 0]
```

Rule 2282

```
Int[u_, x_Symbol] :> With[{v = FunctionOfExponential[u, x]}, Dist[v/D[v, x]
, Subst[Int[FunctionOfExponentialFunction[u, x]/x, x], x, v], x]] /; Functi
onOfExponentialQ[u, x] &&  !MatchQ[u, (w_)*((a_.)*(v_)^(n_))^(m_) /; FreeQ[
{a, m, n}, x] && IntegerQ[m*n]] &&  !MatchQ[u, E^((c_.)*((a_.) + (b_.)*x))*
(F_)[v_] /; FreeQ[{a, b, c}, x] && InverseFunctionQ[F[x]]]
```

Rule 2531

```
Int[Log[1 + (e_.)*((F_)^((c_.)*((a_.) + (b_.)*(x_))))^(n_.)]*((f_.) + (g_.)
*(x_))^(m_.), x_Symbol] :> -Simp[((f + g*x)^m*PolyLog[2, -(e*(F^(c*(a + b*x
)))^n)])/(b*c*n*Log[F]), x] + Dist[(g*m)/(b*c*n*Log[F]), Int[(f + g*x)^(m -
 1)*PolyLog[2, -(e*(F^(c*(a + b*x)))^n)], x], x] /; FreeQ[{F, a, b, c, e, f
, g, n}, x] && GtQ[m, 0]
```

Rule 6240

```
Int[ArcCoth[(c_.) + (d_.)*Tanh[(a_.) + (b_.)*(x_)]]*((e_.) + (f_.)*(x_))^(m
_.), x_Symbol] :> Simp[((e + f*x)^(m + 1)*ArcCoth[c + d*Tanh[a + b*x]])/(f*
(m + 1)), x] + Dist[b/(f*(m + 1)), Int[(e + f*x)^(m + 1)/(c - d + c*E^(2*a
+ 2*b*x)), x], x] /; FreeQ[{a, b, c, d, e, f}, x] && IGtQ[m, 0] && EqQ[(c -
 d)^2, 1]
```

Rule 6589

```
Int[PolyLog[n_, (c_.)*((a_.) + (b_.)*(x_))^(p_.)]/((d_.) + (e_.)*(x_)), x_S
ymbol] :> Simp[PolyLog[n + 1, c*(a + b*x)^p]/(e*p), x] /; FreeQ[{a, b, c, d
, e, n, p}, x] && EqQ[b*d, a*e]
```

Rule 6609

```
Int[((e_.) + (f_.)*(x_))^(m_.)*PolyLog[n_, (d_.)*((F_)^((c_.)*((a_.) + (b_.
)*(x_))))^(p_.)], x_Symbol] :> Simp[((e + f*x)^m*PolyLog[n + 1, d*(F^(c*(a
+ b*x)))^p])/(b*c*p*Log[F]), x] - Dist[(f*m)/(b*c*p*Log[F]), Int[(e + f*x)^
(m - 1)*PolyLog[n + 1, d*(F^(c*(a + b*x)))^p], x], x] /; FreeQ[{F, a, b, c,
 d, e, f, n, p}, x] && GtQ[m, 0]
```

Rubi steps

$$\int x^3 \coth^{-1}(1-d-d\tanh(a+bx))\,dx = \frac{1}{4}x^4\coth^{-1}(1-d-d\tanh(a+bx)) + \frac{1}{4}b\int \frac{x^4}{1+(1-d)e^{2a+2bx}}\,dx$$

$$= \frac{bx^5}{20} + \frac{1}{4}x^4\coth^{-1}(1-d-d\tanh(a+bx)) - \frac{1}{4}(b(1-d))\int \frac{e^{2a+}}{1+(1-}$$

$$= \frac{bx^5}{20} + \frac{1}{4}x^4\coth^{-1}(1-d-d\tanh(a+bx)) - \frac{1}{8}x^4\log\left(1+(1-d)e^{2a}\right.$$

$$= \frac{bx^5}{20} + \frac{1}{4}x^4\coth^{-1}(1-d-d\tanh(a+bx)) - \frac{1}{8}x^4\log\left(1+(1-d)e^{2a}\right.$$

$$= \frac{bx^5}{20} + \frac{1}{4}x^4\coth^{-1}(1-d-d\tanh(a+bx)) - \frac{1}{8}x^4\log\left(1+(1-d)e^{2a}\right.$$

$$= \frac{bx^5}{20} + \frac{1}{4}x^4\coth^{-1}(1-d-d\tanh(a+bx)) - \frac{1}{8}x^4\log\left(1+(1-d)e^{2a}\right.$$

$$= \frac{bx^5}{20} + \frac{1}{4}x^4\coth^{-1}(1-d-d\tanh(a+bx)) - \frac{1}{8}x^4\log\left(1+(1-d)e^{2a}\right.$$

$$= \frac{bx^5}{20} + \frac{1}{4}x^4\coth^{-1}(1-d-d\tanh(a+bx)) - \frac{1}{8}x^4\log\left(1+(1-d)e^{2a}\right.$$

**Mathematica [A]** time = 0.22, size = 144, normalized size = 0.86

$$\frac{1}{16}\left(\frac{3\text{Li}_5\left(\frac{e^{-2(a+bx)}}{d-1}\right)}{b^4} + \frac{6x\text{Li}_4\left(\frac{e^{-2(a+bx)}}{d-1}\right)}{b^3} + \frac{6x^2\text{Li}_3\left(\frac{e^{-2(a+bx)}}{d-1}\right)}{b^2} + \frac{4x^3\text{Li}_2\left(\frac{e^{-2(a+bx)}}{d-1}\right)}{b} - 2x^4\log\left(1-\frac{e^{-2(a+bx)}}{d-1}\right) + 4x^4\,\text{c}\right.$$

Antiderivative was successfully verified.

```
[In] Integrate[x^3*ArcCoth[1 - d - d*Tanh[a + b*x]],x]
```

```
[Out] (4*x^4*ArcCoth[1 - d - d*Tanh[a + b*x]] - 2*x^4*Log[1 - 1/((-1 + d)*E^(2*(a
 + b*x)))] + (4*x^3*PolyLog[2, 1/((-1 + d)*E^(2*(a + b*x)))])/b + (6*x^2*Po
lyLog[3, 1/((-1 + d)*E^(2*(a + b*x)))])/b^2 + (6*x*PolyLog[4, 1/((-1 + d)*E
```

```
^(2*(a + b*x)))])/b^3 + (3*PolyLog[5, 1/((-1 + d)*E^(2*(a + b*x)))])/b^4)/1
6
```

**fricas [C]** time = 0.69, size = 423, normalized size = 2.52

$$\frac{2\,b^5x^5 - 5\,b^4x^4\log\left(\frac{d\cosh(bx+a)+d\sinh(bx+a)}{(d-2)\cosh(bx+a)+d\sinh(bx+a)}\right) - 20\,b^3x^3\mathrm{Li}_2\left(\sqrt{d-1}\,(\cosh(bx+a)+\sinh(bx+a))\right) - 20\,b^3x^3\mathrm{Li}_2}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^3*arccoth(1-d-d*tanh(b*x+a)),x, algorithm="fricas")
```

```
[Out] 1/40*(2*b^5*x^5 - 5*b^4*x^4*log((d*cosh(b*x + a) + d*sinh(b*x + a))/((d - 2
)*cosh(b*x + a) + d*sinh(b*x + a))) - 20*b^3*x^3*dilog(sqrt(d - 1)*(cosh(b*
x + a) + sinh(b*x + a))) - 20*b^3*x^3*dilog(-sqrt(d - 1)*(cosh(b*x + a) + s
inh(b*x + a))) - 5*a^4*log(2*(d - 1)*cosh(b*x + a) + 2*(d - 1)*sinh(b*x + a
) + 2*sqrt(d - 1)) - 5*a^4*log(2*(d - 1)*cosh(b*x + a) + 2*(d - 1)*sinh(b*x
 + a) - 2*sqrt(d - 1)) + 60*b^2*x^2*polylog(3, sqrt(d - 1)*(cosh(b*x + a) +
 sinh(b*x + a))) + 60*b^2*x^2*polylog(3, -sqrt(d - 1)*(cosh(b*x + a) + sinh
(b*x + a))) - 120*b*x*polylog(4, sqrt(d - 1)*(cosh(b*x + a) + sinh(b*x + a)
)) - 120*b*x*polylog(4, -sqrt(d - 1)*(cosh(b*x + a) + sinh(b*x + a))) - 5*(
b^4*x^4 - a^4)*log(sqrt(d - 1)*(cosh(b*x + a) + sinh(b*x + a)) + 1) - 5*(b^
4*x^4 - a^4)*log(-sqrt(d - 1)*(cosh(b*x + a) + sinh(b*x + a)) + 1) + 120*po
lylog(5, sqrt(d - 1)*(cosh(b*x + a) + sinh(b*x + a))) + 120*polylog(5, -sqr
t(d - 1)*(cosh(b*x + a) + sinh(b*x + a))))/b^4
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int x^3\operatorname{arcoth}\left(-d\tanh\left(bx+a\right)-d+1\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^3*arccoth(1-d-d*tanh(b*x+a)),x, algorithm="giac")
```

```
[Out] integrate(x^3*arccoth(-d*tanh(b*x + a) - d + 1), x)
```

**maple [C]** time = 5.43, size = 1802, normalized size = 10.73

result too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^3*arccoth(1-d-d*tanh(b*x+a)),x)
```

```
[Out] 1/16*I*x^4*Pi*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(
2*b*x+2*a)/(exp(2*b*x+2*a)+1))+1/16*I*x^4*Pi*csgn(I*d)*csgn(I*exp(2*b*x+2*a
)/(exp(2*b*x+2*a)+1))*csgn(I*d/(exp(2*b*x+2*a)+1)*exp(2*b*x+2*a))-1/4/b^4*d
/(d-1)*polylog(2,(d-1)*exp(2*b*x+2*a))*a^3+1/2/b^4*d*a^4/(d-1)*ln(1-exp(b*x
+a)*(d-1)^(1/2))+1/2/b^4*d*a^4/(d-1)*ln(1+exp(b*x+a)*(d-1)^(1/2))-1/8*I*x^4
*Pi*csgn(I/(exp(2*b*x+2*a)+1)*(d*exp(2*b*x+2*a)-exp(2*b*x+2*a)-1))^2-1/8*d/
(d-1)*ln(1-(d-1)*exp(2*b*x+2*a))*x^4-3/8/b^2/(d-1)*polylog(3,(d-1)*exp(2*b*
x+2*a))*x^2+3/8/b^3/(d-1)*polylog(4,(d-1)*exp(2*b*x+2*a))*x-1/2/b^4*a^4/(d-
1)*ln(1-exp(b*x+a)*(d-1)^(1/2))-1/2/b^4*a^4/(d-1)*ln(1+exp(b*x+a)*(d-1)^(1/
2))+3/16/b^4*d/(d-1)*polylog(5,(d-1)*exp(2*b*x+2*a))-1/2/b^4*a^3/(d-1)*dilo
g(1-exp(b*x+a)*(d-1)^(1/2))-1/2/b^4*a^3/(d-1)*dilog(1+exp(b*x+a)*(d-1)^(1/2
))+3/8/b^4/(d-1)*ln(1-(d-1)*exp(2*b*x+2*a))*a^4+1/4/b/(d-1)*polylog(2,(d-1)
*exp(2*b*x+2*a))*x^3+1/4/b^4/(d-1)*polylog(2,(d-1)*exp(2*b*x+2*a))*a^3+1/20
*b*x^5+1/16*I*x^4*Pi*csgn(I/(exp(2*b*x+2*a)+1)*(d*exp(2*b*x+2*a)-exp(2*b*x+
2*a)-1))^3-1/8/b^4*d*a^4/(d-1)*ln(d*exp(2*b*x+2*a)-exp(2*b*x+2*a)-1)-1/16*I
*x^4*Pi*csgn(I*d/(exp(2*b*x+2*a)+1)*exp(2*b*x+2*a))^3+1/8/b^4*a^4/(d-1)*ln(
d*exp(2*b*x+2*a)-exp(2*b*x+2*a)-1)+1/8/(d-1)*ln(1-(d-1)*exp(2*b*x+2*a))*x^4
```

```
-3/16/b^4/(d-1)*polylog(5,(d-1)*exp(2*b*x+2*a))-1/2/b^3*a^3/(d-1)*ln(1+exp(
b*x+a)*(d-1)^(1/2))*x-3/8/b^4*d/(d-1)*ln(1-(d-1)*exp(2*b*x+2*a))*a^4-1/4/b*
d/(d-1)*polylog(2,(d-1)*exp(2*b*x+2*a))*x^3-1/4*x^4*ln(exp(b*x+a))-1/8*x^4*
ln(d)+1/8*x^4*ln(d*exp(2*b*x+2*a)-exp(2*b*x+2*a)-1)+1/2/b^3/(d-1)*ln(1-(d-1
)*exp(2*b*x+2*a))*x*a^3+1/2/b^4*d*a^3/(d-1)*dilog(1+exp(b*x+a)*(d-1)^(1/2))
+3/8/b^2*d/(d-1)*polylog(3,(d-1)*exp(2*b*x+2*a))*x^2-3/8/b^3*d/(d-1)*polylo
g(4,(d-1)*exp(2*b*x+2*a))*x+1/2/b^4*d*a^3/(d-1)*dilog(1-exp(b*x+a)*(d-1)^(1
/2))-1/2/b^3*a^3/(d-1)*ln(1-exp(b*x+a)*(d-1)^(1/2))*x+1/16*I*x^4*Pi*csgn(I*
exp(2*b*x+2*a))^3+1/8*I*x^4*Pi*csgn(I*d/(exp(2*b*x+2*a)+1)*exp(2*b*x+2*a))^
2+1/16*I*x^4*Pi*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^3+1/16*I*x^4*Pi*c
sgn(I*(d*exp(2*b*x+2*a)-exp(2*b*x+2*a)-1))*csgn(I/(exp(2*b*x+2*a)+1)*(d*exp
(2*b*x+2*a)-exp(2*b*x+2*a)-1))^2+1/16*I*x^4*Pi*csgn(I/(exp(2*b*x+2*a)+1))*c
sgn(I/(exp(2*b*x+2*a)+1)*(d*exp(2*b*x+2*a)-exp(2*b*x+2*a)-1))^2-1/16*I*x^4*
Pi*csgn(I*d)*csgn(I*d/(exp(2*b*x+2*a)+1)*exp(2*b*x+2*a))^2-1/16*I*x^4*Pi*cs
gn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2-1/16*I
*x^4*Pi*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2-
1/16*I*x^4*Pi*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))*csgn(I*d/(exp(2*b*x
+2*a)+1)*exp(2*b*x+2*a))^2+1/16*I*x^4*Pi*csgn(I*exp(b*x+a))^2*csgn(I*exp(2*
b*x+2*a))-1/8*I*x^4*Pi*csgn(I*exp(b*x+a))*csgn(I*exp(2*b*x+2*a))^2-1/16*I*x
^4*Pi*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*(d*exp(2*b*x+2*a)-exp(2*b*x+2*a)-1)
)*csgn(I/(exp(2*b*x+2*a)+1)*(d*exp(2*b*x+2*a)-exp(2*b*x+2*a)-1))-1/2/b^3*d/
(d-1)*ln(1-(d-1)*exp(2*b*x+2*a))*x*a^3+1/2/b^3*d*a^3/(d-1)*ln(1-exp(b*x+a)*
(d-1)^(1/2))*x+1/2/b^3*d*a^3/(d-1)*ln(1+exp(b*x+a)*(d-1)^(1/2))*x
```

**maxima [A]** time = 1.10, size = 146, normalized size = 0.87

$$-\frac{1}{4}\,x^4\,\mathrm{arcoth}\left(d\tanh\left(bx+a\right)+d-1\right)+\frac{1}{40}\left(\frac{2\,x^5}{d}-\frac{5\left(2\,b^4x^4\log\left(-(d-1)e^{(2\,bx+2\,a)}+1\right)+4\,b^3x^3\mathrm{Li}_2\left((d-1)e^{(2\right.\right.}}{}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^3*arccoth(1-d-d*tanh(b*x+a)),x, algorithm="maxima")
```

```
[Out] -1/4*x^4*arccoth(d*tanh(b*x + a) + d - 1) + 1/40*(2*x^5/d - 5*(2*b^4*x^4*lo
g(-(d - 1)*e^(2*b*x + 2*a) + 1) + 4*b^3*x^3*dilog((d - 1)*e^(2*b*x + 2*a))
- 6*b^2*x^2*polylog(3, (d - 1)*e^(2*b*x + 2*a)) + 6*b*x*polylog(4, (d - 1)*
e^(2*b*x + 2*a)) - 3*polylog(5, (d - 1)*e^(2*b*x + 2*a)))/(b^5*d))*b*d
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.01

$$\int -x^3\,\mathrm{acoth}\left(d+d\,\tanh\left(a+b\,x\right)-1\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(-x^3*acoth(d + d*tanh(a + b*x) - 1),x)
```

```
[Out] int(-x^3*acoth(d + d*tanh(a + b*x) - 1), x)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int x^3\,\mathrm{acoth}\left(-d\tanh\left(a+bx\right)-d+1\right)dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**3*acoth(1-d-d*tanh(b*x+a)),x)
```

```
[Out] Integral(x**3*acoth(-d*tanh(a + b*x) - d + 1), x)
```

# 3.213 $\int x^2 \coth^{-1}(1-d-d\tanh(a+bx))\,dx$

**Optimal**. Leaf size=139

$$-\frac{\text{Li}_4\left(-\left((1-d)e^{2a+2bx}\right)\right)}{8b^3}+\frac{x\text{Li}_3\left(-\left((1-d)e^{2a+2bx}\right)\right)}{4b^2}-\frac{x^2\text{Li}_2\left(-\left((1-d)e^{2a+2bx}\right)\right)}{4b}-\frac{1}{6}x^3\log\left((1-d)e^{2a+2bx}+1\right)+\frac{1}{3}x^3$$

```
[Out] 1/12*b*x^4+1/3*x^3*arccoth(1-d-d*tanh(b*x+a))-1/6*x^3*ln(1+(1-d)*exp(2*b*x+
2*a))-1/4*x^2*polylog(2,-(1-d)*exp(2*b*x+2*a))/b+1/4*x*polylog(3,-(1-d)*exp
(2*b*x+2*a))/b^2-1/8*polylog(4,-(1-d)*exp(2*b*x+2*a))/b^3
```

**Rubi [A]** time = 0.27, antiderivative size = 139, normalized size of antiderivative = 1.00, number of steps used = 7, number of rules used = 7, integrand size = 19, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.368, Rules used = {6240, 2184, 2190, 2531, 6609, 2282, 6589}

$$\frac{x\text{PolyLog}\left(3,-(1-d)e^{2a+2bx}\right)}{4b^2}-\frac{\text{PolyLog}\left(4,-(1-d)e^{2a+2bx}\right)}{8b^3}-\frac{x^2\text{PolyLog}\left(2,-(1-d)e^{2a+2bx}\right)}{4b}-\frac{1}{6}x^3\log\left((1-d)e^{2}\right.$$

Antiderivative was successfully verified.

```
[In] Int[x^2*ArcCoth[1 - d - d*Tanh[a + b*x]],x]
```

```
[Out] (b*x^4)/12 + (x^3*ArcCoth[1 - d - d*Tanh[a + b*x]])/3 - (x^3*Log[1 + (1 - d
)*E^(2*a + 2*b*x)])/6 - (x^2*PolyLog[2, -((1 - d)*E^(2*a + 2*b*x))])/(4*b)
+ (x*PolyLog[3, -((1 - d)*E^(2*a + 2*b*x))])/(4*b^2) - PolyLog[4, -((1 - d)
*E^(2*a + 2*b*x))]/(8*b^3)
```

Rule 2184

```
Int[((c_.) + (d_.)*(x_))^(m_.)/((a_) + (b_.)*((F_)^((g_.)*((e_.) + (f_.)*(x
_))))^(n_.)), x_Symbol] :> Simp[(c + d*x)^(m + 1)/(a*d*(m + 1)), x] - Dist[
b/a, Int[((c + d*x)^m*(F^(g*(e + f*x)))^n)/(a + b*(F^(g*(e + f*x)))^n), x],
 x] /; FreeQ[{F, a, b, c, d, e, f, g, n}, x] && IGtQ[m, 0]
```

Rule 2190

```
Int[(((F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m_.))/
((a_) + (b_.)*((F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)), x_Symbol] :> Simp
[((c + d*x)^m*Log[1 + (b*(F^(g*(e + f*x)))^n)/a])/(b*f*g*n*Log[F]), x] - Di
st[(d*m)/(b*f*g*n*Log[F]), Int[(c + d*x)^(m - 1)*Log[1 + (b*(F^(g*(e + f*x)
))^n)/a], x], x] /; FreeQ[{F, a, b, c, d, e, f, g, n}, x] && IGtQ[m, 0]
```

Rule 2282

```
Int[u_, x_Symbol] :> With[{v = FunctionOfExponential[u, x]}, Dist[v/D[v, x]
, Subst[Int[FunctionOfExponentialFunction[u, x]/x, x], x, v], x]] /; Functi
onOfExponentialQ[u, x] &&  !MatchQ[u, (w_)*((a_.)*(v_)^(n_))^(m_) /; FreeQ[
{a, m, n}, x] && IntegerQ[m*n]] &&  !MatchQ[u, E^((c_.)*((a_.) + (b_.)*x))*
(F_)[v_] /; FreeQ[{a, b, c}, x] && InverseFunctionQ[F[x]]]
```

Rule 2531

```
Int[Log[1 + (e_.)*((F_)^((c_.)*((a_.) + (b_.)*(x_))))^(n_.)]*((f_.) + (g_.)
*(x_))^(m_.), x_Symbol] :> -Simp[((f + g*x)^m*PolyLog[2, -(e*(F^(c*(a + b*x
)))^n)])/(b*c*n*Log[F]), x] + Dist[(g*m)/(b*c*n*Log[F]), Int[(f + g*x)^(m -
 1)*PolyLog[2, -(e*(F^(c*(a + b*x)))^n)], x], x] /; FreeQ[{F, a, b, c, e, f
, g, n}, x] && GtQ[m, 0]
```

Rule 6240

```
Int[ArcCoth[(c_.) + (d_.)*Tanh[(a_.) + (b_.)*(x_)]]*((e_.) + (f_.)*(x_))^(m
_.), x_Symbol] :> Simp[((e + f*x)^(m + 1)*ArcCoth[c + d*Tanh[a + b*x]])/(f*
(m + 1)), x] + Dist[b/(f*(m + 1)), Int[(e + f*x)^(m + 1)/(c - d + c*E^(2*a
+ 2*b*x)), x], x] /; FreeQ[{a, b, c, d, e, f}, x] && IGtQ[m, 0] && EqQ[(c -
 d)^2, 1]
```

Rule 6589

```
Int[PolyLog[n_, (c_.)*((a_.) + (b_.)*(x_))^(p_.)]/((d_.) + (e_.)*(x_)), x_S
ymbol] :> Simp[PolyLog[n + 1, c*(a + b*x)^p]/(e*p), x] /; FreeQ[{a, b, c, d
, e, n, p}, x] && EqQ[b*d, a*e]
```

Rule 6609

```
Int[((e_.) + (f_.)*(x_))^(m_.)*PolyLog[n_, (d_.)*((F_)^((c_.)*((a_.) + (b_.
)*(x_))))^(p_.)], x_Symbol] :> Simp[((e + f*x)^m*PolyLog[n + 1, d*(F^(c*(a
+ b*x)))^p])/(b*c*p*Log[F]), x] - Dist[(f*m)/(b*c*p*Log[F]), Int[(e + f*x)^
(m - 1)*PolyLog[n + 1, d*(F^(c*(a + b*x)))^p], x], x] /; FreeQ[{F, a, b, c,
 d, e, f, n, p}, x] && GtQ[m, 0]
```

Rubi steps

$$\int x^2 \coth^{-1}(1-d-d\tanh(a+bx))\,dx = \frac{1}{3}x^3\coth^{-1}(1-d-d\tanh(a+bx)) + \frac{1}{3}b\int \frac{x^3}{1+(1-d)e^{2a+2bx}}\,dx$$
$$= \frac{bx^4}{12} + \frac{1}{3}x^3\coth^{-1}(1-d-d\tanh(a+bx)) - \frac{1}{3}(b(1-d))\int \frac{e^{2a+}}{1+(1-}$$
$$= \frac{bx^4}{12} + \frac{1}{3}x^3\coth^{-1}(1-d-d\tanh(a+bx)) - \frac{1}{6}x^3\log\left(1+(1-d)e^{2a}\right.$$
$$= \frac{bx^4}{12} + \frac{1}{3}x^3\coth^{-1}(1-d-d\tanh(a+bx)) - \frac{1}{6}x^3\log\left(1+(1-d)e^{2a}\right.$$
$$= \frac{bx^4}{12} + \frac{1}{3}x^3\coth^{-1}(1-d-d\tanh(a+bx)) - \frac{1}{6}x^3\log\left(1+(1-d)e^{2a}\right.$$
$$= \frac{bx^4}{12} + \frac{1}{3}x^3\coth^{-1}(1-d-d\tanh(a+bx)) - \frac{1}{6}x^3\log\left(1+(1-d)e^{2a}\right.$$
$$= \frac{bx^4}{12} + \frac{1}{3}x^3\coth^{-1}(1-d-d\tanh(a+bx)) - \frac{1}{6}x^3\log\left(1+(1-d)e^{2a}\right.$$

**Mathematica [A]** time = 0.12, size = 119, normalized size = 0.86

$$\frac{1}{24}\left(\frac{3\text{Li}_4\left(\frac{e^{-2(a+bx)}}{d-1}\right)}{b^3} + \frac{6x\text{Li}_3\left(\frac{e^{-2(a+bx)}}{d-1}\right)}{b^2} + \frac{6x^2\text{Li}_2\left(\frac{e^{-2(a+bx)}}{d-1}\right)}{b} - 4x^3\log\left(1-\frac{e^{-2(a+bx)}}{d-1}\right) + 8x^3\coth^{-1}(d(-\tanh(a+\right.$$

Antiderivative was successfully verified.

```
[In] Integrate[x^2*ArcCoth[1 - d - d*Tanh[a + b*x]],x]
```

```
[Out] (8*x^3*ArcCoth[1 - d - d*Tanh[a + b*x]] - 4*x^3*Log[1 - 1/((-1 + d)*E^(2*(a
 + b*x)))] + (6*x^2*PolyLog[2, 1/((-1 + d)*E^(2*(a + b*x)))])/b + (6*x*Poly
Log[3, 1/((-1 + d)*E^(2*(a + b*x)))])/b^2 + (3*PolyLog[4, 1/((-1 + d)*E^(2*
(a + b*x)))])/b^3)/24
```

**fricas [C]** time = 1.86, size = 359, normalized size = 2.58

$$b^4x^4 - 2b^3x^3\log\left(\frac{d\cosh(bx+a)+d\sinh(bx+a)}{(d-2)\cosh(bx+a)+d\sinh(bx+a)}\right) - 6b^2x^2\text{Li}_2\left(\sqrt{d-1}\left(\cosh(bx+a)+\sinh(bx+a)\right)\right) - 6b^2x^2\text{Li}_2\left(\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*arccoth(1-d-d*tanh(b*x+a)),x, algorithm="fricas")
```

```
[Out] 1/12*(b^4*x^4 - 2*b^3*x^3*log((d*cosh(b*x + a) + d*sinh(b*x + a))/((d - 2)*
cosh(b*x + a) + d*sinh(b*x + a))) - 6*b^2*x^2*dilog(sqrt(d - 1)*(cosh(b*x +
 a) + sinh(b*x + a))) - 6*b^2*x^2*dilog(-sqrt(d - 1)*(cosh(b*x + a) + sinh(
b*x + a))) + 2*a^3*log(2*(d - 1)*cosh(b*x + a) + 2*(d - 1)*sinh(b*x + a) +
2*sqrt(d - 1)) + 2*a^3*log(2*(d - 1)*cosh(b*x + a) + 2*(d - 1)*sinh(b*x + a
) - 2*sqrt(d - 1)) + 12*b*x*polylog(3, sqrt(d - 1)*(cosh(b*x + a) + sinh(b*
x + a))) + 12*b*x*polylog(3, -sqrt(d - 1)*(cosh(b*x + a) + sinh(b*x + a)))
- 2*(b^3*x^3 + a^3)*log(sqrt(d - 1)*(cosh(b*x + a) + sinh(b*x + a)) + 1) -
2*(b^3*x^3 + a^3)*log(-sqrt(d - 1)*(cosh(b*x + a) + sinh(b*x + a)) + 1) - 1
2*polylog(4, sqrt(d - 1)*(cosh(b*x + a) + sinh(b*x + a))) - 12*polylog(4, -
sqrt(d - 1)*(cosh(b*x + a) + sinh(b*x + a))))/b^3
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int x^2 \operatorname{arcoth}\left(-d \tanh\left(bx + a\right) - d + 1\right) \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*arccoth(1-d-d*tanh(b*x+a)),x, algorithm="giac")
```

```
[Out] integrate(x^2*arccoth(-d*tanh(b*x + a) - d + 1), x)
```

**maple [C]** time = 5.31, size = 1745, normalized size = 12.55

result too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^2*arccoth(1-d-d*tanh(b*x+a)),x)
```

```
[Out] -1/12*I*x^3*Pi*csgn(I*d/(exp(2*b*x+2*a)+1)*exp(2*b*x+2*a))^3+1/12*I*x^3*Pi*
csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^3+1/6*x^3*ln(d*exp(2*b*x+2*a)-exp
(2*b*x+2*a)-1)+1/12*I*x^3*Pi*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I/(exp(2*b*x+2
*a)+1)*(d*exp(2*b*x+2*a)-exp(2*b*x+2*a)-1))^2+1/8/b^3/(d-1)*polylog(4,(d-1)
*exp(2*b*x+2*a))+1/6/(d-1)*ln(1-(d-1)*exp(2*b*x+2*a))*x^3+1/2/b^3*a^2/(d-1)
*dilog(1-exp(b*x+a)*(d-1)^(1/2))+1/2/b^3*a^2/(d-1)*dilog(1+exp(b*x+a)*(d-1)
^(1/2))-1/3/b^3/(d-1)*ln(1-(d-1)*exp(2*b*x+2*a))*a^3+1/4/b/(d-1)*polylog(2,
(d-1)*exp(2*b*x+2*a))*x^2-1/4/b^3/(d-1)*polylog(2,(d-1)*exp(2*b*x+2*a))*a^2
-1/4/b^2/(d-1)*polylog(3,(d-1)*exp(2*b*x+2*a))*x+1/2/b^3*a^3/(d-1)*ln(1-exp
(b*x+a)*(d-1)^(1/2))+1/2/b^3*a^3/(d-1)*ln(1+exp(b*x+a)*(d-1)^(1/2))-1/8/b^3
*d/(d-1)*polylog(4,(d-1)*exp(2*b*x+2*a))-1/6*d/(d-1)*ln(1-(d-1)*exp(2*b*x+2
*a))*x^3+1/6*I*x^3*Pi*csgn(I*d/(exp(2*b*x+2*a)+1)*exp(2*b*x+2*a))^2-1/6*I*x
^3*Pi*csgn(I/(exp(2*b*x+2*a)+1)*(d*exp(2*b*x+2*a)-exp(2*b*x+2*a)-1))^2+1/12
*b*x^4-1/2/b^3*d*a^2/(d-1)*dilog(1-exp(b*x+a)*(d-1)^(1/2))-1/2/b^3*d*a^2/(d
-1)*dilog(1+exp(b*x+a)*(d-1)^(1/2))+1/3/b^3*d/(d-1)*ln(1-(d-1)*exp(2*b*x+2*
a))*a^3-1/4/b*d/(d-1)*polylog(2,(d-1)*exp(2*b*x+2*a))*x^2+1/4/b^3*d/(d-1)*p
olylog(2,(d-1)*exp(2*b*x+2*a))*a^2+1/4/b^2*d/(d-1)*polylog(3,(d-1)*exp(2*b*
x+2*a))*x-1/2/b^2/(d-1)*ln(1-(d-1)*exp(2*b*x+2*a))*x*a^2+1/2/b^2*a^2/(d-1)*
ln(1-exp(b*x+a)*(d-1)^(1/2))*x+1/2/b^2*a^2/(d-1)*ln(1+exp(b*x+a)*(d-1)^(1/2
))*x-1/2/b^3*d*a^3/(d-1)*ln(1-exp(b*x+a)*(d-1)^(1/2))-1/2/b^3*d*a^3/(d-1)*l
n(1+exp(b*x+a)*(d-1)^(1/2))-1/12*I*x^3*Pi*csgn(I*d)*csgn(I*d/(exp(2*b*x+2*a
)+1)*exp(2*b*x+2*a))^2-1/12*I*x^3*Pi*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(
2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2+1/12*I*x^3*Pi*csgn(I/(exp(2*b*x+2*a)+1)*(d
*exp(2*b*x+2*a)-exp(2*b*x+2*a)-1))^3-1/3*x^3*ln(exp(b*x+a))-1/6*x^3*ln(d)+1
/12*I*x^3*Pi*csgn(I*exp(2*b*x+2*a))^3+1/12*I*x^3*Pi*csgn(I*exp(b*x+a))^2*cs
gn(I*exp(2*b*x+2*a))-1/6*I*x^3*Pi*csgn(I*exp(b*x+a))*csgn(I*exp(2*b*x+2*a))
^2-1/12*I*x^3*Pi*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))*csgn(I*d/(exp(2*
```

```
b*x+2*a)+1)*exp(2*b*x+2*a))^2-1/12*I*x^3*Pi*csgn(I*exp(2*b*x+2*a))*csgn(I*e
xp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2-1/6/b^3*a^3/(d-1)*ln(d*exp(2*b*x+2*a)-e
xp(2*b*x+2*a)-1)+1/6/b^3*d*a^3/(d-1)*ln(d*exp(2*b*x+2*a)-exp(2*b*x+2*a)-1)+
1/12*I*x^3*Pi*csgn(I*(d*exp(2*b*x+2*a)-exp(2*b*x+2*a)-1))*csgn(I/(exp(2*b*x
+2*a)+1)*(d*exp(2*b*x+2*a)-exp(2*b*x+2*a)-1))^2+1/12*I*x^3*Pi*csgn(I*d)*csg
n(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))*csgn(I*d/(exp(2*b*x+2*a)+1)*exp(2*b*
x+2*a))-1/2/b^2*d*a^2/(d-1)*ln(1+exp(b*x+a)*(d-1)^(1/2))*x+1/2/b^2*d/(d-1)*
ln(1-(d-1)*exp(2*b*x+2*a))*x*a^2-1/2/b^2*d*a^2/(d-1)*ln(1-exp(b*x+a)*(d-1)^
(1/2))*x+1/12*I*x^3*Pi*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(2*b*x+2*a))*cs
gn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))-1/12*I*x^3*Pi*csgn(I/(exp(2*b*x+2*a
)+1))*csgn(I*(d*exp(2*b*x+2*a)-exp(2*b*x+2*a)-1))*csgn(I/(exp(2*b*x+2*a)+1)
*(d*exp(2*b*x+2*a)-exp(2*b*x+2*a)-1))
```

**maxima [A]** time = 1.11, size = 123, normalized size = 0.88

$$-\frac{1}{3}x^3\operatorname{arcoth}\left(d\tanh\left(bx+a\right)+d-1\right)+\frac{1}{36}\left(\frac{3x^4}{d}-\frac{2\left(4b^3x^3\log\left(-(d-1)e^{(2bx+2a)}+1\right)+6b^2x^2\operatorname{Li}_2\left((d-1)e^{(2\right.\right.}{b}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*arccoth(1-d-d*tanh(b*x+a)),x, algorithm="maxima")
```

```
[Out] -1/3*x^3*arccoth(d*tanh(b*x + a) + d - 1) + 1/36*(3*x^4/d - 2*(4*b^3*x^3*lo
g(-(d - 1)*e^(2*b*x + 2*a) + 1) + 6*b^2*x^2*dilog((d - 1)*e^(2*b*x + 2*a))
 - 6*b*x*polylog(3, (d - 1)*e^(2*b*x + 2*a)) + 3*polylog(4, (d - 1)*e^(2*b*x
 + 2*a)))/(b^4*d))*b*d
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.01

$$\int -x^2\operatorname{acoth}\left(d+d\tanh\left(a+b\,x\right)-1\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(-x^2*acoth(d + d*tanh(a + b*x) - 1),x)
```

```
[Out] int(-x^2*acoth(d + d*tanh(a + b*x) - 1), x)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int x^2\operatorname{acoth}\left(-d\tanh\left(a+bx\right)-d+1\right)dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**2*acoth(1-d-d*tanh(b*x+a)),x)
```

```
[Out] Integral(x**2*acoth(-d*tanh(a + b*x) - d + 1), x)
```

# 3.214 $\int x \coth^{-1}(1-d-d\tanh(a+bx))\,dx$

**Optimal**. Leaf size=110

$$\frac{\text{Li}_3\left(-\left((1-d)e^{2a+2bx}\right)\right)}{8b^2}-\frac{x\text{Li}_2\left(-\left((1-d)e^{2a+2bx}\right)\right)}{4b}-\frac{1}{4}x^2\log\left((1-d)e^{2a+2bx}+1\right)+\frac{1}{2}x^2\coth^{-1}(d(-\tanh(a+bx))-d+$$

```
[Out] 1/6*b*x^3+1/2*x^2*arccoth(1-d-d*tanh(b*x+a))-1/4*x^2*ln(1+(1-d)*exp(2*b*x+2
*a))-1/4*x*polylog(2,-(1-d)*exp(2*b*x+2*a))/b+1/8*polylog(3,-(1-d)*exp(2*b*
x+2*a))/b^2
```

**Rubi [A]** time = 0.24, antiderivative size = 110, normalized size of antiderivative = 1.00, number of steps used = 6, number of rules used = 6, integrand size = 17, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.353, Rules used = {6240, 2184, 2190, 2531, 2282, 6589}

$$\frac{\text{PolyLog}\left(3,-(1-d)e^{2a+2bx}\right)}{8b^2}-\frac{x\text{PolyLog}\left(2,-(1-d)e^{2a+2bx}\right)}{4b}-\frac{1}{4}x^2\log\left((1-d)e^{2a+2bx}+1\right)+\frac{1}{2}x^2\coth^{-1}(d(-\tanh$$

Antiderivative was successfully verified.

```
[In] Int[x*ArcCoth[1 - d - d*Tanh[a + b*x]],x]
```

```
[Out] (b*x^3)/6 + (x^2*ArcCoth[1 - d - d*Tanh[a + b*x]])/2 - (x^2*Log[1 + (1 - d)
*E^(2*a + 2*b*x)])/4 - (x*PolyLog[2, -((1 - d)*E^(2*a + 2*b*x))])/(4*b) + P
olyLog[3, -((1 - d)*E^(2*a + 2*b*x))]/(8*b^2)
```

Rule 2184

```
Int[((c_.) + (d_.)*(x_))^(m_.)/((a_) + (b_.)*((F_)^((g_.)*((e_.) + (f_.)*(x
_))))^(n_.)), x_Symbol] :> Simp[(c + d*x)^(m + 1)/(a*d*(m + 1)), x] - Dist[
b/a, Int[((c + d*x)^m*(F^(g*(e + f*x)))^n)/(a + b*(F^(g*(e + f*x)))^n), x],
 x] /; FreeQ[{F, a, b, c, d, e, f, g, n}, x] && IGtQ[m, 0]
```

Rule 2190

```
Int[(((F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m_.))/
((a_) + (b_.)*((F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)), x_Symbol] :> Simp
[((c + d*x)^m*Log[1 + (b*(F^(g*(e + f*x)))^n)/a])/(b*f*g*n*Log[F]), x] - Di
st[(d*m)/(b*f*g*n*Log[F]), Int[(c + d*x)^(m - 1)*Log[1 + (b*(F^(g*(e + f*x)
))^n)/a], x], x] /; FreeQ[{F, a, b, c, d, e, f, g, n}, x] && IGtQ[m, 0]
```

Rule 2282

```
Int[u_, x_Symbol] :> With[{v = FunctionOfExponential[u, x]}, Dist[v/D[v, x]
, Subst[Int[FunctionOfExponentialFunction[u, x]/x, x], x, v], x]] /; Functi
onOfExponentialQ[u, x] &&  !MatchQ[u, (w_)*((a_.)*(v_)^(n_))^(m_) /; FreeQ[
{a, m, n}, x] && IntegerQ[m*n]] &&  !MatchQ[u, E^((c_.)*((a_.) + (b_.)*x))*
(F_)[v_] /; FreeQ[{a, b, c}, x] && InverseFunctionQ[F[x]]]
```

Rule 2531

```
Int[Log[1 + (e_.)*((F_)^((c_.)*((a_.) + (b_.)*(x_))))^(n_.)]*((f_.) + (g_.)
*(x_))^(m_.), x_Symbol] :> -Simp[((f + g*x)^m*PolyLog[2, -(e*(F^(c*(a + b*x
)))^n)])/(b*c*n*Log[F]), x] + Dist[(g*m)/(b*c*n*Log[F]), Int[(f + g*x)^(m -
 1)*PolyLog[2, -(e*(F^(c*(a + b*x)))^n)], x], x] /; FreeQ[{F, a, b, c, e, f
, g, n}, x] && GtQ[m, 0]
```

Rule 6240

```
Int[ArcCoth[(c_.) + (d_.)*Tanh[(a_.) + (b_.)*(x_)]]*((e_.) + (f_.)*(x_))^(m
_.), x_Symbol] :> Simp[((e + f*x)^(m + 1)*ArcCoth[c + d*Tanh[a + b*x]])/(f*
```

```
(m + 1)), x] + Dist[b/(f*(m + 1)), Int[(e + f*x)^(m + 1)/(c - d + c*E^(2*a
+ 2*b*x)), x], x] /; FreeQ[{a, b, c, d, e, f}, x] && IGtQ[m, 0] && EqQ[(c -
 d)^2, 1]
```

Rule 6589

```
Int[PolyLog[n_, (c_.)*((a_.) + (b_.)*(x_))^(p_.)]/((d_.) + (e_.)*(x_)), x_S
ymbol] :> Simp[PolyLog[n + 1, c*(a + b*x)^p]/(e*p), x] /; FreeQ[{a, b, c, d
, e, n, p}, x] && EqQ[b*d, a*e]
```

Rubi steps

$$\int x\coth^{-1}(1-d-d\tanh(a+bx))\,dx = \frac{1}{2}x^2\coth^{-1}(1-d-d\tanh(a+bx))+\frac{1}{2}b\int\frac{x^2}{1+(1-d)e^{2a+2bx}}\,dx$$
$$=\frac{bx^3}{6}+\frac{1}{2}x^2\coth^{-1}(1-d-d\tanh(a+bx))-\frac{1}{2}(b(1-d))\int\frac{e^{2a+2}}{1+(1-}$$
$$=\frac{bx^3}{6}+\frac{1}{2}x^2\coth^{-1}(1-d-d\tanh(a+bx))-\frac{1}{4}x^2\log\left(1+(1-d)e^{2a+}\right.$$
$$=\frac{bx^3}{6}+\frac{1}{2}x^2\coth^{-1}(1-d-d\tanh(a+bx))-\frac{1}{4}x^2\log\left(1+(1-d)e^{2a+}\right.$$
$$=\frac{bx^3}{6}+\frac{1}{2}x^2\coth^{-1}(1-d-d\tanh(a+bx))-\frac{1}{4}x^2\log\left(1+(1-d)e^{2a+}\right.$$
$$=\frac{bx^3}{6}+\frac{1}{2}x^2\coth^{-1}(1-d-d\tanh(a+bx))-\frac{1}{4}x^2\log\left(1+(1-d)e^{2a+}\right.$$

**Mathematica [A]** time = 0.10, size = 93, normalized size = 0.85

$$\frac{2b^2x^2\left(2\coth^{-1}(d(-\tanh(a+bx))-d+1)-\log\left(1-\frac{e^{-2(a+bx)}}{d-1}\right)\right)+2bx\text{Li}_2\left(\frac{e^{-2(a+bx)}}{d-1}\right)+\text{Li}_3\left(\frac{e^{-2(a+bx)}}{d-1}\right)}{8b^2}$$

Antiderivative was successfully verified.

```
[In] Integrate[x*ArcCoth[1 - d - d*Tanh[a + b*x]],x]
```

```
[Out] (2*b^2*x^2*(2*ArcCoth[1 - d - d*Tanh[a + b*x]] - Log[1 - 1/((-1 + d)*E^(2*(
a + b*x)))]) + 2*b*x*PolyLog[2, 1/((-1 + d)*E^(2*(a + b*x)))] + PolyLog[3,
1/((-1 + d)*E^(2*(a + b*x)))])/(8*b^2)
```

**fricas [C]** time = 1.01, size = 305, normalized size = 2.77

$$\frac{2\,b^3x^3-3\,b^2x^2\log\left(\frac{d\cosh(bx+a)+d\sinh(bx+a)}{(d-2)\cosh(bx+a)+d\sinh(bx+a)}\right)-6\,bx\text{Li}_2\left(\sqrt{d-1}\,(\cosh\,(bx+a)+\sinh\,(bx+a))\right)-6\,bx\text{Li}_2\,(-}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*arccoth(1-d-d*tanh(b*x+a)),x, algorithm="fricas")
```

```
[Out] 1/12*(2*b^3*x^3 - 3*b^2*x^2*log((d*cosh(b*x + a) + d*sinh(b*x + a))/((d - 2
)*cosh(b*x + a) + d*sinh(b*x + a))) - 6*b*x*dilog(sqrt(d - 1)*(cosh(b*x + a
) + sinh(b*x + a))) - 6*b*x*dilog(-sqrt(d - 1)*(cosh(b*x + a) + sinh(b*x +
a))) - 3*a^2*log(2*(d - 1)*cosh(b*x + a) + 2*(d - 1)*sinh(b*x + a) + 2*sqrt
(d - 1)) - 3*a^2*log(2*(d - 1)*cosh(b*x + a) + 2*(d - 1)*sinh(b*x + a) - 2*
sqrt(d - 1)) - 3*(b^2*x^2 - a^2)*log(sqrt(d - 1)*(cosh(b*x + a) + sinh(b*x
+ a)) + 1) - 3*(b^2*x^2 - a^2)*log(-sqrt(d - 1)*(cosh(b*x + a) + sinh(b*x +
```

```
 a)) + 1) + 6*polylog(3, sqrt(d - 1)*(cosh(b*x + a) + sinh(b*x + a))) + 6*p
olylog(3, -sqrt(d - 1)*(cosh(b*x + a) + sinh(b*x + a))))/b^2
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int x \operatorname{arcoth}(-d \tanh(bx + a) - d + 1) \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*arccoth(1-d-d*tanh(b*x+a)),x, algorithm="giac")
```

```
[Out] integrate(x*arccoth(-d*tanh(b*x + a) - d + 1), x)
```

**maple [C]** time = 4.90, size = 1664, normalized size = 15.13

result too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x*arccoth(1-d-d*tanh(b*x+a)),x)
```

```
[Out] 1/4/b^2/(d-1)*polylog(2,(d-1)*exp(2*b*x+2*a))*a-1/2/b^2*a^2/(d-1)*ln(1-exp(
b*x+a)*(d-1)^(1/2))-1/2/b^2*a^2/(d-1)*ln(1+exp(b*x+a)*(d-1)^(1/2))+1/8/b^2*
d/(d-1)*polylog(3,(d-1)*exp(2*b*x+2*a))-1/2/b^2*a/(d-1)*dilog(1-exp(b*x+a)*
(d-1)^(1/2))-1/2/b^2*a/(d-1)*dilog(1+exp(b*x+a)*(d-1)^(1/2))+1/4/b^2/(d-1)*
ln(1-(d-1)*exp(2*b*x+2*a))*a^2+1/4/b/(d-1)*polylog(2,(d-1)*exp(2*b*x+2*a))*
x-1/4*I*x^2*Pi*csgn(I/(exp(2*b*x+2*a)+1)*(d*exp(2*b*x+2*a)-exp(2*b*x+2*a)-1
))^2-1/2*x^2*ln(exp(b*x+a))-1/4*x^2*ln(d)-1/8*I*x^2*Pi*csgn(I*d/(exp(2*b*x+
2*a)+1)*exp(2*b*x+2*a))^3+1/8*I*x^2*Pi*csgn(I*exp(2*b*x+2*a))^3+1/8*I*x^2*P
i*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^3+1/4/(d-1)*ln(1-(d-1)*exp(2*b*
x+2*a))*x^2-1/8/b^2/(d-1)*polylog(3,(d-1)*exp(2*b*x+2*a))+1/4/b^2*a^2/(d-1)
*ln(d*exp(2*b*x+2*a)-exp(2*b*x+2*a)-1)+1/8*I*x^2*Pi*csgn(I/(exp(2*b*x+2*a)+
1)*(d*exp(2*b*x+2*a)-exp(2*b*x+2*a)-1))^3+1/6*b*x^3+1/2/b^2*d*a^2/(d-1)*ln(
1-exp(b*x+a)*(d-1)^(1/2))+1/2/b^2*d*a^2/(d-1)*ln(1+exp(b*x+a)*(d-1)^(1/2))+
1/2/b^2*d*a/(d-1)*dilog(1-exp(b*x+a)*(d-1)^(1/2))+1/2/b^2*d*a/(d-1)*dilog(1
+exp(b*x+a)*(d-1)^(1/2))-1/4/b^2*d/(d-1)*ln(1-(d-1)*exp(2*b*x+2*a))*a^2-1/4
/b*d/(d-1)*polylog(2,(d-1)*exp(2*b*x+2*a))*x-1/4/b^2*d/(d-1)*polylog(2,(d-1
)*exp(2*b*x+2*a))*a+1/2/b/(d-1)*ln(1-(d-1)*exp(2*b*x+2*a))*x*a-1/2/b*a/(d-1
)*ln(1-exp(b*x+a)*(d-1)^(1/2))*x-1/2/b*a/(d-1)*ln(1+exp(b*x+a)*(d-1)^(1/2))
*x-1/8*I*x^2*Pi*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x
+2*a)+1))^2-1/4*d/(d-1)*ln(1-(d-1)*exp(2*b*x+2*a))*x^2+1/4*I*x^2*Pi*csgn(I*
d/(exp(2*b*x+2*a)+1)*exp(2*b*x+2*a))^2+1/8*I*x^2*Pi*csgn(I/(exp(2*b*x+2*a)+
1))*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))-1/8*I*
x^2*Pi*csgn(I/(exp(2*b*x+2*a)+1))*csgn(I*(d*exp(2*b*x+2*a)-exp(2*b*x+2*a)-1
))*csgn(I/(exp(2*b*x+2*a)+1)*(d*exp(2*b*x+2*a)-exp(2*b*x+2*a)-1))-1/8*I*x^2
*Pi*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))^2+1/4*
x^2*ln(d*exp(2*b*x+2*a)-exp(2*b*x+2*a)-1)+1/8*I*x^2*Pi*csgn(I/(exp(2*b*x+2*
a)+1))*csgn(I/(exp(2*b*x+2*a)+1)*(d*exp(2*b*x+2*a)-exp(2*b*x+2*a)-1))^2+1/8
*I*x^2*Pi*csgn(I*(d*exp(2*b*x+2*a)-exp(2*b*x+2*a)-1))*csgn(I/(exp(2*b*x+2*a
)+1)*(d*exp(2*b*x+2*a)-exp(2*b*x+2*a)-1))^2+1/2/b*d*a/(d-1)*ln(1+exp(b*x+a)
*(d-1)^(1/2))*x-1/4/b^2*d*a^2/(d-1)*ln(d*exp(2*b*x+2*a)-exp(2*b*x+2*a)-1)-1
/8*I*x^2*Pi*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))*csgn(I*d/(exp(2*b*x+2
*a)+1)*exp(2*b*x+2*a))^2-1/8*I*x^2*Pi*csgn(I*d)*csgn(I*d/(exp(2*b*x+2*a)+1)
*exp(2*b*x+2*a))^2+1/8*I*x^2*Pi*csgn(I*exp(b*x+a))^2*csgn(I*exp(2*b*x+2*a))
-1/4*I*x^2*Pi*csgn(I*exp(b*x+a))*csgn(I*exp(2*b*x+2*a))^2+1/8*I*x^2*Pi*csgn
(I*d)*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)+1))*csgn(I*d/(exp(2*b*x+2*a)+1)
*exp(2*b*x+2*a))-1/2/b*d/(d-1)*ln(1-(d-1)*exp(2*b*x+2*a))*x*a+1/2/b*d*a/(d-
1)*ln(1-exp(b*x+a)*(d-1)^(1/2))*x
```

**maxima [A]** time = 1.10, size = 100, normalized size = 0.91

$$\frac{1}{24}\left(\frac{4\,x^3}{d} - \frac{3\left(2\,b^2x^2\log\left(-(d-1)e^{(2\,bx+2\,a)}+1\right)+2\,bx\mathrm{Li}_2\left((d-1)e^{(2\,bx+2\,a)}\right)-\mathrm{Li}_3((d-1)e^{(2\,bx+2\,a)})\right)}{b^3d}\right)bd - \frac{1}{2}\,x^2\,\mathrm{arco}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*arccoth(1-d-d*tanh(b*x+a)),x, algorithm="maxima")
```

```
[Out] 1/24*(4*x^3/d - 3*(2*b^2*x^2*log(-(d - 1)*e^(2*b*x + 2*a) + 1) + 2*b*x*dilo
g((d - 1)*e^(2*b*x + 2*a)) - polylog(3, (d - 1)*e^(2*b*x + 2*a)))/(b^3*d))*
b*d - 1/2*x^2*arccoth(d*tanh(b*x + a) + d - 1)
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.01

$$\int -x \operatorname{acoth}\left(d + d \tanh\left(a + b\,x\right) - 1\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(-x*acoth(d + d*tanh(a + b*x) - 1),x)
```

```
[Out] int(-x*acoth(d + d*tanh(a + b*x) - 1), x)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int x \operatorname{acoth}\left(-d \tanh\left(a + bx\right) - d + 1\right)dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*acoth(1-d-d*tanh(b*x+a)),x)
```

```
[Out] Integral(x*acoth(-d*tanh(a + b*x) - d + 1), x)
```

# 3.215 $\int \coth^{-1}(1-d-d\tanh(a+bx))\,dx$

**Optimal**. Leaf size=76

$$-\frac{\text{Li}_2\left(-\left((1-d)e^{2a+2bx}\right)\right)}{4b}-\frac{1}{2}x\log\left((1-d)e^{2a+2bx}+1\right)+x\coth^{-1}(d(-\tanh(a+bx))-d+1)+\frac{bx^2}{2}$$

```
[Out] 1/2*b*x^2+x*arccoth(1-d-d*tanh(b*x+a))-1/2*x*ln(1+(1-d)*exp(2*b*x+2*a))-1/4
*polylog(2,-(1-d)*exp(2*b*x+2*a))/b
```

**Rubi [A]** time = 0.15, antiderivative size = 76, normalized size of antiderivative = 1.00, number of steps used = 5, number of rules used = 5, integrand size = 15, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.333, Rules used = {6232, 2184, 2190, 2279, 2391}

$$-\frac{\text{PolyLog}\left(2,-(1-d)e^{2a+2bx}\right)}{4b}-\frac{1}{2}x\log\left((1-d)e^{2a+2bx}+1\right)+x\coth^{-1}(d(-\tanh(a+bx))-d+1)+\frac{bx^2}{2}$$

Antiderivative was successfully verified.

```
[In] Int[ArcCoth[1 - d - d*Tanh[a + b*x]],x]
```

```
[Out] (b*x^2)/2 + x*ArcCoth[1 - d - d*Tanh[a + b*x]] - (x*Log[1 + (1 - d)*E^(2*a
+ 2*b*x)])/2 - PolyLog[2, -((1 - d)*E^(2*a + 2*b*x))]/(4*b)
```

Rule 2184

```
Int[((c_.) + (d_.)*(x_))^(m_.)/((a_) + (b_.)*((F_)^((g_.)*((e_.) + (f_.)*(x
_))))^(n_.)), x_Symbol] :> Simp[(c + d*x)^(m + 1)/(a*d*(m + 1)), x] - Dist[
b/a, Int[((c + d*x)^m*(F^(g*(e + f*x)))^n)/(a + b*(F^(g*(e + f*x)))^n), x],
 x] /; FreeQ[{F, a, b, c, d, e, f, g, n}, x] && IGtQ[m, 0]
```

Rule 2190

```
Int[(((F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m_.))/
((a_) + (b_.)*((F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)), x_Symbol] :> Simp
[((c + d*x)^m*Log[1 + (b*(F^(g*(e + f*x)))^n)/a])/(b*f*g*n*Log[F]), x] - Di
st[(d*m)/(b*f*g*n*Log[F]), Int[(c + d*x)^(m - 1)*Log[1 + (b*(F^(g*(e + f*x)
))^n)/a], x], x] /; FreeQ[{F, a, b, c, d, e, f, g, n}, x] && IGtQ[m, 0]
```

Rule 2279

```
Int[Log[(a_) + (b_.)*((F_)^((e_.)*((c_.) + (d_.)*(x_))))^(n_.)], x_Symbol]
:> Dist[1/(d*e*n*Log[F]), Subst[Int[Log[a + b*x]/x, x], x, (F^(e*(c + d*x))
)^n], x] /; FreeQ[{F, a, b, c, d, e, n}, x] && GtQ[a, 0]
```

Rule 2391

```
Int[Log[(c_.)*((d_) + (e_.)*(x_)^(n_.))]/(x_), x_Symbol] :> -Simp[PolyLog[2
, -(c*e*x^n)]/n, x] /; FreeQ[{c, d, e, n}, x] && EqQ[c*d, 1]
```

Rule 6232

```
Int[ArcCoth[(c_.) + (d_.)*Tanh[(a_.) + (b_.)*(x_)]], x_Symbol] :> Simp[x*Ar
cCoth[c + d*Tanh[a + b*x]], x] + Dist[b, Int[x/(c - d + c*E^(2*a + 2*b*x)),
 x], x] /; FreeQ[{a, b, c, d}, x] && EqQ[(c - d)^2, 1]
```

Rubi steps

$$\int \coth^{-1}(1-d-d\tanh(a+bx))\,dx = x\coth^{-1}(1-d-d\tanh(a+bx)) + b\int \frac{x}{1+(1-d)e^{2a+2bx}}\,dx$$
$$= \frac{bx^2}{2} + x\coth^{-1}(1-d-d\tanh(a+bx)) - (b(1-d))\int \frac{e^{2a+2bx}x}{1+(1-d)e^{2a+2}$$
$$= \frac{bx^2}{2} + x\coth^{-1}(1-d-d\tanh(a+bx)) - \frac{1}{2}x\log\left(1+(1-d)e^{2a+2bx}\right) +$$
$$= \frac{bx^2}{2} + x\coth^{-1}(1-d-d\tanh(a+bx)) - \frac{1}{2}x\log\left(1+(1-d)e^{2a+2bx}\right) +$$
$$= \frac{bx^2}{2} + x\coth^{-1}(1-d-d\tanh(a+bx)) - \frac{1}{2}x\log\left(1+(1-d)e^{2a+2bx}\right) -$$

**Mathematica [B]** time = 0.98, size = 200, normalized size = 2.63

$$-2\text{Li}_2\left(-\sqrt{d-1}\,e^{a+bx}\right) - 2\text{Li}_2\left(\sqrt{d-1}\,e^{a+bx}\right) - 2\log\left(e^{a+bx}\right)\log\left(1-\sqrt{d-1}\,e^{a+bx}\right) - 2\log\left(e^{a+bx}\right)\log\left(\sqrt{d-1}\,e\right.$$

Warning: Unable to verify antiderivative.

```
[In] Integrate[ArcCoth[1 - d - d*Tanh[a + b*x]],x]
```

```
[Out] x*ArcCoth[1 - d - d*Tanh[a + b*x]] + (b^2*x^2 + Log[E^(a + b*x)]^2 - 2*Log[
E^(a + b*x)]*Log[1 - Sqrt[-1 + d]*E^(a + b*x)] - 2*Log[E^(a + b*x)]*Log[1 +
 Sqrt[-1 + d]*E^(a + b*x)] + 2*Log[E^(a + b*x)]*Log[E^(-a - b*x)*(-1 + (-1
+ d)*E^(2*(a + b*x)))] - 2*b*x*Log[(-2 + d)*Cosh[a + b*x] + d*Sinh[a + b*x]
] - 2*PolyLog[2, -(Sqrt[-1 + d]*E^(a + b*x))] - 2*PolyLog[2, Sqrt[-1 + d]*E
^(a + b*x)])/(4*b)
```

**fricas [B]** time = 0.80, size = 227, normalized size = 2.99

$$b^2x^2 - bx\log\left(\frac{d\cosh(bx+a)+d\sinh(bx+a)}{(d-2)\cosh(bx+a)+d\sinh(bx+a)}\right) + a\log\left(2(d-1)\cosh(bx+a) + 2(d-1)\sinh(bx+a) + 2\sqrt{d-1}\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(1-d-d*tanh(b*x+a)),x, algorithm="fricas")
```

```
[Out] 1/2*(b^2*x^2 - b*x*log((d*cosh(b*x + a) + d*sinh(b*x + a))/((d - 2)*cosh(b*
x + a) + d*sinh(b*x + a))) + a*log(2*(d - 1)*cosh(b*x + a) + 2*(d - 1)*sinh
(b*x + a) + 2*sqrt(d - 1)) + a*log(2*(d - 1)*cosh(b*x + a) + 2*(d - 1)*sinh
(b*x + a) - 2*sqrt(d - 1)) - (b*x + a)*log(sqrt(d - 1)*(cosh(b*x + a) + sin
h(b*x + a)) + 1) - (b*x + a)*log(-sqrt(d - 1)*(cosh(b*x + a) + sinh(b*x + a
)) + 1) - dilog(sqrt(d - 1)*(cosh(b*x + a) + sinh(b*x + a))) - dilog(-sqrt(
d - 1)*(cosh(b*x + a) + sinh(b*x + a))))/b
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \operatorname{arcoth}(-d\tanh(bx+a) - d + 1)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(1-d-d*tanh(b*x+a)),x, algorithm="giac")
```

```
[Out] integrate(arccoth(-d*tanh(b*x + a) - d + 1), x)
```

**maple [B]** time = 0.40, size = 271, normalized size = 3.57

$$-\frac{\operatorname{arccoth}(1-d-d\tanh(bx+a))\ln(-d\tanh(bx+a)+d)}{2b} + \frac{\operatorname{arccoth}(1-d-d\tanh(bx+a))\ln(-d\tanh(b}{2b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(arccoth(1-d-d*tanh(b*x+a)),x)
```

```
[Out] -1/2/b*arccoth(1-d-d*tanh(b*x+a))*ln(-d*tanh(b*x+a)+d)+1/2/b*arccoth(1-d-d*
tanh(b*x+a))*ln(-d*tanh(b*x+a)-d)+1/8/b*ln(-d*tanh(b*x+a)-d)^2-1/4/b*dilog(
1-1/2*d*tanh(b*x+a)-1/2*d)-1/4/b*ln(-d*tanh(b*x+a)-d)*ln(1-1/2*d*tanh(b*x+a
)-1/2*d)+1/4/b*dilog((-d*tanh(b*x+a)-d+2)/(-2*d+2))+1/4/b*ln(-d*tanh(b*x+a)
+d)*ln((-d*tanh(b*x+a)-d+2)/(-2*d+2))-1/4/b*dilog(-1/2*(-d*tanh(b*x+a)-d)/d
)-1/4/b*ln(-d*tanh(b*x+a)+d)*ln(-1/2*(-d*tanh(b*x+a)-d)/d)
```

**maxima [A]** time = 1.10, size = 73, normalized size = 0.96

$$\frac{1}{4}\,bd\left(\frac{2\,x^2}{d}-\frac{2\,bx\log\left(-(d-1)e^{(2\,bx+2\,a)}+1\right)+\mathrm{Li}_2\left((d-1)e^{(2\,bx+2\,a)}\right)}{b^2d}\right)-x\,\mathrm{arcoth}\left(d\tanh\left(bx+a\right)+d-1\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(1-d-d*tanh(b*x+a)),x, algorithm="maxima")
```

```
[Out] 1/4*b*d*(2*x^2/d - (2*b*x*log(-(d - 1)*e^(2*b*x + 2*a) + 1) + dilog((d - 1)
*e^(2*b*x + 2*a)))/(b^2*d)) - x*arccoth(d*tanh(b*x + a) + d - 1)
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.01

$$\int -\mathrm{acoth}\left(d+d\tanh\left(a+b\,x\right)-1\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(-acoth(d + d*tanh(a + b*x) - 1),x)
```

```
[Out] int(-acoth(d + d*tanh(a + b*x) - 1), x)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \mathrm{acoth}\left(-d\tanh\left(a+bx\right)-d+1\right)dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(1-d-d*tanh(b*x+a)),x)
```

```
[Out] Integral(acoth(-d*tanh(a + b*x) - d + 1), x)
```

## 3.216 $\int \frac{\coth^{-1}(1-d-d\tanh(a+bx))}{x}\,dx$

**Optimal**. Leaf size=22

$$\mathrm{Int}\left(\frac{\coth^{-1}(d(-\tanh(a+bx))-d+1)}{x},x\right)$$

```
[Out] CannotIntegrate(arccoth(1-d-d*tanh(b*x+a))/x,x)
```

**Rubi [A]** time = 0.06, antiderivative size = 0, normalized size of antiderivative = 0.00, number of steps used = 0, number of rules used = 0, integrand size = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int \frac{\coth^{-1}(1-d-d\tanh(a+bx))}{x}\,dx$$

Verification is Not applicable to the result.

```
[In] Int[ArcCoth[1 - d - d*Tanh[a + b*x]]/x,x]
[Out] Defer[Int][ArcCoth[1 - d - d*Tanh[a + b*x]]/x, x]
```

Rubi steps

$$\int \frac{\coth^{-1}(1-d-d\tanh(a+bx))}{x}\,dx=\int \frac{\coth^{-1}(1-d-d\tanh(a+bx))}{x}\,dx$$

**Mathematica [A]** time = 3.39, size = 0, normalized size = 0.00

$$\int \frac{\coth^{-1}(1-d-d\tanh(a+bx))}{x}\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[ArcCoth[1 - d - d*Tanh[a + b*x]]/x,x]
[Out] Integrate[ArcCoth[1 - d - d*Tanh[a + b*x]]/x, x]
```

**fricas [A]** time = 0.52, size = 0, normalized size = 0.00

$$\mathrm{integral}\left(-\frac{\operatorname{arcoth}(d\tanh(bx+a)+d-1)}{x},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(1-d-d*tanh(b*x+a))/x,x, algorithm="fricas")
[Out] integral(-arccoth(d*tanh(b*x + a) + d - 1)/x, x)
```

**giac [A]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{arcoth}(-d\tanh(bx+a)-d+1)}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(1-d-d*tanh(b*x+a))/x,x, algorithm="giac")
[Out] integrate(arccoth(-d*tanh(b*x + a) - d + 1)/x, x)
```

**maple** [A] time = 0.95, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{arccoth}(1-d-d\tanh(bx+a))}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(arccoth(1-d-d*tanh(b*x+a))/x,x)
[Out] int(arccoth(1-d-d*tanh(b*x+a))/x,x)
```

**maxima** [A] time = 0.00, size = 0, normalized size = 0.00

$$-\int \frac{\operatorname{arcoth}(d\tanh(bx+a)+d-1)}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(1-d-d*tanh(b*x+a))/x,x, algorithm="maxima")
[Out] -integrate(arccoth(d*tanh(b*x + a) + d - 1)/x, x)
```

**mupad** [A] time = 0.00, size = -1, normalized size = -0.05

$$\int -\frac{\operatorname{acoth}(d+d\tanh(a+b\,x)-1)}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(-acoth(d + d*tanh(a + b*x) - 1)/x,x)
[Out] int(-acoth(d + d*tanh(a + b*x) - 1)/x, x)
```

**sympy** [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{acoth}(-d\tanh(a+bx)-d+1)}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(1-d-d*tanh(b*x+a))/x,x)
[Out] Integral(acoth(-d*tanh(a + b*x) - d + 1)/x, x)
```

# 3.217 $\int x^2 \coth^{-1}(c + d \coth(a + bx))\, dx$

**Optimal**. Leaf size=303

$$\frac{\text{Li}_4\left(\frac{(-c-d+1)e^{2a+2bx}}{-c+d+1}\right)}{8b^3}-\frac{\text{Li}_4\left(\frac{(c+d+1)e^{2a+2bx}}{c-d+1}\right)}{8b^3}-\frac{x\text{Li}_3\left(\frac{(-c-d+1)e^{2a+2bx}}{-c+d+1}\right)}{4b^2}+\frac{x\text{Li}_3\left(\frac{(c+d+1)e^{2a+2bx}}{c-d+1}\right)}{4b^2}+\frac{x^2\text{Li}_2\left(\frac{(-c-d+1)e^{2a+2bx}}{-c+d+1}\right)}{4b}-\frac{x^2 \cdots}{\cdots}$$

```
[Out] 1/3*x^3*arccoth(c+d*coth(b*x+a))+1/6*x^3*ln(1-(1-c-d)*exp(2*b*x+2*a)/(1-c+d
))-1/6*x^3*ln(1-(1+c+d)*exp(2*b*x+2*a)/(1+c-d))+1/4*x^2*polylog(2,(1-c-d)*e
xp(2*b*x+2*a)/(1-c+d))/b-1/4*x^2*polylog(2,(1+c+d)*exp(2*b*x+2*a)/(1+c-d))/
b-1/4*x*polylog(3,(1-c-d)*exp(2*b*x+2*a)/(1-c+d))/b^2+1/4*x*polylog(3,(1+c+
d)*exp(2*b*x+2*a)/(1+c-d))/b^2+1/8*polylog(4,(1-c-d)*exp(2*b*x+2*a)/(1-c+d)
)/b^3-1/8*polylog(4,(1+c+d)*exp(2*b*x+2*a)/(1+c-d))/b^3
```

**Rubi [A]** time = 0.47, antiderivative size = 303, normalized size of antiderivative = 1.00, number of steps used = 11, number of rules used = 6, integrand size = 15, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.400, Rules used = {6246, 2190, 2531, 6609, 2282, 6589}

$$-\frac{x\text{PolyLog}\left(3,\frac{(-c-d+1)e^{2a+2bx}}{-c+d+1}\right)}{4b^2}+\frac{x\text{PolyLog}\left(3,\frac{(c+d+1)e^{2a+2bx}}{c-d+1}\right)}{4b^2}+\frac{\text{PolyLog}\left(4,\frac{(-c-d+1)e^{2a+2bx}}{-c+d+1}\right)}{8b^3}-\frac{\text{PolyLog}\left(4,\frac{(c+d+1)\cdots}{c-d\cdots}\right)}{8b^3}$$

Antiderivative was successfully verified.

```
[In] Int[x^2*ArcCoth[c + d*Coth[a + b*x]],x]
```

```
[Out] (x^3*ArcCoth[c + d*Coth[a + b*x]])/3 + (x^3*Log[1 - ((1 - c - d)*E^(2*a + 2
*b*x))/(1 - c + d)])/6 - (x^3*Log[1 - ((1 + c + d)*E^(2*a + 2*b*x))/(1 + c
- d)])/6 + (x^2*PolyLog[2, ((1 - c - d)*E^(2*a + 2*b*x))/(1 - c + d)])/(4*b
) - (x^2*PolyLog[2, ((1 + c + d)*E^(2*a + 2*b*x))/(1 + c - d)])/(4*b) - (x*
PolyLog[3, ((1 - c - d)*E^(2*a + 2*b*x))/(1 - c + d)])/(4*b^2) + (x*PolyLog
[3, ((1 + c + d)*E^(2*a + 2*b*x))/(1 + c - d)])/(4*b^2) + PolyLog[4, ((1 -
c - d)*E^(2*a + 2*b*x))/(1 - c + d)]/(8*b^3) - PolyLog[4, ((1 + c + d)*E^(2
*a + 2*b*x))/(1 + c - d)]/(8*b^3)
```

Rule 2190

```
Int[(((F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m_.))/
((a_) + (b_.)*((F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)), x_Symbol] :> Simp
[((c + d*x)^m*Log[1 + (b*(F^(g*(e + f*x)))^n)/a])/(b*f*g*n*Log[F]), x] - Di
st[(d*m)/(b*f*g*n*Log[F]), Int[(c + d*x)^(m - 1)*Log[1 + (b*(F^(g*(e + f*x)
))^n)/a], x], x] /; FreeQ[{F, a, b, c, d, e, f, g, n}, x] && IGtQ[m, 0]
```

Rule 2282

```
Int[u_, x_Symbol] :> With[{v = FunctionOfExponential[u, x]}, Dist[v/D[v, x]
, Subst[Int[FunctionOfExponentialFunction[u, x]/x, x], x, v], x]] /; Functi
onOfExponentialQ[u, x] &&  !MatchQ[u, (w_)*((a_.)*(v_)^(n_))^(m_) /; FreeQ[
{a, m, n}, x] && IntegerQ[m*n]] &&  !MatchQ[u, E^((c_.)*((a_.) + (b_.)*x))*
(F_)[v_] /; FreeQ[{a, b, c}, x] && InverseFunctionQ[F[x]]]
```

Rule 2531

```
Int[Log[1 + (e_.)*((F_)^((c_.)*((a_.) + (b_.)*(x_))))^(n_.)]*((f_.) + (g_.)
*(x_))^(m_.), x_Symbol] :> -Simp[((f + g*x)^m*PolyLog[2, -(e*(F^(c*(a + b*x
)))^n)])/(b*c*n*Log[F]), x] + Dist[(g*m)/(b*c*n*Log[F]), Int[(f + g*x)^(m -
 1)*PolyLog[2, -(e*(F^(c*(a + b*x)))^n)], x], x] /; FreeQ[{F, a, b, c, e, f
, g, n}, x] && GtQ[m, 0]
```

Rule 6246

```
Int[ArcCoth[(c_.) + Coth[(a_.) + (b_.)*(x_)]*(d_.)]*((e_.) + (f_.)*(x_))^(m
_.), x_Symbol] :> Simp[((e + f*x)^(m + 1)*ArcCoth[c + d*Coth[a + b*x]])/(f*
(m + 1)), x] + (-Dist[(b*(1 - c - d))/(f*(m + 1)), Int[((e + f*x)^(m + 1)*E
^(2*a + 2*b*x))/(1 - c + d - (1 - c - d)*E^(2*a + 2*b*x)), x], x] + Dist[(b
*(1 + c + d))/(f*(m + 1)), Int[((e + f*x)^(m + 1)*E^(2*a + 2*b*x))/(1 + c -
 d - (1 + c + d)*E^(2*a + 2*b*x)), x], x]) /; FreeQ[{a, b, c, d, e, f}, x]
&& IGtQ[m, 0] && NeQ[(c - d)^2, 1]
```

Rule 6589

```
Int[PolyLog[n_, (c_.)*((a_.) + (b_.)*(x_))^(p_.)]/((d_.) + (e_.)*(x_)), x_S
ymbol] :> Simp[PolyLog[n + 1, c*(a + b*x)^p]/(e*p), x] /; FreeQ[{a, b, c, d
, e, n, p}, x] && EqQ[b*d, a*e]
```

Rule 6609

```
Int[((e_.) + (f_.)*(x_))^(m_.)*PolyLog[n_, (d_.)*((F_)^((c_.)*((a_.) + (b_.
)*(x_))))^(p_.)], x_Symbol] :> Simp[((e + f*x)^m*PolyLog[n + 1, d*(F^(c*(a
+ b*x)))^p])/(b*c*p*Log[F]), x] - Dist[(f*m)/(b*c*p*Log[F]), Int[(e + f*x)^
(m - 1)*PolyLog[n + 1, d*(F^(c*(a + b*x)))^p], x], x] /; FreeQ[{F, a, b, c,
 d, e, f, n, p}, x] && GtQ[m, 0]
```

Rubi steps

$$\int x^2 \coth^{-1}(c+d\coth(a+bx))\,dx = \frac{1}{3}x^3\coth^{-1}(c+d\coth(a+bx)) - \frac{1}{3}(b(1-c-d))\int \frac{e^{2a+2bx}x^3}{1-c+d+(-1+c+a}$$

$$= \frac{1}{3}x^3\coth^{-1}(c+d\coth(a+bx)) + \frac{1}{6}x^3\log\left(1-\frac{(1-c-d)e^{2a+2bx}}{1-c+d}\right) - \frac{1}{6}x^3\,\mathrm{lo}$$

$$= \frac{1}{3}x^3\coth^{-1}(c+d\coth(a+bx)) + \frac{1}{6}x^3\log\left(1-\frac{(1-c-d)e^{2a+2bx}}{1-c+d}\right) - \frac{1}{6}x^3\,\mathrm{lo}$$

$$= \frac{1}{3}x^3\coth^{-1}(c+d\coth(a+bx)) + \frac{1}{6}x^3\log\left(1-\frac{(1-c-d)e^{2a+2bx}}{1-c+d}\right) - \frac{1}{6}x^3\,\mathrm{lo}$$

$$= \frac{1}{3}x^3\coth^{-1}(c+d\coth(a+bx)) + \frac{1}{6}x^3\log\left(1-\frac{(1-c-d)e^{2a+2bx}}{1-c+d}\right) - \frac{1}{6}x^3\,\mathrm{lo}$$

$$= \frac{1}{3}x^3\coth^{-1}(c+d\coth(a+bx)) + \frac{1}{6}x^3\log\left(1-\frac{(1-c-d)e^{2a+2bx}}{1-c+d}\right) - \frac{1}{6}x^3\,\mathrm{lo}$$

**Mathematica [A]** time = 0.45, size = 353, normalized size = 1.17

$$4b^3x^3\log\left(\frac{2(\cosh(a+bx)-\sinh(a+bx))((c-1)\sinh(a+bx)+d\cosh(a+bx))}{c+d-1}\right) - 4b^3x^3\log\left(\frac{(c-d+1)(\sinh(2(a+bx))-\cosh(2(a+bx)))}{c+d+1}+1\right) - 6b^2$$

Warning: Unable to verify antiderivative.

```
[In] Integrate[x^2*ArcCoth[c + d*Coth[a + b*x]],x]
```

```
[Out] (x^3*ArcCoth[c + d*Coth[a + b*x]])/3 + (4*b^3*x^3*Log[(2*(Cosh[a + b*x] - S
inh[a + b*x])*(d*Cosh[a + b*x] + (-1 + c)*Sinh[a + b*x]))/(-1 + c + d)] - 4
*b^3*x^3*Log[1 + ((1 + c - d)*(-Cosh[2*(a + b*x)] + Sinh[2*(a + b*x)]))/(1
+ c + d)] - 6*b^2*x^2*PolyLog[2, ((-1 + c - d)*(Cosh[2*(a + b*x)] - Sinh[2*
```

```
(a + b*x)]))/(-1 + c + d)] + 6*b^2*x^2*PolyLog[2, ((1 + c - d)*(Cosh[2*(a +
 b*x)] - Sinh[2*(a + b*x)]))/(1 + c + d)] - 6*b*x*PolyLog[3, ((-1 + c - d)*
(Cosh[2*(a + b*x)] - Sinh[2*(a + b*x)]))/(-1 + c + d)] + 6*b*x*PolyLog[3, (
(1 + c - d)*(Cosh[2*(a + b*x)] - Sinh[2*(a + b*x)]))/(1 + c + d)] - 3*PolyL
og[4, ((-1 + c - d)*(Cosh[2*(a + b*x)] - Sinh[2*(a + b*x)]))/(-1 + c + d)]
+ 3*PolyLog[4, ((1 + c - d)*(Cosh[2*(a + b*x)] - Sinh[2*(a + b*x)]))/(1 + c
 + d)])/(24*b^3)
```

**fricas [C]** time = 0.56, size = 879, normalized size = 2.90

result too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*arccoth(c+d*coth(b*x+a)),x, algorithm="fricas")
```

```
[Out] 1/6*(b^3*x^3*log((d*cosh(b*x + a) + (c + 1)*sinh(b*x + a))/(d*cosh(b*x + a)
 + (c - 1)*sinh(b*x + a))) - 3*b^2*x^2*dilog(sqrt((c + d + 1)/(c - d + 1))*
(cosh(b*x + a) + sinh(b*x + a))) - 3*b^2*x^2*dilog(-sqrt((c + d + 1)/(c - d
 + 1))*(cosh(b*x + a) + sinh(b*x + a))) + 3*b^2*x^2*dilog(sqrt((c + d - 1)/
(c - d - 1))*(cosh(b*x + a) + sinh(b*x + a))) + 3*b^2*x^2*dilog(-sqrt((c +
d - 1)/(c - d - 1))*(cosh(b*x + a) + sinh(b*x + a))) + a^3*log(2*(c + d + 1
)*cosh(b*x + a) + 2*(c + d + 1)*sinh(b*x + a) + 2*(c - d + 1)*sqrt((c + d +
 1)/(c - d + 1))) + a^3*log(2*(c + d + 1)*cosh(b*x + a) + 2*(c + d + 1)*sin
h(b*x + a) - 2*(c - d + 1)*sqrt((c + d + 1)/(c - d + 1))) - a^3*log(2*(c +
d - 1)*cosh(b*x + a) + 2*(c + d - 1)*sinh(b*x + a) + 2*(c - d - 1)*sqrt((c
+ d - 1)/(c - d - 1))) - a^3*log(2*(c + d - 1)*cosh(b*x + a) + 2*(c + d - 1
)*sinh(b*x + a) - 2*(c - d - 1)*sqrt((c + d - 1)/(c - d - 1))) + 6*b*x*poly
log(3, sqrt((c + d + 1)/(c - d + 1))*(cosh(b*x + a) + sinh(b*x + a))) + 6*b
*x*polylog(3, -sqrt((c + d + 1)/(c - d + 1))*(cosh(b*x + a) + sinh(b*x + a)
)) - 6*b*x*polylog(3, sqrt((c + d - 1)/(c - d - 1))*(cosh(b*x + a) + sinh(b
*x + a))) - 6*b*x*polylog(3, -sqrt((c + d - 1)/(c - d - 1))*(cosh(b*x + a)
+ sinh(b*x + a))) - (b^3*x^3 + a^3)*log(sqrt((c + d + 1)/(c - d + 1))*(cosh
(b*x + a) + sinh(b*x + a)) + 1) - (b^3*x^3 + a^3)*log(-sqrt((c + d + 1)/(c
- d + 1))*(cosh(b*x + a) + sinh(b*x + a)) + 1) + (b^3*x^3 + a^3)*log(sqrt((
c + d - 1)/(c - d - 1))*(cosh(b*x + a) + sinh(b*x + a)) + 1) + (b^3*x^3 + a
^3)*log(-sqrt((c + d - 1)/(c - d - 1))*(cosh(b*x + a) + sinh(b*x + a)) + 1)
 - 6*polylog(4, sqrt((c + d + 1)/(c - d + 1))*(cosh(b*x + a) + sinh(b*x + a
))) - 6*polylog(4, -sqrt((c + d + 1)/(c - d + 1))*(cosh(b*x + a) + sinh(b*x
 + a))) + 6*polylog(4, sqrt((c + d - 1)/(c - d - 1))*(cosh(b*x + a) + sinh(
b*x + a))) + 6*polylog(4, -sqrt((c + d - 1)/(c - d - 1))*(cosh(b*x + a) + s
inh(b*x + a))))/b^3
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int x^2 \operatorname{arcoth}(d \coth(bx + a) + c) \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*arccoth(c+d*coth(b*x+a)),x, algorithm="giac")
```

```
[Out] integrate(x^2*arccoth(d*coth(b*x + a) + c), x)
```

**maple [C]** time = 10.36, size = 5222, normalized size = 17.23

output too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^2*arccoth(c+d*coth(b*x+a)),x)
```

```
[Out] result too large to display
```

**maxima** [A] time = 0.70, size = 277, normalized size = 0.91

$$\frac{1}{3}x^3\operatorname{arcoth}\left(d\coth\left(bx+a\right)+c\right)-\frac{1}{18}bd\left(\frac{4b^3x^3\log\left(-\frac{(c+d+1)e^{(2bx+2a)}}{c-d+1}+1\right)+6b^2x^2\mathrm{Li}_2\left(\frac{(c+d+1)e^{(2bx+2a)}}{c-d+1}\right)-6bx\mathrm{Li}_3\left(\cdots\right.}{b^4d}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*arccoth(c+d*coth(b*x+a)),x, algorithm="maxima")
```

```
[Out] 1/3*x^3*arccoth(d*coth(b*x + a) + c) - 1/18*b*d*((4*b^3*x^3*log(-(c + d + 1
)*e^(2*b*x + 2*a)/(c - d + 1) + 1) + 6*b^2*x^2*dilog((c + d + 1)*e^(2*b*x +
 2*a)/(c - d + 1)) - 6*b*x*polylog(3, (c + d + 1)*e^(2*b*x + 2*a)/(c - d +
1)) + 3*polylog(4, (c + d + 1)*e^(2*b*x + 2*a)/(c - d + 1)))/(b^4*d) - (4*b
^3*x^3*log(-(c + d - 1)*e^(2*b*x + 2*a)/(c - d - 1) + 1) + 6*b^2*x^2*dilog(
(c + d - 1)*e^(2*b*x + 2*a)/(c - d - 1)) - 6*b*x*polylog(3, (c + d - 1)*e^(
2*b*x + 2*a)/(c - d - 1)) + 3*polylog(4, (c + d - 1)*e^(2*b*x + 2*a)/(c - d
 - 1)))/(b^4*d))
```

**mupad** [F] time = 0.00, size = -1, normalized size = -0.00

$$\int x^2\operatorname{acoth}\left(c+d\coth\left(a+b\,x\right)\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^2*acoth(c + d*coth(a + b*x)),x)
```

```
[Out] int(x^2*acoth(c + d*coth(a + b*x)), x)
```

**sympy** [F] time = 0.00, size = 0, normalized size = 0.00

$$\int x^2\operatorname{acoth}\left(c+d\coth\left(a+bx\right)\right)dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**2*acoth(c+d*coth(b*x+a)),x)
```

```
[Out] Integral(x**2*acoth(c + d*coth(a + b*x)), x)
```

## 3.218 $\int x\coth^{-1}(c+d\coth(a+bx))\,dx$

**Optimal**. Leaf size=229

$$-\frac{\text{Li}_3\left(\frac{(-c-d+1)e^{2a+2bx}}{-c+d+1}\right)}{8b^2}+\frac{\text{Li}_3\left(\frac{(c+d+1)e^{2a+2bx}}{c-d+1}\right)}{8b^2}+\frac{x\text{Li}_2\left(\frac{(-c-d+1)e^{2a+2bx}}{-c+d+1}\right)}{4b}-\frac{x\text{Li}_2\left(\frac{(c+d+1)e^{2a+2bx}}{c-d+1}\right)}{4b}+\frac{1}{4}x^2\log\left(1-\frac{(-c-d+}{-c+}\right.$$

```
[Out] 1/2*x^2*arccoth(c+d*coth(b*x+a))+1/4*x^2*ln(1-(1-c-d)*exp(2*b*x+2*a)/(1-c+d
))-1/4*x^2*ln(1-(1+c+d)*exp(2*b*x+2*a)/(1+c-d))+1/4*x*polylog(2,(1-c-d)*exp
(2*b*x+2*a)/(1-c+d))/b-1/4*x*polylog(2,(1+c+d)*exp(2*b*x+2*a)/(1+c-d))/b-1/
8*polylog(3,(1-c-d)*exp(2*b*x+2*a)/(1-c+d))/b^2+1/8*polylog(3,(1+c+d)*exp(2
*b*x+2*a)/(1+c-d))/b^2
```

**Rubi [A]** time = 0.38, antiderivative size = 229, normalized size of antiderivative = 1.00, number of steps used = 9, number of rules used = 5, integrand size = 13, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.385, Rules used = {6246, 2190, 2531, 2282, 6589}

$$-\frac{\text{PolyLog}\left(3,\frac{(-c-d+1)e^{2a+2bx}}{-c+d+1}\right)}{8b^2}+\frac{\text{PolyLog}\left(3,\frac{(c+d+1)e^{2a+2bx}}{c-d+1}\right)}{8b^2}+\frac{x\text{PolyLog}\left(2,\frac{(-c-d+1)e^{2a+2bx}}{-c+d+1}\right)}{4b}-\frac{x\text{PolyLog}\left(2,\frac{(c+d+1)}{c-d}\right.}{4b}$$

Antiderivative was successfully verified.

```
[In] Int[x*ArcCoth[c + d*Coth[a + b*x]],x]
```

```
[Out] (x^2*ArcCoth[c + d*Coth[a + b*x]])/2 + (x^2*Log[1 - ((1 - c - d)*E^(2*a + 2
*b*x))/(1 - c + d)])/4 - (x^2*Log[1 - ((1 + c + d)*E^(2*a + 2*b*x))/(1 + c
- d)])/4 + (x*PolyLog[2, ((1 - c - d)*E^(2*a + 2*b*x))/(1 - c + d)])/(4*b)
- (x*PolyLog[2, ((1 + c + d)*E^(2*a + 2*b*x))/(1 + c - d)])/(4*b) - PolyLog
[3, ((1 - c - d)*E^(2*a + 2*b*x))/(1 - c + d)]/(8*b^2) + PolyLog[3, ((1 + c
 + d)*E^(2*a + 2*b*x))/(1 + c - d)]/(8*b^2)
```

Rule 2190

```
Int[(((F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m_.))/
((a_) + (b_.)*((F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)), x_Symbol] :> Simp
[((c + d*x)^m*Log[1 + (b*(F^(g*(e + f*x)))^n)/a])/(b*f*g*n*Log[F]), x] - Di
st[(d*m)/(b*f*g*n*Log[F]), Int[(c + d*x)^(m - 1)*Log[1 + (b*(F^(g*(e + f*x)
))^n)/a], x], x] /; FreeQ[{F, a, b, c, d, e, f, g, n}, x] && IGtQ[m, 0]
```

Rule 2282

```
Int[u_, x_Symbol] :> With[{v = FunctionOfExponential[u, x]}, Dist[v/D[v, x]
, Subst[Int[FunctionOfExponentialFunction[u, x]/x, x], x, v], x]] /; Functi
onOfExponentialQ[u, x] &&  !MatchQ[u, (w_)*((a_.)*(v_)^(n_))^(m_) /; FreeQ[
{a, m, n}, x] && IntegerQ[m*n]] &&  !MatchQ[u, E^((c_.)*((a_.) + (b_.)*x))*
(F_)[v_] /; FreeQ[{a, b, c}, x] && InverseFunctionQ[F[x]]]
```

Rule 2531

```
Int[Log[1 + (e_.)*((F_)^((c_.)*((a_.) + (b_.)*(x_))))^(n_.)]*((f_.) + (g_.)
*(x_))^(m_.), x_Symbol] :> -Simp[((f + g*x)^m*PolyLog[2, -(e*(F^(c*(a + b*x
)))^n)])/(b*c*n*Log[F]), x] + Dist[(g*m)/(b*c*n*Log[F]), Int[(f + g*x)^(m -
 1)*PolyLog[2, -(e*(F^(c*(a + b*x)))^n)], x], x] /; FreeQ[{F, a, b, c, e, f
, g, n}, x] && GtQ[m, 0]
```

Rule 6246

```
Int[ArcCoth[(c_.) + Coth[(a_.) + (b_.)*(x_)]*(d_.)]*((e_.) + (f_.)*(x_))^(m
_.), x_Symbol] :> Simp[((e + f*x)^(m + 1)*ArcCoth[c + d*Coth[a + b*x]])/(f*
```

```
(m + 1)), x] + (-Dist[(b*(1 - c - d))/(f*(m + 1)), Int[((e + f*x)^(m + 1)*E
^(2*a + 2*b*x))/(1 - c + d - (1 - c - d)*E^(2*a + 2*b*x)), x], x] + Dist[(b
*(1 + c + d))/(f*(m + 1)), Int[((e + f*x)^(m + 1)*E^(2*a + 2*b*x))/(1 + c -
 d - (1 + c + d)*E^(2*a + 2*b*x)), x], x]) /; FreeQ[{a, b, c, d, e, f}, x]
&& IGtQ[m, 0] && NeQ[(c - d)^2, 1]
```

Rule 6589

```
Int[PolyLog[n_, (c_.)*((a_.) + (b_.)*(x_))^(p_.)]/((d_.) + (e_.)*(x_)), x_S
ymbol] :> Simp[PolyLog[n + 1, c*(a + b*x)^p]/(e*p), x] /; FreeQ[{a, b, c, d
, e, n, p}, x] && EqQ[b*d, a*e]
```

Rubi steps

$$\int x\coth^{-1}(c+d\coth(a+bx))\,dx = \frac{1}{2}x^2\coth^{-1}(c+d\coth(a+bx)) - \frac{1}{2}(b(1-c-d))\int \frac{e^{2a+2bx}x^2}{1-c+d+(-1+c+d)$$

$$= \frac{1}{2}x^2\coth^{-1}(c+d\coth(a+bx)) + \frac{1}{4}x^2\log\left(1-\frac{(1-c-d)e^{2a+2bx}}{1-c+d}\right) - \frac{1}{4}x^2\log$$

$$= \frac{1}{2}x^2\coth^{-1}(c+d\coth(a+bx)) + \frac{1}{4}x^2\log\left(1-\frac{(1-c-d)e^{2a+2bx}}{1-c+d}\right) - \frac{1}{4}x^2\log$$

$$= \frac{1}{2}x^2\coth^{-1}(c+d\coth(a+bx)) + \frac{1}{4}x^2\log\left(1-\frac{(1-c-d)e^{2a+2bx}}{1-c+d}\right) - \frac{1}{4}x^2\log$$

$$= \frac{1}{2}x^2\coth^{-1}(c+d\coth(a+bx)) + \frac{1}{4}x^2\log\left(1-\frac{(1-c-d)e^{2a+2bx}}{1-c+d}\right) - \frac{1}{4}x^2\log$$

**Mathematica [A]** time = 0.16, size = 267, normalized size = 1.17

$$2b^2x^2\log\left(\frac{2(\cosh(a+bx)-\sinh(a+bx))((c-1)\sinh(a+bx)+d\cosh(a+bx))}{c+d-1}\right) - 2b^2x^2\log\left(\frac{(c-d+1)(\sinh(2(a+bx))-\cosh(2(a+bx)))}{c+d+1}+1\right) - 2bx$$

Warning: Unable to verify antiderivative.

```
[In] Integrate[x*ArcCoth[c + d*Coth[a + b*x]],x]
```

```
[Out] (x^2*ArcCoth[c + d*Coth[a + b*x]])/2 + (2*b^2*x^2*Log[(2*(Cosh[a + b*x] - S
inh[a + b*x])*(d*Cosh[a + b*x] + (-1 + c)*Sinh[a + b*x]))/(-1 + c + d)] - 2
*b^2*x^2*Log[1 + ((1 + c - d)*(-Cosh[2*(a + b*x)] + Sinh[2*(a + b*x)]))/(1
+ c + d)] - 2*b*x*PolyLog[2, ((-1 + c - d)*(Cosh[2*(a + b*x)] - Sinh[2*(a +
 b*x)]))/(-1 + c + d)] + 2*b*x*PolyLog[2, ((1 + c - d)*(Cosh[2*(a + b*x)] -
 Sinh[2*(a + b*x)]))/(1 + c + d)] - PolyLog[3, ((-1 + c - d)*(Cosh[2*(a + b
*x)] - Sinh[2*(a + b*x)]))/(-1 + c + d)] + PolyLog[3, ((1 + c - d)*(Cosh[2*
(a + b*x)] - Sinh[2*(a + b*x)]))/(1 + c + d)])/(8*b^2)
```

**fricas [C]** time = 0.62, size = 729, normalized size = 3.18

$$b^2x^2\log\left(\frac{d\cosh(bx+a)+(c+1)\sinh(bx+a)}{d\cosh(bx+a)+(c-1)\sinh(bx+a)}\right) - 2bx\mathrm{Li}_2\left(\sqrt{\frac{c+d+1}{c-d+1}}(\cosh(bx+a)+\sinh(bx+a))\right) - 2bx\mathrm{Li}_2\left(-\sqrt{\frac{c+d+1}{c-d+1}}(\cos$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*arccoth(c+d*coth(b*x+a)),x, algorithm="fricas")
```

```
[Out] 1/4*(b^2*x^2*log((d*cosh(b*x + a) + (c + 1)*sinh(b*x + a))/(d*cosh(b*x + a)
 + (c - 1)*sinh(b*x + a))) - 2*b*x*dilog(sqrt((c + d + 1)/(c - d + 1))*(cos
h(b*x + a) + sinh(b*x + a))) - 2*b*x*dilog(-sqrt((c + d + 1)/(c - d + 1))*(
cosh(b*x + a) + sinh(b*x + a))) + 2*b*x*dilog(sqrt((c + d - 1)/(c - d - 1))
*(cosh(b*x + a) + sinh(b*x + a))) + 2*b*x*dilog(-sqrt((c + d - 1)/(c - d -
1))*(cosh(b*x + a) + sinh(b*x + a))) - a^2*log(2*(c + d + 1)*cosh(b*x + a)
+ 2*(c + d + 1)*sinh(b*x + a) + 2*(c - d + 1)*sqrt((c + d + 1)/(c - d + 1))
) - a^2*log(2*(c + d + 1)*cosh(b*x + a) + 2*(c + d + 1)*sinh(b*x + a) - 2*(
c - d + 1)*sqrt((c + d + 1)/(c - d + 1))) + a^2*log(2*(c + d - 1)*cosh(b*x
+ a) + 2*(c + d - 1)*sinh(b*x + a) + 2*(c - d - 1)*sqrt((c + d - 1)/(c - d
- 1))) + a^2*log(2*(c + d - 1)*cosh(b*x + a) + 2*(c + d - 1)*sinh(b*x + a)
- 2*(c - d - 1)*sqrt((c + d - 1)/(c - d - 1))) - (b^2*x^2 - a^2)*log(sqrt((
c + d + 1)/(c - d + 1))*(cosh(b*x + a) + sinh(b*x + a)) + 1) - (b^2*x^2 - a
^2)*log(-sqrt((c + d + 1)/(c - d + 1))*(cosh(b*x + a) + sinh(b*x + a)) + 1)
 + (b^2*x^2 - a^2)*log(sqrt((c + d - 1)/(c - d - 1))*(cosh(b*x + a) + sinh(
b*x + a)) + 1) + (b^2*x^2 - a^2)*log(-sqrt((c + d - 1)/(c - d - 1))*(cosh(b
*x + a) + sinh(b*x + a)) + 1) + 2*polylog(3, sqrt((c + d + 1)/(c - d + 1))*
(cosh(b*x + a) + sinh(b*x + a))) + 2*polylog(3, -sqrt((c + d + 1)/(c - d +
1))*(cosh(b*x + a) + sinh(b*x + a))) - 2*polylog(3, sqrt((c + d - 1)/(c - d
 - 1))*(cosh(b*x + a) + sinh(b*x + a))) - 2*polylog(3, -sqrt((c + d - 1)/(c
 - d - 1))*(cosh(b*x + a) + sinh(b*x + a))))/b^2
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int x \operatorname{arcoth}(d \coth(bx + a) + c) \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*arccoth(c+d*coth(b*x+a)),x, algorithm="giac")
```

```
[Out] integrate(x*arccoth(d*coth(b*x + a) + c), x)
```

**maple [C]** time = 3.78, size = 4918, normalized size = 21.48

output too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x*arccoth(c+d*coth(b*x+a)),x)
```

```
[Out] -1/4/b^2*a^2/(c+d-1)*ln(c*exp(2*b*x+2*a)+d*exp(2*b*x+2*a)-exp(2*b*x+2*a)-c+
d+1)-1/8*I*Pi*x^2*csgn(I*((exp(2*b*x+2*a)-1)*c+(exp(2*b*x+2*a)+1)*d+exp(2*b
*x+2*a)-1)/(exp(2*b*x+2*a)-1))^3+1/8/b^2/(1+c+d)*polylog(3,(1+c+d)*exp(2*b*
x+2*a)/(1+c-d))-1/4/b^2/(1+c+d)*ln(1-(1+c+d)*exp(2*b*x+2*a)/(1+c-d))*a^2-1/
4/b^2/(1+c+d)*polylog(2,(1+c+d)*exp(2*b*x+2*a)/(1+c-d))*a+1/2/b^2*a^2/(1+c+
d)*ln((-c*exp(b*x+a)-exp(b*x+a)*d+((1+c-d)*(1+c+d))^(1/2)-exp(b*x+a))/((1+c
-d)*(1+c+d))^(1/2))+1/2/b^2*a^2/(1+c+d)*ln((c*exp(b*x+a)+exp(b*x+a)*d+((1+c
-d)*(1+c+d))^(1/2)+exp(b*x+a))/((1+c-d)*(1+c+d))^(1/2))+1/8/b^2*d/(1+c+d)*p
olylog(3,(1+c+d)*exp(2*b*x+2*a)/(1+c-d))+1/8/b^2*c/(1+c+d)*polylog(3,(1+c+d
)*exp(2*b*x+2*a)/(1+c-d))+1/2/b^2*a/(1+c+d)*dilog((-c*exp(b*x+a)-exp(b*x+a)
*d+((1+c-d)*(1+c+d))^(1/2)-exp(b*x+a))/((1+c-d)*(1+c+d))^(1/2))+1/2/b^2*a/(
1+c+d)*dilog((c*exp(b*x+a)+exp(b*x+a)*d+((1+c-d)*(1+c+d))^(1/2)+exp(b*x+a))
/((1+c-d)*(1+c+d))^(1/2))-1/4/b/(1+c+d)*polylog(2,(1+c+d)*exp(2*b*x+2*a)/(1
+c-d))*x-1/4*d/(1+c+d)*ln(1-(1+c+d)*exp(2*b*x+2*a)/(1+c-d))*x^2-1/4*c/(1+c+
d)*ln(1-(1+c+d)*exp(2*b*x+2*a)/(1+c-d))*x^2+1/4*x^2*ln((exp(2*b*x+2*a)-1)*c
+(exp(2*b*x+2*a)+1)*d+exp(2*b*x+2*a)-1)+1/4/b*c/(c+d-1)*polylog(2,(c+d-1)*e
xp(2*b*x+2*a)/(c-d-1))*x+1/4/b^2*c/(c+d-1)*polylog(2,(c+d-1)*exp(2*b*x+2*a)
/(c-d-1))*a+1/4/b^2*d/(c+d-1)*ln(1-(c+d-1)*exp(2*b*x+2*a)/(c-d-1))*a^2+1/4/
b*d/(c+d-1)*polylog(2,(c+d-1)*exp(2*b*x+2*a)/(c-d-1))*x+1/4/b^2*d/(c+d-1)*p
olylog(2,(c+d-1)*exp(2*b*x+2*a)/(c-d-1))*a-1/2/b/(c+d-1)*ln(1-(c+d-1)*exp(2
*b*x+2*a)/(c-d-1))*x*a+1/2/b*a/(c+d-1)*ln((-c*exp(b*x+a)-exp(b*x+a)*d+((c-d
```

-1)*(c+d-1))^(1/2)+exp(b*x+a))/((c-d-1)*(c+d-1))^(1/2))*x-1/4/(1+c+d)*ln(1-
(1+c+d)*exp(2*b*x+2*a)/(1+c-d))*x^2+1/4*d/(c+d-1)*ln(1-(c+d-1)*exp(2*b*x+2*
a)/(c-d-1))*x^2-1/8/b^2*c/(c+d-1)*polylog(3,(c+d-1)*exp(2*b*x+2*a)/(c-d-1))
-1/8/b^2*d/(c+d-1)*polylog(3,(c+d-1)*exp(2*b*x+2*a)/(c-d-1))+1/2/b^2*a/(c+d
-1)*dilog((-c*exp(b*x+a)-exp(b*x+a)*d+((c-d-1)*(c+d-1))^(1/2)+exp(b*x+a))/(
(c-d-1)*(c+d-1))^(1/2))+1/2/b^2*a/(c+d-1)*dilog((c*exp(b*x+a)+exp(b*x+a)*d+
((c-d-1)*(c+d-1))^(1/2)-exp(b*x+a))/((c-d-1)*(c+d-1))^(1/2))-1/4/b^2/(c+d-1
)*ln(1-(c+d-1)*exp(2*b*x+2*a)/(c-d-1))*a^2-1/4/b/(c+d-1)*polylog(2,(c+d-1)*
exp(2*b*x+2*a)/(c-d-1))*x-1/4/b^2/(c+d-1)*polylog(2,(c+d-1)*exp(2*b*x+2*a)/
(c-d-1))*a+1/2/b^2*a^2/(c+d-1)*ln((-c*exp(b*x+a)-exp(b*x+a)*d+((c-d-1)*(c+d
-1))^(1/2)+exp(b*x+a))/((c-d-1)*(c+d-1))^(1/2))+1/2/b^2*a^2/(c+d-1)*ln((c*e
xp(b*x+a)+exp(b*x+a)*d+((c-d-1)*(c+d-1))^(1/2)-exp(b*x+a))/((c-d-1)*(c+d-1)
)^(1/2))+1/4*c/(c+d-1)*ln(1-(c+d-1)*exp(2*b*x+2*a)/(c-d-1))*x^2-1/4/(c+d-1)
*ln(1-(c+d-1)*exp(2*b*x+2*a)/(c-d-1))*x^2+1/8/b^2/(c+d-1)*polylog(3,(c+d-1)
*exp(2*b*x+2*a)/(c-d-1))-1/4*x^2*ln((exp(2*b*x+2*a)-1)*c+(exp(2*b*x+2*a)+1)
*d-exp(2*b*x+2*a)+1)-1/4/b^2*a^2/(1+c+d)*ln(c*exp(2*b*x+2*a)+d*exp(2*b*x+2*
a)+exp(2*b*x+2*a)-c+d-1)+1/8*I*Pi*x^2*csgn(I*((exp(2*b*x+2*a)-1)*c+(exp(2*b
*x+2*a)+1)*d-exp(2*b*x+2*a)+1)/(exp(2*b*x+2*a)-1))^3-1/2/b*c*a/(c+d-1)*ln((
c*exp(b*x+a)+exp(b*x+a)*d+((c-d-1)*(c+d-1))^(1/2)-exp(b*x+a))/((c-d-1)*(c+d
-1))^(1/2))*x-1/2/b*d*a/(c+d-1)*ln((-c*exp(b*x+a)-exp(b*x+a)*d+((c-d-1)*(c+
d-1))^(1/2)+exp(b*x+a))/((c-d-1)*(c+d-1))^(1/2))*x-1/2/b*d*a/(c+d-1)*ln((c*
exp(b*x+a)+exp(b*x+a)*d+((c-d-1)*(c+d-1))^(1/2)-exp(b*x+a))/((c-d-1)*(c+d-1
))^(1/2))*x+1/2/b*c/(c+d-1)*ln(1-(c+d-1)*exp(2*b*x+2*a)/(c-d-1))*x*a+1/2/b*
d/(c+d-1)*ln(1-(c+d-1)*exp(2*b*x+2*a)/(c-d-1))*x*a-1/2/b*c*a/(c+d-1)*ln((-c
*exp(b*x+a)-exp(b*x+a)*d+((c-d-1)*(c+d-1))^(1/2)+exp(b*x+a))/((c-d-1)*(c+d-
1))^(1/2))*x+1/2/b^2*a*c/(1+c+d)*dilog((-c*exp(b*x+a)-exp(b*x+a)*d+((1+c-d)
*(1+c+d))^(1/2)-exp(b*x+a))/((1+c-d)*(1+c+d))^(1/2))+1/2/b^2*a*c/(1+c+d)*di
log((c*exp(b*x+a)+exp(b*x+a)*d+((1+c-d)*(1+c+d))^(1/2)+exp(b*x+a))/((1+c-d)
*(1+c+d))^(1/2))+1/2/b^2*a*d/(1+c+d)*dilog((-c*exp(b*x+a)-exp(b*x+a)*d+((1+
c-d)*(1+c+d))^(1/2)-exp(b*x+a))/((1+c-d)*(1+c+d))^(1/2))+1/2/b^2*a*d/(1+c+d
)*dilog((c*exp(b*x+a)+exp(b*x+a)*d+((1+c-d)*(1+c+d))^(1/2)+exp(b*x+a))/((1+
c-d)*(1+c+d))^(1/2))-1/2/b/(1+c+d)*ln(1-(1+c+d)*exp(2*b*x+2*a)/(1+c-d))*x*a
+1/2/b*a/(1+c+d)*ln((-c*exp(b*x+a)-exp(b*x+a)*d+((1+c-d)*(1+c+d))^(1/2)-exp
(b*x+a))/((1+c-d)*(1+c+d))^(1/2))*x-1/4/b^2*d/(1+c+d)*ln(1-(1+c+d)*exp(2*b*
x+2*a)/(1+c-d))*a^2+1/4/b^2*c/(c+d-1)*ln(1-(c+d-1)*exp(2*b*x+2*a)/(c-d-1))*
a^2-1/8*I*Pi*x^2*csgn(I/(exp(2*b*x+2*a)-1))*csgn(I*((exp(2*b*x+2*a)-1)*c+(e
xp(2*b*x+2*a)+1)*d-exp(2*b*x+2*a)+1)/(exp(2*b*x+2*a)-1))^2-1/4/b^2*a^2*d/(1
+c+d)*ln(c*exp(2*b*x+2*a)+d*exp(2*b*x+2*a)+exp(2*b*x+2*a)-c+d-1)-1/4/b^2*a^
2*c/(1+c+d)*ln(c*exp(2*b*x+2*a)+d*exp(2*b*x+2*a)+exp(2*b*x+2*a)-c+d-1)-1/2/
b*d/(1+c+d)*ln(1-(1+c+d)*exp(2*b*x+2*a)/(1+c-d))*x*a-1/2/b*c/(1+c+d)*ln(1-(
1+c+d)*exp(2*b*x+2*a)/(1+c-d))*x*a+1/2/b*a/(c+d-1)*ln((c*exp(b*x+a)+exp(b*x
+a)*d+((c-d-1)*(c+d-1))^(1/2)-exp(b*x+a))/((c-d-1)*(c+d-1))^(1/2))*x-1/2/b^
2*c*a^2/(c+d-1)*ln((-c*exp(b*x+a)-exp(b*x+a)*d+((c-d-1)*(c+d-1))^(1/2)+exp(
b*x+a))/((c-d-1)*(c+d-1))^(1/2))-1/2/b^2*c*a^2/(c+d-1)*ln((c*exp(b*x+a)+exp
(b*x+a)*d+((c-d-1)*(c+d-1))^(1/2)-exp(b*x+a))/((c-d-1)*(c+d-1))^(1/2))-1/2/
b^2*d*a^2/(c+d-1)*ln((-c*exp(b*x+a)-exp(b*x+a)*d+((c-d-1)*(c+d-1))^(1/2)+ex
p(b*x+a))/((c-d-1)*(c+d-1))^(1/2))-1/2/b^2*d*a^2/(c+d-1)*ln((c*exp(b*x+a)+e
xp(b*x+a)*d+((c-d-1)*(c+d-1))^(1/2)-exp(b*x+a))/((c-d-1)*(c+d-1))^(1/2))-1/
2/b^2*c*a/(c+d-1)*dilog((-c*exp(b*x+a)-exp(b*x+a)*d+((c-d-1)*(c+d-1))^(1/2)
+exp(b*x+a))/((c-d-1)*(c+d-1))^(1/2))-1/2/b^2*c*a/(c+d-1)*dilog((c*exp(b*x+
a)+exp(b*x+a)*d+((c-d-1)*(c+d-1))^(1/2)-exp(b*x+a))/((c-d-1)*(c+d-1))^(1/2)
)-1/2/b^2*d*a/(c+d-1)*dilog((-c*exp(b*x+a)-exp(b*x+a)*d+((c-d-1)*(c+d-1))^(
1/2)+exp(b*x+a))/((c-d-1)*(c+d-1))^(1/2))-1/2/b^2*d*a/(c+d-1)*dilog((c*exp(
b*x+a)+exp(b*x+a)*d+((c-d-1)*(c+d-1))^(1/2)-exp(b*x+a))/((c-d-1)*(c+d-1))^(
1/2))+1/8*I*Pi*x^2*csgn(I/(exp(2*b*x+2*a)-1))*csgn(I*((exp(2*b*x+2*a)-1)*c+
(exp(2*b*x+2*a)+1)*d-exp(2*b*x+2*a)+1))*csgn(I*((exp(2*b*x+2*a)-1)*c+(exp(2
*b*x+2*a)+1)*d-exp(2*b*x+2*a)+1)/(exp(2*b*x+2*a)-1))-1/8*I*Pi*x^2*csgn(I/(e
xp(2*b*x+2*a)-1))*csgn(I*((exp(2*b*x+2*a)-1)*c+(exp(2*b*x+2*a)+1)*d+exp(2*b
*x+2*a)-1))*csgn(I*((exp(2*b*x+2*a)-1)*c+(exp(2*b*x+2*a)+1)*d+exp(2*b*x+2*a

```
)-1)/(exp(2*b*x+2*a)-1))-1/8*I*Pi*x^2*csgn(I*((exp(2*b*x+2*a)-1)*c+(exp(2*b
*x+2*a)+1)*d-exp(2*b*x+2*a)+1))*csgn(I*((exp(2*b*x+2*a)-1)*c+(exp(2*b*x+2*a
)+1)*d-exp(2*b*x+2*a)+1)/(exp(2*b*x+2*a)-1))^2+1/8*I*Pi*x^2*csgn(I*((exp(2*
b*x+2*a)-1)*c+(exp(2*b*x+2*a)+1)*d+exp(2*b*x+2*a)-1))*csgn(I*((exp(2*b*x+2*
a)-1)*c+(exp(2*b*x+2*a)+1)*d+exp(2*b*x+2*a)-1)/(exp(2*b*x+2*a)-1))^2+1/2/b*
a/(1+c+d)*ln((c*exp(b*x+a)+exp(b*x+a)*d+((1+c-d)*(1+c+d))^(1/2)+exp(b*x+a))
/((1+c-d)*(1+c+d))^(1/2))*x-1/4/b*d/(1+c+d)*polylog(2,(1+c+d)*exp(2*b*x+2*a
)/(1+c-d))*x-1/4/b*c/(1+c+d)*polylog(2,(1+c+d)*exp(2*b*x+2*a)/(1+c-d))*x-1/
4/b^2*d/(1+c+d)*polylog(2,(1+c+d)*exp(2*b*x+2*a)/(1+c-d))*a-1/4/b^2*c/(1+c+
d)*ln(1-(1+c+d)*exp(2*b*x+2*a)/(1+c-d))*a^2-1/4/b^2*c/(1+c+d)*polylog(2,(1+
c+d)*exp(2*b*x+2*a)/(1+c-d))*a+1/2/b^2*a^2*c/(1+c+d)*ln((-c*exp(b*x+a)-exp(
b*x+a)*d+((1+c-d)*(1+c+d))^(1/2)-exp(b*x+a))/((1+c-d)*(1+c+d))^(1/2))+1/2/b
^2*a^2*c/(1+c+d)*ln((c*exp(b*x+a)+exp(b*x+a)*d+((1+c-d)*(1+c+d))^(1/2)+exp(
b*x+a))/((1+c-d)*(1+c+d))^(1/2))+1/2/b^2*a^2*d/(1+c+d)*ln((-c*exp(b*x+a)-ex
p(b*x+a)*d+((1+c-d)*(1+c+d))^(1/2)-exp(b*x+a))/((1+c-d)*(1+c+d))^(1/2))+1/2
/b^2*a^2*d/(1+c+d)*ln((c*exp(b*x+a)+exp(b*x+a)*d+((1+c-d)*(1+c+d))^(1/2)+ex
p(b*x+a))/((1+c-d)*(1+c+d))^(1/2))+1/2/b*a*c/(1+c+d)*ln((-c*exp(b*x+a)-exp(
b*x+a)*d+((1+c-d)*(1+c+d))^(1/2)-exp(b*x+a))/((1+c-d)*(1+c+d))^(1/2))*x+1/2
/b*a*c/(1+c+d)*ln((c*exp(b*x+a)+exp(b*x+a)*d+((1+c-d)*(1+c+d))^(1/2)+exp(b*
x+a))/((1+c-d)*(1+c+d))^(1/2))*x+1/2/b*a*d/(1+c+d)*ln((-c*exp(b*x+a)-exp(b*
x+a)*d+((1+c-d)*(1+c+d))^(1/2)-exp(b*x+a))/((1+c-d)*(1+c+d))^(1/2))*x+1/2/b
*a*d/(1+c+d)*ln((c*exp(b*x+a)+exp(b*x+a)*d+((1+c-d)*(1+c+d))^(1/2)+exp(b*x+
a))/((1+c-d)*(1+c+d))^(1/2))*x+1/8*I*Pi*x^2*csgn(I/(exp(2*b*x+2*a)-1))*csgn
(I*((exp(2*b*x+2*a)-1)*c+(exp(2*b*x+2*a)+1)*d+exp(2*b*x+2*a)-1)/(exp(2*b*x+
2*a)-1))^2+1/4/b^2*d*a^2/(c+d-1)*ln(c*exp(2*b*x+2*a)+d*exp(2*b*x+2*a)-exp(2
*b*x+2*a)-c+d+1)+1/4/b^2*c*a^2/(c+d-1)*ln(c*exp(2*b*x+2*a)+d*exp(2*b*x+2*a)
-exp(2*b*x+2*a)-c+d+1)
```

**maxima [A]** time = 0.74, size = 213, normalized size = 0.93

$$-\frac{1}{8}\,bd\left(\frac{2\,b^2x^2\log\left(-\frac{(c+d+1)e^{(2\,bx+2\,a)}}{c-d+1}+1\right)+2\,bx\mathrm{Li}_2\left(\frac{(c+d+1)e^{(2\,bx+2\,a)}}{c-d+1}\right)-\mathrm{Li}_3(\frac{(c+d+1)e^{(2\,bx+2\,a)}}{c-d+1})}{b^3d}-\frac{2\,b^2x^2\log\left(-\frac{(c+d-1)e^{(}}{c-d}\right.}{}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*arccoth(c+d*coth(b*x+a)),x, algorithm="maxima")
```

```
[Out] -1/8*b*d*((2*b^2*x^2*log(-(c + d + 1)*e^(2*b*x + 2*a)/(c - d + 1) + 1) + 2*
b*x*dilog((c + d + 1)*e^(2*b*x + 2*a)/(c - d + 1)) - polylog(3, (c + d + 1)
*e^(2*b*x + 2*a)/(c - d + 1)))/(b^3*d) - (2*b^2*x^2*log(-(c + d - 1)*e^(2*b
*x + 2*a)/(c - d - 1) + 1) + 2*b*x*dilog((c + d - 1)*e^(2*b*x + 2*a)/(c - d
 - 1)) - polylog(3, (c + d - 1)*e^(2*b*x + 2*a)/(c - d - 1)))/(b^3*d)) + 1/
2*x^2*arccoth(d*coth(b*x + a) + c)
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.00

$$\int x\,\mathrm{acoth}\left(c+d\,\mathrm{coth}\left(a+b\,x\right)\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x*acoth(c + d*coth(a + b*x)),x)
```

```
[Out] int(x*acoth(c + d*coth(a + b*x)), x)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int x\,\mathrm{acoth}\left(c+d\coth\left(a+bx\right)\right)dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*acoth(c+d*coth(b*x+a)),x)
[Out] Integral(x*acoth(c + d*coth(a + b*x)), x)
```

## 3.219 $\int \coth^{-1}(c + d\coth(a + bx))\,dx$

**Optimal**. Leaf size=150

$$\frac{\mathrm{Li}_2\left(\frac{(-c-d+1)e^{2a+2bx}}{-c+d+1}\right)}{4b}-\frac{\mathrm{Li}_2\left(\frac{(c+d+1)e^{2a+2bx}}{c-d+1}\right)}{4b}+\frac{1}{2}x\log\left(1-\frac{(-c-d+1)e^{2a+2bx}}{-c+d+1}\right)-\frac{1}{2}x\log\left(1-\frac{(c+d+1)e^{2a+2bx}}{c-d+1}\right)+x$$

```
[Out] x*arccoth(c+d*coth(b*x+a))+1/2*x*ln(1-(1-c-d)*exp(2*b*x+2*a)/(1-c+d))-1/2*x
*ln(1-(1+c+d)*exp(2*b*x+2*a)/(1+c-d))+1/4*polylog(2,(1-c-d)*exp(2*b*x+2*a)/
(1-c+d))/b-1/4*polylog(2,(1+c+d)*exp(2*b*x+2*a)/(1+c-d))/b
```

**Rubi [A]** time = 0.23, antiderivative size = 150, normalized size of antiderivative = 1.00, number of steps used = 7, number of rules used = 4, integrand size = 11, $\frac{\text{number of rules}}{\text{integrand size}} = 0.364$, Rules used = {6238, 2190, 2279, 2391}

$$\frac{\mathrm{PolyLog}\left(2,\frac{(-c-d+1)e^{2a+2bx}}{-c+d+1}\right)}{4b}-\frac{\mathrm{PolyLog}\left(2,\frac{(c+d+1)e^{2a+2bx}}{c-d+1}\right)}{4b}+\frac{1}{2}x\log\left(1-\frac{(-c-d+1)e^{2a+2bx}}{-c+d+1}\right)-\frac{1}{2}x\log\left(1-\frac{(c+d}{c}\right.$$

Antiderivative was successfully verified.

```
[In] Int[ArcCoth[c + d*Coth[a + b*x]],x]
```

```
[Out] x*ArcCoth[c + d*Coth[a + b*x]] + (x*Log[1 - ((1 - c - d)*E^(2*a + 2*b*x))/(
1 - c + d)])/2 - (x*Log[1 - ((1 + c + d)*E^(2*a + 2*b*x))/(1 + c - d)])/2 +
 PolyLog[2, ((1 - c - d)*E^(2*a + 2*b*x))/(1 - c + d)]/(4*b) - PolyLog[2, (
(1 + c + d)*E^(2*a + 2*b*x))/(1 + c - d)]/(4*b)
```

Rule 2190

```
Int[(((F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m_.))/
((a_) + (b_.)*((F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)), x_Symbol] :> Simp
[((c + d*x)^m*Log[1 + (b*(F^(g*(e + f*x)))^n)/a])/(b*f*g*n*Log[F]), x] - Di
st[(d*m)/(b*f*g*n*Log[F]), Int[(c + d*x)^(m - 1)*Log[1 + (b*(F^(g*(e + f*x)
))^n)/a], x], x] /; FreeQ[{F, a, b, c, d, e, f, g, n}, x] && IGtQ[m, 0]
```

Rule 2279

```
Int[Log[(a_) + (b_.)*((F_)^((e_.)*((c_.) + (d_.)*(x_))))^(n_.)], x_Symbol]
:> Dist[1/(d*e*n*Log[F]), Subst[Int[Log[a + b*x]/x, x], x, (F^(e*(c + d*x))
)^n], x] /; FreeQ[{F, a, b, c, d, e, n}, x] && GtQ[a, 0]
```

Rule 2391

```
Int[Log[(c_.)*((d_) + (e_.)*(x_)^(n_.))]/(x_), x_Symbol] :> -Simp[PolyLog[2
, -(c*e*x^n)]/n, x] /; FreeQ[{c, d, e, n}, x] && EqQ[c*d, 1]
```

Rule 6238

```
Int[ArcCoth[(c_.) + Coth[(a_.) + (b_.)*(x_)]*(d_.)], x_Symbol] :> Simp[x*Ar
cCoth[c + d*Coth[a + b*x]], x] + (-Dist[b*(1 - c - d), Int[(x*E^(2*a + 2*b*
x))/(1 - c + d - (1 - c - d)*E^(2*a + 2*b*x)), x], x] + Dist[b*(1 + c + d),
 Int[(x*E^(2*a + 2*b*x))/(1 + c - d - (1 + c + d)*E^(2*a + 2*b*x)), x], x])
 /; FreeQ[{a, b, c, d}, x] && NeQ[(c - d)^2, 1]
```

Rubi steps

$$\int \coth^{-1}(c + d\coth(a + bx))\,dx = x\coth^{-1}(c + d\coth(a + bx)) - (b(1 - c - d))\int \frac{e^{2a+2bx}x}{1 - c + d + (-1 + c + d)e^{2a+2b}}$$

$$= x\coth^{-1}(c + d\coth(a + bx)) + \frac{1}{2}x\log\left(1 - \frac{(1 - c - d)e^{2a+2bx}}{1 - c + d}\right) - \frac{1}{2}x\log\left(1 - \right.$$

$$= x\coth^{-1}(c + d\coth(a + bx)) + \frac{1}{2}x\log\left(1 - \frac{(1 - c - d)e^{2a+2bx}}{1 - c + d}\right) - \frac{1}{2}x\log\left(1 - \right.$$

$$= x\coth^{-1}(c + d\coth(a + bx)) + \frac{1}{2}x\log\left(1 - \frac{(1 - c - d)e^{2a+2bx}}{1 - c + d}\right) - \frac{1}{2}x\log\left(1 - \right.$$

**Mathematica [A]** time = 1.26, size = 131, normalized size = 0.87

$$x\coth^{-1}(d\coth(a+bx)+c) - \frac{-\text{Li}_2\left(\frac{(c+d-1)e^{2(a+bx)}}{c-d-1}\right) + \text{Li}_2\left(\frac{(c+d+1)e^{2(a+bx)}}{c-d+1}\right) - 2bx\left(\log\left(1 - \frac{(c+d-1)e^{2(a+bx)}}{c-d-1}\right) - \log\left(1 - \right.\right.}{4b}$$

Antiderivative was successfully verified.

```
[In] Integrate[ArcCoth[c + d*Coth[a + b*x]],x]
```

```
[Out] x*ArcCoth[c + d*Coth[a + b*x]] - (-2*b*x*(Log[1 - ((-1 + c + d)*E^(2*(a + b
*x)))/(-1 + c - d)] - Log[1 - ((1 + c + d)*E^(2*(a + b*x)))/(1 + c - d)]) -
 PolyLog[2, ((-1 + c + d)*E^(2*(a + b*x)))/(-1 + c - d)] + PolyLog[2, ((1 +
 c + d)*E^(2*(a + b*x)))/(1 + c - d)])/(4*b)
```

**fricas [B]** time = 0.48, size = 539, normalized size = 3.59

$$bx\log\left(\frac{d\cosh(bx+a)+(c+1)\sinh(bx+a)}{d\cosh(bx+a)+(c-1)\sinh(bx+a)}\right) + a\log\left(2\,(c+d+1)\cosh\,(bx+a) + 2\,(c+d+1)\sinh\,(bx+a) + 2\,(c-d+1)\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(c+d*coth(b*x+a)),x, algorithm="fricas")
```

```
[Out] 1/2*(b*x*log((d*cosh(b*x + a) + (c + 1)*sinh(b*x + a))/(d*cosh(b*x + a) + (
c - 1)*sinh(b*x + a))) + a*log(2*(c + d + 1)*cosh(b*x + a) + 2*(c + d + 1)*
sinh(b*x + a) + 2*(c - d + 1)*sqrt((c + d + 1)/(c - d + 1))) + a*log(2*(c +
 d + 1)*cosh(b*x + a) + 2*(c + d + 1)*sinh(b*x + a) - 2*(c - d + 1)*sqrt((c
 + d + 1)/(c - d + 1))) - a*log(2*(c + d - 1)*cosh(b*x + a) + 2*(c + d - 1)
*sinh(b*x + a) + 2*(c - d - 1)*sqrt((c + d - 1)/(c - d - 1))) - a*log(2*(c
+ d - 1)*cosh(b*x + a) + 2*(c + d - 1)*sinh(b*x + a) - 2*(c - d - 1)*sqrt((
c + d - 1)/(c - d - 1))) - (b*x + a)*log(sqrt((c + d + 1)/(c - d + 1))*(cos
h(b*x + a) + sinh(b*x + a)) + 1) - (b*x + a)*log(-sqrt((c + d + 1)/(c - d +
 1))*(cosh(b*x + a) + sinh(b*x + a)) + 1) + (b*x + a)*log(sqrt((c + d - 1)/
(c - d - 1))*(cosh(b*x + a) + sinh(b*x + a)) + 1) + (b*x + a)*log(-sqrt((c
+ d - 1)/(c - d - 1))*(cosh(b*x + a) + sinh(b*x + a)) + 1) - dilog(sqrt((c
+ d + 1)/(c - d + 1))*(cosh(b*x + a) + sinh(b*x + a))) - dilog(-sqrt((c + d
 + 1)/(c - d + 1))*(cosh(b*x + a) + sinh(b*x + a))) + dilog(sqrt((c + d - 1
)/(c - d - 1))*(cosh(b*x + a) + sinh(b*x + a))) + dilog(-sqrt((c + d - 1)/(
c - d - 1))*(cosh(b*x + a) + sinh(b*x + a))))/b
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \text{arcoth}\,(d\coth\,(bx+a)+c)\,\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(c+d*coth(b*x+a)),x, algorithm="giac")
```

```
[Out] integrate(arccoth(d*coth(b*x + a) + c), x)
```

**maple [B]** time = 0.53, size = 306, normalized size = 2.04

$$-\frac{\operatorname{arccoth}\left(c+d\coth\left(bx+a\right)\right)\ln\left(d\coth\left(bx+a\right)-d\right)}{2b}+\frac{\operatorname{arccoth}\left(c+d\coth\left(bx+a\right)\right)\ln\left(d\coth\left(bx+a\right)+d\right)}{2b}-$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(arccoth(c+d*coth(b*x+a)),x)
```

```
[Out] -1/2/b*arccoth(c+d*coth(b*x+a))*ln(d*coth(b*x+a)-d)+1/2/b*arccoth(c+d*coth(
b*x+a))*ln(d*coth(b*x+a)+d)-1/4/b*dilog((d*coth(b*x+a)+c-1)/(c+d-1))-1/4/b*
ln(d*coth(b*x+a)-d)*ln((d*coth(b*x+a)+c-1)/(c+d-1))+1/4/b*dilog((d*coth(b*x
+a)+c+1)/(1+c+d))+1/4/b*ln(d*coth(b*x+a)-d)*ln((d*coth(b*x+a)+c+1)/(1+c+d))
+1/4/b*dilog((d*coth(b*x+a)+c-1)/(c-d-1))+1/4/b*ln(d*coth(b*x+a)+d)*ln((d*c
oth(b*x+a)+c-1)/(c-d-1))-1/4/b*dilog((d*coth(b*x+a)+c+1)/(1+c-d))-1/4/b*ln(
d*coth(b*x+a)+d)*ln((d*coth(b*x+a)+c+1)/(1+c-d))
```

**maxima [A]** time = 0.71, size = 142, normalized size = 0.95

$$-\frac{1}{4}\,bd\left(\frac{2\,bx\log\left(-\frac{(c+d+1)e^{(2\,bx+2\,a)}}{c-d+1}+1\right)+\operatorname{Li}_2\left(\frac{(c+d+1)e^{(2\,bx+2\,a)}}{c-d+1}\right)}{b^2d}-\frac{2\,bx\log\left(-\frac{(c+d-1)e^{(2\,bx+2\,a)}}{c-d-1}+1\right)+\operatorname{Li}_2\left(\frac{(c+d-1)e^{(2\,bx+}}{c-d-1}\right.}{b^2d}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(c+d*coth(b*x+a)),x, algorithm="maxima")
```

```
[Out] -1/4*b*d*((2*b*x*log(-(c + d + 1)*e^(2*b*x + 2*a)/(c - d + 1) + 1) + dilog(
(c + d + 1)*e^(2*b*x + 2*a)/(c - d + 1)))/(b^2*d) - (2*b*x*log(-(c + d - 1)
*e^(2*b*x + 2*a)/(c - d - 1) + 1) + dilog((c + d - 1)*e^(2*b*x + 2*a)/(c -
d - 1)))/(b^2*d)) + x*arccoth(d*coth(b*x + a) + c)
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.01

$$\int \operatorname{acoth}\left(c+d\coth\left(a+b\,x\right)\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(c + d*coth(a + b*x)),x)
```

```
[Out] int(acoth(c + d*coth(a + b*x)), x)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \operatorname{acoth}\left(c+d\coth\left(a+bx\right)\right)dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(c+d*coth(b*x+a)),x)
```

```
[Out] Integral(acoth(c + d*coth(a + b*x)), x)
```

# 3.220 $\int \frac{\coth^{-1}(c+d\coth(a+bx))}{x}\,dx$

**Optimal**. Leaf size=18

$$\text{Int}\left(\frac{\coth^{-1}(d\coth(a+bx)+c)}{x},x\right)$$

```
[Out] CannotIntegrate(arccoth(c+d*coth(b*x+a))/x,x)
```

**Rubi** [A] time = 0.15, antiderivative size = 0, normalized size of antiderivative = 0.00, number of steps used = 0, number of rules used = 0, integrand size = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int \frac{\coth^{-1}(c+d\coth(a+bx))}{x}\,dx$$

Verification is Not applicable to the result.

```
[In] Int[ArcCoth[c + d*Coth[a + b*x]]/x,x]
[Out] Defer[Int][ArcCoth[c + d*Coth[a + b*x]]/x, x]
```

Rubi steps

$$\int \frac{\coth^{-1}(c+d\coth(a+bx))}{x}\,dx = \int \frac{\coth^{-1}(c+d\coth(a+bx))}{x}\,dx$$

**Mathematica** [A] time = 6.23, size = 0, normalized size = 0.00

$$\int \frac{\coth^{-1}(c+d\coth(a+bx))}{x}\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[ArcCoth[c + d*Coth[a + b*x]]/x,x]
[Out] Integrate[ArcCoth[c + d*Coth[a + b*x]]/x, x]
```

**fricas** [A] time = 1.07, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{\text{arcoth}\left(d\coth\left(bx+a\right)+c\right)}{x},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(c+d*coth(b*x+a))/x,x, algorithm="fricas")
[Out] integral(arccoth(d*coth(b*x + a) + c)/x, x)
```

**giac** [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\text{arcoth}\left(d\coth\left(bx+a\right)+c\right)}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(c+d*coth(b*x+a))/x,x, algorithm="giac")
[Out] integrate(arccoth(d*coth(b*x + a) + c)/x, x)
```

**maple** [A] time = 0.84, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{arccoth}\left(c+d\coth\left(bx+a\right)\right)}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(arccoth(c+d*coth(b*x+a))/x,x)
```

```
[Out] int(arccoth(c+d*coth(b*x+a))/x,x)
```

**maxima** [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{arcoth}\left(d\coth\left(bx+a\right)+c\right)}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(c+d*coth(b*x+a))/x,x, algorithm="maxima")
```

```
[Out] integrate(arccoth(d*coth(b*x + a) + c)/x, x)
```

**mupad** [A] time = 0.00, size = -1, normalized size = -0.06

$$\int \frac{\operatorname{acoth}\left(c+d\coth\left(a+b\,x\right)\right)}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(c + d*coth(a + b*x))/x,x)
```

```
[Out] int(acoth(c + d*coth(a + b*x))/x, x)
```

**sympy** [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{acoth}\left(c+d\coth\left(a+bx\right)\right)}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(c+d*coth(b*x+a))/x,x)
```

```
[Out] Integral(acoth(c + d*coth(a + b*x))/x, x)
```

# 3.221 $\int x^3 \coth^{-1}(1+d+d\coth(a+bx))\,dx$

**Optimal**. Leaf size=152

$$\frac{3\text{Li}_5\left((d+1)e^{2a+2bx}\right)}{16b^4}-\frac{3x\text{Li}_4\left((d+1)e^{2a+2bx}\right)}{8b^3}+\frac{3x^2\text{Li}_3\left((d+1)e^{2a+2bx}\right)}{8b^2}-\frac{x^3\text{Li}_2\left((d+1)e^{2a+2bx}\right)}{4b}-\frac{1}{8}x^4\log\left(1-(d+1\right.$$

[Out] 1/20*b*x^5+1/4*x^4*arccoth(1+d+d*coth(b*x+a))-1/8*x^4*ln(1-(1+d)*exp(2*b*x+2*a))-1/4*x^3*polylog(2,(1+d)*exp(2*b*x+2*a))/b+3/8*x^2*polylog(3,(1+d)*exp(2*b*x+2*a))/b^2-3/8*x*polylog(4,(1+d)*exp(2*b*x+2*a))/b^3+3/16*polylog(5,(1+d)*exp(2*b*x+2*a))/b^4

**Rubi [A]** time = 0.31, antiderivative size = 152, normalized size of antiderivative = 1.00, number of steps used = 8, number of rules used = 7, integrand size = 16, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.438, Rules used = {6242, 2184, 2190, 2531, 6609, 2282, 6589}

$$\frac{3x^2\text{PolyLog}\left(3,(d+1)e^{2a+2bx}\right)}{8b^2}-\frac{3x\text{PolyLog}\left(4,(d+1)e^{2a+2bx}\right)}{8b^3}+\frac{3\text{PolyLog}\left(5,(d+1)e^{2a+2bx}\right)}{16b^4}-\frac{x^3\text{PolyLog}\left(2,(d\right.}{4b}$$

Antiderivative was successfully verified.

[In] Int[x^3*ArcCoth[1 + d + d*Coth[a + b*x]],x]

[Out] (b*x^5)/20 + (x^4*ArcCoth[1 + d + d*Coth[a + b*x]])/4 - (x^4*Log[1 - (1 + d)*E^(2*a + 2*b*x)])/8 - (x^3*PolyLog[2, (1 + d)*E^(2*a + 2*b*x)])/(4*b) + (3*x^2*PolyLog[3, (1 + d)*E^(2*a + 2*b*x)])/(8*b^2) - (3*x*PolyLog[4, (1 + d)*E^(2*a + 2*b*x)])/(8*b^3) + (3*PolyLog[5, (1 + d)*E^(2*a + 2*b*x)])/(16*b^4)

Rule 2184

```
Int[((c_.) + (d_.)*(x_))^(m_.)/((a_) + (b_.)*((F_)^((g_.)*((e_.) + (f_.)*(x
_))))^(n_.)), x_Symbol] :> Simp[(c + d*x)^(m + 1)/(a*d*(m + 1)), x] - Dist[
b/a, Int[((c + d*x)^m*(F^(g*(e + f*x)))^n)/(a + b*(F^(g*(e + f*x)))^n), x],
 x] /; FreeQ[{F, a, b, c, d, e, f, g, n}, x] && IGtQ[m, 0]
```

Rule 2190

```
Int[(((F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m_.))/
((a_) + (b_.)*((F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)), x_Symbol] :> Simp
[((c + d*x)^m*Log[1 + (b*(F^(g*(e + f*x)))^n)/a])/(b*f*g*n*Log[F]), x] - Di
st[(d*m)/(b*f*g*n*Log[F]), Int[(c + d*x)^(m - 1)*Log[1 + (b*(F^(g*(e + f*x)
))^n)/a], x], x] /; FreeQ[{F, a, b, c, d, e, f, g, n}, x] && IGtQ[m, 0]
```

Rule 2282

```
Int[u_, x_Symbol] :> With[{v = FunctionOfExponential[u, x]}, Dist[v/D[v, x]
, Subst[Int[FunctionOfExponentialFunction[u, x]/x, x], x, v], x]] /; Functi
onOfExponentialQ[u, x] &&  !MatchQ[u, (w_)*((a_.)*(v_)^(n_))^(m_) /; FreeQ[
{a, m, n}, x] && IntegerQ[m*n]] &&  !MatchQ[u, E^((c_.)*((a_.) + (b_.)*x))*
(F_)[v_] /; FreeQ[{a, b, c}, x] && InverseFunctionQ[F[x]]]
```

Rule 2531

```
Int[Log[1 + (e_.)*((F_)^((c_.)*((a_.) + (b_.)*(x_))))^(n_.)]*((f_.) + (g_.)
*(x_))^(m_.), x_Symbol] :> -Simp[((f + g*x)^m*PolyLog[2, -(e*(F^(c*(a + b*x
)))^n)])/(b*c*n*Log[F]), x] + Dist[(g*m)/(b*c*n*Log[F]), Int[(f + g*x)^(m -
 1)*PolyLog[2, -(e*(F^(c*(a + b*x)))^n)], x], x] /; FreeQ[{F, a, b, c, e, f
, g, n}, x] && GtQ[m, 0]
```

Rule 6242

```
Int[ArcCoth[(c_.) + Coth[(a_.) + (b_.)*(x_)]*(d_.)]*((e_.) + (f_.)*(x_))^(m
_.), x_Symbol] :> Simp[((e + f*x)^(m + 1)*ArcCoth[c + d*Coth[a + b*x]])/(f*
(m + 1)), x] + Dist[b/(f*(m + 1)), Int[(e + f*x)^(m + 1)/(c - d - c*E^(2*a
+ 2*b*x)), x], x] /; FreeQ[{a, b, c, d, e, f}, x] && IGtQ[m, 0] && EqQ[(c -
 d)^2, 1]
```

Rule 6589

```
Int[PolyLog[n_, (c_.)*((a_.) + (b_.)*(x_))^(p_.)]/((d_.) + (e_.)*(x_)), x_S
ymbol] :> Simp[PolyLog[n + 1, c*(a + b*x)^p]/(e*p), x] /; FreeQ[{a, b, c, d
, e, n, p}, x] && EqQ[b*d, a*e]
```

Rule 6609

```
Int[((e_.) + (f_.)*(x_))^(m_.)*PolyLog[n_, (d_.)*((F_)^((c_.)*((a_.) + (b_.
)*(x_))))^(p_.)], x_Symbol] :> Simp[((e + f*x)^m*PolyLog[n + 1, d*(F^(c*(a
+ b*x)))^p])/(b*c*p*Log[F]), x] - Dist[(f*m)/(b*c*p*Log[F]), Int[(e + f*x)^
(m - 1)*PolyLog[n + 1, d*(F^(c*(a + b*x)))^p], x], x] /; FreeQ[{F, a, b, c,
 d, e, f, n, p}, x] && GtQ[m, 0]
```

Rubi steps

$$\int x^3 \coth^{-1}(1+d+d\coth(a+bx))\,dx = \frac{1}{4}x^4\coth^{-1}(1+d+d\coth(a+bx)) + \frac{1}{4}b\int \frac{x^4}{1+(-1-d)e^{2a+2bx}}\,dx$$

$$= \frac{bx^5}{20} + \frac{1}{4}x^4\coth^{-1}(1+d+d\coth(a+bx)) + \frac{1}{4}(b(1+d))\int \frac{e^{2a}}{1+(-1}$$

$$= \frac{bx^5}{20} + \frac{1}{4}x^4\coth^{-1}(1+d+d\coth(a+bx)) - \frac{1}{8}x^4\log\left(1-(1+d)e^{2a}\right.$$

$$= \frac{bx^5}{20} + \frac{1}{4}x^4\coth^{-1}(1+d+d\coth(a+bx)) - \frac{1}{8}x^4\log\left(1-(1+d)e^{2a}\right.$$

$$= \frac{bx^5}{20} + \frac{1}{4}x^4\coth^{-1}(1+d+d\coth(a+bx)) - \frac{1}{8}x^4\log\left(1-(1+d)e^{2a}\right.$$

$$= \frac{bx^5}{20} + \frac{1}{4}x^4\coth^{-1}(1+d+d\coth(a+bx)) - \frac{1}{8}x^4\log\left(1-(1+d)e^{2a}\right.$$

$$= \frac{bx^5}{20} + \frac{1}{4}x^4\coth^{-1}(1+d+d\coth(a+bx)) - \frac{1}{8}x^4\log\left(1-(1+d)e^{2a}\right.$$

$$= \frac{bx^5}{20} + \frac{1}{4}x^4\coth^{-1}(1+d+d\coth(a+bx)) - \frac{1}{8}x^4\log\left(1-(1+d)e^{2a}\right.$$

**Mathematica [A]** time = 0.20, size = 141, normalized size = 0.93

$$\frac{1}{16}\left(\frac{3\text{Li}_5\left(\frac{e^{-2(a+bx)}}{d+1}\right)}{b^4} + \frac{6x\text{Li}_4\left(\frac{e^{-2(a+bx)}}{d+1}\right)}{b^3} + \frac{6x^2\text{Li}_3\left(\frac{e^{-2(a+bx)}}{d+1}\right)}{b^2} + \frac{4x^3\text{Li}_2\left(\frac{e^{-2(a+bx)}}{d+1}\right)}{b} - 2x^4\log\left(1-\frac{e^{-2(a+bx)}}{d+1}\right) + 4x^4\,\mathrm{c}\right.$$

Antiderivative was successfully verified.

```
[In] Integrate[x^3*ArcCoth[1 + d + d*Coth[a + b*x]],x]
```

```
[Out] (4*x^4*ArcCoth[1 + d + d*Coth[a + b*x]] - 2*x^4*Log[1 - 1/((1 + d)*E^(2*(a
+ b*x)))] + (4*x^3*PolyLog[2, 1/((1 + d)*E^(2*(a + b*x)))])/b + (6*x^2*Poly
```

```
Log[3, 1/((1 + d)*E^(2*(a + b*x)))])/b^2 + (6*x*PolyLog[4, 1/((1 + d)*E^(2*
(a + b*x)))])/b^3 + (3*PolyLog[5, 1/((1 + d)*E^(2*(a + b*x)))])/b^4)/16
```

**fricas [C]** time = 0.53, size = 423, normalized size = 2.78

$$2\,b^5x^5 + 5\,b^4x^4\log\left(\frac{d\cosh(bx+a)+(d+2)\sinh(bx+a)}{d\cosh(bx+a)+d\sinh(bx+a)}\right) - 20\,b^3x^3\mathrm{Li}_2\left(\sqrt{d+1}\,(\cosh(bx+a)+\sinh(bx+a))\right) - 20\,b^3x^3\mathrm{Li}_2$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^3*arccoth(1+d+d*coth(b*x+a)),x, algorithm="fricas")
```

```
[Out] 1/40*(2*b^5*x^5 + 5*b^4*x^4*log((d*cosh(b*x + a) + (d + 2)*sinh(b*x + a))/(
d*cosh(b*x + a) + d*sinh(b*x + a))) - 20*b^3*x^3*dilog(sqrt(d + 1)*(cosh(b*
x + a) + sinh(b*x + a))) - 20*b^3*x^3*dilog(-sqrt(d + 1)*(cosh(b*x + a) + s
inh(b*x + a))) - 5*a^4*log(2*(d + 1)*cosh(b*x + a) + 2*(d + 1)*sinh(b*x + a
) + 2*sqrt(d + 1)) - 5*a^4*log(2*(d + 1)*cosh(b*x + a) + 2*(d + 1)*sinh(b*x
 + a) - 2*sqrt(d + 1)) + 60*b^2*x^2*polylog(3, sqrt(d + 1)*(cosh(b*x + a) +
 sinh(b*x + a))) + 60*b^2*x^2*polylog(3, -sqrt(d + 1)*(cosh(b*x + a) + sinh
(b*x + a))) - 120*b*x*polylog(4, sqrt(d + 1)*(cosh(b*x + a) + sinh(b*x + a)
)) - 120*b*x*polylog(4, -sqrt(d + 1)*(cosh(b*x + a) + sinh(b*x + a))) - 5*(
b^4*x^4 - a^4)*log(sqrt(d + 1)*(cosh(b*x + a) + sinh(b*x + a)) + 1) - 5*(b^
4*x^4 - a^4)*log(-sqrt(d + 1)*(cosh(b*x + a) + sinh(b*x + a)) + 1) + 120*po
lylog(5, sqrt(d + 1)*(cosh(b*x + a) + sinh(b*x + a))) + 120*polylog(5, -sqr
t(d + 1)*(cosh(b*x + a) + sinh(b*x + a))))/b^4
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int x^3\,\mathrm{arcoth}\left(d\coth\left(bx+a\right)+d+1\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^3*arccoth(1+d+d*coth(b*x+a)),x, algorithm="giac")
```

```
[Out] integrate(x^3*arccoth(d*coth(b*x + a) + d + 1), x)
```

**maple [C]** time = 5.86, size = 1698, normalized size = 11.17

result too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^3*arccoth(1+d+d*coth(b*x+a)),x)
```

```
[Out] -1/16*I*x^4*Pi*csgn(I/(exp(2*b*x+2*a)-1)*(d*exp(2*b*x+2*a)+exp(2*b*x+2*a)-1
))^3+3/16/b^4/(1+d)*polylog(5,(1+d)*exp(2*b*x+2*a))-1/8/(1+d)*ln(1-(1+d)*ex
p(2*b*x+2*a))*x^4+1/2/b^4*a^4/(1+d)*ln(1-exp(b*x+a)*(1+d)^(1/2))+1/2/b^4*a^
4/(1+d)*ln(1+exp(b*x+a)*(1+d)^(1/2))-1/8*d/(1+d)*ln(1-(1+d)*exp(2*b*x+2*a))
*x^4+3/16/b^4*d/(1+d)*polylog(5,(1+d)*exp(2*b*x+2*a))+1/2/b^4*a^3/(1+d)*dil
og(1-exp(b*x+a)*(1+d)^(1/2))+1/2/b^4*a^3/(1+d)*dilog(1+exp(b*x+a)*(1+d)^(1/
2))-1/4/b/(1+d)*polylog(2,(1+d)*exp(2*b*x+2*a))*x^3-1/4/b^4/(1+d)*polylog(2
,(1+d)*exp(2*b*x+2*a))*a^3+3/8/b^2/(1+d)*polylog(3,(1+d)*exp(2*b*x+2*a))*x^
2-3/8/b^3/(1+d)*polylog(4,(1+d)*exp(2*b*x+2*a))*x-3/8/b^4/(1+d)*ln(1-(1+d)*
exp(2*b*x+2*a))*a^4+1/20*b*x^5-1/8/b^4*a^4/(1+d)*ln(d*exp(2*b*x+2*a)+exp(2*
b*x+2*a)-1)+1/16*I*x^4*Pi*csgn(I*d/(exp(2*b*x+2*a)-1)*exp(2*b*x+2*a))^3+1/2
/b^3*a^3/(1+d)*ln(1+exp(b*x+a)*(1+d)^(1/2))*x+1/8*x^4*ln(d*exp(2*b*x+2*a)+e
xp(2*b*x+2*a)-1)+1/2/b^4*d*a^3/(1+d)*dilog(1+exp(b*x+a)*(1+d)^(1/2))+1/2/b^
4*d*a^3/(1+d)*dilog(1-exp(b*x+a)*(1+d)^(1/2))+1/2/b^4*d*a^4/(1+d)*ln(1-exp(
b*x+a)*(1+d)^(1/2))+1/2/b^4*d*a^4/(1+d)*ln(1+exp(b*x+a)*(1+d)^(1/2))-1/2/b^
3/(1+d)*ln(1-(1+d)*exp(2*b*x+2*a))*x*a^3-3/8/b^4*d/(1+d)*ln(1-(1+d)*exp(2*b
*x+2*a))*a^4-1/4/b*d/(1+d)*polylog(2,(1+d)*exp(2*b*x+2*a))*x^3-1/4/b^4*d/(1
```

```
+d)*polylog(2,(1+d)*exp(2*b*x+2*a))*a^3+3/8/b^2*d/(1+d)*polylog(3,(1+d)*exp
(2*b*x+2*a))*x^2-3/8/b^3*d/(1+d)*polylog(4,(1+d)*exp(2*b*x+2*a))*x+1/2/b^3*
a^3/(1+d)*ln(1-exp(b*x+a)*(1+d)^(1/2))*x-1/4*x^4*ln(exp(b*x+a))-1/8*x^4*ln(
d)+1/16*I*x^4*Pi*csgn(I*exp(2*b*x+2*a))^3+1/16*I*x^4*Pi*csgn(I*exp(2*b*x+2*
a)/(exp(2*b*x+2*a)-1))^3+1/16*I*x^4*Pi*csgn(I/(exp(2*b*x+2*a)-1))*csgn(I/(e
xp(2*b*x+2*a)-1)*(d*exp(2*b*x+2*a)+exp(2*b*x+2*a)-1))^2-1/16*I*x^4*Pi*csgn(
I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)-1))^2+1/2/b^3*d*a^3
/(1+d)*ln(1+exp(b*x+a)*(1+d)^(1/2))*x-1/2/b^3*d/(1+d)*ln(1-(1+d)*exp(2*b*x+
2*a))*x*a^3+1/2/b^3*d*a^3/(1+d)*ln(1-exp(b*x+a)*(1+d)^(1/2))*x-1/16*I*x^4*P
i*csgn(I/(exp(2*b*x+2*a)-1))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)-1))^2+1/
16*I*x^4*Pi*csgn(I*(d*exp(2*b*x+2*a)+exp(2*b*x+2*a)-1))*csgn(I/(exp(2*b*x+2
*a)-1)*(d*exp(2*b*x+2*a)+exp(2*b*x+2*a)-1))^2-1/16*I*x^4*Pi*csgn(I*exp(2*b*
x+2*a)/(exp(2*b*x+2*a)-1))*csgn(I*d/(exp(2*b*x+2*a)-1)*exp(2*b*x+2*a))^2-1/
16*I*x^4*Pi*csgn(I*d)*csgn(I*d/(exp(2*b*x+2*a)-1)*exp(2*b*x+2*a))^2+1/16*I*
x^4*Pi*csgn(I*exp(b*x+a))^2*csgn(I*exp(2*b*x+2*a))-1/8*I*x^4*Pi*csgn(I*exp(
b*x+a))*csgn(I*exp(2*b*x+2*a))^2+1/16*I*x^4*Pi*csgn(I*d)*csgn(I*exp(2*b*x+2
*a)/(exp(2*b*x+2*a)-1))*csgn(I*d/(exp(2*b*x+2*a)-1)*exp(2*b*x+2*a))+1/16*I*
x^4*Pi*csgn(I*exp(2*b*x+2*a))*csgn(I/(exp(2*b*x+2*a)-1))*csgn(I*exp(2*b*x+2
*a)/(exp(2*b*x+2*a)-1))-1/16*I*x^4*Pi*csgn(I/(exp(2*b*x+2*a)-1))*csgn(I*(d*
exp(2*b*x+2*a)+exp(2*b*x+2*a)-1))*csgn(I/(exp(2*b*x+2*a)-1)*(d*exp(2*b*x+2*
a)+exp(2*b*x+2*a)-1))-1/8/b^4*d*a^4/(1+d)*ln(d*exp(2*b*x+2*a)+exp(2*b*x+2*a
)-1)
```

**maxima [A]** time = 1.09, size = 146, normalized size = 0.96

$$\frac{1}{4}x^4 \operatorname{arcoth}(d\coth(bx+a)+d+1)+\frac{1}{40}\left(\frac{2x^5}{d}-\frac{5\left(2b^4x^4\log\left(-(d+1)e^{(2bx+2a)}+1\right)+4b^3x^3\mathrm{Li}_2\left((d+1)e^{(2b\right.\right.}}{}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^3*arccoth(1+d+d*coth(b*x+a)),x, algorithm="maxima")
```

```
[Out] 1/4*x^4*arccoth(d*coth(b*x + a) + d + 1) + 1/40*(2*x^5/d - 5*(2*b^4*x^4*log
(-(d + 1)*e^(2*b*x + 2*a) + 1) + 4*b^3*x^3*dilog((d + 1)*e^(2*b*x + 2*a)) -
 6*b^2*x^2*polylog(3, (d + 1)*e^(2*b*x + 2*a)) + 6*b*x*polylog(4, (d + 1)*e
^(2*b*x + 2*a)) - 3*polylog(5, (d + 1)*e^(2*b*x + 2*a)))/(b^5*d))*b*d
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.01

$$\int x^3 \operatorname{acoth}(d+d\coth(a+b\,x)+1)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^3*acoth(d + d*coth(a + b*x) + 1),x)
```

```
[Out] int(x^3*acoth(d + d*coth(a + b*x) + 1), x)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int x^3 \operatorname{acoth}(d\coth(a+bx)+d+1)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**3*acoth(1+d+d*coth(b*x+a)),x)
```

```
[Out] Integral(x**3*acoth(d*coth(a + b*x) + d + 1), x)
```

# 3.222 $\int x^2 \coth^{-1}(1 + d + d\coth(a + bx))\,dx$

**Optimal**. Leaf size=126

$$-\frac{\text{Li}_4\left((d+1)e^{2a+2bx}\right)}{8b^3}+\frac{x\text{Li}_3\left((d+1)e^{2a+2bx}\right)}{4b^2}-\frac{x^2\text{Li}_2\left((d+1)e^{2a+2bx}\right)}{4b}-\frac{1}{6}x^3\log\left(1-(d+1)e^{2a+2bx}\right)+\frac{1}{3}x^3\coth^{-1}(d\,\mathrm{c}$$

```
[Out] 1/12*b*x^4+1/3*x^3*arccoth(1+d+d*coth(b*x+a))-1/6*x^3*ln(1-(1+d)*exp(2*b*x+
2*a))-1/4*x^2*polylog(2,(1+d)*exp(2*b*x+2*a))/b+1/4*x*polylog(3,(1+d)*exp(2
*b*x+2*a))/b^2-1/8*polylog(4,(1+d)*exp(2*b*x+2*a))/b^3
```

**Rubi [A]** time = 0.27, antiderivative size = 126, normalized size of antiderivative = 1.00, number of steps used = 7, number of rules used = 7, integrand size = 16, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.438, Rules used = {6242, 2184, 2190, 2531, 6609, 2282, 6589}

$$\frac{x\text{PolyLog}\left(3,(d+1)e^{2a+2bx}\right)}{4b^2}-\frac{\text{PolyLog}\left(4,(d+1)e^{2a+2bx}\right)}{8b^3}-\frac{x^2\text{PolyLog}\left(2,(d+1)e^{2a+2bx}\right)}{4b}-\frac{1}{6}x^3\log\left(1-(d+1)e^2\right.$$

Antiderivative was successfully verified.

```
[In] Int[x^2*ArcCoth[1 + d + d*Coth[a + b*x]],x]
```

```
[Out] (b*x^4)/12 + (x^3*ArcCoth[1 + d + d*Coth[a + b*x]])/3 - (x^3*Log[1 - (1 + d
)*E^(2*a + 2*b*x)])/6 - (x^2*PolyLog[2, (1 + d)*E^(2*a + 2*b*x)])/(4*b) + (
x*PolyLog[3, (1 + d)*E^(2*a + 2*b*x)])/(4*b^2) - PolyLog[4, (1 + d)*E^(2*a
+ 2*b*x)]/(8*b^3)
```

Rule 2184

```
Int[((c_.) + (d_.)*(x_))^(m_.)/((a_) + (b_.)*((F_)^((g_.)*((e_.) + (f_.)*(x
_))))^(n_.)), x_Symbol] :> Simp[(c + d*x)^(m + 1)/(a*d*(m + 1)), x] - Dist[
b/a, Int[((c + d*x)^m*(F^(g*(e + f*x)))^n)/(a + b*(F^(g*(e + f*x)))^n), x],
 x] /; FreeQ[{F, a, b, c, d, e, f, g, n}, x] && IGtQ[m, 0]
```

Rule 2190

```
Int[(((F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m_.))/
((a_) + (b_.)*((F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)), x_Symbol] :> Simp
[((c + d*x)^m*Log[1 + (b*(F^(g*(e + f*x)))^n)/a])/(b*f*g*n*Log[F]), x] - Di
st[(d*m)/(b*f*g*n*Log[F]), Int[(c + d*x)^(m - 1)*Log[1 + (b*(F^(g*(e + f*x)
))^n)/a], x], x] /; FreeQ[{F, a, b, c, d, e, f, g, n}, x] && IGtQ[m, 0]
```

Rule 2282

```
Int[u_, x_Symbol] :> With[{v = FunctionOfExponential[u, x]}, Dist[v/D[v, x]
, Subst[Int[FunctionOfExponentialFunction[u, x]/x, x], x, v], x]] /; Functi
onOfExponentialQ[u, x] &&  !MatchQ[u, (w_)*((a_.)*(v_)^(n_))^(m_) /; FreeQ[
{a, m, n}, x] && IntegerQ[m*n]] &&  !MatchQ[u, E^((c_.)*((a_.) + (b_.)*x))*
(F_)[v_] /; FreeQ[{a, b, c}, x] && InverseFunctionQ[F[x]]]
```

Rule 2531

```
Int[Log[1 + (e_.)*((F_)^((c_.)*((a_.) + (b_.)*(x_))))^(n_.)]*((f_.) + (g_.)
*(x_))^(m_.), x_Symbol] :> -Simp[((f + g*x)^m*PolyLog[2, -(e*(F^(c*(a + b*x
)))^n)])/(b*c*n*Log[F]), x] + Dist[(g*m)/(b*c*n*Log[F]), Int[(f + g*x)^(m -
 1)*PolyLog[2, -(e*(F^(c*(a + b*x)))^n)], x], x] /; FreeQ[{F, a, b, c, e, f
, g, n}, x] && GtQ[m, 0]
```

Rule 6242

```
Int[ArcCoth[(c_.) + Coth[(a_.) + (b_.)*(x_)]*(d_.)]*((e_.) + (f_.)*(x_))^(m
_.), x_Symbol] :> Simp[((e + f*x)^(m + 1)*ArcCoth[c + d*Coth[a + b*x]])/(f*
(m + 1)), x] + Dist[b/(f*(m + 1)), Int[(e + f*x)^(m + 1)/(c - d - c*E^(2*a
+ 2*b*x)), x], x] /; FreeQ[{a, b, c, d, e, f}, x] && IGtQ[m, 0] && EqQ[(c -
 d)^2, 1]
```

Rule 6589

```
Int[PolyLog[n_, (c_.)*((a_.) + (b_.)*(x_))^(p_.)]/((d_.) + (e_.)*(x_)), x_S
ymbol] :> Simp[PolyLog[n + 1, c*(a + b*x)^p]/(e*p), x] /; FreeQ[{a, b, c, d
, e, n, p}, x] && EqQ[b*d, a*e]
```

Rule 6609

```
Int[((e_.) + (f_.)*(x_))^(m_.)*PolyLog[n_, (d_.)*((F_)^((c_.)*((a_.) + (b_.
)*(x_))))^(p_.)], x_Symbol] :> Simp[((e + f*x)^m*PolyLog[n + 1, d*(F^(c*(a
+ b*x)))^p])/(b*c*p*Log[F]), x] - Dist[(f*m)/(b*c*p*Log[F]), Int[(e + f*x)^
(m - 1)*PolyLog[n + 1, d*(F^(c*(a + b*x)))^p], x], x] /; FreeQ[{F, a, b, c,
 d, e, f, n, p}, x] && GtQ[m, 0]
```

Rubi steps

$$\begin{aligned}\int x^2\coth^{-1}(1+d+d\coth(a+bx))\,dx &= \frac{1}{3}x^3\coth^{-1}(1+d+d\coth(a+bx))+\frac{1}{3}b\int\frac{x^3}{1+(-1-d)e^{2a+2bx}}\,dx\\
&= \frac{bx^4}{12}+\frac{1}{3}x^3\coth^{-1}(1+d+d\coth(a+bx))+\frac{1}{3}(b(1+d))\int\frac{e^{2a}}{1+(-1}\\
&= \frac{bx^4}{12}+\frac{1}{3}x^3\coth^{-1}(1+d+d\coth(a+bx))-\frac{1}{6}x^3\log\left(1-(1+d)e^{2a}\right.\\
&= \frac{bx^4}{12}+\frac{1}{3}x^3\coth^{-1}(1+d+d\coth(a+bx))-\frac{1}{6}x^3\log\left(1-(1+d)e^{2a}\right.\\
&= \frac{bx^4}{12}+\frac{1}{3}x^3\coth^{-1}(1+d+d\coth(a+bx))-\frac{1}{6}x^3\log\left(1-(1+d)e^{2a}\right.\\
&= \frac{bx^4}{12}+\frac{1}{3}x^3\coth^{-1}(1+d+d\coth(a+bx))-\frac{1}{6}x^3\log\left(1-(1+d)e^{2a}\right.\\
&= \frac{bx^4}{12}+\frac{1}{3}x^3\coth^{-1}(1+d+d\coth(a+bx))-\frac{1}{6}x^3\log\left(1-(1+d)e^{2a}\right.\end{aligned}$$

**Mathematica [A]** time = 0.11, size = 116, normalized size = 0.92

$$\frac{1}{24}\left(\frac{3\text{Li}_4\left(\frac{e^{-2(a+bx)}}{d+1}\right)}{b^3}+\frac{6x\text{Li}_3\left(\frac{e^{-2(a+bx)}}{d+1}\right)}{b^2}+\frac{6x^2\text{Li}_2\left(\frac{e^{-2(a+bx)}}{d+1}\right)}{b}-4x^3\log\left(1-\frac{e^{-2(a+bx)}}{d+1}\right)+8x^3\coth^{-1}(d\coth(a+bx\right.$$

Antiderivative was successfully verified.

```
[In] Integrate[x^2*ArcCoth[1 + d + d*Coth[a + b*x]],x]
```

```
[Out] (8*x^3*ArcCoth[1 + d + d*Coth[a + b*x]] - 4*x^3*Log[1 - 1/((1 + d)*E^(2*(a
+ b*x)))] + (6*x^2*PolyLog[2, 1/((1 + d)*E^(2*(a + b*x)))])/b + (6*x*PolyLo
g[3, 1/((1 + d)*E^(2*(a + b*x)))])/b^2 + (3*PolyLog[4, 1/((1 + d)*E^(2*(a +
 b*x)))])/b^3)/24
```

**fricas [C]** time = 0.87, size = 359, normalized size = 2.85

$$b^4x^4+2\,b^3x^3\log\left(\frac{d\cosh(bx+a)+(d+2)\sinh(bx+a)}{d\cosh(bx+a)+d\sinh(bx+a)}\right)-6\,b^2x^2\text{Li}_2\left(\sqrt{d+1}\left(\cosh\left(bx+a\right)+\sinh\left(bx+a\right)\right)\right)-6\,b^2x^2\text{Li}_2$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*arccoth(1+d+d*coth(b*x+a)),x, algorithm="fricas")
```

```
[Out] 1/12*(b^4*x^4 + 2*b^3*x^3*log((d*cosh(b*x + a) + (d + 2)*sinh(b*x + a))/(d*
cosh(b*x + a) + d*sinh(b*x + a))) - 6*b^2*x^2*dilog(sqrt(d + 1)*(cosh(b*x +
 a) + sinh(b*x + a))) - 6*b^2*x^2*dilog(-sqrt(d + 1)*(cosh(b*x + a) + sinh(
b*x + a))) + 2*a^3*log(2*(d + 1)*cosh(b*x + a) + 2*(d + 1)*sinh(b*x + a) +
2*sqrt(d + 1)) + 2*a^3*log(2*(d + 1)*cosh(b*x + a) + 2*(d + 1)*sinh(b*x + a
) - 2*sqrt(d + 1)) + 12*b*x*polylog(3, sqrt(d + 1)*(cosh(b*x + a) + sinh(b*
x + a))) + 12*b*x*polylog(3, -sqrt(d + 1)*(cosh(b*x + a) + sinh(b*x + a)))
- 2*(b^3*x^3 + a^3)*log(sqrt(d + 1)*(cosh(b*x + a) + sinh(b*x + a)) + 1) -
2*(b^3*x^3 + a^3)*log(-sqrt(d + 1)*(cosh(b*x + a) + sinh(b*x + a)) + 1) - 1
2*polylog(4, sqrt(d + 1)*(cosh(b*x + a) + sinh(b*x + a))) - 12*polylog(4, -
sqrt(d + 1)*(cosh(b*x + a) + sinh(b*x + a))))/b^3
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int x^2 \operatorname{arcoth}\left(d \coth\left(bx + a\right) + d + 1\right) \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*arccoth(1+d+d*coth(b*x+a)),x, algorithm="giac")
```

```
[Out] integrate(x^2*arccoth(d*coth(b*x + a) + d + 1), x)
```

**maple [C]** time = 5.59, size = 1641, normalized size = 13.02

result too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^2*arccoth(1+d+d*coth(b*x+a)),x)
```

```
[Out] 1/3/b^3/(1+d)*ln(1-(1+d)*exp(2*b*x+2*a))*a^3-1/4/b/(1+d)*polylog(2,(1+d)*ex
p(2*b*x+2*a))*x^2+1/4/b^3/(1+d)*polylog(2,(1+d)*exp(2*b*x+2*a))*a^2+1/4/b^2
/(1+d)*polylog(3,(1+d)*exp(2*b*x+2*a))*x-1/2/b^3*a^3/(1+d)*ln(1-exp(b*x+a)*
(1+d)^(1/2))-1/2/b^3*a^3/(1+d)*ln(1+exp(b*x+a)*(1+d)^(1/2))-1/8/b^3*d/(1+d)
*polylog(4,(1+d)*exp(2*b*x+2*a))-1/2/b^3*a^2/(1+d)*dilog(1-exp(b*x+a)*(1+d)
^(1/2))-1/2/b^3*a^2/(1+d)*dilog(1+exp(b*x+a)*(1+d)^(1/2))-1/6*d/(1+d)*ln(1-
(1+d)*exp(2*b*x+2*a))*x^3+1/12*I*x^3*Pi*csgn(I*(d*exp(2*b*x+2*a)+exp(2*b*x+
2*a)-1))*csgn(I/(exp(2*b*x+2*a)-1)*(d*exp(2*b*x+2*a)+exp(2*b*x+2*a)-1))^2-1
/12*I*x^3*Pi*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)-1))*csgn(I*d/(exp(2*b*x+
2*a)-1)*exp(2*b*x+2*a))^2-1/12*I*x^3*Pi*csgn(I*d)*csgn(I*d/(exp(2*b*x+2*a)-
1)*exp(2*b*x+2*a))^2+1/12*b*x^4-1/3*x^3*ln(exp(b*x+a))-1/6*x^3*ln(d)+1/12*I
*x^3*Pi*csgn(I*exp(2*b*x+2*a))^3-1/12*I*x^3*Pi*csgn(I/(exp(2*b*x+2*a)-1)*(d
*exp(2*b*x+2*a)+exp(2*b*x+2*a)-1))^3+1/12*I*x^3*Pi*csgn(I*exp(2*b*x+2*a)/(e
xp(2*b*x+2*a)-1))^3-1/2/b^2*a^2/(1+d)*ln(1-exp(b*x+a)*(1+d)^(1/2))*x-1/2/b^
2*a^2/(1+d)*ln(1+exp(b*x+a)*(1+d)^(1/2))*x-1/2/b^3*d*a^3/(1+d)*ln(1-exp(b*x
+a)*(1+d)^(1/2))-1/2/b^3*d*a^3/(1+d)*ln(1+exp(b*x+a)*(1+d)^(1/2))-1/2/b^3*d
*a^2/(1+d)*dilog(1-exp(b*x+a)*(1+d)^(1/2))-1/2/b^3*d*a^2/(1+d)*dilog(1+exp(
b*x+a)*(1+d)^(1/2))-1/6*I*x^3*Pi*csgn(I*exp(b*x+a))*csgn(I*exp(2*b*x+2*a))^
2+1/12*I*x^3*Pi*csgn(I*exp(b*x+a))^2*csgn(I*exp(2*b*x+2*a))+1/12*I*x^3*Pi*c
sgn(I*d/(exp(2*b*x+2*a)-1)*exp(2*b*x+2*a))^3-1/6/(1+d)*ln(1-(1+d)*exp(2*b*x
+2*a))*x^3-1/8/b^3/(1+d)*polylog(4,(1+d)*exp(2*b*x+2*a))+1/2/b^2/(1+d)*ln(1
-(1+d)*exp(2*b*x+2*a))*x*a^2+1/6/b^3*a^3/(1+d)*ln(d*exp(2*b*x+2*a)+exp(2*b*
x+2*a)-1)+1/3/b^3*d/(1+d)*ln(1-(1+d)*exp(2*b*x+2*a))*a^3-1/4/b*d/(1+d)*poly
log(2,(1+d)*exp(2*b*x+2*a))*x^2+1/4/b^3*d/(1+d)*polylog(2,(1+d)*exp(2*b*x+2
*a))*a^2+1/4/b^2*d/(1+d)*polylog(3,(1+d)*exp(2*b*x+2*a))*x+1/6*x^3*ln(d*exp
(2*b*x+2*a)+exp(2*b*x+2*a)-1)+1/12*I*x^3*Pi*csgn(I/(exp(2*b*x+2*a)-1))*csgn
(I/(exp(2*b*x+2*a)-1)*(d*exp(2*b*x+2*a)+exp(2*b*x+2*a)-1))^2-1/12*I*x^3*Pi*
```

```
csgn(I/(exp(2*b*x+2*a)-1))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)-1))^2+1/6/
b^3*d*a^3/(1+d)*ln(d*exp(2*b*x+2*a)+exp(2*b*x+2*a)-1)-1/12*I*x^3*Pi*csgn(I*
exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)-1))^2-1/2/b^2*d*a^2/(
1+d)*ln(1-exp(b*x+a)*(1+d)^(1/2))*x-1/2/b^2*d*a^2/(1+d)*ln(1+exp(b*x+a)*(1+
d)^(1/2))*x+1/2/b^2*d/(1+d)*ln(1-(1+d)*exp(2*b*x+2*a))*x*a^2+1/12*I*x^3*Pi*
csgn(I*exp(2*b*x+2*a))*csgn(I/(exp(2*b*x+2*a)-1))*csgn(I*exp(2*b*x+2*a)/(ex
p(2*b*x+2*a)-1))-1/12*I*x^3*Pi*csgn(I/(exp(2*b*x+2*a)-1))*csgn(I*(d*exp(2*b
*x+2*a)+exp(2*b*x+2*a)-1))*csgn(I/(exp(2*b*x+2*a)-1)*(d*exp(2*b*x+2*a)+exp(
2*b*x+2*a)-1))+1/12*I*x^3*Pi*csgn(I*d)*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a
)-1))*csgn(I*d/(exp(2*b*x+2*a)-1)*exp(2*b*x+2*a))
```

**maxima [A]** time = 1.11, size = 123, normalized size = 0.98

$$\frac{1}{3}\,x^3\operatorname{arcoth}\left(d\coth\left(bx+a\right)+d+1\right)+\frac{1}{36}\left(\frac{3\,x^4}{d}-\frac{2\left(4\,b^3x^3\log\left(-(d+1)e^{(2\,bx+2\,a)}+1\right)+6\,b^2x^2\mathrm{Li}_2\left((d+1)e^{(2\,b}\right.\right.}{b^4}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*arccoth(1+d+d*coth(b*x+a)),x, algorithm="maxima")
```

```
[Out] 1/3*x^3*arccoth(d*coth(b*x + a) + d + 1) + 1/36*(3*x^4/d - 2*(4*b^3*x^3*log
(-(d + 1)*e^(2*b*x + 2*a) + 1) + 6*b^2*x^2*dilog((d + 1)*e^(2*b*x + 2*a)) -
 6*b*x*polylog(3, (d + 1)*e^(2*b*x + 2*a)) + 3*polylog(4, (d + 1)*e^(2*b*x
+ 2*a)))/(b^4*d))*b*d
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.01

$$\int x^2\,\mathrm{acoth}\left(d+d\,\coth\left(a+b\,x\right)+1\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^2*acoth(d + d*coth(a + b*x) + 1),x)
```

```
[Out] int(x^2*acoth(d + d*coth(a + b*x) + 1), x)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int x^{2}\operatorname{acoth}\left(d\coth\left(a+bx\right)+d+1\right)dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**2*acoth(1+d+d*coth(b*x+a)),x)
```

```
[Out] Integral(x**2*acoth(d*coth(a + b*x) + d + 1), x)
```

# 3.223 $\int x \coth^{-1}(1 + d + d \coth(a + bx)) \, dx$

**Optimal**. Leaf size=100

$$\frac{\text{Li}_3\left((d+1)e^{2a+2bx}\right)}{8b^2}-\frac{x\text{Li}_2\left((d+1)e^{2a+2bx}\right)}{4b}-\frac{1}{4}x^2\log\left(1-(d+1)e^{2a+2bx}\right)+\frac{1}{2}x^2\coth^{-1}(d\coth(a+bx)+d+1)+\frac{bx^3}{6}$$

```
[Out] 1/6*b*x^3+1/2*x^2*arccoth(1+d+d*coth(b*x+a))-1/4*x^2*ln(1-(1+d)*exp(2*b*x+2
*a))-1/4*x*polylog(2,(1+d)*exp(2*b*x+2*a))/b+1/8*polylog(3,(1+d)*exp(2*b*x+
2*a))/b^2
```

**Rubi [A]** time = 0.24, antiderivative size = 100, normalized size of antiderivative = 1.00, number of steps used = 6, number of rules used = 6, integrand size = 14, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.429, Rules used = {6242, 2184, 2190, 2531, 2282, 6589}

$$\frac{\text{PolyLog}\left(3,(d+1)e^{2a+2bx}\right)}{8b^2}-\frac{x\text{PolyLog}\left(2,(d+1)e^{2a+2bx}\right)}{4b}-\frac{1}{4}x^2\log\left(1-(d+1)e^{2a+2bx}\right)+\frac{1}{2}x^2\coth^{-1}(d\coth(a+b$$

Antiderivative was successfully verified.

```
[In] Int[x*ArcCoth[1 + d + d*Coth[a + b*x]],x]
```

```
[Out] (b*x^3)/6 + (x^2*ArcCoth[1 + d + d*Coth[a + b*x]])/2 - (x^2*Log[1 - (1 + d)
*E^(2*a + 2*b*x)])/4 - (x*PolyLog[2, (1 + d)*E^(2*a + 2*b*x)])/(4*b) + Poly
Log[3, (1 + d)*E^(2*a + 2*b*x)]/(8*b^2)
```

Rule 2184

```
Int[((c_.) + (d_.)*(x_))^(m_.)/((a_) + (b_.)*((F_)^((g_.)*((e_.) + (f_.)*(x
_))))^(n_.)), x_Symbol] :> Simp[(c + d*x)^(m + 1)/(a*d*(m + 1)), x] - Dist[
b/a, Int[((c + d*x)^m*(F^(g*(e + f*x)))^n)/(a + b*(F^(g*(e + f*x)))^n), x],
 x] /; FreeQ[{F, a, b, c, d, e, f, g, n}, x] && IGtQ[m, 0]
```

Rule 2190

```
Int[(((F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m_.))/
((a_) + (b_.)*((F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)), x_Symbol] :> Simp
[((c + d*x)^m*Log[1 + (b*(F^(g*(e + f*x)))^n)/a])/(b*f*g*n*Log[F]), x] - Di
st[(d*m)/(b*f*g*n*Log[F]), Int[(c + d*x)^(m - 1)*Log[1 + (b*(F^(g*(e + f*x)
))^n)/a], x], x] /; FreeQ[{F, a, b, c, d, e, f, g, n}, x] && IGtQ[m, 0]
```

Rule 2282

```
Int[u_, x_Symbol] :> With[{v = FunctionOfExponential[u, x]}, Dist[v/D[v, x]
, Subst[Int[FunctionOfExponentialFunction[u, x]/x, x], x, v], x]] /; Functi
onOfExponentialQ[u, x] &&  !MatchQ[u, (w_)*((a_.)*(v_)^(n_))^(m_) /; FreeQ[
{a, m, n}, x] && IntegerQ[m*n]] &&  !MatchQ[u, E^((c_.)*((a_.) + (b_.)*x))*
(F_)[v_] /; FreeQ[{a, b, c}, x] && InverseFunctionQ[F[x]]]
```

Rule 2531

```
Int[Log[1 + (e_.)*((F_)^((c_.)*((a_.) + (b_.)*(x_))))^(n_.)]*((f_.) + (g_.)
*(x_))^(m_.), x_Symbol] :> -Simp[((f + g*x)^m*PolyLog[2, -(e*(F^(c*(a + b*x
)))^n)])/(b*c*n*Log[F]), x] + Dist[(g*m)/(b*c*n*Log[F]), Int[(f + g*x)^(m -
 1)*PolyLog[2, -(e*(F^(c*(a + b*x)))^n)], x], x] /; FreeQ[{F, a, b, c, e, f
, g, n}, x] && GtQ[m, 0]
```

Rule 6242

```
Int[ArcCoth[(c_.) + Coth[(a_.) + (b_.)*(x_)]*(d_.)]*((e_.) + (f_.)*(x_))^(m
_.), x_Symbol] :> Simp[((e + f*x)^(m + 1)*ArcCoth[c + d*Coth[a + b*x]])/(f*
```

```
(m + 1)), x] + Dist[b/(f*(m + 1)), Int[(e + f*x)^(m + 1)/(c - d - c*E^(2*a
+ 2*b*x)), x], x] /; FreeQ[{a, b, c, d, e, f}, x] && IGtQ[m, 0] && EqQ[(c -
 d)^2, 1]
```

Rule 6589

```
Int[PolyLog[n_, (c_.)*((a_.) + (b_.)*(x_))^(p_.)]/((d_.) + (e_.)*(x_)), x_S
ymbol] :> Simp[PolyLog[n + 1, c*(a + b*x)^p]/(e*p), x] /; FreeQ[{a, b, c, d
, e, n, p}, x] && EqQ[b*d, a*e]
```

Rubi steps

$$\begin{aligned}
\int x \coth^{-1}(1+d+d\coth(a+bx))\,dx &= \frac{1}{2}x^2\coth^{-1}(1+d+d\coth(a+bx)) + \frac{1}{2}b\int \frac{x^2}{1+(-1-d)e^{2a+2bx}}\,dx \\
&= \frac{bx^3}{6} + \frac{1}{2}x^2\coth^{-1}(1+d+d\coth(a+bx)) + \frac{1}{2}(b(1+d))\int \frac{e^{2a+}}{1+(-1-} \\
&= \frac{bx^3}{6} + \frac{1}{2}x^2\coth^{-1}(1+d+d\coth(a+bx)) - \frac{1}{4}x^2\log\left(1-(1+d)e^{2a+}\right. \\
&= \frac{bx^3}{6} + \frac{1}{2}x^2\coth^{-1}(1+d+d\coth(a+bx)) - \frac{1}{4}x^2\log\left(1-(1+d)e^{2a+}\right. \\
&= \frac{bx^3}{6} + \frac{1}{2}x^2\coth^{-1}(1+d+d\coth(a+bx)) - \frac{1}{4}x^2\log\left(1-(1+d)e^{2a+}\right. \\
&= \frac{bx^3}{6} + \frac{1}{2}x^2\coth^{-1}(1+d+d\coth(a+bx)) - \frac{1}{4}x^2\log\left(1-(1+d)e^{2a+}\right.
\end{aligned}$$

**Mathematica [A]** time = 0.10, size = 90, normalized size = 0.90

$$\frac{2b^2x^2\left(2\coth^{-1}(d\coth(a+bx)+d+1)-\log\left(1-\frac{e^{-2(a+bx)}}{d+1}\right)\right)+2bx\text{Li}_2\left(\frac{e^{-2(a+bx)}}{d+1}\right)+\text{Li}_3\left(\frac{e^{-2(a+bx)}}{d+1}\right)}{8b^2}$$

Antiderivative was successfully verified.

```
[In] Integrate[x*ArcCoth[1 + d + d*Coth[a + b*x]],x]
```

```
[Out] (2*b^2*x^2*(2*ArcCoth[1 + d + d*Coth[a + b*x]] - Log[1 - 1/((1 + d)*E^(2*(a
 + b*x)))]) + 2*b*x*PolyLog[2, 1/((1 + d)*E^(2*(a + b*x)))] + PolyLog[3, 1/
((1 + d)*E^(2*(a + b*x)))])/(8*b^2)
```

**fricas [C]** time = 0.64, size = 305, normalized size = 3.05

$$\frac{2\,b^3x^3+3\,b^2x^2\log\left(\frac{d\cosh(bx+a)+(d+2)\sinh(bx+a)}{d\cosh(bx+a)+d\sinh(bx+a)}\right)-6\,bx\text{Li}_2\left(\sqrt{d+1}\left(\cosh\left(bx+a\right)+\sinh\left(bx+a\right)\right)\right)-6\,bx\text{Li}_2\left(-\right.}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*arccoth(1+d+d*coth(b*x+a)),x, algorithm="fricas")
```

```
[Out] 1/12*(2*b^3*x^3 + 3*b^2*x^2*log((d*cosh(b*x + a) + (d + 2)*sinh(b*x + a))/(
d*cosh(b*x + a) + d*sinh(b*x + a))) - 6*b*x*dilog(sqrt(d + 1)*(cosh(b*x + a
) + sinh(b*x + a))) - 6*b*x*dilog(-sqrt(d + 1)*(cosh(b*x + a) + sinh(b*x +
a))) - 3*a^2*log(2*(d + 1)*cosh(b*x + a) + 2*(d + 1)*sinh(b*x + a) + 2*sqrt
(d + 1)) - 3*a^2*log(2*(d + 1)*cosh(b*x + a) + 2*(d + 1)*sinh(b*x + a) - 2*
sqrt(d + 1)) - 3*(b^2*x^2 - a^2)*log(sqrt(d + 1)*(cosh(b*x + a) + sinh(b*x
+ a)) + 1) - 3*(b^2*x^2 - a^2)*log(-sqrt(d + 1)*(cosh(b*x + a) + sinh(b*x +
```

```
 a)) + 1) + 6*polylog(3, sqrt(d + 1)*(cosh(b*x + a) + sinh(b*x + a))) + 6*p
olylog(3, -sqrt(d + 1)*(cosh(b*x + a) + sinh(b*x + a))))/b^2
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int x \operatorname{arcoth}(d \coth(bx + a) + d + 1) \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*arccoth(1+d+d*coth(b*x+a)),x, algorithm="giac")
```

```
[Out] integrate(x*arccoth(d*coth(b*x + a) + d + 1), x)
```

**maple [C]** time = 5.09, size = 1560, normalized size = 15.60

result too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x*arccoth(1+d+d*coth(b*x+a)),x)
```

```
[Out] -1/4*d/(1+d)*ln(1-(1+d)*exp(2*b*x+2*a))*x^2+1/8/b^2*d/(1+d)*polylog(3,(1+d)
*exp(2*b*x+2*a))+1/2/b^2*a^2/(1+d)*ln(1-exp(b*x+a)*(1+d)^(1/2))+1/2/b^2*a^2
/(1+d)*ln(1+exp(b*x+a)*(1+d)^(1/2))+1/2/b^2*a/(1+d)*dilog(1-exp(b*x+a)*(1+d
)^(1/2))+1/2/b^2*a/(1+d)*dilog(1+exp(b*x+a)*(1+d)^(1/2))-1/4/b^2/(1+d)*ln(1
-(1+d)*exp(2*b*x+2*a))*a^2-1/4/b/(1+d)*polylog(2,(1+d)*exp(2*b*x+2*a))*x-1/
4/b^2/(1+d)*polylog(2,(1+d)*exp(2*b*x+2*a))*a-1/8*I*x^2*Pi*csgn(I/(exp(2*b*
x+2*a)-1)*(d*exp(2*b*x+2*a)+exp(2*b*x+2*a)-1))^3-1/2*x^2*ln(exp(b*x+a))-1/4
*x^2*ln(d)+1/8*I*x^2*Pi*csgn(I*d/(exp(2*b*x+2*a)-1)*exp(2*b*x+2*a))^3+1/8*I
*x^2*Pi*csgn(I*exp(2*b*x+2*a))^3-1/4/b^2*a^2/(1+d)*ln(d*exp(2*b*x+2*a)+exp(
2*b*x+2*a)-1)+1/6*b*x^3-1/4/(1+d)*ln(1-(1+d)*exp(2*b*x+2*a))*x^2+1/8/b^2/(1
+d)*polylog(3,(1+d)*exp(2*b*x+2*a))-1/2/b/(1+d)*ln(1-(1+d)*exp(2*b*x+2*a))*
x*a-1/4/b^2*d/(1+d)*ln(1-(1+d)*exp(2*b*x+2*a))*a^2-1/4/b*d/(1+d)*polylog(2,
(1+d)*exp(2*b*x+2*a))*x-1/4/b^2*d/(1+d)*polylog(2,(1+d)*exp(2*b*x+2*a))*a+1
/2/b*a/(1+d)*ln(1-exp(b*x+a)*(1+d)^(1/2))*x+1/2/b*a/(1+d)*ln(1+exp(b*x+a)*(
1+d)^(1/2))*x+1/2/b^2*d*a^2/(1+d)*ln(1-exp(b*x+a)*(1+d)^(1/2))+1/2/b^2*d*a^
2/(1+d)*ln(1+exp(b*x+a)*(1+d)^(1/2))+1/2/b^2*d*a/(1+d)*dilog(1-exp(b*x+a)*(
1+d)^(1/2))+1/2/b^2*d*a/(1+d)*dilog(1+exp(b*x+a)*(1+d)^(1/2))-1/8*I*x^2*Pi*
csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)-1))^2+1/8*I*x^
2*Pi*csgn(I/(exp(2*b*x+2*a)-1))*csgn(I/(exp(2*b*x+2*a)-1)*(d*exp(2*b*x+2*a)
+exp(2*b*x+2*a)-1))^2+1/8*I*x^2*Pi*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)-1)
)^3+1/4*x^2*ln(d*exp(2*b*x+2*a)+exp(2*b*x+2*a)-1)+1/8*I*x^2*Pi*csgn(I*(d*ex
p(2*b*x+2*a)+exp(2*b*x+2*a)-1))*csgn(I/(exp(2*b*x+2*a)-1)*(d*exp(2*b*x+2*a)
+exp(2*b*x+2*a)-1))^2-1/8*I*x^2*Pi*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)-1)
)*csgn(I*d/(exp(2*b*x+2*a)-1)*exp(2*b*x+2*a))^2-1/8*I*x^2*Pi*csgn(I/(exp(2*
b*x+2*a)-1))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)-1))^2+1/8*I*x^2*Pi*csgn(
I*exp(b*x+a))^2*csgn(I*exp(2*b*x+2*a))-1/4*I*x^2*Pi*csgn(I*exp(b*x+a))*csgn
(I*exp(2*b*x+2*a))^2-1/8*I*x^2*Pi*csgn(I*d)*csgn(I*d/(exp(2*b*x+2*a)-1)*exp
(2*b*x+2*a))^2-1/4/b^2*d*a^2/(1+d)*ln(d*exp(2*b*x+2*a)+exp(2*b*x+2*a)-1)+1/
2/b*d*a/(1+d)*ln(1-exp(b*x+a)*(1+d)^(1/2))*x+1/2/b*d*a/(1+d)*ln(1+exp(b*x+a
)*(1+d)^(1/2))*x-1/2/b*d/(1+d)*ln(1-(1+d)*exp(2*b*x+2*a))*x*a+1/8*I*x^2*Pi*
csgn(I*exp(2*b*x+2*a))*csgn(I/(exp(2*b*x+2*a)-1))*csgn(I*exp(2*b*x+2*a)/(ex
p(2*b*x+2*a)-1))-1/8*I*x^2*Pi*csgn(I/(exp(2*b*x+2*a)-1))*csgn(I*(d*exp(2*b*
x+2*a)+exp(2*b*x+2*a)-1))*csgn(I/(exp(2*b*x+2*a)-1)*(d*exp(2*b*x+2*a)+exp(2
*b*x+2*a)-1))+1/8*I*x^2*Pi*csgn(I*d)*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)-
1))*csgn(I*d/(exp(2*b*x+2*a)-1)*exp(2*b*x+2*a))
```

**maxima [A]** time = 1.10, size = 100, normalized size = 1.00

$$\frac{1}{24}\left(\frac{4\,x^3}{d} - \frac{3\left(2\,b^2x^2\log\left(-(d+1)e^{(2\,bx+2\,a)}+1\right)+2\,bx\mathrm{Li}_2\left((d+1)e^{(2\,bx+2\,a)}\right)-\mathrm{Li}_3((d+1)e^{(2\,bx+2\,a)})\right)}{b^3d}\right)bd+\frac{1}{2}\,x^2\,\mathrm{arc}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*arccoth(1+d+d*coth(b*x+a)),x, algorithm="maxima")
```

```
[Out] 1/24*(4*x^3/d - 3*(2*b^2*x^2*log(-(d + 1)*e^(2*b*x + 2*a) + 1) + 2*b*x*dilo
g((d + 1)*e^(2*b*x + 2*a)) - polylog(3, (d + 1)*e^(2*b*x + 2*a)))/(b^3*d))*
b*d + 1/2*x^2*arccoth(d*coth(b*x + a) + d + 1)
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.01

$$\int x \operatorname{acoth}\left(d + d \coth\left(a + b\,x\right) + 1\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x*acoth(d + d*coth(a + b*x) + 1),x)
```

```
[Out] int(x*acoth(d + d*coth(a + b*x) + 1), x)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int x \operatorname{acoth}\left(d \coth\left(a + bx\right) + d + 1\right)dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*acoth(1+d+d*coth(b*x+a)),x)
```

```
[Out] Integral(x*acoth(d*coth(a + b*x) + d + 1), x)
```

## 3.224 $\int \coth^{-1}(1+d+d\coth(a+bx))\,dx$

**Optimal**. Leaf size=69

$$-\frac{\text{Li}_2\left((d+1)e^{2a+2bx}\right)}{4b}-\frac{1}{2}x\log\left(1-(d+1)e^{2a+2bx}\right)+x\coth^{-1}(d\coth(a+bx)+d+1)+\frac{bx^2}{2}$$

```
[Out] 1/2*b*x^2+x*arccoth(1+d+d*coth(b*x+a))-1/2*x*ln(1-(1+d)*exp(2*b*x+2*a))-1/4
*polylog(2,(1+d)*exp(2*b*x+2*a))/b
```

**Rubi [A]** time = 0.14, antiderivative size = 69, normalized size of antiderivative = 1.00, number of steps used = 5, number of rules used = 5, integrand size = 12, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.417, Rules used = {6234, 2184, 2190, 2279, 2391}

$$-\frac{\text{PolyLog}\left(2,(d+1)e^{2a+2bx}\right)}{4b}-\frac{1}{2}x\log\left(1-(d+1)e^{2a+2bx}\right)+x\coth^{-1}(d\coth(a+bx)+d+1)+\frac{bx^2}{2}$$

Antiderivative was successfully verified.

```
[In] Int[ArcCoth[1 + d + d*Coth[a + b*x]],x]
```

```
[Out] (b*x^2)/2 + x*ArcCoth[1 + d + d*Coth[a + b*x]] - (x*Log[1 - (1 + d)*E^(2*a
+ 2*b*x)])/2 - PolyLog[2, (1 + d)*E^(2*a + 2*b*x)]/(4*b)
```

Rule 2184

```
Int[((c_.) + (d_.)*(x_))^(m_.)/((a_) + (b_.)*((F_)^((g_.)*((e_.) + (f_.)*(x
_))))^(n_.)), x_Symbol] :> Simp[(c + d*x)^(m + 1)/(a*d*(m + 1)), x] - Dist[
b/a, Int[((c + d*x)^m*(F^(g*(e + f*x)))^n)/(a + b*(F^(g*(e + f*x)))^n), x],
 x] /; FreeQ[{F, a, b, c, d, e, f, g, n}, x] && IGtQ[m, 0]
```

Rule 2190

```
Int[(((F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m_.))/
((a_) + (b_.)*((F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)), x_Symbol] :> Simp
[((c + d*x)^m*Log[1 + (b*(F^(g*(e + f*x)))^n)/a])/(b*f*g*n*Log[F]), x] - Di
st[(d*m)/(b*f*g*n*Log[F]), Int[(c + d*x)^(m - 1)*Log[1 + (b*(F^(g*(e + f*x)
))^n)/a], x], x] /; FreeQ[{F, a, b, c, d, e, f, g, n}, x] && IGtQ[m, 0]
```

Rule 2279

```
Int[Log[(a_) + (b_.)*((F_)^((e_.)*((c_.) + (d_.)*(x_))))^(n_.)], x_Symbol]
:> Dist[1/(d*e*n*Log[F]), Subst[Int[Log[a + b*x]/x, x], x, (F^(e*(c + d*x))
)^n], x] /; FreeQ[{F, a, b, c, d, e, n}, x] && GtQ[a, 0]
```

Rule 2391

```
Int[Log[(c_.)*((d_) + (e_.)*(x_)^(n_.))]/(x_), x_Symbol] :> -Simp[PolyLog[2
, -(c*e*x^n)]/n, x] /; FreeQ[{c, d, e, n}, x] && EqQ[c*d, 1]
```

Rule 6234

```
Int[ArcCoth[(c_.) + Coth[(a_.) + (b_.)*(x_)]*(d_.)], x_Symbol] :> Simp[x*Ar
cCoth[c + d*Coth[a + b*x]], x] + Dist[b, Int[x/(c - d - c*E^(2*a + 2*b*x)),
 x], x] /; FreeQ[{a, b, c, d}, x] && EqQ[(c - d)^2, 1]
```

Rubi steps

$$\int \coth^{-1}(1+d+d\coth(a+bx))\,dx = x\coth^{-1}(1+d+d\coth(a+bx)) + b\int \frac{x}{1+(-1-d)e^{2a+2bx}}\,dx$$
$$= \frac{bx^2}{2} + x\coth^{-1}(1+d+d\coth(a+bx)) + (b(1+d))\int \frac{e^{2a+2bx}x}{1+(-1-d)e^{2a}}$$
$$= \frac{bx^2}{2} + x\coth^{-1}(1+d+d\coth(a+bx)) - \frac{1}{2}x\log\left(1-(1+d)e^{2a+2bx}\right) +$$
$$= \frac{bx^2}{2} + x\coth^{-1}(1+d+d\coth(a+bx)) - \frac{1}{2}x\log\left(1-(1+d)e^{2a+2bx}\right) +$$
$$= \frac{bx^2}{2} + x\coth^{-1}(1+d+d\coth(a+bx)) - \frac{1}{2}x\log\left(1-(1+d)e^{2a+2bx}\right) -$$

**Mathematica [B]** time = 0.87, size = 197, normalized size = 2.86

$$-2\text{Li}_2\left(-\sqrt{d+1}\,e^{a+bx}\right) - 2\text{Li}_2\left(\sqrt{d+1}\,e^{a+bx}\right) - 2\log\left(e^{a+bx}\right)\log\left(1-\sqrt{d+1}\,e^{a+bx}\right) - 2\log\left(e^{a+bx}\right)\log\left(\sqrt{d+1}\right.$$

Warning: Unable to verify antiderivative.

```
[In] Integrate[ArcCoth[1 + d + d*Coth[a + b*x]],x]
```

```
[Out] x*ArcCoth[1 + d + d*Coth[a + b*x]] + (b^2*x^2 + Log[E^(a + b*x)]^2 - 2*Log[
E^(a + b*x)]*Log[1 - Sqrt[1 + d]*E^(a + b*x)] - 2*Log[E^(a + b*x)]*Log[1 +
Sqrt[1 + d]*E^(a + b*x)] + 2*Log[E^(a + b*x)]*Log[E^(-a - b*x)*(-1 + (1 + d
)*E^(2*(a + b*x)))] - 2*b*x*Log[d*Cosh[a + b*x] + (2 + d)*Sinh[a + b*x]] -
2*PolyLog[2, -(Sqrt[1 + d]*E^(a + b*x))] - 2*PolyLog[2, Sqrt[1 + d]*E^(a +
b*x)])/(4*b)
```

**fricas [B]** time = 0.49, size = 226, normalized size = 3.28

$$b^2x^2 + bx\log\left(\frac{d\cosh(bx+a)+(d+2)\sinh(bx+a)}{d\cosh(bx+a)+d\sinh(bx+a)}\right) + a\log\left(2\,(d+1)\cosh\left(bx+a\right) + 2\,(d+1)\sinh\left(bx+a\right) + 2\,\sqrt{d+1}\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(1+d+d*coth(b*x+a)),x, algorithm="fricas")
```

```
[Out] 1/2*(b^2*x^2 + b*x*log((d*cosh(b*x + a) + (d + 2)*sinh(b*x + a))/(d*cosh(b*
x + a) + d*sinh(b*x + a))) + a*log(2*(d + 1)*cosh(b*x + a) + 2*(d + 1)*sinh
(b*x + a) + 2*sqrt(d + 1)) + a*log(2*(d + 1)*cosh(b*x + a) + 2*(d + 1)*sinh
(b*x + a) - 2*sqrt(d + 1)) - (b*x + a)*log(sqrt(d + 1)*(cosh(b*x + a) + sin
h(b*x + a)) + 1) - (b*x + a)*log(-sqrt(d + 1)*(cosh(b*x + a) + sinh(b*x + a
)) + 1) - dilog(sqrt(d + 1)*(cosh(b*x + a) + sinh(b*x + a))) - dilog(-sqrt(
d + 1)*(cosh(b*x + a) + sinh(b*x + a))))/b
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \operatorname{arcoth}\left(d\coth\left(bx+a\right)+d+1\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(1+d+d*coth(b*x+a)),x, algorithm="giac")
```

```
[Out] integrate(arccoth(d*coth(b*x + a) + d + 1), x)
```

**maple [B]** time = 0.56, size = 247, normalized size = 3.58

$$-\frac{\operatorname{arccoth}\left(1+d+d\coth\left(bx+a\right)\right)\ln\left(d\coth\left(bx+a\right)-d\right)}{2b} + \frac{\operatorname{arccoth}\left(1+d+d\coth\left(bx+a\right)\right)\ln\left(d\coth\left(bx+\right.\right.}{2b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(arccoth(1+d+d*coth(b*x+a)),x)
```

```
[Out] -1/2/b*arccoth(1+d+d*coth(b*x+a))*ln(d*coth(b*x+a)-d)+1/2/b*arccoth(1+d+d*c
oth(b*x+a))*ln(d*coth(b*x+a)+d)-1/4/b*dilog(1/2*(d*coth(b*x+a)+d)/d)-1/4/b*
ln(d*coth(b*x+a)-d)*ln(1/2*(d*coth(b*x+a)+d)/d)+1/4/b*dilog((d*coth(b*x+a)+
d+2)/(2*d+2))+1/4/b*ln(d*coth(b*x+a)-d)*ln((d*coth(b*x+a)+d+2)/(2*d+2))+1/8
/b*ln(d*coth(b*x+a)+d)^2-1/4/b*dilog(1+1/2*d*coth(b*x+a)+1/2*d)-1/4/b*ln(d*
coth(b*x+a)+d)*ln(1+1/2*d*coth(b*x+a)+1/2*d)
```

**maxima** [A] time = 1.10, size = 72, normalized size = 1.04

$$\frac{1}{4}\,bd\left(\frac{2\,x^2}{d}-\frac{2\,bx\log\left(-(d+1)e^{(2\,bx+2\,a)}+1\right)+\mathrm{Li}_2\left((d+1)e^{(2\,bx+2\,a)}\right)}{b^2d}\right)+x\,\mathrm{arcoth}\left(d\coth\left(bx+a\right)+d+1\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(1+d+d*coth(b*x+a)),x, algorithm="maxima")
```

```
[Out] 1/4*b*d*(2*x^2/d - (2*b*x*log(-(d + 1)*e^(2*b*x + 2*a) + 1) + dilog((d + 1)
*e^(2*b*x + 2*a)))/(b^2*d)) + x*arccoth(d*coth(b*x + a) + d + 1)
```

**mupad** [F] time = 0.00, size = -1, normalized size = -0.01

$$\int \mathrm{acoth}\left(d+d\coth\left(a+b\,x\right)+1\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(d + d*coth(a + b*x) + 1),x)
```

```
[Out] int(acoth(d + d*coth(a + b*x) + 1), x)
```

**sympy** [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \mathrm{acoth}\left(d\coth\left(a+bx\right)+d+1\right)dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(1+d+d*coth(b*x+a)),x)
```

```
[Out] Integral(acoth(d*coth(a + b*x) + d + 1), x)
```

## 3.225 $\int \frac{\coth^{-1}(1+d+d\coth(a+bx))}{x}\,dx$

**Optimal**. Leaf size=19

$$\text{Int}\left(\frac{\coth^{-1}(d\coth(a+bx)+d+1)}{x},x\right)$$

```
[Out] CannotIntegrate(arccoth(1+d+d*coth(b*x+a))/x,x)
```

**Rubi [A]** time = 0.06, antiderivative size = 0, normalized size of antiderivative = 0.00, number of steps used = 0, number of rules used = 0, integrand size = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int \frac{\coth^{-1}(1+d+d\coth(a+bx))}{x}\,dx$$

Verification is Not applicable to the result.

```
[In] Int[ArcCoth[1 + d + d*Coth[a + b*x]]/x,x]
[Out] Defer[Int][ArcCoth[1 + d + d*Coth[a + b*x]]/x, x]
```

Rubi steps

$$\int \frac{\coth^{-1}(1+d+d\coth(a+bx))}{x}\,dx=\int \frac{\coth^{-1}(1+d+d\coth(a+bx))}{x}\,dx$$

**Mathematica [A]** time = 3.50, size = 0, normalized size = 0.00

$$\int \frac{\coth^{-1}(1+d+d\coth(a+bx))}{x}\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[ArcCoth[1 + d + d*Coth[a + b*x]]/x,x]
[Out] Integrate[ArcCoth[1 + d + d*Coth[a + b*x]]/x, x]
```

**fricas [A]** time = 0.70, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{\text{arcoth}\left(d\coth\left(bx+a\right)+d+1\right)}{x},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(1+d+d*coth(b*x+a))/x,x, algorithm="fricas")
[Out] integral(arccoth(d*coth(b*x + a) + d + 1)/x, x)
```

**giac [A]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\text{arcoth}\left(d\coth\left(bx+a\right)+d+1\right)}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(1+d+d*coth(b*x+a))/x,x, algorithm="giac")
[Out] integrate(arccoth(d*coth(b*x + a) + d + 1)/x, x)
```

**maple** [A] time = 1.27, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{arccoth}(1 + d + d \coth(bx + a))}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(arccoth(1+d+d*coth(b*x+a))/x,x)
```

```
[Out] int(arccoth(1+d+d*coth(b*x+a))/x,x)
```

**maxima** [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{arcoth}(d \coth(bx + a) + d + 1)}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(1+d+d*coth(b*x+a))/x,x, algorithm="maxima")
```

```
[Out] integrate(arccoth(d*coth(b*x + a) + d + 1)/x, x)
```

**mupad** [A] time = 0.00, size = -1, normalized size = -0.05

$$\int \frac{\operatorname{acoth}(d + d \coth(a + b\,x) + 1)}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(d + d*coth(a + b*x) + 1)/x,x)
```

```
[Out] int(acoth(d + d*coth(a + b*x) + 1)/x, x)
```

**sympy** [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{acoth}(d \coth(a + bx) + d + 1)}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(1+d+d*coth(b*x+a))/x,x)
```

```
[Out] Integral(acoth(d*coth(a + b*x) + d + 1)/x, x)
```

## 3.226 $\int x^3 \coth^{-1}(1-d-d\coth(a+bx))\,dx$

**Optimal**. Leaf size=165

$$\frac{3\text{Li}_5\left((1-d)e^{2a+2bx}\right)}{16b^4}-\frac{3x\text{Li}_4\left((1-d)e^{2a+2bx}\right)}{8b^3}+\frac{3x^2\text{Li}_3\left((1-d)e^{2a+2bx}\right)}{8b^2}-\frac{x^3\text{Li}_2\left((1-d)e^{2a+2bx}\right)}{4b}-\frac{1}{8}x^4\log\left(1-(1-\right.$$

```
[Out] 1/20*b*x^5+1/4*x^4*arccoth(1-d-d*coth(b*x+a))-1/8*x^4*ln(1-(1-d)*exp(2*b*x+
2*a))-1/4*x^3*polylog(2,(1-d)*exp(2*b*x+2*a))/b+3/8*x^2*polylog(3,(1-d)*exp
(2*b*x+2*a))/b^2-3/8*x*polylog(4,(1-d)*exp(2*b*x+2*a))/b^3+3/16*polylog(5,(
1-d)*exp(2*b*x+2*a))/b^4
```

**Rubi [A]** time = 0.31, antiderivative size = 165, normalized size of antiderivative = 1.00, number of steps used = 8, number of rules used = 7, integrand size = 19, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.368, Rules used = {6242, 2184, 2190, 2531, 6609, 2282, 6589}

$$\frac{3x^2\text{PolyLog}\left(3,(1-d)e^{2a+2bx}\right)}{8b^2}-\frac{3x\text{PolyLog}\left(4,(1-d)e^{2a+2bx}\right)}{8b^3}+\frac{3\text{PolyLog}\left(5,(1-d)e^{2a+2bx}\right)}{16b^4}-\frac{x^3\text{PolyLog}\left(2,\right.}{4}$$

Antiderivative was successfully verified.

```
[In] Int[x^3*ArcCoth[1 - d - d*Coth[a + b*x]],x]
```

```
[Out] (b*x^5)/20 + (x^4*ArcCoth[1 - d - d*Coth[a + b*x]])/4 - (x^4*Log[1 - (1 - d
)*E^(2*a + 2*b*x)])/8 - (x^3*PolyLog[2, (1 - d)*E^(2*a + 2*b*x)])/(4*b) + (
3*x^2*PolyLog[3, (1 - d)*E^(2*a + 2*b*x)])/(8*b^2) - (3*x*PolyLog[4, (1 - d
)*E^(2*a + 2*b*x)])/(8*b^3) + (3*PolyLog[5, (1 - d)*E^(2*a + 2*b*x)])/(16*b
^4)
```

Rule 2184

```
Int[((c_.) + (d_.)*(x_))^(m_.)/((a_) + (b_.)*((F_)^((g_.)*((e_.) + (f_.)*(x
_))))^(n_.)), x_Symbol] :> Simp[(c + d*x)^(m + 1)/(a*d*(m + 1)), x] - Dist[
b/a, Int[((c + d*x)^m*(F^(g*(e + f*x)))^n)/(a + b*(F^(g*(e + f*x)))^n), x],
 x] /; FreeQ[{F, a, b, c, d, e, f, g, n}, x] && IGtQ[m, 0]
```

Rule 2190

```
Int[(((F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m_.))/
((a_) + (b_.)*((F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)), x_Symbol] :> Simp
[((c + d*x)^m*Log[1 + (b*(F^(g*(e + f*x)))^n)/a])/(b*f*g*n*Log[F]), x] - Di
st[(d*m)/(b*f*g*n*Log[F]), Int[(c + d*x)^(m - 1)*Log[1 + (b*(F^(g*(e + f*x)
))^n)/a], x], x] /; FreeQ[{F, a, b, c, d, e, f, g, n}, x] && IGtQ[m, 0]
```

Rule 2282

```
Int[u_, x_Symbol] :> With[{v = FunctionOfExponential[u, x]}, Dist[v/D[v, x]
, Subst[Int[FunctionOfExponentialFunction[u, x]/x, x], x, v], x]] /; Functi
onOfExponentialQ[u, x] &&  !MatchQ[u, (w_)*((a_.)*(v_)^(n_))^(m_) /; FreeQ[
{a, m, n}, x] && IntegerQ[m*n]] &&  !MatchQ[u, E^((c_.)*((a_.) + (b_.)*x))*
(F_)[v_] /; FreeQ[{a, b, c}, x] && InverseFunctionQ[F[x]]]
```

Rule 2531

```
Int[Log[1 + (e_.)*((F_)^((c_.)*((a_.) + (b_.)*(x_))))^(n_.)]*((f_.) + (g_.)
*(x_))^(m_.), x_Symbol] :> -Simp[((f + g*x)^m*PolyLog[2, -(e*(F^(c*(a + b*x
)))^n)])/(b*c*n*Log[F]), x] + Dist[(g*m)/(b*c*n*Log[F]), Int[(f + g*x)^(m -
 1)*PolyLog[2, -(e*(F^(c*(a + b*x)))^n)], x], x] /; FreeQ[{F, a, b, c, e, f
, g, n}, x] && GtQ[m, 0]
```

Rule 6242

```
Int[ArcCoth[(c_.) + Coth[(a_.) + (b_.)*(x_)]*(d_.)]*((e_.) + (f_.)*(x_))^(m
_.), x_Symbol] :> Simp[((e + f*x)^(m + 1)*ArcCoth[c + d*Coth[a + b*x]])/(f*
(m + 1)), x] + Dist[b/(f*(m + 1)), Int[(e + f*x)^(m + 1)/(c - d - c*E^(2*a
+ 2*b*x)), x], x] /; FreeQ[{a, b, c, d, e, f}, x] && IGtQ[m, 0] && EqQ[(c -
 d)^2, 1]
```

Rule 6589

```
Int[PolyLog[n_, (c_.)*((a_.) + (b_.)*(x_))^(p_.)]/((d_.) + (e_.)*(x_)), x_S
ymbol] :> Simp[PolyLog[n + 1, c*(a + b*x)^p]/(e*p), x] /; FreeQ[{a, b, c, d
, e, n, p}, x] && EqQ[b*d, a*e]
```

Rule 6609

```
Int[((e_.) + (f_.)*(x_))^(m_.)*PolyLog[n_, (d_.)*((F_)^((c_.)*((a_.) + (b_.
)*(x_))))^(p_.)], x_Symbol] :> Simp[((e + f*x)^m*PolyLog[n + 1, d*(F^(c*(a
+ b*x)))^p])/(b*c*p*Log[F]), x] - Dist[(f*m)/(b*c*p*Log[F]), Int[(e + f*x)^
(m - 1)*PolyLog[n + 1, d*(F^(c*(a + b*x)))^p], x], x] /; FreeQ[{F, a, b, c,
 d, e, f, n, p}, x] && GtQ[m, 0]
```

Rubi steps

$$\int x^3 \coth^{-1}(1-d-d\coth(a+bx))\,dx = \frac{1}{4}x^4\coth^{-1}(1-d-d\coth(a+bx)) + \frac{1}{4}b\int \frac{x^4}{1+(-1+d)e^{2a+2bx}}\,dx$$
$$= \frac{bx^5}{20} + \frac{1}{4}x^4\coth^{-1}(1-d-d\coth(a+bx)) + \frac{1}{4}(b(1-d))\int \frac{e^{2a+2bx}}{1+(-1+d}$$
$$= \frac{bx^5}{20} + \frac{1}{4}x^4\coth^{-1}(1-d-d\coth(a+bx)) - \frac{1}{8}x^4\log\left(1-(1-d)e^{2a+2bx}\right.$$
$$= \frac{bx^5}{20} + \frac{1}{4}x^4\coth^{-1}(1-d-d\coth(a+bx)) - \frac{1}{8}x^4\log\left(1-(1-d)e^{2a+2bx}\right.$$
$$= \frac{bx^5}{20} + \frac{1}{4}x^4\coth^{-1}(1-d-d\coth(a+bx)) - \frac{1}{8}x^4\log\left(1-(1-d)e^{2a+2bx}\right.$$
$$= \frac{bx^5}{20} + \frac{1}{4}x^4\coth^{-1}(1-d-d\coth(a+bx)) - \frac{1}{8}x^4\log\left(1-(1-d)e^{2a+2bx}\right.$$
$$= \frac{bx^5}{20} + \frac{1}{4}x^4\coth^{-1}(1-d-d\coth(a+bx)) - \frac{1}{8}x^4\log\left(1-(1-d)e^{2a+2bx}\right.$$
$$= \frac{bx^5}{20} + \frac{1}{4}x^4\coth^{-1}(1-d-d\coth(a+bx)) - \frac{1}{8}x^4\log\left(1-(1-d)e^{2a+2bx}\right.$$

**Mathematica [A]** time = 0.21, size = 147, normalized size = 0.89

$$\frac{1}{16}\left(\frac{3\text{Li}_5\left(-\frac{e^{-2(a+bx)}}{d-1}\right)}{b^4} + \frac{6x\text{Li}_4\left(-\frac{e^{-2(a+bx)}}{d-1}\right)}{b^3} + \frac{6x^2\text{Li}_3\left(-\frac{e^{-2(a+bx)}}{d-1}\right)}{b^2} + \frac{4x^3\text{Li}_2\left(-\frac{e^{-2(a+bx)}}{d-1}\right)}{b} - 2x^4\log\left(\frac{e^{-2(a+bx)}}{d-1}+1\right) + 4x\right.$$

Antiderivative was successfully verified.

```
[In] Integrate[x^3*ArcCoth[1 - d - d*Coth[a + b*x]],x]
```

```
[Out] (4*x^4*ArcCoth[1 - d - d*Coth[a + b*x]] - 2*x^4*Log[1 + 1/((-1 + d)*E^(2*(a
 + b*x)))] + (4*x^3*PolyLog[2, -(1/((-1 + d)*E^(2*(a + b*x))))])/b + (6*x^2
*PolyLog[3, -(1/((-1 + d)*E^(2*(a + b*x))))])/b^2 + (6*x*PolyLog[4, -(1/((-
```

```
1 + d)*E^(2*(a + b*x))))])/b^3 + (3*PolyLog[5, -(1/((-1 + d)*E^(2*(a + b*x)
)))])/b^4)/16
```

**fricas** [C] time = 0.57, size = 450, normalized size = 2.73

$$2\,b^5x^5 - 5\,b^4x^4\log\left(\frac{d\cosh(bx+a)+d\sinh(bx+a)}{d\cosh(bx+a)+(d-2)\sinh(bx+a)}\right) - 20\,b^3x^3\mathrm{Li}_2\left(\frac{1}{2}\sqrt{-4\,d+4}\left(\cosh\left(bx+a\right)+\sinh\left(bx+a\right)\right)\right) - 20$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^3*arccoth(1-d-d*coth(b*x+a)),x, algorithm="fricas")
```

```
[Out] 1/40*(2*b^5*x^5 - 5*b^4*x^4*log((d*cosh(b*x + a) + d*sinh(b*x + a))/(d*cosh
(b*x + a) + (d - 2)*sinh(b*x + a))) - 20*b^3*x^3*dilog(1/2*sqrt(-4*d + 4)*(
cosh(b*x + a) + sinh(b*x + a))) - 20*b^3*x^3*dilog(-1/2*sqrt(-4*d + 4)*(cos
h(b*x + a) + sinh(b*x + a))) - 5*a^4*log(2*(d - 1)*cosh(b*x + a) + 2*(d - 1
)*sinh(b*x + a) + sqrt(-4*d + 4)) - 5*a^4*log(2*(d - 1)*cosh(b*x + a) + 2*(
d - 1)*sinh(b*x + a) - sqrt(-4*d + 4)) + 60*b^2*x^2*polylog(3, 1/2*sqrt(-4*
d + 4)*(cosh(b*x + a) + sinh(b*x + a))) + 60*b^2*x^2*polylog(3, -1/2*sqrt(-
4*d + 4)*(cosh(b*x + a) + sinh(b*x + a))) - 120*b*x*polylog(4, 1/2*sqrt(-4*
d + 4)*(cosh(b*x + a) + sinh(b*x + a))) - 120*b*x*polylog(4, -1/2*sqrt(-4*d
 + 4)*(cosh(b*x + a) + sinh(b*x + a))) - 5*(b^4*x^4 - a^4)*log(1/2*sqrt(-4*
d + 4)*(cosh(b*x + a) + sinh(b*x + a)) + 1) - 5*(b^4*x^4 - a^4)*log(-1/2*sq
rt(-4*d + 4)*(cosh(b*x + a) + sinh(b*x + a)) + 1) + 120*polylog(5, 1/2*sqrt
(-4*d + 4)*(cosh(b*x + a) + sinh(b*x + a))) + 120*polylog(5, -1/2*sqrt(-4*d
 + 4)*(cosh(b*x + a) + sinh(b*x + a))))/b^4
```

**giac** [F] time = 0.00, size = 0, normalized size = 0.00

$$\int x^3 \operatorname{arcoth}\left(-d\coth\left(bx+a\right) - d + 1\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^3*arccoth(1-d-d*coth(b*x+a)),x, algorithm="giac")
```

```
[Out] integrate(x^3*arccoth(-d*coth(b*x + a) - d + 1), x)
```

**maple** [C] time = 6.46, size = 1830, normalized size = 11.09

result too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^3*arccoth(1-d-d*coth(b*x+a)),x)
```

```
[Out] 1/8*I*x^4*Pi*csgn(I*d/(exp(2*b*x+2*a)-1)*exp(2*b*x+2*a))^2-1/16*I*x^4*Pi*cs
gn(I*d/(exp(2*b*x+2*a)-1)*exp(2*b*x+2*a))^3-1/8*I*x^4*Pi*csgn(I/(exp(2*b*x+
2*a)-1)*(d*exp(2*b*x+2*a)-exp(2*b*x+2*a)+1))^2+1/2/b^4*d*a^3/(d-1)*dilog(1+
exp(b*x+a)*(1-d)^(1/2))+1/2/b^4*d*a^3/(d-1)*dilog(1-exp(b*x+a)*(1-d)^(1/2))
+1/2/b^3/(d-1)*ln(1+(d-1)*exp(2*b*x+2*a))*x*a^3-3/8/b^4*d/(d-1)*ln(1+(d-1)*
exp(2*b*x+2*a))*a^4-1/4/b*d/(d-1)*polylog(2,-(d-1)*exp(2*b*x+2*a))*x^3-1/4/
b^4*d/(d-1)*polylog(2,-(d-1)*exp(2*b*x+2*a))*a^3+3/8/b^2*d/(d-1)*polylog(3,
-(d-1)*exp(2*b*x+2*a))*x^2-3/8/b^3*d/(d-1)*polylog(4,-(d-1)*exp(2*b*x+2*a))
*x-1/2/b^3*a^3/(d-1)*ln(1+exp(b*x+a)*(1-d)^(1/2))*x-1/2/b^3*a^3/(d-1)*ln(1-
exp(b*x+a)*(1-d)^(1/2))*x+1/8*x^4*ln(d*exp(2*b*x+2*a)-exp(2*b*x+2*a)+1)+1/2
0*b*x^5+1/8/b^4*a^4/(d-1)*ln(d*exp(2*b*x+2*a)-exp(2*b*x+2*a)+1)+1/2/b^4*d*a
^4/(d-1)*ln(1+exp(b*x+a)*(1-d)^(1/2))+1/2/b^4*d*a^4/(d-1)*ln(1-exp(b*x+a)*(
1-d)^(1/2))+1/16*I*x^4*Pi*csgn(I/(exp(2*b*x+2*a)-1)*(d*exp(2*b*x+2*a)-exp(2
*b*x+2*a)+1))^3-1/8*d/(d-1)*ln(1+(d-1)*exp(2*b*x+2*a))*x^4+3/8/b^3/(d-1)*po
lylog(4,-(d-1)*exp(2*b*x+2*a))*x+3/8/b^4/(d-1)*ln(1+(d-1)*exp(2*b*x+2*a))*a
^4+1/4/b/(d-1)*polylog(2,-(d-1)*exp(2*b*x+2*a))*x^3+1/4/b^4/(d-1)*polylog(2
```

```
,-(d-1)*exp(2*b*x+2*a))*a^3-3/8/b^2/(d-1)*polylog(3,-(d-1)*exp(2*b*x+2*a))*
x^2-1/2/b^4*a^4/(d-1)*ln(1+exp(b*x+a)*(1-d)^(1/2))-1/2/b^4*a^4/(d-1)*ln(1-e
xp(b*x+a)*(1-d)^(1/2))-1/2/b^4*a^3/(d-1)*dilog(1+exp(b*x+a)*(1-d)^(1/2))-1/
2/b^4*a^3/(d-1)*dilog(1-exp(b*x+a)*(1-d)^(1/2))+3/16/b^4*d/(d-1)*polylog(5,
-(d-1)*exp(2*b*x+2*a))+1/8/(d-1)*ln(1+(d-1)*exp(2*b*x+2*a))*x^4-3/16/b^4/(d
-1)*polylog(5,-(d-1)*exp(2*b*x+2*a))-1/4*x^4*ln(exp(b*x+a))-1/8*x^4*ln(d)-1
/16*I*x^4*Pi*csgn(I/(exp(2*b*x+2*a)-1))*csgn(I*(d*exp(2*b*x+2*a)-exp(2*b*x+
2*a)+1))*csgn(I/(exp(2*b*x+2*a)-1)*(d*exp(2*b*x+2*a)-exp(2*b*x+2*a)+1))+1/1
6*I*x^4*Pi*csgn(I*exp(2*b*x+2*a))^3+1/16*I*x^4*Pi*csgn(I*exp(2*b*x+2*a)/(ex
p(2*b*x+2*a)-1))^3-1/16*I*x^4*Pi*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*
a)/(exp(2*b*x+2*a)-1))^2-1/16*I*x^4*Pi*csgn(I/(exp(2*b*x+2*a)-1))*csgn(I*ex
p(2*b*x+2*a)/(exp(2*b*x+2*a)-1))^2-1/16*I*x^4*Pi*csgn(I*exp(2*b*x+2*a)/(exp
(2*b*x+2*a)-1))*csgn(I*d/(exp(2*b*x+2*a)-1)*exp(2*b*x+2*a))^2-1/16*I*x^4*Pi
*csgn(I*d)*csgn(I*d/(exp(2*b*x+2*a)-1)*exp(2*b*x+2*a))^2+1/16*I*x^4*Pi*csgn
(I*exp(b*x+a))^2*csgn(I*exp(2*b*x+2*a))-1/8*I*x^4*Pi*csgn(I*exp(b*x+a))*csg
n(I*exp(2*b*x+2*a))^2+1/16*I*x^4*Pi*csgn(I*d)*csgn(I*exp(2*b*x+2*a)/(exp(2*
b*x+2*a)-1))*csgn(I*d/(exp(2*b*x+2*a)-1)*exp(2*b*x+2*a))+1/16*I*x^4*Pi*csgn
(I*exp(2*b*x+2*a))*csgn(I/(exp(2*b*x+2*a)-1))*csgn(I*exp(2*b*x+2*a)/(exp(2*
b*x+2*a)-1))+1/2/b^3*d*a^3/(d-1)*ln(1-exp(b*x+a)*(1-d)^(1/2))*x-1/2/b^3*d/(
d-1)*ln(1+(d-1)*exp(2*b*x+2*a))*x*a^3+1/2/b^3*d*a^3/(d-1)*ln(1+exp(b*x+a)*(
1-d)^(1/2))*x+1/16*I*x^4*Pi*csgn(I*(d*exp(2*b*x+2*a)-exp(2*b*x+2*a)+1))*csg
n(I/(exp(2*b*x+2*a)-1)*(d*exp(2*b*x+2*a)-exp(2*b*x+2*a)+1))^2+1/16*I*x^4*Pi
*csgn(I/(exp(2*b*x+2*a)-1))*csgn(I/(exp(2*b*x+2*a)-1)*(d*exp(2*b*x+2*a)-exp
(2*b*x+2*a)+1))^2-1/8/b^4*d*a^4/(d-1)*ln(d*exp(2*b*x+2*a)-exp(2*b*x+2*a)+1)
```

**maxima [A]** time = 1.10, size = 149, normalized size = 0.90

$$-\frac{1}{4}x^4\operatorname{arcoth}\left(d\coth\left(bx+a\right)+d-1\right)+\frac{1}{40}\left(\frac{2x^5}{d}-\frac{5\left(2b^4x^4\log\left((d-1)e^{(2bx+2a)}+1\right)+4b^3x^3\mathrm{Li}_2\left(-(d-1)e^{(2bx+\cdots}\right.\right.}{\cdots}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^3*arccoth(1-d-d*coth(b*x+a)),x, algorithm="maxima")
```

```
[Out] -1/4*x^4*arccoth(d*coth(b*x + a) + d - 1) + 1/40*(2*x^5/d - 5*(2*b^4*x^4*lo
g((d - 1)*e^(2*b*x + 2*a) + 1) + 4*b^3*x^3*dilog(-(d - 1)*e^(2*b*x + 2*a))
- 6*b^2*x^2*polylog(3, -(d - 1)*e^(2*b*x + 2*a)) + 6*b*x*polylog(4, -(d - 1
)*e^(2*b*x + 2*a)) - 3*polylog(5, -(d - 1)*e^(2*b*x + 2*a)))/(b^5*d))*b*d
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.01

$$\int -x^3\operatorname{acoth}\left(d+d\coth\left(a+b\,x\right)-1\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(-x^3*acoth(d + d*coth(a + b*x) - 1),x)
```

```
[Out] int(-x^3*acoth(d + d*coth(a + b*x) - 1), x)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int x^3\operatorname{acoth}\left(-d\coth\left(a+bx\right)-d+1\right)dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**3*acoth(1-d-d*coth(b*x+a)),x)
```

```
[Out] Integral(x**3*acoth(-d*coth(a + b*x) - d + 1), x)
```

## 3.227 $\int x^2 \coth^{-1}(1-d-d\coth(a+bx))\,dx$

**Optimal**. Leaf size=137

$$-\frac{\text{Li}_4\left((1-d)e^{2a+2bx}\right)}{8b^3}+\frac{x\text{Li}_3\left((1-d)e^{2a+2bx}\right)}{4b^2}-\frac{x^2\text{Li}_2\left((1-d)e^{2a+2bx}\right)}{4b}-\frac{1}{6}x^3\log\left(1-(1-d)e^{2a+2bx}\right)+\frac{1}{3}x^3\coth^{-1}($$

```
[Out] 1/12*b*x^4+1/3*x^3*arccoth(1-d-d*coth(b*x+a))-1/6*x^3*ln(1-(1-d)*exp(2*b*x+
2*a))-1/4*x^2*polylog(2,(1-d)*exp(2*b*x+2*a))/b+1/4*x*polylog(3,(1-d)*exp(2
*b*x+2*a))/b^2-1/8*polylog(4,(1-d)*exp(2*b*x+2*a))/b^3
```

**Rubi [A]** time = 0.27, antiderivative size = 137, normalized size of antiderivative = 1.00, number of steps used = 7, number of rules used = 7, integrand size = 19, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.368, Rules used = {6242, 2184, 2190, 2531, 6609, 2282, 6589}

$$\frac{x\text{PolyLog}\left(3,(1-d)e^{2a+2bx}\right)}{4b^2}-\frac{\text{PolyLog}\left(4,(1-d)e^{2a+2bx}\right)}{8b^3}-\frac{x^2\text{PolyLog}\left(2,(1-d)e^{2a+2bx}\right)}{4b}-\frac{1}{6}x^3\log\left(1-(1-d\right.$$

Antiderivative was successfully verified.

```
[In] Int[x^2*ArcCoth[1 - d - d*Coth[a + b*x]],x]
```

```
[Out] (b*x^4)/12 + (x^3*ArcCoth[1 - d - d*Coth[a + b*x]])/3 - (x^3*Log[1 - (1 - d
)*E^(2*a + 2*b*x)])/6 - (x^2*PolyLog[2, (1 - d)*E^(2*a + 2*b*x)])/(4*b) + (
x*PolyLog[3, (1 - d)*E^(2*a + 2*b*x)])/(4*b^2) - PolyLog[4, (1 - d)*E^(2*a
+ 2*b*x)]/(8*b^3)
```

Rule 2184

```
Int[((c_.) + (d_.)*(x_))^(m_.)/((a_) + (b_.)*((F_)^((g_.)*((e_.) + (f_.)*(x
_))))^(n_.)), x_Symbol] :> Simp[(c + d*x)^(m + 1)/(a*d*(m + 1)), x] - Dist[
b/a, Int[((c + d*x)^m*(F^(g*(e + f*x)))^n)/(a + b*(F^(g*(e + f*x)))^n), x],
 x] /; FreeQ[{F, a, b, c, d, e, f, g, n}, x] && IGtQ[m, 0]
```

Rule 2190

```
Int[(((F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m_.))/
((a_) + (b_.)*((F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)), x_Symbol] :> Simp
[((c + d*x)^m*Log[1 + (b*(F^(g*(e + f*x)))^n)/a])/(b*f*g*n*Log[F]), x] - Di
st[(d*m)/(b*f*g*n*Log[F]), Int[(c + d*x)^(m - 1)*Log[1 + (b*(F^(g*(e + f*x)
))^n)/a], x], x] /; FreeQ[{F, a, b, c, d, e, f, g, n}, x] && IGtQ[m, 0]
```

Rule 2282

```
Int[u_, x_Symbol] :> With[{v = FunctionOfExponential[u, x]}, Dist[v/D[v, x]
, Subst[Int[FunctionOfExponentialFunction[u, x]/x, x], x, v], x]] /; Functi
onOfExponentialQ[u, x] &&  !MatchQ[u, (w_)*((a_.)*(v_)^(n_))^(m_) /; FreeQ[
{a, m, n}, x] && IntegerQ[m*n]] &&  !MatchQ[u, E^((c_.)*((a_.) + (b_.)*x))*
(F_)[v_] /; FreeQ[{a, b, c}, x] && InverseFunctionQ[F[x]]]
```

Rule 2531

```
Int[Log[1 + (e_.)*((F_)^((c_.)*((a_.) + (b_.)*(x_))))^(n_.)]*((f_.) + (g_.)
*(x_))^(m_.), x_Symbol] :> -Simp[((f + g*x)^m*PolyLog[2, -(e*(F^(c*(a + b*x
)))^n)])/(b*c*n*Log[F]), x] + Dist[(g*m)/(b*c*n*Log[F]), Int[(f + g*x)^(m -
 1)*PolyLog[2, -(e*(F^(c*(a + b*x)))^n)], x], x] /; FreeQ[{F, a, b, c, e, f
, g, n}, x] && GtQ[m, 0]
```

Rule 6242

```
Int[ArcCoth[(c_.) + Coth[(a_.) + (b_.)*(x_)]*(d_.)]*((e_.) + (f_.)*(x_))^(m
_.), x_Symbol] :> Simp[((e + f*x)^(m + 1)*ArcCoth[c + d*Coth[a + b*x]])/(f*
(m + 1)), x] + Dist[b/(f*(m + 1)), Int[(e + f*x)^(m + 1)/(c - d - c*E^(2*a
+ 2*b*x)), x], x] /; FreeQ[{a, b, c, d, e, f}, x] && IGtQ[m, 0] && EqQ[(c -
 d)^2, 1]
```

Rule 6589

```
Int[PolyLog[n_, (c_.)*((a_.) + (b_.)*(x_))^(p_.)]/((d_.) + (e_.)*(x_)), x_S
ymbol] :> Simp[PolyLog[n + 1, c*(a + b*x)^p]/(e*p), x] /; FreeQ[{a, b, c, d
, e, n, p}, x] && EqQ[b*d, a*e]
```

Rule 6609

```
Int[((e_.) + (f_.)*(x_))^(m_.)*PolyLog[n_, (d_.)*((F_)^((c_.)*((a_.) + (b_.
)*(x_))))^(p_.)], x_Symbol] :> Simp[((e + f*x)^m*PolyLog[n + 1, d*(F^(c*(a
+ b*x)))^p])/(b*c*p*Log[F]), x] - Dist[(f*m)/(b*c*p*Log[F]), Int[(e + f*x)^
(m - 1)*PolyLog[n + 1, d*(F^(c*(a + b*x)))^p], x], x] /; FreeQ[{F, a, b, c,
 d, e, f, n, p}, x] && GtQ[m, 0]
```

Rubi steps

$$\int x^2 \coth^{-1}(1-d-d\coth(a+bx))\,dx = \frac{1}{3}x^3\coth^{-1}(1-d-d\coth(a+bx)) + \frac{1}{3}b\int \frac{x^3}{1+(-1+d)e^{2a+2bx}}\,dx$$
$$= \frac{bx^4}{12} + \frac{1}{3}x^3\coth^{-1}(1-d-d\coth(a+bx)) + \frac{1}{3}(b(1-d))\int \frac{e^{2a+2bx}}{1+(-1+d}$$
$$= \frac{bx^4}{12} + \frac{1}{3}x^3\coth^{-1}(1-d-d\coth(a+bx)) - \frac{1}{6}x^3\log\left(1-(1-d)e^{2a+2bx}\right.$$
$$= \frac{bx^4}{12} + \frac{1}{3}x^3\coth^{-1}(1-d-d\coth(a+bx)) - \frac{1}{6}x^3\log\left(1-(1-d)e^{2a+2bx}\right.$$
$$= \frac{bx^4}{12} + \frac{1}{3}x^3\coth^{-1}(1-d-d\coth(a+bx)) - \frac{1}{6}x^3\log\left(1-(1-d)e^{2a+2bx}\right.$$
$$= \frac{bx^4}{12} + \frac{1}{3}x^3\coth^{-1}(1-d-d\coth(a+bx)) - \frac{1}{6}x^3\log\left(1-(1-d)e^{2a+2bx}\right.$$
$$= \frac{bx^4}{12} + \frac{1}{3}x^3\coth^{-1}(1-d-d\coth(a+bx)) - \frac{1}{6}x^3\log\left(1-(1-d)e^{2a+2bx}\right.$$

**Mathematica [A]** time = 0.12, size = 121, normalized size = 0.88

$$\frac{1}{24}\left(\frac{3\text{Li}_4\left(-\frac{e^{-2(a+bx)}}{d-1}\right)}{b^3} + \frac{6x\text{Li}_3\left(-\frac{e^{-2(a+bx)}}{d-1}\right)}{b^2} + \frac{6x^2\text{Li}_2\left(-\frac{e^{-2(a+bx)}}{d-1}\right)}{b} - 4x^3\log\left(\frac{e^{-2(a+bx)}}{d-1}+1\right) + 8x^3\coth^{-1}(d(-\coth(a\right.$$

Antiderivative was successfully verified.

```
[In] Integrate[x^2*ArcCoth[1 - d - d*Coth[a + b*x]],x]
```

```
[Out] (8*x^3*ArcCoth[1 - d - d*Coth[a + b*x]] - 4*x^3*Log[1 + 1/((-1 + d)*E^(2*(a
 + b*x)))] + (6*x^2*PolyLog[2, -(1/((-1 + d)*E^(2*(a + b*x))))])/b + (6*x*P
olyLog[3, -(1/((-1 + d)*E^(2*(a + b*x))))])/b^2 + (3*PolyLog[4, -(1/((-1 +
d)*E^(2*(a + b*x))))])/b^3)/24
```

**fricas [C]** time = 0.53, size = 381, normalized size = 2.78

$$b^4x^4 - 2\,b^3x^3\log\left(\frac{d\cosh(bx+a)+d\sinh(bx+a)}{d\cosh(bx+a)+(d-2)\sinh(bx+a)}\right) - 6\,b^2x^2\text{Li}_2\left(\frac{1}{2}\sqrt{-4\,d+4}\,(\cosh(bx+a)+\sinh(bx+a))\right) - 6\,b^2x^2\text{Li}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*arccoth(1-d-d*coth(b*x+a)),x, algorithm="fricas")
```

```
[Out] 1/12*(b^4*x^4 - 2*b^3*x^3*log((d*cosh(b*x + a) + d*sinh(b*x + a))/(d*cosh(b
*x + a) + (d - 2)*sinh(b*x + a))) - 6*b^2*x^2*dilog(1/2*sqrt(-4*d + 4)*(cos
h(b*x + a) + sinh(b*x + a))) - 6*b^2*x^2*dilog(-1/2*sqrt(-4*d + 4)*(cosh(b*
x + a) + sinh(b*x + a))) + 2*a^3*log(2*(d - 1)*cosh(b*x + a) + 2*(d - 1)*si
nh(b*x + a) + sqrt(-4*d + 4)) + 2*a^3*log(2*(d - 1)*cosh(b*x + a) + 2*(d -
1)*sinh(b*x + a) - sqrt(-4*d + 4)) + 12*b*x*polylog(3, 1/2*sqrt(-4*d + 4)*(
cosh(b*x + a) + sinh(b*x + a))) + 12*b*x*polylog(3, -1/2*sqrt(-4*d + 4)*(co
sh(b*x + a) + sinh(b*x + a))) - 2*(b^3*x^3 + a^3)*log(1/2*sqrt(-4*d + 4)*(c
osh(b*x + a) + sinh(b*x + a)) + 1) - 2*(b^3*x^3 + a^3)*log(-1/2*sqrt(-4*d +
 4)*(cosh(b*x + a) + sinh(b*x + a)) + 1) - 12*polylog(4, 1/2*sqrt(-4*d + 4)
*(cosh(b*x + a) + sinh(b*x + a))) - 12*polylog(4, -1/2*sqrt(-4*d + 4)*(cosh
(b*x + a) + sinh(b*x + a))))/b^3
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int x^2 \operatorname{arcoth}(-d \coth(bx+a) - d + 1)\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*arccoth(1-d-d*coth(b*x+a)),x, algorithm="giac")
```

```
[Out] integrate(x^2*arccoth(-d*coth(b*x + a) - d + 1), x)
```

**maple [C]** time = 5.46, size = 1771, normalized size = 12.93

result too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^2*arccoth(1-d-d*coth(b*x+a)),x)
```

```
[Out] 1/12*I*x^3*Pi*csgn(I*exp(2*b*x+2*a))*csgn(I/(exp(2*b*x+2*a)-1))*csgn(I*exp(
2*b*x+2*a)/(exp(2*b*x+2*a)-1))+1/12*I*x^3*Pi*csgn(I*exp(b*x+a))^2*csgn(I*ex
p(2*b*x+2*a))-1/6*I*x^3*Pi*csgn(I*exp(b*x+a))*csgn(I*exp(2*b*x+2*a))^2-1/6*
I*x^3*Pi*csgn(I/(exp(2*b*x+2*a)-1)*(d*exp(2*b*x+2*a)-exp(2*b*x+2*a)+1))^2+1
/12*I*x^3*Pi*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)-1))^3-1/12*I*x^3*Pi*csgn
(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)-1))*csgn(I*d/(exp(2*b*x+2*a)-1)*exp(2*b*x
+2*a))^2+1/12*b*x^4+1/12*I*x^3*Pi*csgn(I*exp(2*b*x+2*a))^3-1/3*x^3*ln(exp(b
*x+a))-1/6*x^3*ln(d)+1/6/(d-1)*ln(1+(d-1)*exp(2*b*x+2*a))*x^3+1/8/b^3/(d-1)
*polylog(4,-(d-1)*exp(2*b*x+2*a))-1/12*I*x^3*Pi*csgn(I*d/(exp(2*b*x+2*a)-1)
*exp(2*b*x+2*a))^3+1/6*I*x^3*Pi*csgn(I*d/(exp(2*b*x+2*a)-1)*exp(2*b*x+2*a))
^2-1/6/b^3*a^3/(d-1)*ln(d*exp(2*b*x+2*a)-exp(2*b*x+2*a)+1)-1/3/b^3/(d-1)*ln
(1+(d-1)*exp(2*b*x+2*a))*a^3+1/4/b/(d-1)*polylog(2,-(d-1)*exp(2*b*x+2*a))*x
^2-1/4/b^3/(d-1)*polylog(2,-(d-1)*exp(2*b*x+2*a))*a^2-1/4/b^2/(d-1)*polylog
(3,-(d-1)*exp(2*b*x+2*a))*x+1/2/b^3*a^3/(d-1)*ln(1+exp(b*x+a)*(1-d)^(1/2))+
1/2/b^3*a^3/(d-1)*ln(1-exp(b*x+a)*(1-d)^(1/2))-1/8/b^3*d/(d-1)*polylog(4,-(
d-1)*exp(2*b*x+2*a))+1/2/b^3*a^2/(d-1)*dilog(1+exp(b*x+a)*(1-d)^(1/2))+1/2/
b^3*a^2/(d-1)*dilog(1-exp(b*x+a)*(1-d)^(1/2))-1/6*d/(d-1)*ln(1+(d-1)*exp(2*
b*x+2*a))*x^3+1/6*x^3*ln(d*exp(2*b*x+2*a)-exp(2*b*x+2*a)+1)-1/2/b^3*d*a^2/(
d-1)*dilog(1+exp(b*x+a)*(1-d)^(1/2))-1/2/b^3*d*a^2/(d-1)*dilog(1-exp(b*x+a)
*(1-d)^(1/2))+1/3/b^3*d/(d-1)*ln(1+(d-1)*exp(2*b*x+2*a))*a^3-1/4/b*d/(d-1)*
polylog(2,-(d-1)*exp(2*b*x+2*a))*x^2+1/4/b^3*d/(d-1)*polylog(2,-(d-1)*exp(2
*b*x+2*a))*a^2+1/4/b^2*d/(d-1)*polylog(3,-(d-1)*exp(2*b*x+2*a))*x-1/2/b^2/(
d-1)*ln(1+(d-1)*exp(2*b*x+2*a))*x*a^2+1/2/b^2*a^2/(d-1)*ln(1+exp(b*x+a)*(1-
d)^(1/2))*x+1/2/b^2*a^2/(d-1)*ln(1-exp(b*x+a)*(1-d)^(1/2))*x-1/2/b^3*d*a^3/
(d-1)*ln(1+exp(b*x+a)*(1-d)^(1/2))-1/2/b^3*d*a^3/(d-1)*ln(1-exp(b*x+a)*(1-d
)^(1/2))+1/12*I*x^3*Pi*csgn(I/(exp(2*b*x+2*a)-1)*(d*exp(2*b*x+2*a)-exp(2*b*
```

```
x+2*a)+1))^3+1/12*I*x^3*Pi*csgn(I*(d*exp(2*b*x+2*a)-exp(2*b*x+2*a)+1))*csgn
(I/(exp(2*b*x+2*a)-1)*(d*exp(2*b*x+2*a)-exp(2*b*x+2*a)+1))^2+1/12*I*x^3*Pi*
csgn(I/(exp(2*b*x+2*a)-1))*csgn(I/(exp(2*b*x+2*a)-1)*(d*exp(2*b*x+2*a)-exp(
2*b*x+2*a)+1))^2+1/6/b^3*d*a^3/(d-1)*ln(d*exp(2*b*x+2*a)-exp(2*b*x+2*a)+1)-
1/12*I*x^3*Pi*csgn(I/(exp(2*b*x+2*a)-1))*csgn(I*(d*exp(2*b*x+2*a)-exp(2*b*x
+2*a)+1))*csgn(I/(exp(2*b*x+2*a)-1)*(d*exp(2*b*x+2*a)-exp(2*b*x+2*a)+1))+1/
12*I*x^3*Pi*csgn(I*d)*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)-1))*csgn(I*d/(e
xp(2*b*x+2*a)-1)*exp(2*b*x+2*a))-1/12*I*x^3*Pi*csgn(I*d)*csgn(I*d/(exp(2*b*
x+2*a)-1)*exp(2*b*x+2*a))^2-1/12*I*x^3*Pi*csgn(I*exp(2*b*x+2*a))*csgn(I*exp
(2*b*x+2*a)/(exp(2*b*x+2*a)-1))^2-1/12*I*x^3*Pi*csgn(I/(exp(2*b*x+2*a)-1))*
csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)-1))^2+1/2/b^2*d/(d-1)*ln(1+(d-1)*exp(
2*b*x+2*a))*x*a^2-1/2/b^2*d*a^2/(d-1)*ln(1+exp(b*x+a)*(1-d)^(1/2))*x-1/2/b^
2*d*a^2/(d-1)*ln(1-exp(b*x+a)*(1-d)^(1/2))*x
```

**maxima** [A] time = 1.10, size = 125, normalized size = 0.91

$$-\frac{1}{3}x^3\operatorname{arcoth}\left(d\coth\left(bx+a\right)+d-1\right)+\frac{1}{36}\left(\frac{3x^4}{d}-\frac{2\left(4b^3x^3\log\left((d-1)e^{(2bx+2a)}+1\right)+6b^2x^2\mathrm{Li}_2\left(-(d-1)e^{(2bx+\cdots}\right.\right.}{b^4 \cdots}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*arccoth(1-d-d*coth(b*x+a)),x, algorithm="maxima")
```

```
[Out] -1/3*x^3*arccoth(d*coth(b*x + a) + d - 1) + 1/36*(3*x^4/d - 2*(4*b^3*x^3*lo
g((d - 1)*e^(2*b*x + 2*a) + 1) + 6*b^2*x^2*dilog(-(d - 1)*e^(2*b*x + 2*a))
- 6*b*x*polylog(3, -(d - 1)*e^(2*b*x + 2*a)) + 3*polylog(4, -(d - 1)*e^(2*b
*x + 2*a)))/(b^4*d))*b*d
```

**mupad** [F] time = 0.00, size = -1, normalized size = -0.01

$$\int -x^2\,\mathrm{acoth}\left(d+d\coth\left(a+b\,x\right)-1\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(-x^2*acoth(d + d*coth(a + b*x) - 1),x)
```

```
[Out] int(-x^2*acoth(d + d*coth(a + b*x) - 1), x)
```

**sympy** [F] time = 0.00, size = 0, normalized size = 0.00

$$\int x^2\operatorname{acoth}\left(-d\coth\left(a+bx\right)-d+1\right)dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**2*acoth(1-d-d*coth(b*x+a)),x)
```

```
[Out] Integral(x**2*acoth(-d*coth(a + b*x) - d + 1), x)
```

# 3.228 $\int x \coth^{-1}(1-d-d\coth(a+bx))\,dx$

**Optimal**. Leaf size=109

$$\frac{\text{Li}_3\left((1-d)e^{2a+2bx}\right)}{8b^2}-\frac{x\text{Li}_2\left((1-d)e^{2a+2bx}\right)}{4b}-\frac{1}{4}x^2\log\left(1-(1-d)e^{2a+2bx}\right)+\frac{1}{2}x^2\coth^{-1}(d(-\coth(a+bx))-d+1)+$$

[Out] 1/6*b*x^3+1/2*x^2*arccoth(1-d-d*coth(b*x+a))-1/4*x^2*ln(1-(1-d)*exp(2*b*x+2*a))-1/4*x*polylog(2,(1-d)*exp(2*b*x+2*a))/b+1/8*polylog(3,(1-d)*exp(2*b*x+2*a))/b^2

**Rubi [A]** time = 0.24, antiderivative size = 109, normalized size of antiderivative = 1.00, number of steps used = 6, number of rules used = 6, integrand size = 17, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.353, Rules used = {6242, 2184, 2190, 2531, 2282, 6589}

$$\frac{\text{PolyLog}\left(3,(1-d)e^{2a+2bx}\right)}{8b^2}-\frac{x\text{PolyLog}\left(2,(1-d)e^{2a+2bx}\right)}{4b}-\frac{1}{4}x^2\log\left(1-(1-d)e^{2a+2bx}\right)+\frac{1}{2}x^2\coth^{-1}(d(-\coth$$

Antiderivative was successfully verified.

```
[In] Int[x*ArcCoth[1 - d - d*Coth[a + b*x]],x]
```

```
[Out] (b*x^3)/6 + (x^2*ArcCoth[1 - d - d*Coth[a + b*x]])/2 - (x^2*Log[1 - (1 - d)
*E^(2*a + 2*b*x)])/4 - (x*PolyLog[2, (1 - d)*E^(2*a + 2*b*x)])/(4*b) + Poly
Log[3, (1 - d)*E^(2*a + 2*b*x)]/(8*b^2)
```

Rule 2184

```
Int[((c_.) + (d_.)*(x_))^(m_.)/((a_) + (b_.)*((F_)^((g_.)*((e_.) + (f_.)*(x
_))))^(n_.)), x_Symbol] :> Simp[(c + d*x)^(m + 1)/(a*d*(m + 1)), x] - Dist[
b/a, Int[((c + d*x)^m*(F^(g*(e + f*x)))^n)/(a + b*(F^(g*(e + f*x)))^n), x],
 x] /; FreeQ[{F, a, b, c, d, e, f, g, n}, x] && IGtQ[m, 0]
```

Rule 2190

```
Int[(((F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m_.))/
((a_) + (b_.)*((F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)), x_Symbol] :> Simp
[((c + d*x)^m*Log[1 + (b*(F^(g*(e + f*x)))^n)/a])/(b*f*g*n*Log[F]), x] - Di
st[(d*m)/(b*f*g*n*Log[F]), Int[(c + d*x)^(m - 1)*Log[1 + (b*(F^(g*(e + f*x)
))^n)/a], x], x] /; FreeQ[{F, a, b, c, d, e, f, g, n}, x] && IGtQ[m, 0]
```

Rule 2282

```
Int[u_, x_Symbol] :> With[{v = FunctionOfExponential[u, x]}, Dist[v/D[v, x]
, Subst[Int[FunctionOfExponentialFunction[u, x]/x, x], x, v], x]] /; Functi
onOfExponentialQ[u, x] &&  !MatchQ[u, (w_)*((a_.)*(v_)^(n_))^(m_) /; FreeQ[
{a, m, n}, x] && IntegerQ[m*n]] &&  !MatchQ[u, E^((c_.)*((a_.) + (b_.)*x))*
(F_)[v_] /; FreeQ[{a, b, c}, x] && InverseFunctionQ[F[x]]]
```

Rule 2531

```
Int[Log[1 + (e_.)*((F_)^((c_.)*((a_.) + (b_.)*(x_))))^(n_.)]*((f_.) + (g_.)
*(x_))^(m_.), x_Symbol] :> -Simp[((f + g*x)^m*PolyLog[2, -(e*(F^(c*(a + b*x
)))^n)])/(b*c*n*Log[F]), x] + Dist[(g*m)/(b*c*n*Log[F]), Int[(f + g*x)^(m -
 1)*PolyLog[2, -(e*(F^(c*(a + b*x)))^n)], x], x] /; FreeQ[{F, a, b, c, e, f
, g, n}, x] && GtQ[m, 0]
```

Rule 6242

```
Int[ArcCoth[(c_.) + Coth[(a_.) + (b_.)*(x_)]*(d_.)]*((e_.) + (f_.)*(x_))^(m
_.), x_Symbol] :> Simp[((e + f*x)^(m + 1)*ArcCoth[c + d*Coth[a + b*x]])/(f*
```

```
(m + 1)), x] + Dist[b/(f*(m + 1)), Int[(e + f*x)^(m + 1)/(c - d - c*E^(2*a
+ 2*b*x)), x], x] /; FreeQ[{a, b, c, d, e, f}, x] && IGtQ[m, 0] && EqQ[(c -
 d)^2, 1]
```

Rule 6589

```
Int[PolyLog[n_, (c_.)*((a_.) + (b_.)*(x_))^(p_.)]/((d_.) + (e_.)*(x_)), x_S
ymbol] :> Simp[PolyLog[n + 1, c*(a + b*x)^p]/(e*p), x] /; FreeQ[{a, b, c, d
, e, n, p}, x] && EqQ[b*d, a*e]
```

Rubi steps

$$\int x\coth^{-1}(1-d-d\coth(a+bx))\,dx = \frac{1}{2}x^2\coth^{-1}(1-d-d\coth(a+bx))+\frac{1}{2}b\int\frac{x^2}{1+(-1+d)e^{2a+2bx}}\,dx$$
$$=\frac{bx^3}{6}+\frac{1}{2}x^2\coth^{-1}(1-d-d\coth(a+bx))+\frac{1}{2}(b(1-d))\int\frac{e^{2a+2bx}x}{1+(-1+d)}$$
$$=\frac{bx^3}{6}+\frac{1}{2}x^2\coth^{-1}(1-d-d\coth(a+bx))-\frac{1}{4}x^2\log\left(1-(1-d)e^{2a+2bx}\right)$$
$$=\frac{bx^3}{6}+\frac{1}{2}x^2\coth^{-1}(1-d-d\coth(a+bx))-\frac{1}{4}x^2\log\left(1-(1-d)e^{2a+2bx}\right)$$
$$=\frac{bx^3}{6}+\frac{1}{2}x^2\coth^{-1}(1-d-d\coth(a+bx))-\frac{1}{4}x^2\log\left(1-(1-d)e^{2a+2bx}\right)$$
$$=\frac{bx^3}{6}+\frac{1}{2}x^2\coth^{-1}(1-d-d\coth(a+bx))-\frac{1}{4}x^2\log\left(1-(1-d)e^{2a+2bx}\right)$$

**Mathematica [A]** time = 0.12, size = 94, normalized size = 0.86

$$\frac{2b^2x^2\left(2\coth^{-1}(d(-\coth(a+bx))-d+1)-\log\left(\frac{e^{-2(a+bx)}}{d-1}+1\right)\right)+2bx\text{Li}_2\left(-\frac{e^{-2(a+bx)}}{d-1}\right)+\text{Li}_3\left(-\frac{e^{-2(a+bx)}}{d-1}\right)}{8b^2}$$

Antiderivative was successfully verified.

```
[In] Integrate[x*ArcCoth[1 - d - d*Coth[a + b*x]],x]
```

```
[Out] (2*b^2*x^2*(2*ArcCoth[1 - d - d*Coth[a + b*x]] - Log[1 + 1/((-1 + d)*E^(2*(
a + b*x)))]) + 2*b*x*PolyLog[2, -(1/((-1 + d)*E^(2*(a + b*x))))] + PolyLog[
3, -(1/((-1 + d)*E^(2*(a + b*x))))])/(8*b^2)
```

**fricas [C]** time = 0.53, size = 322, normalized size = 2.95

$$2\,b^3x^3-3\,b^2x^2\log\left(\frac{d\cosh(bx+a)+d\sinh(bx+a)}{d\cosh(bx+a)+(d-2)\sinh(bx+a)}\right)-6\,bx\text{Li}_2\left(\frac{1}{2}\sqrt{-4\,d+4}\,(\cosh(bx+a)+\sinh(bx+a))\right)-6\,bx\text{Li}_2$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*arccoth(1-d-d*coth(b*x+a)),x, algorithm="fricas")
```

```
[Out] 1/12*(2*b^3*x^3 - 3*b^2*x^2*log((d*cosh(b*x + a) + d*sinh(b*x + a))/(d*cosh
(b*x + a) + (d - 2)*sinh(b*x + a))) - 6*b*x*dilog(1/2*sqrt(-4*d + 4)*(cosh(
b*x + a) + sinh(b*x + a))) - 6*b*x*dilog(-1/2*sqrt(-4*d + 4)*(cosh(b*x + a)
 + sinh(b*x + a))) - 3*a^2*log(2*(d - 1)*cosh(b*x + a) + 2*(d - 1)*sinh(b*x
 + a) + sqrt(-4*d + 4)) - 3*a^2*log(2*(d - 1)*cosh(b*x + a) + 2*(d - 1)*sin
h(b*x + a) - sqrt(-4*d + 4)) - 3*(b^2*x^2 - a^2)*log(1/2*sqrt(-4*d + 4)*(co
sh(b*x + a) + sinh(b*x + a)) + 1) - 3*(b^2*x^2 - a^2)*log(-1/2*sqrt(-4*d +
```

```
4)*(cosh(b*x + a) + sinh(b*x + a)) + 1) + 6*polylog(3, 1/2*sqrt(-4*d + 4)*(
cosh(b*x + a) + sinh(b*x + a))) + 6*polylog(3, -1/2*sqrt(-4*d + 4)*(cosh(b*
x + a) + sinh(b*x + a))))/b^2
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int x \operatorname{arcoth}\left(-d \coth\left(bx+a\right)-d+1\right) \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*arccoth(1-d-d*coth(b*x+a)),x, algorithm="giac")
```

```
[Out] integrate(x*arccoth(-d*coth(b*x + a) - d + 1), x)
```

**maple [C]** time = 4.88, size = 1688, normalized size = 15.49

result too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x*arccoth(1-d-d*coth(b*x+a)),x)
```

```
[Out] 1/8*I*x^2*Pi*csgn(I*d)*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)-1))*csgn(I*d/(
exp(2*b*x+2*a)-1)*exp(2*b*x+2*a))+1/8*I*x^2*Pi*csgn(I*exp(2*b*x+2*a))*csgn(
I/(exp(2*b*x+2*a)-1))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)-1))-1/8*I*x^2*P
i*csgn(I/(exp(2*b*x+2*a)-1))*csgn(I*(d*exp(2*b*x+2*a)-exp(2*b*x+2*a)+1))*cs
gn(I/(exp(2*b*x+2*a)-1)*(d*exp(2*b*x+2*a)-exp(2*b*x+2*a)+1))-1/4/b^2*d/(d-1
)*ln(1+(d-1)*exp(2*b*x+2*a))*a^2-1/8/b^2/(d-1)*polylog(3,-(d-1)*exp(2*b*x+2
*a))+1/4/(d-1)*ln(1+(d-1)*exp(2*b*x+2*a))*x^2-1/2*x^2*ln(exp(b*x+a))-1/4*x^
2*ln(d)+1/8*I*x^2*Pi*csgn(I*exp(2*b*x+2*a))^3+1/6*b*x^3-1/4/b*d/(d-1)*polyl
og(2,-(d-1)*exp(2*b*x+2*a))*x-1/4/b^2*d/(d-1)*polylog(2,-(d-1)*exp(2*b*x+2*
a))*a+1/2/b/(d-1)*ln(1+(d-1)*exp(2*b*x+2*a))*x*a-1/2/b*a/(d-1)*ln(1+exp(b*x
+a)*(1-d)^(1/2))*x-1/2/b*a/(d-1)*ln(1-exp(b*x+a)*(1-d)^(1/2))*x+1/2/b^2*d*a
^2/(d-1)*ln(1+exp(b*x+a)*(1-d)^(1/2))+1/2/b^2*d*a^2/(d-1)*ln(1-exp(b*x+a)*(
1-d)^(1/2))+1/2/b^2*d*a/(d-1)*dilog(1+exp(b*x+a)*(1-d)^(1/2))+1/2/b^2*d*a/(
d-1)*dilog(1-exp(b*x+a)*(1-d)^(1/2))+1/4*I*x^2*Pi*csgn(I*d/(exp(2*b*x+2*a)-
1)*exp(2*b*x+2*a))^2-1/4/b^2*d*a^2/(d-1)*ln(d*exp(2*b*x+2*a)-exp(2*b*x+2*a)
+1)+1/8*I*x^2*Pi*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)-1))^3+1/4/b^2*a^2/(d
-1)*ln(d*exp(2*b*x+2*a)-exp(2*b*x+2*a)+1)+1/8*I*x^2*Pi*csgn(I/(exp(2*b*x+2*
a)-1)*(d*exp(2*b*x+2*a)-exp(2*b*x+2*a)+1))^3+1/4/b^2/(d-1)*ln(1+(d-1)*exp(2
*b*x+2*a))*a^2+1/4/b/(d-1)*polylog(2,-(d-1)*exp(2*b*x+2*a))*x+1/4/b^2/(d-1)
*polylog(2,-(d-1)*exp(2*b*x+2*a))*a-1/2/b^2*a^2/(d-1)*ln(1+exp(b*x+a)*(1-d)
^(1/2))-1/2/b^2*a^2/(d-1)*ln(1-exp(b*x+a)*(1-d)^(1/2))-1/4*d/(d-1)*ln(1+(d-
1)*exp(2*b*x+2*a))*x^2+1/8/b^2*d/(d-1)*polylog(3,-(d-1)*exp(2*b*x+2*a))-1/2
/b^2*a/(d-1)*dilog(1+exp(b*x+a)*(1-d)^(1/2))-1/2/b^2*a/(d-1)*dilog(1-exp(b*
x+a)*(1-d)^(1/2))+1/8*I*x^2*Pi*csgn(I*(d*exp(2*b*x+2*a)-exp(2*b*x+2*a)+1))*
csgn(I/(exp(2*b*x+2*a)-1)*(d*exp(2*b*x+2*a)-exp(2*b*x+2*a)+1))^2+1/8*I*x^2*
Pi*csgn(I/(exp(2*b*x+2*a)-1))*csgn(I/(exp(2*b*x+2*a)-1)*(d*exp(2*b*x+2*a)-e
xp(2*b*x+2*a)+1))^2-1/8*I*x^2*Pi*csgn(I*d/(exp(2*b*x+2*a)-1)*exp(2*b*x+2*a)
)^3+1/4*x^2*ln(d*exp(2*b*x+2*a)-exp(2*b*x+2*a)+1)-1/8*I*x^2*Pi*csgn(I/(exp(
2*b*x+2*a)-1))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)-1))^2-1/8*I*x^2*Pi*csg
n(I*exp(2*b*x+2*a)/(exp(2*b*x+2*a)-1))*csgn(I*d/(exp(2*b*x+2*a)-1)*exp(2*b*
x+2*a))^2-1/4*I*x^2*Pi*csgn(I/(exp(2*b*x+2*a)-1)*(d*exp(2*b*x+2*a)-exp(2*b*
x+2*a)+1))^2-1/8*I*x^2*Pi*csgn(I*d)*csgn(I*d/(exp(2*b*x+2*a)-1)*exp(2*b*x+2
*a))^2-1/8*I*x^2*Pi*csgn(I*exp(2*b*x+2*a))*csgn(I*exp(2*b*x+2*a)/(exp(2*b*x
+2*a)-1))^2+1/8*I*x^2*Pi*csgn(I*exp(b*x+a))^2*csgn(I*exp(2*b*x+2*a))-1/4*I*
x^2*Pi*csgn(I*exp(b*x+a))*csgn(I*exp(2*b*x+2*a))^2+1/2/b*d*a/(d-1)*ln(1-exp
(b*x+a)*(1-d)^(1/2))*x-1/2/b*d/(d-1)*ln(1+(d-1)*exp(2*b*x+2*a))*x*a+1/2/b*d
*a/(d-1)*ln(1+exp(b*x+a)*(1-d)^(1/2))*x
```

**maxima** [A] time = 1.12, size = 101, normalized size = 0.93

$$\frac{1}{24}\left(\frac{4x^3}{d} - \frac{3\left(2b^2x^2\log\left((d-1)e^{(2bx+2a)}+1\right)+2bx\mathrm{Li}_2\left(-(d-1)e^{(2bx+2a)}\right)-\mathrm{Li}_3(-(d-1)e^{(2bx+2a)})\right)}{b^3d}\right)bd-\frac{1}{2}x^2\,\mathrm{ar}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*arccoth(1-d-d*coth(b*x+a)),x, algorithm="maxima")
```

```
[Out] 1/24*(4*x^3/d - 3*(2*b^2*x^2*log((d - 1)*e^(2*b*x + 2*a) + 1) + 2*b*x*dilog
(-(d - 1)*e^(2*b*x + 2*a)) - polylog(3, -(d - 1)*e^(2*b*x + 2*a)))/(b^3*d))
*b*d - 1/2*x^2*arccoth(d*coth(b*x + a) + d - 1)
```

**mupad** [F] time = 0.00, size = -1, normalized size = -0.01

$$\int -x\,\mathrm{acoth}\left(d+d\coth\left(a+b\,x\right)-1\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(-x*acoth(d + d*coth(a + b*x) - 1),x)
```

```
[Out] int(-x*acoth(d + d*coth(a + b*x) - 1), x)
```

**sympy** [F] time = 0.00, size = 0, normalized size = 0.00

$$\int x\,\mathrm{acoth}\left(-d\coth\left(a+bx\right)-d+1\right)dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*acoth(1-d-d*coth(b*x+a)),x)
```

```
[Out] Integral(x*acoth(-d*coth(a + b*x) - d + 1), x)
```

# 3.229 $\int \coth^{-1}(1-d-d\coth(a+bx))\,dx$

**Optimal**. Leaf size=76

$$-\frac{\text{Li}_2\left((1-d)e^{2a+2bx}\right)}{4b}-\frac{1}{2}x\log\left(1-(1-d)e^{2a+2bx}\right)+x\coth^{-1}(d(-\coth(a+bx))-d+1)+\frac{bx^2}{2}$$

```
[Out] 1/2*b*x^2+x*arccoth(1-d-d*coth(b*x+a))-1/2*x*ln(1-(1-d)*exp(2*b*x+2*a))-1/4
*polylog(2,(1-d)*exp(2*b*x+2*a))/b
```

**Rubi [A]** time = 0.14, antiderivative size = 76, normalized size of antiderivative = 1.00, number of steps used = 5, number of rules used = 5, integrand size = 15, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.333, Rules used = {6234, 2184, 2190, 2279, 2391}

$$-\frac{\text{PolyLog}\left(2,(1-d)e^{2a+2bx}\right)}{4b}-\frac{1}{2}x\log\left(1-(1-d)e^{2a+2bx}\right)+x\coth^{-1}(d(-\coth(a+bx))-d+1)+\frac{bx^2}{2}$$

Antiderivative was successfully verified.

```
[In] Int[ArcCoth[1 - d - d*Coth[a + b*x]],x]
```

```
[Out] (b*x^2)/2 + x*ArcCoth[1 - d - d*Coth[a + b*x]] - (x*Log[1 - (1 - d)*E^(2*a
+ 2*b*x)])/2 - PolyLog[2, (1 - d)*E^(2*a + 2*b*x)]/(4*b)
```

Rule 2184

```
Int[((c_.) + (d_.)*(x_))^(m_.)/((a_) + (b_.)*((F_)^((g_.)*((e_.) + (f_.)*(x
_))))^(n_.)), x_Symbol] :> Simp[(c + d*x)^(m + 1)/(a*d*(m + 1)), x] - Dist[
b/a, Int[((c + d*x)^m*(F^(g*(e + f*x)))^n)/(a + b*(F^(g*(e + f*x)))^n), x],
 x] /; FreeQ[{F, a, b, c, d, e, f, g, n}, x] && IGtQ[m, 0]
```

Rule 2190

```
Int[(((F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m_.))/
((a_) + (b_.)*((F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)), x_Symbol] :> Simp
[((c + d*x)^m*Log[1 + (b*(F^(g*(e + f*x)))^n)/a])/(b*f*g*n*Log[F]), x] - Di
st[(d*m)/(b*f*g*n*Log[F]), Int[(c + d*x)^(m - 1)*Log[1 + (b*(F^(g*(e + f*x)
))^n)/a], x], x] /; FreeQ[{F, a, b, c, d, e, f, g, n}, x] && IGtQ[m, 0]
```

Rule 2279

```
Int[Log[(a_) + (b_.)*((F_)^((e_.)*((c_.) + (d_.)*(x_))))^(n_.)], x_Symbol]
:> Dist[1/(d*e*n*Log[F]), Subst[Int[Log[a + b*x]/x, x], x, (F^(e*(c + d*x))
)^n], x] /; FreeQ[{F, a, b, c, d, e, n}, x] && GtQ[a, 0]
```

Rule 2391

```
Int[Log[(c_.)*((d_) + (e_.)*(x_)^(n_.))]/(x_), x_Symbol] :> -Simp[PolyLog[2
, -(c*e*x^n)]/n, x] /; FreeQ[{c, d, e, n}, x] && EqQ[c*d, 1]
```

Rule 6234

```
Int[ArcCoth[(c_.) + Coth[(a_.) + (b_.)*(x_)]*(d_.)], x_Symbol] :> Simp[x*Ar
cCoth[c + d*Coth[a + b*x]], x] + Dist[b, Int[x/(c - d - c*E^(2*a + 2*b*x)),
 x], x] /; FreeQ[{a, b, c, d}, x] && EqQ[(c - d)^2, 1]
```

Rubi steps

$$\int \coth^{-1}(1-d-d\coth(a+bx))\,dx = x\coth^{-1}(1-d-d\coth(a+bx)) + b\int \frac{x}{1+(-1+d)e^{2a+2bx}}\,dx$$
$$= \frac{bx^2}{2} + x\coth^{-1}(1-d-d\coth(a+bx)) + (b(1-d))\int \frac{e^{2a+2bx}x}{1+(-1+d)e^{2a+2bx}}$$
$$= \frac{bx^2}{2} + x\coth^{-1}(1-d-d\coth(a+bx)) - \frac{1}{2}x\log\left(1-(1-d)e^{2a+2bx}\right) + \frac{1}{2}$$
$$= \frac{bx^2}{2} + x\coth^{-1}(1-d-d\coth(a+bx)) - \frac{1}{2}x\log\left(1-(1-d)e^{2a+2bx}\right) + \frac{\text{Su}}{}$$
$$= \frac{bx^2}{2} + x\coth^{-1}(1-d-d\coth(a+bx)) - \frac{1}{2}x\log\left(1-(1-d)e^{2a+2bx}\right) - \frac{\text{Li}}{}$$

**Mathematica [B]** time = 0.79, size = 208, normalized size = 2.74

$$\frac{-2\text{Li}_2\left(-\sqrt{1-d}\,e^{a+bx}\right) - 2\text{Li}_2\left(\sqrt{1-d}\,e^{a+bx}\right) - 2\log\left(e^{a+bx}\right)\log\left(1-\sqrt{1-d}\,e^{a+bx}\right) - 2\log\left(e^{a+bx}\right)\log\left(\sqrt{1-d}\,e^{a+b}\right.}{}$$

Warning: Unable to verify antiderivative.

```
[In] Integrate[ArcCoth[1 - d - d*Coth[a + b*x]],x]
```

```
[Out] x*ArcCoth[1 - d - d*Coth[a + b*x]] + (b^2*x^2 + Log[E^(a + b*x)]^2 - 2*Log[
E^(a + b*x)]*Log[1 - Sqrt[1 - d]*E^(a + b*x)] - 2*Log[E^(a + b*x)]*Log[1 +
Sqrt[1 - d]*E^(a + b*x)] + 2*Log[E^(a + b*x)]*Log[E^(-a - b*x)*(1 + (-1 + d
)*E^(2*(a + b*x)))] - 2*b*x*Log[d*Cosh[a + b*x] + (-2 + d)*Sinh[a + b*x]] -
 2*PolyLog[2, -(Sqrt[1 - d]*E^(a + b*x))] - 2*PolyLog[2, Sqrt[1 - d]*E^(a +
 b*x)])/(4*b)
```

**fricas [B]** time = 0.84, size = 239, normalized size = 3.14

$$\frac{b^2x^2 - bx\log\left(\frac{d\cosh(bx+a)+d\sinh(bx+a)}{d\cosh(bx+a)+(d-2)\sinh(bx+a)}\right) + a\log\left(2\,(d-1)\cosh\,(bx+a) + 2\,(d-1)\sinh\,(bx+a) + \sqrt{-4\,d+4}\right) +}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(1-d-d*coth(b*x+a)),x, algorithm="fricas")
```

```
[Out] 1/2*(b^2*x^2 - b*x*log((d*cosh(b*x + a) + d*sinh(b*x + a))/(d*cosh(b*x + a)
 + (d - 2)*sinh(b*x + a))) + a*log(2*(d - 1)*cosh(b*x + a) + 2*(d - 1)*sinh
(b*x + a) + sqrt(-4*d + 4)) + a*log(2*(d - 1)*cosh(b*x + a) + 2*(d - 1)*sin
h(b*x + a) - sqrt(-4*d + 4)) - (b*x + a)*log(1/2*sqrt(-4*d + 4)*(cosh(b*x +
 a) + sinh(b*x + a)) + 1) - (b*x + a)*log(-1/2*sqrt(-4*d + 4)*(cosh(b*x + a
) + sinh(b*x + a)) + 1) - dilog(1/2*sqrt(-4*d + 4)*(cosh(b*x + a) + sinh(b*
x + a))) - dilog(-1/2*sqrt(-4*d + 4)*(cosh(b*x + a) + sinh(b*x + a))))/b
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \operatorname{arcoth}\left(-d\coth\left(bx+a\right)-d+1\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(1-d-d*coth(b*x+a)),x, algorithm="giac")
```

```
[Out] integrate(arccoth(-d*coth(b*x + a) - d + 1), x)
```

**maple [B]** time = 0.52, size = 271, normalized size = 3.57

$$-\frac{\operatorname{arccoth}\left(1-d-d\coth\left(bx+a\right)\right)\ln\left(-d\coth\left(bx+a\right)+d\right)}{2b} + \frac{\operatorname{arccoth}\left(1-d-d\coth\left(bx+a\right)\right)\ln\left(-d\coth\left(bx+\right.\right.}{2b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(arccoth(1-d-d*coth(b*x+a)),x)
```

```
[Out] -1/2/b*arccoth(1-d-d*coth(b*x+a))*ln(-d*coth(b*x+a)+d)+1/2/b*arccoth(1-d-d*
coth(b*x+a))*ln(-d*coth(b*x+a)-d)+1/8/b*ln(-d*coth(b*x+a)-d)^2-1/4/b*dilog(
1-1/2*d*coth(b*x+a)-1/2*d)-1/4/b*ln(-d*coth(b*x+a)-d)*ln(1-1/2*d*coth(b*x+a
)-1/2*d)-1/4/b*dilog(-1/2*(-d*coth(b*x+a)-d)/d)-1/4/b*ln(-d*coth(b*x+a)+d)*
ln(-1/2*(-d*coth(b*x+a)-d)/d)+1/4/b*dilog((-d*coth(b*x+a)-d+2)/(-2*d+2))+1/
4/b*ln(-d*coth(b*x+a)+d)*ln((-d*coth(b*x+a)-d+2)/(-2*d+2))
```

**maxima** [A] time = 1.11, size = 73, normalized size = 0.96

$$\frac{1}{4}\,bd\left(\frac{2\,x^2}{d}-\frac{2\,bx\log\left((d-1)e^{(2\,bx+2\,a)}+1\right)+\mathrm{Li}_2\left(-(d-1)e^{(2\,bx+2\,a)}\right)}{b^2d}\right)-x\,\mathrm{arcoth}\left(d\coth\left(bx+a\right)+d-1\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(1-d-d*coth(b*x+a)),x, algorithm="maxima")
```

```
[Out] 1/4*b*d*(2*x^2/d - (2*b*x*log((d - 1)*e^(2*b*x + 2*a) + 1) + dilog(-(d - 1)
*e^(2*b*x + 2*a)))/(b^2*d)) - x*arccoth(d*coth(b*x + a) + d - 1)
```

**mupad** [F] time = 0.00, size = -1, normalized size = -0.01

$$\int -\mathrm{acoth}\left(d+d\coth\left(a+b\,x\right)-1\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(-acoth(d + d*coth(a + b*x) - 1),x)
```

```
[Out] int(-acoth(d + d*coth(a + b*x) - 1), x)
```

**sympy** [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \mathrm{acoth}\left(-d\coth\left(a+bx\right)-d+1\right)dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(1-d-d*coth(b*x+a)),x)
```

```
[Out] Integral(acoth(-d*coth(a + b*x) - d + 1), x)
```

## 3.230 $\int \frac{\coth^{-1}(1-d-d\coth(a+bx))}{x}\,dx$

**Optimal**. Leaf size=22

$$\text{Int}\left(\frac{\coth^{-1}(d(-\coth(a+bx))-d+1)}{x},x\right)$$

[Out] CannotIntegrate(arccoth(1-d-d*coth(b*x+a))/x,x)

**Rubi** [A] time = 0.08, antiderivative size = 0, normalized size of antiderivative = 0.00, number of steps used = 0, number of rules used = 0, integrand size = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int \frac{\coth^{-1}(1-d-d\coth(a+bx))}{x}\,dx$$

Verification is Not applicable to the result.

[In] Int[ArcCoth[1 - d - d*Coth[a + b*x]]/x,x]

[Out] Defer[Int][ArcCoth[1 - d - d*Coth[a + b*x]]/x, x]

Rubi steps

$$\int \frac{\coth^{-1}(1-d-d\coth(a+bx))}{x}\,dx=\int \frac{\coth^{-1}(1-d-d\coth(a+bx))}{x}\,dx$$

**Mathematica** [A] time = 3.63, size = 0, normalized size = 0.00

$$\int \frac{\coth^{-1}(1-d-d\coth(a+bx))}{x}\,dx$$

Verification is Not applicable to the result.

[In] Integrate[ArcCoth[1 - d - d*Coth[a + b*x]]/x,x]

[Out] Integrate[ArcCoth[1 - d - d*Coth[a + b*x]]/x, x]

**fricas** [A] time = 0.42, size = 0, normalized size = 0.00

$$\text{integral}\left(-\frac{\text{arcoth}\left(d\coth\left(bx+a\right)+d-1\right)}{x},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

[In] integrate(arccoth(1-d-d*coth(b*x+a))/x,x, algorithm="fricas")

[Out] integral(-arccoth(d*coth(b*x + a) + d - 1)/x, x)

**giac** [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\text{arcoth}\left(-d\coth\left(bx+a\right)-d+1\right)}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

[In] integrate(arccoth(1-d-d*coth(b*x+a))/x,x, algorithm="giac")

[Out] integrate(arccoth(-d*coth(b*x + a) - d + 1)/x, x)

**maple** [A] time = 1.20, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{arccoth}(1 - d - d\coth(bx + a))}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(arccoth(1-d-d*coth(b*x+a))/x,x)
[Out] int(arccoth(1-d-d*coth(b*x+a))/x,x)
```

**maxima** [A] time = 0.00, size = 0, normalized size = 0.00

$$-\int \frac{\operatorname{arcoth}(d\coth(bx + a) + d - 1)}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(1-d-d*coth(b*x+a))/x,x, algorithm="maxima")
[Out] -integrate(arccoth(d*coth(b*x + a) + d - 1)/x, x)
```

**mupad** [A] time = 0.00, size = -1, normalized size = -0.05

$$\int -\frac{\operatorname{acoth}(d + d\coth(a + b\,x) - 1)}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(-acoth(d + d*coth(a + b*x) - 1)/x,x)
[Out] int(-acoth(d + d*coth(a + b*x) - 1)/x, x)
```

**sympy** [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{acoth}(-d\coth(a + bx) - d + 1)}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(1-d-d*coth(b*x+a))/x,x)
[Out] Integral(acoth(-d*coth(a + b*x) - d + 1)/x, x)
```

# 3.231 $\int (e+fx)^3 \coth^{-1}(\tan(a+bx))\,dx$

**Optimal**. Leaf size=302

$$-\frac{3f^3\text{Li}_5\left(-ie^{2i(a+bx)}\right)}{16b^4}+\frac{3f^3\text{Li}_5\left(ie^{2i(a+bx)}\right)}{16b^4}+\frac{3if^2(e+fx)\text{Li}_4\left(-ie^{2i(a+bx)}\right)}{8b^3}-\frac{3if^2(e+fx)\text{Li}_4\left(ie^{2i(a+bx)}\right)}{8b^3}+\frac{3f(e+fx)^2}{}$$

```
[Out] 1/4*(f*x+e)^4*arccoth(tan(b*x+a))/f+1/4*I*(f*x+e)^4*arctan(exp(2*I*(b*x+a))
)/f-1/4*I*(f*x+e)^3*polylog(2,-I*exp(2*I*(b*x+a)))/b+1/4*I*(f*x+e)^3*polylo
g(2,I*exp(2*I*(b*x+a)))/b+3/8*f*(f*x+e)^2*polylog(3,-I*exp(2*I*(b*x+a)))/b^
2-3/8*f*(f*x+e)^2*polylog(3,I*exp(2*I*(b*x+a)))/b^2+3/8*I*f^2*(f*x+e)*polyl
og(4,-I*exp(2*I*(b*x+a)))/b^3-3/8*I*f^2*(f*x+e)*polylog(4,I*exp(2*I*(b*x+a)
))/b^3-3/16*f^3*polylog(5,-I*exp(2*I*(b*x+a)))/b^4+3/16*f^3*polylog(5,I*exp
(2*I*(b*x+a)))/b^4
```

**Rubi [A]** time = 0.24, antiderivative size = 302, normalized size of antiderivative = 1.00, number of steps used = 12, number of rules used = 6, integrand size = 15, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.400, Rules used = {6252, 4181, 2531, 6609, 2282, 6589}

$$\frac{3if^2(e+fx)\text{PolyLog}\left(4,-ie^{2i(a+bx)}\right)}{8b^3}-\frac{3if^2(e+fx)\text{PolyLog}\left(4,ie^{2i(a+bx)}\right)}{8b^3}+\frac{3f(e+fx)^2\text{PolyLog}\left(3,-ie^{2i(a+bx)}\right)}{8b^2}-$$

Antiderivative was successfully verified.

```
[In] Int[(e + f*x)^3*ArcCoth[Tan[a + b*x]],x]
```

```
[Out] ((e + f*x)^4*ArcCoth[Tan[a + b*x]])/(4*f) + ((I/4)*(e + f*x)^4*ArcTan[E^((2
*I)*(a + b*x))])/f - ((I/4)*(e + f*x)^3*PolyLog[2, (-I)*E^((2*I)*(a + b*x))
])/b + ((I/4)*(e + f*x)^3*PolyLog[2, I*E^((2*I)*(a + b*x))])/b + (3*f*(e +
f*x)^2*PolyLog[3, (-I)*E^((2*I)*(a + b*x))])/(8*b^2) - (3*f*(e + f*x)^2*Pol
yLog[3, I*E^((2*I)*(a + b*x))])/(8*b^2) + (((3*I)/8)*f^2*(e + f*x)*PolyLog[
4, (-I)*E^((2*I)*(a + b*x))])/b^3 - (((3*I)/8)*f^2*(e + f*x)*PolyLog[4, I*E
^((2*I)*(a + b*x))])/b^3 - (3*f^3*PolyLog[5, (-I)*E^((2*I)*(a + b*x))])/(16
*b^4) + (3*f^3*PolyLog[5, I*E^((2*I)*(a + b*x))])/(16*b^4)
```

Rule 2282

```
Int[u_, x_Symbol] :> With[{v = FunctionOfExponential[u, x]}, Dist[v/D[v, x]
, Subst[Int[FunctionOfExponentialFunction[u, x]/x, x], x, v], x]] /; Functi
onOfExponentialQ[u, x] && !MatchQ[u, (w_)*((a_.)*(v_)^(n_))^(m_) /; FreeQ[
{a, m, n}, x] && IntegerQ[m*n]] && !MatchQ[u, E^((c_.)*((a_.) + (b_.)*x))*
(F_)[v_] /; FreeQ[{a, b, c}, x] && InverseFunctionQ[F[x]]]
```

Rule 2531

```
Int[Log[1 + (e_.)*((F_)^((c_.)*((a_.) + (b_.)*(x_))))^(n_.)]*((f_.) + (g_.)
*(x_))^(m_.), x_Symbol] :> -Simp[((f + g*x)^m*PolyLog[2, -(e*(F^(c*(a + b*x
)))^n)])/(b*c*n*Log[F]), x] + Dist[(g*m)/(b*c*n*Log[F]), Int[(f + g*x)^(m -
 1)*PolyLog[2, -(e*(F^(c*(a + b*x)))^n)], x], x] /; FreeQ[{F, a, b, c, e, f
, g, n}, x] && GtQ[m, 0]
```

Rule 4181

```
Int[csc[(e_.) + Pi*(k_.) + (f_.)*(x_)]*((c_.) + (d_.)*(x_))^(m_.), x_Symbol
] :> Simp[(-2*(c + d*x)^m*ArcTanh[E^(I*k*Pi)*E^(I*(e + f*x))])/f, x] + (-Di
st[(d*m)/f, Int[(c + d*x)^(m - 1)*Log[1 - E^(I*k*Pi)*E^(I*(e + f*x))], x],
x] + Dist[(d*m)/f, Int[(c + d*x)^(m - 1)*Log[1 + E^(I*k*Pi)*E^(I*(e + f*x))
], x], x]) /; FreeQ[{c, d, e, f}, x] && IntegerQ[2*k] && IGtQ[m, 0]
```

Rule 6252

```
Int[ArcCoth[Tan[(a_.) + (b_.)*(x_)]]*((e_.) + (f_.)*(x_))^(m_.), x_Symbol]
:> Simp[((e + f*x)^(m + 1)*ArcCoth[Tan[a + b*x]])/(f*(m + 1)), x] - Dist[b/
(f*(m + 1)), Int[(e + f*x)^(m + 1)*Sec[2*a + 2*b*x], x], x] /; FreeQ[{a, b,
 e, f}, x] && IGtQ[m, 0]
```

Rule 6589

```
Int[PolyLog[n_, (c_.)*((a_.) + (b_.)*(x_))^(p_.)]/((d_.) + (e_.)*(x_)), x_S
ymbol] :> Simp[PolyLog[n + 1, c*(a + b*x)^p]/(e*p), x] /; FreeQ[{a, b, c, d
, e, n, p}, x] && EqQ[b*d, a*e]
```

Rule 6609

```
Int[((e_.) + (f_.)*(x_))^(m_.)*PolyLog[n_, (d_.)*((F_)^((c_.)*((a_.) + (b_.
)*(x_))))^(p_.)], x_Symbol] :> Simp[((e + f*x)^m*PolyLog[n + 1, d*(F^(c*(a
+ b*x)))^p])/(b*c*p*Log[F]), x] - Dist[(f*m)/(b*c*p*Log[F]), Int[(e + f*x)^
(m - 1)*PolyLog[n + 1, d*(F^(c*(a + b*x)))^p], x], x] /; FreeQ[{F, a, b, c,
 d, e, f, n, p}, x] && GtQ[m, 0]
```

Rubi steps

$$\int (e+fx)^3 \coth^{-1}(\tan(a+bx))\,dx = \frac{(e+fx)^4\coth^{-1}(\tan(a+bx))}{4f} - \frac{b\int (e+fx)^4\sec(2a+2bx)\,dx}{4f}$$

$$= \frac{(e+fx)^4\coth^{-1}(\tan(a+bx))}{4f} + \frac{i(e+fx)^4\tan^{-1}\left(e^{2i(a+bx)}\right)}{4f} + \frac{1}{2}\int (e+$$

$$= \frac{(e+fx)^4\coth^{-1}(\tan(a+bx))}{4f} + \frac{i(e+fx)^4\tan^{-1}\left(e^{2i(a+bx)}\right)}{4f} - \frac{i(e+fx)^3}{}$$

$$= \frac{(e+fx)^4\coth^{-1}(\tan(a+bx))}{4f} + \frac{i(e+fx)^4\tan^{-1}\left(e^{2i(a+bx)}\right)}{4f} - \frac{i(e+fx)^3}{}$$

$$= \frac{(e+fx)^4\coth^{-1}(\tan(a+bx))}{4f} + \frac{i(e+fx)^4\tan^{-1}\left(e^{2i(a+bx)}\right)}{4f} - \frac{i(e+fx)^3}{}$$

$$= \frac{(e+fx)^4\coth^{-1}(\tan(a+bx))}{4f} + \frac{i(e+fx)^4\tan^{-1}\left(e^{2i(a+bx)}\right)}{4f} - \frac{i(e+fx)^3}{}$$

$$= \frac{(e+fx)^4\coth^{-1}(\tan(a+bx))}{4f} + \frac{i(e+fx)^4\tan^{-1}\left(e^{2i(a+bx)}\right)}{4f} - \frac{i(e+fx)^3}{}$$

**Mathematica [B]** time = 0.35, size = 654, normalized size = 2.17

$$\frac{1}{4}x\left(4e^3+6e^2fx+4ef^2x^2+f^3x^3\right)\coth^{-1}(\tan(a+bx)) + \frac{-8b^4e^3x\log\left(1-ie^{2i(a+bx)}\right)+8b^4e^3x\log\left(1+ie^{2i(a+bx)}\right)}{}$$

Antiderivative was successfully verified.

```
[In] Integrate[(e + f*x)^3*ArcCoth[Tan[a + b*x]],x]
```

```
[Out] (x*(4*e^3 + 6*e^2*f*x + 4*e*f^2*x^2 + f^3*x^3)*ArcCoth[Tan[a + b*x]])/4 + (
-8*b^4*e^3*x*Log[1 - I*E^((2*I)*(a + b*x))] - 12*b^4*e^2*f*x^2*Log[1 - I*E^
((2*I)*(a + b*x))] - 8*b^4*e*f^2*x^3*Log[1 - I*E^((2*I)*(a + b*x))] - 2*b^4
*f^3*x^4*Log[1 - I*E^((2*I)*(a + b*x))] + 8*b^4*e^3*x*Log[1 + I*E^((2*I)*(a
 + b*x))] + 12*b^4*e^2*f*x^2*Log[1 + I*E^((2*I)*(a + b*x))] + 8*b^4*e*f^2*x
^3*Log[1 + I*E^((2*I)*(a + b*x))] + 2*b^4*f^3*x^4*Log[1 + I*E^((2*I)*(a + b
*x))] - (4*I)*b^3*(e + f*x)^3*PolyLog[2, (-I)*E^((2*I)*(a + b*x))] + (4*I)*
```

```
b^3*(e + f*x)^3*PolyLog[2, I*E^((2*I)*(a + b*x))] + 6*b^2*e^2*f*PolyLog[3,
(-I)*E^((2*I)*(a + b*x))] + 12*b^2*e*f^2*x*PolyLog[3, (-I)*E^((2*I)*(a + b*
x))] + 6*b^2*f^3*x^2*PolyLog[3, (-I)*E^((2*I)*(a + b*x))] - 6*b^2*e^2*f*Pol
yLog[3, I*E^((2*I)*(a + b*x))] - 12*b^2*e*f^2*x*PolyLog[3, I*E^((2*I)*(a +
b*x))] - 6*b^2*f^3*x^2*PolyLog[3, I*E^((2*I)*(a + b*x))] + (6*I)*b*e*f^2*Po
lyLog[4, (-I)*E^((2*I)*(a + b*x))] + (6*I)*b*f^3*x*PolyLog[4, (-I)*E^((2*I)
*(a + b*x))] - (6*I)*b*e*f^2*PolyLog[4, I*E^((2*I)*(a + b*x))] - (6*I)*b*f^
3*x*PolyLog[4, I*E^((2*I)*(a + b*x))] - 3*f^3*PolyLog[5, (-I)*E^((2*I)*(a +
 b*x))] + 3*f^3*PolyLog[5, I*E^((2*I)*(a + b*x))])/(16*b^4)
```

**fricas [C]** time = 0.77, size = 1808, normalized size = 5.99

result too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((f*x+e)^3*arccoth(tan(b*x+a)),x, algorithm="fricas")
```

```
[Out] -1/32*(3*f^3*polylog(5, (I*tan(b*x + a)^2 + 2*tan(b*x + a) - I)/(tan(b*x +
a)^2 + 1)) - 3*f^3*polylog(5, (I*tan(b*x + a)^2 - 2*tan(b*x + a) - I)/(tan(
b*x + a)^2 + 1)) + 3*f^3*polylog(5, (-I*tan(b*x + a)^2 + 2*tan(b*x + a) + I
)/(tan(b*x + a)^2 + 1)) - 3*f^3*polylog(5, (-I*tan(b*x + a)^2 - 2*tan(b*x +
 a) + I)/(tan(b*x + a)^2 + 1)) - (4*I*b^3*f^3*x^3 + 12*I*b^3*e*f^2*x^2 + 12
*I*b^3*e^2*f*x + 4*I*b^3*e^3)*dilog(-((I + 1)*tan(b*x + a)^2 + 2*tan(b*x +
a) - I + 1)/(tan(b*x + a)^2 + 1) + 1) - (4*I*b^3*f^3*x^3 + 12*I*b^3*e*f^2*x
^2 + 12*I*b^3*e^2*f*x + 4*I*b^3*e^3)*dilog(-((I + 1)*tan(b*x + a)^2 - 2*tan
(b*x + a) - I + 1)/(tan(b*x + a)^2 + 1) + 1) - (-4*I*b^3*f^3*x^3 - 12*I*b^3
*e*f^2*x^2 - 12*I*b^3*e^2*f*x - 4*I*b^3*e^3)*dilog(-(-(I - 1)*tan(b*x + a)^
2 + 2*tan(b*x + a) + I + 1)/(tan(b*x + a)^2 + 1) + 1) - (-4*I*b^3*f^3*x^3 -
 12*I*b^3*e*f^2*x^2 - 12*I*b^3*e^2*f*x - 4*I*b^3*e^3)*dilog(-(-(I - 1)*tan(
b*x + a)^2 - 2*tan(b*x + a) + I + 1)/(tan(b*x + a)^2 + 1) + 1) + 2*(b^4*f^3
*x^4 + 4*b^4*e*f^2*x^3 + 6*b^4*e^2*f*x^2 + 4*b^4*e^3*x + 4*a*b^3*e^3 - 6*a^
2*b^2*e^2*f + 4*a^3*b*e*f^2 - a^4*f^3)*log(((I + 1)*tan(b*x + a)^2 + 2*tan(
b*x + a) - I + 1)/(tan(b*x + a)^2 + 1)) - 2*(4*a*b^3*e^3 - 6*a^2*b^2*e^2*f
+ 4*a^3*b*e*f^2 - a^4*f^3)*log(((I + 1)*tan(b*x + a)^2 + 2*I*tan(b*x + a) +
 I - 1)/(tan(b*x + a)^2 + 1)) + 2*(4*a*b^3*e^3 - 6*a^2*b^2*e^2*f + 4*a^3*b*
e*f^2 - a^4*f^3)*log(((I + 1)*tan(b*x + a)^2 - 2*I*tan(b*x + a) + I - 1)/(t
an(b*x + a)^2 + 1)) - 2*(b^4*f^3*x^4 + 4*b^4*e*f^2*x^3 + 6*b^4*e^2*f*x^2 +
4*b^4*e^3*x + 4*a*b^3*e^3 - 6*a^2*b^2*e^2*f + 4*a^3*b*e*f^2 - a^4*f^3)*log(
((I + 1)*tan(b*x + a)^2 - 2*tan(b*x + a) - I + 1)/(tan(b*x + a)^2 + 1)) + 2
*(b^4*f^3*x^4 + 4*b^4*e*f^2*x^3 + 6*b^4*e^2*f*x^2 + 4*b^4*e^3*x + 4*a*b^3*e
^3 - 6*a^2*b^2*e^2*f + 4*a^3*b*e*f^2 - a^4*f^3)*log((-(I - 1)*tan(b*x + a)^
2 + 2*tan(b*x + a) + I + 1)/(tan(b*x + a)^2 + 1)) - 2*(b^4*f^3*x^4 + 4*b^4*
e*f^2*x^3 + 6*b^4*e^2*f*x^2 + 4*b^4*e^3*x + 4*a*b^3*e^3 - 6*a^2*b^2*e^2*f +
 4*a^3*b*e*f^2 - a^4*f^3)*log((-(I - 1)*tan(b*x + a)^2 - 2*tan(b*x + a) + I
 + 1)/(tan(b*x + a)^2 + 1)) - 2*(4*a*b^3*e^3 - 6*a^2*b^2*e^2*f + 4*a^3*b*e*
f^2 - a^4*f^3)*log(((I - 1)*tan(b*x + a)^2 + 2*I*tan(b*x + a) + I + 1)/(tan
(b*x + a)^2 + 1)) + 2*(4*a*b^3*e^3 - 6*a^2*b^2*e^2*f + 4*a^3*b*e*f^2 - a^4*
f^3)*log(((I - 1)*tan(b*x + a)^2 - 2*I*tan(b*x + a) + I + 1)/(tan(b*x + a)^
2 + 1)) - 4*(b^4*f^3*x^4 + 4*b^4*e*f^2*x^3 + 6*b^4*e^2*f*x^2 + 4*b^4*e^3*x)
*log((tan(b*x + a) + 1)/(tan(b*x + a) - 1)) - (6*I*b*f^3*x + 6*I*b*e*f^2)*p
olylog(4, (I*tan(b*x + a)^2 + 2*tan(b*x + a) - I)/(tan(b*x + a)^2 + 1)) - (
6*I*b*f^3*x + 6*I*b*e*f^2)*polylog(4, (I*tan(b*x + a)^2 - 2*tan(b*x + a) -
I)/(tan(b*x + a)^2 + 1)) - (-6*I*b*f^3*x - 6*I*b*e*f^2)*polylog(4, (-I*tan(
b*x + a)^2 + 2*tan(b*x + a) + I)/(tan(b*x + a)^2 + 1)) - (-6*I*b*f^3*x - 6*
I*b*e*f^2)*polylog(4, (-I*tan(b*x + a)^2 - 2*tan(b*x + a) + I)/(tan(b*x + a
)^2 + 1)) - 6*(b^2*f^3*x^2 + 2*b^2*e*f^2*x + b^2*e^2*f)*polylog(3, (I*tan(b
*x + a)^2 + 2*tan(b*x + a) - I)/(tan(b*x + a)^2 + 1)) + 6*(b^2*f^3*x^2 + 2*
b^2*e*f^2*x + b^2*e^2*f)*polylog(3, (I*tan(b*x + a)^2 - 2*tan(b*x + a) - I)
/(tan(b*x + a)^2 + 1)) - 6*(b^2*f^3*x^2 + 2*b^2*e*f^2*x + b^2*e^2*f)*polylo
g(3, (-I*tan(b*x + a)^2 + 2*tan(b*x + a) + I)/(tan(b*x + a)^2 + 1)) + 6*(b^
```

```
2*f^3*x^2 + 2*b^2*e*f^2*x + b^2*e^2*f)*polylog(3, (-I*tan(b*x + a)^2 - 2*ta
n(b*x + a) + I)/(tan(b*x + a)^2 + 1)))/b^4
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int (fx+e)^3 \operatorname{arcoth}(\tan(bx+a))\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((f*x+e)^3*arccoth(tan(b*x+a)),x, algorithm="giac")
```

```
[Out] integrate((f*x + e)^3*arccoth(tan(b*x + a)), x)
```

**maple [C]** time = 50.40, size = 7429, normalized size = 24.60

output too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((f*x+e)^3*arccoth(tan(b*x+a)),x)
```

```
[Out] result too large to display
```

**maxima [F]** time = 0.00, size = 0, normalized size = 0.00

$$\frac{1}{16}\left(f^3x^4+4ef^2x^3+6e^2fx^2+4e^3x\right)\log\left(2\cos(2bx+2a)^2+2\sin(2bx+2a)^2+4\sin(2bx+2a)+2\right)-\frac{1}{1}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((f*x+e)^3*arccoth(tan(b*x+a)),x, algorithm="maxima")
```

```
[Out] 1/16*(f^3*x^4 + 4*e*f^2*x^3 + 6*e^2*f*x^2 + 4*e^3*x)*log(2*cos(2*b*x + 2*a)
^2 + 2*sin(2*b*x + 2*a)^2 + 4*sin(2*b*x + 2*a) + 2) - 1/16*(f^3*x^4 + 4*e*f
^2*x^3 + 6*e^2*f*x^2 + 4*e^3*x)*log(2*cos(2*b*x + 2*a)^2 + 2*sin(2*b*x + 2*
a)^2 - 4*sin(2*b*x + 2*a) + 2) - integrate(1/2*((b*f^3*x^4 + 4*b*e*f^2*x^3
+ 6*b*e^2*f*x^2 + 4*b*e^3*x)*cos(4*b*x + 4*a)*cos(2*b*x + 2*a) + (b*f^3*x^4
 + 4*b*e*f^2*x^3 + 6*b*e^2*f*x^2 + 4*b*e^3*x)*sin(4*b*x + 4*a)*sin(2*b*x +
2*a) + (b*f^3*x^4 + 4*b*e*f^2*x^3 + 6*b*e^2*f*x^2 + 4*b*e^3*x)*cos(2*b*x +
2*a))/(cos(4*b*x + 4*a)^2 + sin(4*b*x + 4*a)^2 + 2*cos(4*b*x + 4*a) + 1), x
)
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.00

$$\int \operatorname{acoth}(\tan(a+b\,x))\,{\left(e+f\,x\right)}^3 \,d x$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(tan(a + b*x))*(e + f*x)^3,x)
```

```
[Out] int(acoth(tan(a + b*x))*(e + f*x)^3, x)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int (e+fx)^3 \operatorname{acoth}(\tan(a+bx))\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((f*x+e)**3*acoth(tan(b*x+a)),x)
```

```
[Out] Integral((e + f*x)**3*acoth(tan(a + b*x)), x)
```

# 3.232 $\int (e+fx)^2 \coth^{-1}(\tan(a+bx))\,dx$

**Optimal**. Leaf size=234

$$\frac{if^2\text{Li}_4\left(-ie^{2i(a+bx)}\right)}{8b^3}-\frac{if^2\text{Li}_4\left(ie^{2i(a+bx)}\right)}{8b^3}+\frac{f(e+fx)\text{Li}_3\left(-ie^{2i(a+bx)}\right)}{4b^2}-\frac{f(e+fx)\text{Li}_3\left(ie^{2i(a+bx)}\right)}{4b^2}-\frac{i(e+fx)^2\text{Li}_2\left(-ie^{2i(a}\right.}{4b}$$

```
[Out] 1/3*(f*x+e)^3*arccoth(tan(b*x+a))/f+1/3*I*(f*x+e)^3*arctan(exp(2*I*(b*x+a))
)/f-1/4*I*(f*x+e)^2*polylog(2,-I*exp(2*I*(b*x+a)))/b+1/4*I*(f*x+e)^2*polylo
g(2,I*exp(2*I*(b*x+a)))/b+1/4*f*(f*x+e)*polylog(3,-I*exp(2*I*(b*x+a)))/b^2-
1/4*f*(f*x+e)*polylog(3,I*exp(2*I*(b*x+a)))/b^2+1/8*I*f^2*polylog(4,-I*exp(
2*I*(b*x+a)))/b^3-1/8*I*f^2*polylog(4,I*exp(2*I*(b*x+a)))/b^3
```

**Rubi [A]** time = 0.17, antiderivative size = 234, normalized size of antiderivative = 1.00, number of steps used = 10, number of rules used = 6, integrand size = 15, $\frac{\text{number of rules}}{\text{integrand size}} = 0.400$, Rules used = {6252, 4181, 2531, 6609, 2282, 6589}

$$\frac{f(e+fx)\text{PolyLog}\left(3,-ie^{2i(a+bx)}\right)}{4b^2}-\frac{f(e+fx)\text{PolyLog}\left(3,ie^{2i(a+bx)}\right)}{4b^2}+\frac{if^2\text{PolyLog}\left(4,-ie^{2i(a+bx)}\right)}{8b^3}-\frac{if^2\text{PolyLog}\left(4,\right.}{8b^3}$$

Antiderivative was successfully verified.

```
[In] Int[(e + f*x)^2*ArcCoth[Tan[a + b*x]],x]
```

```
[Out] ((e + f*x)^3*ArcCoth[Tan[a + b*x]])/(3*f) + ((I/3)*(e + f*x)^3*ArcTan[E^((2
*I)*(a + b*x))])/f - ((I/4)*(e + f*x)^2*PolyLog[2, (-I)*E^((2*I)*(a + b*x))
])/b + ((I/4)*(e + f*x)^2*PolyLog[2, I*E^((2*I)*(a + b*x))])/b + (f*(e + f*
x)*PolyLog[3, (-I)*E^((2*I)*(a + b*x))])/(4*b^2) - (f*(e + f*x)*PolyLog[3,
I*E^((2*I)*(a + b*x))])/(4*b^2) + ((I/8)*f^2*PolyLog[4, (-I)*E^((2*I)*(a +
b*x))])/b^3 - ((I/8)*f^2*PolyLog[4, I*E^((2*I)*(a + b*x))])/b^3
```

Rule 2282

```
Int[u_, x_Symbol] :> With[{v = FunctionOfExponential[u, x]}, Dist[v/D[v, x]
, Subst[Int[FunctionOfExponentialFunction[u, x]/x, x], x, v], x]] /; Functi
onOfExponentialQ[u, x] &&  !MatchQ[u, (w_)*((a_.)*(v_)^(n_))^(m_) /; FreeQ[
{a, m, n}, x] && IntegerQ[m*n]] &&  !MatchQ[u, E^((c_.)*((a_.) + (b_.)*x))*
(F_)[v_] /; FreeQ[{a, b, c}, x] && InverseFunctionQ[F[x]]]
```

Rule 2531

```
Int[Log[1 + (e_.)*((F_)^((c_.)*((a_.) + (b_.)*(x_))))^(n_.)]*((f_.) + (g_.)
*(x_))^(m_.), x_Symbol] :> -Simp[((f + g*x)^m*PolyLog[2, -(e*(F^(c*(a + b*x
)))^n)])/(b*c*n*Log[F]), x] + Dist[(g*m)/(b*c*n*Log[F]), Int[(f + g*x)^(m -
 1)*PolyLog[2, -(e*(F^(c*(a + b*x)))^n)], x], x] /; FreeQ[{F, a, b, c, e, f
, g, n}, x] && GtQ[m, 0]
```

Rule 4181

```
Int[csc[(e_.) + Pi*(k_.) + (f_.)*(x_)]*((c_.) + (d_.)*(x_))^(m_.), x_Symbol
] :> Simp[(-2*(c + d*x)^m*ArcTanh[E^(I*k*Pi)*E^(I*(e + f*x))])/f, x] + (-Di
st[(d*m)/f, Int[(c + d*x)^(m - 1)*Log[1 - E^(I*k*Pi)*E^(I*(e + f*x))], x],
x] + Dist[(d*m)/f, Int[(c + d*x)^(m - 1)*Log[1 + E^(I*k*Pi)*E^(I*(e + f*x))
], x], x]) /; FreeQ[{c, d, e, f}, x] && IntegerQ[2*k] && IGtQ[m, 0]
```

Rule 6252

```
Int[ArcCoth[Tan[(a_.) + (b_.)*(x_)]]*((e_.) + (f_.)*(x_))^(m_.), x_Symbol]
:> Simp[((e + f*x)^(m + 1)*ArcCoth[Tan[a + b*x]])/(f*(m + 1)), x] - Dist[b/
(f*(m + 1)), Int[(e + f*x)^(m + 1)*Sec[2*a + 2*b*x], x], x] /; FreeQ[{a, b,
```

```
e, f}, x] && IGtQ[m, 0]
```

Rule 6589

```
Int[PolyLog[n_, (c_.)*((a_.) + (b_.)*(x_))^(p_.)]/((d_.) + (e_.)*(x_)), x_S
ymbol] :> Simp[PolyLog[n + 1, c*(a + b*x)^p]/(e*p), x] /; FreeQ[{a, b, c, d
, e, n, p}, x] && EqQ[b*d, a*e]
```

Rule 6609

```
Int[((e_.) + (f_.)*(x_))^(m_.)*PolyLog[n_, (d_.)*((F_)^((c_.)*((a_.) + (b_.
)*(x_))))^(p_.)], x_Symbol] :> Simp[((e + f*x)^m*PolyLog[n + 1, d*(F^(c*(a
+ b*x)))^p])/(b*c*p*Log[F]), x] - Dist[(f*m)/(b*c*p*Log[F]), Int[(e + f*x)^
(m - 1)*PolyLog[n + 1, d*(F^(c*(a + b*x)))^p], x], x] /; FreeQ[{F, a, b, c,
 d, e, f, n, p}, x] && GtQ[m, 0]
```

Rubi steps

$$\int (e+fx)^2\coth^{-1}(\tan(a+bx))\,dx = \frac{(e+fx)^3\coth^{-1}(\tan(a+bx))}{3f} - \frac{b\int (e+fx)^3\sec(2a+2bx)\,dx}{3f}$$

$$= \frac{(e+fx)^3\coth^{-1}(\tan(a+bx))}{3f} + \frac{i(e+fx)^3\tan^{-1}\left(e^{2i(a+bx)}\right)}{3f} + \frac{1}{2}\int (e+$$

$$= \frac{(e+fx)^3\coth^{-1}(\tan(a+bx))}{3f} + \frac{i(e+fx)^3\tan^{-1}\left(e^{2i(a+bx)}\right)}{3f} - \frac{i(e+fx)^2}{}$$

$$= \frac{(e+fx)^3\coth^{-1}(\tan(a+bx))}{3f} + \frac{i(e+fx)^3\tan^{-1}\left(e^{2i(a+bx)}\right)}{3f} - \frac{i(e+fx)^2}{}$$

$$= \frac{(e+fx)^3\coth^{-1}(\tan(a+bx))}{3f} + \frac{i(e+fx)^3\tan^{-1}\left(e^{2i(a+bx)}\right)}{3f} - \frac{i(e+fx)^2}{}$$

$$= \frac{(e+fx)^3\coth^{-1}(\tan(a+bx))}{3f} + \frac{i(e+fx)^3\tan^{-1}\left(e^{2i(a+bx)}\right)}{3f} - \frac{i(e+fx)^2}{}$$

**Mathematica [A]** time = 0.20, size = 409, normalized size = 1.75

$$\frac{1}{3}x\left(3e^2+3efx+f^2x^2\right)\coth^{-1}(\tan(a+bx)) + \frac{-12b^3e^2x\log\left(1-ie^{2i(a+bx)}\right)+12b^3e^2x\log\left(1+ie^{2i(a+bx)}\right)-12b^3e}{}$$

Antiderivative was successfully verified.

```
[In] Integrate[(e + f*x)^2*ArcCoth[Tan[a + b*x]],x]
```

```
[Out] (x*(3*e^2 + 3*e*f*x + f^2*x^2)*ArcCoth[Tan[a + b*x]])/3 + (-12*b^3*e^2*x*Lo
g[1 - I*E^((2*I)*(a + b*x))] - 12*b^3*e*f*x^2*Log[1 - I*E^((2*I)*(a + b*x))
] - 4*b^3*f^2*x^3*Log[1 - I*E^((2*I)*(a + b*x))] + 12*b^3*e^2*x*Log[1 + I*E
^((2*I)*(a + b*x))] + 12*b^3*e*f*x^2*Log[1 + I*E^((2*I)*(a + b*x))] + 4*b^3
*f^2*x^3*Log[1 + I*E^((2*I)*(a + b*x))] - (6*I)*b^2*(e + f*x)^2*PolyLog[2,
(-I)*E^((2*I)*(a + b*x))] + (6*I)*b^2*(e + f*x)^2*PolyLog[2, I*E^((2*I)*(a
+ b*x))] + 6*b*e*f*PolyLog[3, (-I)*E^((2*I)*(a + b*x))] + 6*b*f^2*x*PolyLog
[3, (-I)*E^((2*I)*(a + b*x))] - 6*b*e*f*PolyLog[3, I*E^((2*I)*(a + b*x))] -
 6*b*f^2*x*PolyLog[3, I*E^((2*I)*(a + b*x))] + (3*I)*f^2*PolyLog[4, (-I)*E^
((2*I)*(a + b*x))] - (3*I)*f^2*PolyLog[4, I*E^((2*I)*(a + b*x))])/(24*b^3)
```

**fricas [C]** time = 0.91, size = 1278, normalized size = 5.46

result too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((f*x+e)^2*arccoth(tan(b*x+a)),x, algorithm="fricas")
```

```
[Out] 1/48*(3*I*f^2*polylog(4, (I*tan(b*x + a)^2 + 2*tan(b*x + a) - I)/(tan(b*x +
 a)^2 + 1)) + 3*I*f^2*polylog(4, (I*tan(b*x + a)^2 - 2*tan(b*x + a) - I)/(t
an(b*x + a)^2 + 1)) - 3*I*f^2*polylog(4, (-I*tan(b*x + a)^2 + 2*tan(b*x + a
) + I)/(tan(b*x + a)^2 + 1)) - 3*I*f^2*polylog(4, (-I*tan(b*x + a)^2 - 2*ta
n(b*x + a) + I)/(tan(b*x + a)^2 + 1)) + (6*I*b^2*f^2*x^2 + 12*I*b^2*e*f*x +
 6*I*b^2*e^2)*dilog(-((I + 1)*tan(b*x + a)^2 + 2*tan(b*x + a) - I + 1)/(tan
(b*x + a)^2 + 1) + 1) + (6*I*b^2*f^2*x^2 + 12*I*b^2*e*f*x + 6*I*b^2*e^2)*di
log(-((I + 1)*tan(b*x + a)^2 - 2*tan(b*x + a) - I + 1)/(tan(b*x + a)^2 + 1)
 + 1) + (-6*I*b^2*f^2*x^2 - 12*I*b^2*e*f*x - 6*I*b^2*e^2)*dilog(-(-(I - 1)*
tan(b*x + a)^2 + 2*tan(b*x + a) + I + 1)/(tan(b*x + a)^2 + 1) + 1) + (-6*I*
b^2*f^2*x^2 - 12*I*b^2*e*f*x - 6*I*b^2*e^2)*dilog(-(-(I - 1)*tan(b*x + a)^2
 - 2*tan(b*x + a) + I + 1)/(tan(b*x + a)^2 + 1) + 1) - 4*(b^3*f^2*x^3 + 3*b
^3*e*f*x^2 + 3*b^3*e^2*x + 3*a*b^2*e^2 - 3*a^2*b*e*f + a^3*f^2)*log(((I + 1
)*tan(b*x + a)^2 + 2*tan(b*x + a) - I + 1)/(tan(b*x + a)^2 + 1)) + 4*(3*a*b
^2*e^2 - 3*a^2*b*e*f + a^3*f^2)*log(((I + 1)*tan(b*x + a)^2 + 2*I*tan(b*x +
 a) + I - 1)/(tan(b*x + a)^2 + 1)) - 4*(3*a*b^2*e^2 - 3*a^2*b*e*f + a^3*f^2
)*log(((I + 1)*tan(b*x + a)^2 - 2*I*tan(b*x + a) + I - 1)/(tan(b*x + a)^2 +
 1)) + 4*(b^3*f^2*x^3 + 3*b^3*e*f*x^2 + 3*b^3*e^2*x + 3*a*b^2*e^2 - 3*a^2*b
*e*f + a^3*f^2)*log(((I + 1)*tan(b*x + a)^2 - 2*tan(b*x + a) - I + 1)/(tan(
b*x + a)^2 + 1)) - 4*(b^3*f^2*x^3 + 3*b^3*e*f*x^2 + 3*b^3*e^2*x + 3*a*b^2*e
^2 - 3*a^2*b*e*f + a^3*f^2)*log((-(I - 1)*tan(b*x + a)^2 + 2*tan(b*x + a) +
 I + 1)/(tan(b*x + a)^2 + 1)) + 4*(b^3*f^2*x^3 + 3*b^3*e*f*x^2 + 3*b^3*e^2*
x + 3*a*b^2*e^2 - 3*a^2*b*e*f + a^3*f^2)*log((-(I - 1)*tan(b*x + a)^2 - 2*t
an(b*x + a) + I + 1)/(tan(b*x + a)^2 + 1)) + 4*(3*a*b^2*e^2 - 3*a^2*b*e*f +
 a^3*f^2)*log(((I - 1)*tan(b*x + a)^2 + 2*I*tan(b*x + a) + I + 1)/(tan(b*x
+ a)^2 + 1)) - 4*(3*a*b^2*e^2 - 3*a^2*b*e*f + a^3*f^2)*log(((I - 1)*tan(b*x
 + a)^2 - 2*I*tan(b*x + a) + I + 1)/(tan(b*x + a)^2 + 1)) + 8*(b^3*f^2*x^3
+ 3*b^3*e*f*x^2 + 3*b^3*e^2*x)*log((tan(b*x + a) + 1)/(tan(b*x + a) - 1)) +
 6*(b*f^2*x + b*e*f)*polylog(3, (I*tan(b*x + a)^2 + 2*tan(b*x + a) - I)/(ta
n(b*x + a)^2 + 1)) - 6*(b*f^2*x + b*e*f)*polylog(3, (I*tan(b*x + a)^2 - 2*t
an(b*x + a) - I)/(tan(b*x + a)^2 + 1)) + 6*(b*f^2*x + b*e*f)*polylog(3, (-I
*tan(b*x + a)^2 + 2*tan(b*x + a) + I)/(tan(b*x + a)^2 + 1)) - 6*(b*f^2*x +
b*e*f)*polylog(3, (-I*tan(b*x + a)^2 - 2*tan(b*x + a) + I)/(tan(b*x + a)^2
+ 1)))/b^3
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \left(fx+e\right)^2 \operatorname{arcoth}\left(\tan\left(bx+a\right)\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((f*x+e)^2*arccoth(tan(b*x+a)),x, algorithm="giac")
```

```
[Out] integrate((f*x + e)^2*arccoth(tan(b*x + a)), x)
```

**maple [C]** time = 36.63, size = 5543, normalized size = 23.69

output too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((f*x+e)^2*arccoth(tan(b*x+a)),x)
```

```
[Out] result too large to display
```

**maxima [F]** time = 0.00, size = 0, normalized size = 0.00

$$\frac{1}{12}\left(f^2x^3+3\,efx^2+3\,e^2x\right)\log\left(2\,\cos\left(2\,bx+2\,a\right)^2+2\,\sin\left(2\,bx+2\,a\right)^2+4\,\sin\left(2\,bx+2\,a\right)+2\right)-\frac{1}{12}\left(f^2x^3+3\,ef\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((f*x+e)^2*arccoth(tan(b*x+a)),x, algorithm="maxima")
```

```
[Out] 1/12*(f^2*x^3 + 3*e*f*x^2 + 3*e^2*x)*log(2*cos(2*b*x + 2*a)^2 + 2*sin(2*b*x
 + 2*a)^2 + 4*sin(2*b*x + 2*a) + 2) - 1/12*(f^2*x^3 + 3*e*f*x^2 + 3*e^2*x)*
log(2*cos(2*b*x + 2*a)^2 + 2*sin(2*b*x + 2*a)^2 - 4*sin(2*b*x + 2*a) + 2) -
 integrate(2/3*((b*f^2*x^3 + 3*b*e*f*x^2 + 3*b*e^2*x)*cos(4*b*x + 4*a)*cos(
2*b*x + 2*a) + (b*f^2*x^3 + 3*b*e*f*x^2 + 3*b*e^2*x)*sin(4*b*x + 4*a)*sin(2
*b*x + 2*a) + (b*f^2*x^3 + 3*b*e*f*x^2 + 3*b*e^2*x)*cos(2*b*x + 2*a))/(cos(
4*b*x + 4*a)^2 + sin(4*b*x + 4*a)^2 + 2*cos(4*b*x + 4*a) + 1), x)
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.00

$$\int \operatorname{acoth}\left(\tan\left(a+b\,x\right)\right)\,{\left(e+f\,x\right)}^2 \,d x$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(tan(a + b*x))*(e + f*x)^2,x)
```

```
[Out] int(acoth(tan(a + b*x))*(e + f*x)^2, x)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \left(e + f x\right)^{2} \operatorname{acoth}{\left(\tan{\left(a + b x \right)} \right)}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((f*x+e)**2*acoth(tan(b*x+a)),x)
```

```
[Out] Integral((e + f*x)**2*acoth(tan(a + b*x)), x)
```

# 3.233 $\int (e+fx)\coth^{-1}(\tan(a+bx))\,dx$

**Optimal**. Leaf size=162

$$\frac{f\text{Li}_3\left(-ie^{2i(a+bx)}\right)}{8b^2}-\frac{f\text{Li}_3\left(ie^{2i(a+bx)}\right)}{8b^2}-\frac{i(e+fx)\text{Li}_2\left(-ie^{2i(a+bx)}\right)}{4b}+\frac{i(e+fx)\text{Li}_2\left(ie^{2i(a+bx)}\right)}{4b}+\frac{i(e+fx)^2\tan^{-1}\left(e^{2i(a+bx)}\right)}{2f}$$

```
[Out] 1/2*(f*x+e)^2*arccoth(tan(b*x+a))/f+1/2*I*(f*x+e)^2*arctan(exp(2*I*(b*x+a))
)/f-1/4*I*(f*x+e)*polylog(2,-I*exp(2*I*(b*x+a)))/b+1/4*I*(f*x+e)*polylog(2,
I*exp(2*I*(b*x+a)))/b+1/8*f*polylog(3,-I*exp(2*I*(b*x+a)))/b^2-1/8*f*polylo
g(3,I*exp(2*I*(b*x+a)))/b^2
```

**Rubi [A]** time = 0.11, antiderivative size = 162, normalized size of antiderivative = 1.00, number of steps used = 8, number of rules used = 5, integrand size = 13, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.385, Rules used = {6252, 4181, 2531, 2282, 6589}

$$\frac{f\text{PolyLog}\left(3,-ie^{2i(a+bx)}\right)}{8b^2}-\frac{f\text{PolyLog}\left(3,ie^{2i(a+bx)}\right)}{8b^2}-\frac{i(e+fx)\text{PolyLog}\left(2,-ie^{2i(a+bx)}\right)}{4b}+\frac{i(e+fx)\text{PolyLog}\left(2,ie^{2i(a}\right.}{4b}$$

Antiderivative was successfully verified.

```
[In] Int[(e + f*x)*ArcCoth[Tan[a + b*x]],x]
```

```
[Out] ((e + f*x)^2*ArcCoth[Tan[a + b*x]])/(2*f) + ((I/2)*(e + f*x)^2*ArcTan[E^((2
*I)*(a + b*x))])/f - ((I/4)*(e + f*x)*PolyLog[2, (-I)*E^((2*I)*(a + b*x))])
/b + ((I/4)*(e + f*x)*PolyLog[2, I*E^((2*I)*(a + b*x))])/b + (f*PolyLog[3,
(-I)*E^((2*I)*(a + b*x))])/(8*b^2) - (f*PolyLog[3, I*E^((2*I)*(a + b*x))])/
(8*b^2)
```

Rule 2282

```
Int[u_, x_Symbol] :> With[{v = FunctionOfExponential[u, x]}, Dist[v/D[v, x]
, Subst[Int[FunctionOfExponentialFunction[u, x]/x, x], x, v], x]] /; Functi
onOfExponentialQ[u, x] && !MatchQ[u, (w_)*((a_.)*(v_)^(n_))^(m_) /; FreeQ[
{a, m, n}, x] && IntegerQ[m*n]] && !MatchQ[u, E^((c_.)*((a_.) + (b_.)*x))*
(F_)[v_] /; FreeQ[{a, b, c}, x] && InverseFunctionQ[F[x]]]
```

Rule 2531

```
Int[Log[1 + (e_.)*((F_)^((c_.)*((a_.) + (b_.)*(x_))))^(n_.)]*((f_.) + (g_.)
*(x_))^(m_.), x_Symbol] :> -Simp[((f + g*x)^m*PolyLog[2, -(e*(F^(c*(a + b*x
)))^n)])/(b*c*n*Log[F]), x] + Dist[(g*m)/(b*c*n*Log[F]), Int[(f + g*x)^(m -
 1)*PolyLog[2, -(e*(F^(c*(a + b*x)))^n)], x], x] /; FreeQ[{F, a, b, c, e, f
, g, n}, x] && GtQ[m, 0]
```

Rule 4181

```
Int[csc[(e_.) + Pi*(k_.) + (f_.)*(x_)]*((c_.) + (d_.)*(x_))^(m_.), x_Symbol
] :> Simp[(-2*(c + d*x)^m*ArcTanh[E^(I*k*Pi)*E^(I*(e + f*x))])/f, x] + (-Di
st[(d*m)/f, Int[(c + d*x)^(m - 1)*Log[1 - E^(I*k*Pi)*E^(I*(e + f*x))], x],
x] + Dist[(d*m)/f, Int[(c + d*x)^(m - 1)*Log[1 + E^(I*k*Pi)*E^(I*(e + f*x))
], x], x]) /; FreeQ[{c, d, e, f}, x] && IntegerQ[2*k] && IGtQ[m, 0]
```

Rule 6252

```
Int[ArcCoth[Tan[(a_.) + (b_.)*(x_)]]*((e_.) + (f_.)*(x_))^(m_.), x_Symbol]
:> Simp[((e + f*x)^(m + 1)*ArcCoth[Tan[a + b*x]])/(f*(m + 1)), x] - Dist[b/
(f*(m + 1)), Int[(e + f*x)^(m + 1)*Sec[2*a + 2*b*x], x], x] /; FreeQ[{a, b,
 e, f}, x] && IGtQ[m, 0]
```

Rule 6589

```
Int[PolyLog[n_, (c_.)*((a_.) + (b_.)*(x_))^(p_.)]/((d_.) + (e_.)*(x_)), x_S
ymbol] :> Simp[PolyLog[n + 1, c*(a + b*x)^p]/(e*p), x] /; FreeQ[{a, b, c, d
, e, n, p}, x] && EqQ[b*d, a*e]
```

Rubi steps

$$\int (e+fx)\coth^{-1}(\tan(a+bx))\,dx = \frac{(e+fx)^2\coth^{-1}(\tan(a+bx))}{2f} - \frac{b\int (e+fx)^2\sec(2a+2bx)\,dx}{2f}$$
$$= \frac{(e+fx)^2\coth^{-1}(\tan(a+bx))}{2f} + \frac{i(e+fx)^2\tan^{-1}\left(e^{2i(a+bx)}\right)}{2f} + \frac{1}{2}\int (e+f$$
$$= \frac{(e+fx)^2\coth^{-1}(\tan(a+bx))}{2f} + \frac{i(e+fx)^2\tan^{-1}\left(e^{2i(a+bx)}\right)}{2f} - \frac{i(e+fx)\mathrm{Li}$$
$$= \frac{(e+fx)^2\coth^{-1}(\tan(a+bx))}{2f} + \frac{i(e+fx)^2\tan^{-1}\left(e^{2i(a+bx)}\right)}{2f} - \frac{i(e+fx)\mathrm{Li}$$
$$= \frac{(e+fx)^2\coth^{-1}(\tan(a+bx))}{2f} + \frac{i(e+fx)^2\tan^{-1}\left(e^{2i(a+bx)}\right)}{2f} - \frac{i(e+fx)\mathrm{Li}$$

**Mathematica [A]** time = 0.14, size = 263, normalized size = 1.62

$$-be\left(\frac{i\mathrm{Li}_2\left(-ie^{i(2a+2bx)}\right)}{4b^2} - \frac{i\mathrm{Li}_2\left(ie^{i(2a+2bx)}\right)}{4b^2} - \frac{ix\tan^{-1}\left(e^{2ia+2ibx}\right)}{b}\right) + \frac{f\left(4ib^2x^2\tan^{-1}(\cos(2(a+bx))+i\sin(2(a+\right.}{}$$

Warning: Unable to verify antiderivative.

```
[In] Integrate[(e + f*x)*ArcCoth[Tan[a + b*x]],x]
```

```
[Out] e*x*ArcCoth[Tan[a + b*x]] + (f*x^2*ArcCoth[Tan[a + b*x]])/2 - b*e*(((-I)*x*
ArcTan[E^((2*I)*a + (2*I)*b*x)])/b + ((I/4)*PolyLog[2, (-I)*E^(I*(2*a + 2*b
*x))])/b^2 - ((I/4)*PolyLog[2, I*E^(I*(2*a + 2*b*x))])/b^2) + (f*((4*I)*b^2
*x^2*ArcTan[Cos[2*(a + b*x)] + I*Sin[2*(a + b*x)]] + (2*I)*b*x*PolyLog[2, I
*Cos[2*(a + b*x)] - Sin[2*(a + b*x)]] - (2*I)*b*x*PolyLog[2, (-I)*Cos[2*(a
+ b*x)] + Sin[2*(a + b*x)]] - PolyLog[3, I*Cos[2*(a + b*x)] - Sin[2*(a + b*
x)]] + PolyLog[3, (-I)*Cos[2*(a + b*x)] + Sin[2*(a + b*x)]]))/(8*b^2)
```

**fricas [C]** time = 0.66, size = 830, normalized size = 5.12

result too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((f*x+e)*arccoth(tan(b*x+a)),x, algorithm="fricas")
```

```
[Out] 1/16*((2*I*b*f*x + 2*I*b*e)*dilog(-((I + 1)*tan(b*x + a)^2 + 2*tan(b*x + a)
 - I + 1)/(tan(b*x + a)^2 + 1) + 1) + (2*I*b*f*x + 2*I*b*e)*dilog(-((I + 1)
*tan(b*x + a)^2 - 2*tan(b*x + a) - I + 1)/(tan(b*x + a)^2 + 1) + 1) + (-2*I
*b*f*x - 2*I*b*e)*dilog(-(-(I - 1)*tan(b*x + a)^2 + 2*tan(b*x + a) + I + 1)
/(tan(b*x + a)^2 + 1) + 1) + (-2*I*b*f*x - 2*I*b*e)*dilog(-(-(I - 1)*tan(b*
x + a)^2 - 2*tan(b*x + a) + I + 1)/(tan(b*x + a)^2 + 1) + 1) - 2*(b^2*f*x^2
 + 2*b^2*e*x + 2*a*b*e - a^2*f)*log(((I + 1)*tan(b*x + a)^2 + 2*tan(b*x + a
) - I + 1)/(tan(b*x + a)^2 + 1)) + 2*(2*a*b*e - a^2*f)*log(((I + 1)*tan(b*x
 + a)^2 + 2*I*tan(b*x + a) + I - 1)/(tan(b*x + a)^2 + 1)) - 2*(2*a*b*e - a^
2*f)*log(((I + 1)*tan(b*x + a)^2 - 2*I*tan(b*x + a) + I - 1)/(tan(b*x + a)^
2 + 1)) + 2*(b^2*f*x^2 + 2*b^2*e*x + 2*a*b*e - a^2*f)*log(((I + 1)*tan(b*x
```

```
+ a)^2 - 2*tan(b*x + a) - I + 1)/(tan(b*x + a)^2 + 1)) - 2*(b^2*f*x^2 + 2*b
^2*e*x + 2*a*b*e - a^2*f)*log((-(I - 1)*tan(b*x + a)^2 + 2*tan(b*x + a) + I
 + 1)/(tan(b*x + a)^2 + 1)) + 2*(b^2*f*x^2 + 2*b^2*e*x + 2*a*b*e - a^2*f)*l
og((-(I - 1)*tan(b*x + a)^2 - 2*tan(b*x + a) + I + 1)/(tan(b*x + a)^2 + 1))
 + 2*(2*a*b*e - a^2*f)*log(((I - 1)*tan(b*x + a)^2 + 2*I*tan(b*x + a) + I +
 1)/(tan(b*x + a)^2 + 1)) - 2*(2*a*b*e - a^2*f)*log(((I - 1)*tan(b*x + a)^2
 - 2*I*tan(b*x + a) + I + 1)/(tan(b*x + a)^2 + 1)) + 4*(b^2*f*x^2 + 2*b^2*e
*x)*log((tan(b*x + a) + 1)/(tan(b*x + a) - 1)) + f*polylog(3, (I*tan(b*x +
a)^2 + 2*tan(b*x + a) - I)/(tan(b*x + a)^2 + 1)) - f*polylog(3, (I*tan(b*x
+ a)^2 - 2*tan(b*x + a) - I)/(tan(b*x + a)^2 + 1)) + f*polylog(3, (-I*tan(b
*x + a)^2 + 2*tan(b*x + a) + I)/(tan(b*x + a)^2 + 1)) - f*polylog(3, (-I*ta
n(b*x + a)^2 - 2*tan(b*x + a) + I)/(tan(b*x + a)^2 + 1)))/b^2
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \left(fx+e\right) \operatorname{arcoth}\left(\tan\left(bx+a\right)\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((f*x+e)*arccoth(tan(b*x+a)),x, algorithm="giac")
```

```
[Out] integrate((f*x + e)*arccoth(tan(b*x + a)), x)
```

**maple [C]** time = 4.74, size = 2543, normalized size = 15.70

Expression too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((f*x+e)*arccoth(tan(b*x+a)),x)
```

```
[Out] 1/4*I*Pi*x*e+1/8*I*Pi*f*x^2+1/4/b^2*f*(I*b*x+I*a)^2*ln(1-I*exp(2*I*(b*x+a))
)+1/4/b^2*f*(I*b*x+I*a)*polylog(2,I*exp(2*I*(b*x+a)))-1/4*ln(exp(2*I*(b*x+a
))-I)*x^2*f-1/2*ln(exp(2*I*(b*x+a))-I)*x*e+1/8*f*polylog(3,-I*exp(2*I*(b*x+
a)))/b^2-1/8*f*polylog(3,I*exp(2*I*(b*x+a)))/b^2-1/2*I/b*e*dilog(1+exp(I*(b
*x+a))*(-1)^(3/4))-1/2*I/b*e*dilog(1-exp(I*(b*x+a))*(-1)^(3/4))+1/4*I*Pi*x*
e*csgn((1-I)*(exp(2*I*(b*x+a))-I)/(exp(2*I*(b*x+a))+1))^3-1/4*I*Pi*x*e*csgn
((1-I)*(exp(2*I*(b*x+a))-I)/(exp(2*I*(b*x+a))+1))^2-1/4*I*Pi*x*e*csgn(I/(ex
p(2*I*(b*x+a))+1))*csgn(I*(exp(2*I*(b*x+a))+I))*csgn(I*(exp(2*I*(b*x+a))+I)
/(exp(2*I*(b*x+a))+1))+1/2*I/b*e*dilog(((-I)^(1/2)-exp(I*(b*x+a)))/(-I)^(1/
2))+1/2*I/b*e*dilog(((-I)^(1/2)+exp(I*(b*x+a)))/(-I)^(1/2))-1/2/b*a*e*ln(-e
xp(2*I*(b*x+a))+I)+1/2/b*a*e*ln(exp(2*I*(b*x+a))+I)-1/4/b^2*a^2*f*ln(exp(2*
I*(b*x+a))+I)-1/4/b^2*f*(I*b*x+I*a)^2*ln(1+I*exp(2*I*(b*x+a)))-1/4/b^2*f*(I
*b*x+I*a)*polylog(2,-I*exp(2*I*(b*x+a)))+(1/4*f*x^2+1/2*e*x)*ln(exp(2*I*(b*
x+a))+I)+1/4/b^2*a^2*f*ln(-exp(2*I*(b*x+a))+I)+1/4*I*Pi*x*e*csgn(I*(exp(2*I
*(b*x+a))-I)/(exp(2*I*(b*x+a))+1))*csgn((1-I)*(exp(2*I*(b*x+a))-I)/(exp(2*I
*(b*x+a))+1))-1/4*I*Pi*x*e*csgn(I*(exp(2*I*(b*x+a))-I)/(exp(2*I*(b*x+a))+1)
)*csgn((1-I)*(exp(2*I*(b*x+a))-I)/(exp(2*I*(b*x+a))+1))^2-1/8*I*Pi*f*csgn(I
*(exp(2*I*(b*x+a))+I)/(exp(2*I*(b*x+a))+1))*csgn((1+I)*(exp(2*I*(b*x+a))+I)
/(exp(2*I*(b*x+a))+1))*x^2+1/4*I*Pi*x*e*csgn(I*(exp(2*I*(b*x+a))+I)/(exp(2*
I*(b*x+a))+1))*csgn((1+I)*(exp(2*I*(b*x+a))+I)/(exp(2*I*(b*x+a))+1))^2-1/4*
I*Pi*x*e*csgn(I/(exp(2*I*(b*x+a))+1))*csgn(I*(exp(2*I*(b*x+a))-I)/(exp(2*I*
(b*x+a))+1))^2-1/8*I*Pi*f*csgn((1-I)*(exp(2*I*(b*x+a))-I)/(exp(2*I*(b*x+a))
+1))^2*x^2+1/8*I*Pi*f*csgn(I*(exp(2*I*(b*x+a))-I)/(exp(2*I*(b*x+a))+1))^3*x
^2-1/8*I*Pi*f*csgn((1+I)*(exp(2*I*(b*x+a))+I)/(exp(2*I*(b*x+a))+1))^3*x^2+1
/4*I*Pi*x*e*csgn(I*(exp(2*I*(b*x+a))-I)/(exp(2*I*(b*x+a))+1))^3-1/4*I*Pi*x*
e*csgn(I*(exp(2*I*(b*x+a))+I)/(exp(2*I*(b*x+a))+1))^3-1/8*I*Pi*f*csgn(I*(ex
p(2*I*(b*x+a))+I)/(exp(2*I*(b*x+a))+1))^3*x^2+1/8*I*Pi*f*csgn(I*(exp(2*I*(b
*x+a))+I)/(exp(2*I*(b*x+a))+1))*csgn((1+I)*(exp(2*I*(b*x+a))+I)/(exp(2*I*(b
*x+a))+1))^2*x^2-1/8*I*Pi*f*csgn(I/(exp(2*I*(b*x+a))+1))*csgn(I*(exp(2*I*(b
*x+a))-I)/(exp(2*I*(b*x+a))+1))^2*x^2+1/2*I/b^2*f*a*(I*b*x+I*a)*ln(1+exp(I*
```

```
(b*x+a))*(-1)^(3/4))+1/2*I/b^2*f*a*(I*b*x+I*a)*ln(1-exp(I*(b*x+a))*(-1)^(3/
4))+1/2*I/b*e*(I*b*x+I*a)*ln(((-I)^(1/2)+exp(I*(b*x+a)))/(-I)^(1/2))+1/8*I*
Pi*f*csgn((1+I)*(exp(2*I*(b*x+a))+I)/(exp(2*I*(b*x+a))+1))^2*x^2+1/2*I/b^2*
f*a*dilog(1-exp(I*(b*x+a))*(-1)^(3/4))+1/2*I/b*e*(I*b*x+I*a)*ln(((-I)^(1/2)
-exp(I*(b*x+a)))/(-I)^(1/2))+1/8*I*Pi*f*csgn(I/(exp(2*I*(b*x+a))+1))*csgn(I
*(exp(2*I*(b*x+a))-I))*csgn(I*(exp(2*I*(b*x+a))-I)/(exp(2*I*(b*x+a))+1))*x^
2+1/4*I*Pi*x*e*csgn(I/(exp(2*I*(b*x+a))+1))*csgn(I*(exp(2*I*(b*x+a))-I))*cs
gn(I*(exp(2*I*(b*x+a))-I)/(exp(2*I*(b*x+a))+1))-1/4*I*Pi*x*e*csgn(I*(exp(2*
I*(b*x+a))-I))*csgn(I*(exp(2*I*(b*x+a))-I)/(exp(2*I*(b*x+a))+1))^2-1/8*I*Pi
*f*csgn(I*(exp(2*I*(b*x+a))-I))*csgn(I*(exp(2*I*(b*x+a))-I)/(exp(2*I*(b*x+a
))+1))^2*x^2-1/8*I*Pi*f*csgn(I*(exp(2*I*(b*x+a))-I)/(exp(2*I*(b*x+a))+1))*c
sgn((1-I)*(exp(2*I*(b*x+a))-I)/(exp(2*I*(b*x+a))+1))^2*x^2-1/4*I*Pi*x*e*csg
n(I*(exp(2*I*(b*x+a))+I)/(exp(2*I*(b*x+a))+1))*csgn((1+I)*(exp(2*I*(b*x+a))
+I)/(exp(2*I*(b*x+a))+1))+1/8*I*Pi*f*csgn(I*(exp(2*I*(b*x+a))-I)/(exp(2*I*(
b*x+a))+1))*csgn((1-I)*(exp(2*I*(b*x+a))-I)/(exp(2*I*(b*x+a))+1))*x^2+1/2*I
/b^2*f*a*dilog(1+exp(I*(b*x+a))*(-1)^(3/4))-1/8*I*Pi*f*csgn(I/(exp(2*I*(b*x
+a))+1))*csgn(I*(exp(2*I*(b*x+a))+I))*csgn(I*(exp(2*I*(b*x+a))+I)/(exp(2*I*
(b*x+a))+1))*x^2-1/2*I/b^2*f*a*dilog(((-I)^(1/2)+exp(I*(b*x+a)))/(-I)^(1/2)
)+1/8*I*Pi*f*csgn((1-I)*(exp(2*I*(b*x+a))-I)/(exp(2*I*(b*x+a))+1))^3*x^2-1/
2*I/b^2*f*a*(I*b*x+I*a)*ln(((-I)^(1/2)-exp(I*(b*x+a)))/(-I)^(1/2))-1/2*I/b^
2*f*a*(I*b*x+I*a)*ln(((-I)^(1/2)+exp(I*(b*x+a)))/(-I)^(1/2))-1/4*I*Pi*x*e*c
sgn((1+I)*(exp(2*I*(b*x+a))+I)/(exp(2*I*(b*x+a))+1))^3+1/4*I*Pi*x*e*csgn((1
+I)*(exp(2*I*(b*x+a))+I)/(exp(2*I*(b*x+a))+1))^2-1/2*I/b^2*f*a*dilog(((-I)^
(1/2)-exp(I*(b*x+a)))/(-I)^(1/2))-1/2*I/b*e*(I*b*x+I*a)*ln(1+exp(I*(b*x+a))
*(-1)^(3/4))-1/2*I/b*e*(I*b*x+I*a)*ln(1-exp(I*(b*x+a))*(-1)^(3/4))+1/4*I*Pi
*x*e*csgn(I/(exp(2*I*(b*x+a))+1))*csgn(I*(exp(2*I*(b*x+a))+I)/(exp(2*I*(b*x
+a))+1))^2+1/4*I*Pi*x*e*csgn(I*(exp(2*I*(b*x+a))+I))*csgn(I*(exp(2*I*(b*x+a
))+I)/(exp(2*I*(b*x+a))+1))^2+1/8*I*Pi*f*csgn(I/(exp(2*I*(b*x+a))+1))*csgn(
I*(exp(2*I*(b*x+a))+I)/(exp(2*I*(b*x+a))+1))^2*x^2+1/8*I*Pi*f*csgn(I*(exp(2
*I*(b*x+a))+I))*csgn(I*(exp(2*I*(b*x+a))+I)/(exp(2*I*(b*x+a))+1))^2*x^2
```

**maxima [F]** time = 0.00, size = 0, normalized size = 0.00

$$\frac{1}{8}\left(fx^2+2\,ex\right)\log\left(2\,\cos\left(2\,bx+2\,a\right)^2+2\,\sin\left(2\,bx+2\,a\right)^2+4\,\sin\left(2\,bx+2\,a\right)+2\right)-\frac{1}{8}\left(fx^2+2\,ex\right)\log\left(2\,\text{co}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((f*x+e)*arccoth(tan(b*x+a)),x, algorithm="maxima")
```

```
[Out] 1/8*(f*x^2 + 2*e*x)*log(2*cos(2*b*x + 2*a)^2 + 2*sin(2*b*x + 2*a)^2 + 4*sin
(2*b*x + 2*a) + 2) - 1/8*(f*x^2 + 2*e*x)*log(2*cos(2*b*x + 2*a)^2 + 2*sin(2
*b*x + 2*a)^2 - 4*sin(2*b*x + 2*a) + 2) - integrate(((b*f*x^2 + 2*b*e*x)*co
s(4*b*x + 4*a)*cos(2*b*x + 2*a) + (b*f*x^2 + 2*b*e*x)*sin(4*b*x + 4*a)*sin(
2*b*x + 2*a) + (b*f*x^2 + 2*b*e*x)*cos(2*b*x + 2*a))/(cos(4*b*x + 4*a)^2 +
sin(4*b*x + 4*a)^2 + 2*cos(4*b*x + 4*a) + 1), x)
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.01

$$\int \mathrm{acoth}\left(\tan\left(a+b\,x\right)\right)\,\left(e+f\,x\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(tan(a + b*x))*(e + f*x),x)
```

```
[Out] int(acoth(tan(a + b*x))*(e + f*x), x)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \left(e+fx\right)\operatorname{acoth}\left(\tan\left(a+bx\right)\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((f*x+e)*acoth(tan(b*x+a)),x)
```

```
[Out] Integral((e + f*x)*acoth(tan(a + b*x)), x)
```

# 3.234 $\int \coth^{-1}(\tan(a+bx))\,dx$

**Optimal**. Leaf size=79

$$-\frac{i\text{Li}_2\left(-ie^{2i(a+bx)}\right)}{4b}+\frac{i\text{Li}_2\left(ie^{2i(a+bx)}\right)}{4b}+ix\tan^{-1}\left(e^{2i(a+bx)}\right)+x\coth^{-1}(\tan(a+bx))$$

```
[Out] x*arccoth(tan(b*x+a))+I*x*arctan(exp(2*I*(b*x+a)))-1/4*I*polylog(2,-I*exp(2
*I*(b*x+a)))/b+1/4*I*polylog(2,I*exp(2*I*(b*x+a)))/b
```

**Rubi** [A] time = 0.05, antiderivative size = 79, normalized size of antiderivative = 1.00, number of steps used = 6, number of rules used = 4, integrand size = 7, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.571, Rules used = {6248, 4181, 2279, 2391}

$$-\frac{i\text{PolyLog}\left(2,-ie^{2i(a+bx)}\right)}{4b}+\frac{i\text{PolyLog}\left(2,ie^{2i(a+bx)}\right)}{4b}+ix\tan^{-1}\left(e^{2i(a+bx)}\right)+x\coth^{-1}(\tan(a+bx))$$

Antiderivative was successfully verified.

```
[In] Int[ArcCoth[Tan[a + b*x]],x]
```

```
[Out] x*ArcCoth[Tan[a + b*x]] + I*x*ArcTan[E^((2*I)*(a + b*x))] - ((I/4)*PolyLog[
2, (-I)*E^((2*I)*(a + b*x))])/b + ((I/4)*PolyLog[2, I*E^((2*I)*(a + b*x))])
/b
```

Rule 2279

```
Int[Log[(a_) + (b_.)*((F_)^((e_.)*((c_.) + (d_.)*(x_))))^(n_.)], x_Symbol]
:> Dist[1/(d*e*n*Log[F]), Subst[Int[Log[a + b*x]/x, x], x, (F^(e*(c + d*x))
)^n], x] /; FreeQ[{F, a, b, c, d, e, n}, x] && GtQ[a, 0]
```

Rule 2391

```
Int[Log[(c_.)*((d_) + (e_.)*(x_)^(n_.))]/(x_), x_Symbol] :> -Simp[PolyLog[2
, -(c*e*x^n)]/n, x] /; FreeQ[{c, d, e, n}, x] && EqQ[c*d, 1]
```

Rule 4181

```
Int[csc[(e_.) + Pi*(k_.) + (f_.)*(x_)]*((c_.) + (d_.)*(x_))^(m_.), x_Symbol
] :> Simp[(-2*(c + d*x)^m*ArcTanh[E^(I*k*Pi)*E^(I*(e + f*x))])/f, x] + (-Di
st[(d*m)/f, Int[(c + d*x)^(m - 1)*Log[1 - E^(I*k*Pi)*E^(I*(e + f*x))], x],
x] + Dist[(d*m)/f, Int[(c + d*x)^(m - 1)*Log[1 + E^(I*k*Pi)*E^(I*(e + f*x))
], x], x]) /; FreeQ[{c, d, e, f}, x] && IntegerQ[2*k] && IGtQ[m, 0]
```

Rule 6248

```
Int[ArcCoth[Tan[(a_.) + (b_.)*(x_)]], x_Symbol] :> Simp[x*ArcCoth[Tan[a + b
*x]], x] - Dist[b, Int[x*Sec[2*a + 2*b*x], x], x] /; FreeQ[{a, b}, x]
```

Rubi steps

$$\begin{aligned}\int \coth^{-1}(\tan(a+bx))\,dx &= x\coth^{-1}(\tan(a+bx))-b\int x\sec(2a+2bx)\,dx\\ &= x\coth^{-1}(\tan(a+bx))+ix\tan^{-1}\left(e^{2i(a+bx)}\right)+\frac{1}{2}\int\log\left(1-ie^{i(2a+2bx)}\right)dx-\frac{1}{2}\int 1\\ &= x\coth^{-1}(\tan(a+bx))+ix\tan^{-1}\left(e^{2i(a+bx)}\right)-\frac{i\,\text{Subst}\left(\int\frac{\log(1-ix)}{x}\,dx,x,e^{i(2a+2bx)}\right)}{4b}\\ &= x\coth^{-1}(\tan(a+bx))+ix\tan^{-1}\left(e^{2i(a+bx)}\right)-\frac{i\text{Li}_2\left(-ie^{2i(a+bx)}\right)}{4b}+\frac{i\text{Li}_2\left(ie^{2i(a+bx)}\right)}{4b}\end{aligned}$$

**Mathematica [A]** time = 0.02, size = 78, normalized size = 0.99

$$\frac{-i\text{Li}_2\left(-ie^{2i(a+bx)}\right)+i\text{Li}_2\left(ie^{2i(a+bx)}\right)+4bx\left(\coth^{-1}(\tan(a+bx))+i\tan^{-1}\left(e^{2i(a+bx)}\right)\right)}{4b}$$

Antiderivative was successfully verified.

```
[In] Integrate[ArcCoth[Tan[a + b*x]],x]
```

```
[Out] (4*b*x*(ArcCoth[Tan[a + b*x]] + I*ArcTan[E^((2*I)*(a + b*x))]) - I*PolyLog[
2, (-I)*E^((2*I)*(a + b*x))] + I*PolyLog[2, I*E^((2*I)*(a + b*x))])/(4*b)
```

**fricas [B]** time = 1.01, size = 498, normalized size = 6.30

$$4\,bx\log\left(\frac{\tan(bx+a)+1}{\tan(bx+a)-1}\right)-2\,(bx+a)\log\left(\frac{(i+1)\,\tan(bx+a)^2+2\,\tan(bx+a)-i+1}{\tan(bx+a)^2+1}\right)+2\,a\log\left(\frac{(i+1)\,\tan(bx+a)^2+2i\,\tan(bx+a)+i-1}{\tan(bx+a)^2+1}\right)-2\,a$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(tan(b*x+a)),x, algorithm="fricas")
```

```
[Out] 1/8*(4*b*x*log((tan(b*x + a) + 1)/(tan(b*x + a) - 1)) - 2*(b*x + a)*log(((I
 + 1)*tan(b*x + a)^2 + 2*tan(b*x + a) - I + 1)/(tan(b*x + a)^2 + 1)) + 2*a*
log(((I + 1)*tan(b*x + a)^2 + 2*I*tan(b*x + a) + I - 1)/(tan(b*x + a)^2 + 1
)) - 2*a*log(((I + 1)*tan(b*x + a)^2 - 2*I*tan(b*x + a) + I - 1)/(tan(b*x +
 a)^2 + 1)) + 2*(b*x + a)*log(((I + 1)*tan(b*x + a)^2 - 2*tan(b*x + a) - I
+ 1)/(tan(b*x + a)^2 + 1)) - 2*(b*x + a)*log((-(I - 1)*tan(b*x + a)^2 + 2*t
an(b*x + a) + I + 1)/(tan(b*x + a)^2 + 1)) + 2*(b*x + a)*log((-(I - 1)*tan(
b*x + a)^2 - 2*tan(b*x + a) + I + 1)/(tan(b*x + a)^2 + 1)) + 2*a*log(((I -
1)*tan(b*x + a)^2 + 2*I*tan(b*x + a) + I + 1)/(tan(b*x + a)^2 + 1)) - 2*a*l
og(((I - 1)*tan(b*x + a)^2 - 2*I*tan(b*x + a) + I + 1)/(tan(b*x + a)^2 + 1)
) + I*dilog(-((I + 1)*tan(b*x + a)^2 + 2*tan(b*x + a) - I + 1)/(tan(b*x + a
)^2 + 1) + 1) + I*dilog(-((I + 1)*tan(b*x + a)^2 - 2*tan(b*x + a) - I + 1)/
(tan(b*x + a)^2 + 1) + 1) - I*dilog(-(-(I - 1)*tan(b*x + a)^2 + 2*tan(b*x +
 a) + I + 1)/(tan(b*x + a)^2 + 1) + 1) - I*dilog(-(-(I - 1)*tan(b*x + a)^2
- 2*tan(b*x + a) + I + 1)/(tan(b*x + a)^2 + 1) + 1))/b
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \operatorname{arcoth}\left(\tan\left(bx+a\right)\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(tan(b*x+a)),x, algorithm="giac")
```

```
[Out] integrate(arccoth(tan(b*x + a)), x)
```

**maple [B]** time = 0.55, size = 180, normalized size = 2.28

$$\frac{\arctan\left(\tan\left(bx+a\right)\right)\operatorname{arccoth}\left(\tan\left(bx+a\right)\right)}{b}+\frac{\arctan\left(\tan\left(bx+a\right)\right)\ln\left(1+\frac{i(1+i\tan(bx+a))^2}{1+\tan^2(bx+a)}\right)}{2b}-\frac{\arctan\left(\tan\left(bx+a\right)\right)}{2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(arccoth(tan(b*x+a)),x)
```

```
[Out] 1/b*arctan(tan(b*x+a))*arccoth(tan(b*x+a))+1/2/b*arctan(tan(b*x+a))*ln(1+I*
(1+I*tan(b*x+a))^2/(1+tan(b*x+a)^2))-1/2/b*arctan(tan(b*x+a))*ln(1-I*(1+I*t
an(b*x+a))^2/(1+tan(b*x+a)^2))-1/4*I/b*dilog(1+I*(1+I*tan(b*x+a))^2/(1+tan(
b*x+a)^2))+1/4*I/b*dilog(1-I*(1+I*tan(b*x+a))^2/(1+tan(b*x+a)^2))
```

**maxima [B]** time = 0.46, size = 182, normalized size = 2.30

$$\frac{4\,(bx + a)\,\mathrm{arcoth}\left(\tan\left(bx + a\right)\right) + \left(\arctan\left(\frac{1}{2}\,\tan\left(bx + a\right) + \frac{1}{2}, \frac{1}{2}\,\tan\left(bx + a\right) + \frac{1}{2}\right) - \arctan\left(\frac{1}{2}\,\tan\left(bx + a\right) - \right.\right.}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(tan(b*x+a)),x, algorithm="maxima")
```

```
[Out] 1/4*(4*(b*x + a)*arccoth(tan(b*x + a)) + (arctan2(1/2*tan(b*x + a) + 1/2, 1
/2*tan(b*x + a) + 1/2) - arctan2(1/2*tan(b*x + a) - 1/2, -1/2*tan(b*x + a)
+ 1/2))*log(tan(b*x + a)^2 + 1) - (b*x + a)*log(1/2*tan(b*x + a)^2 + tan(b*
x + a) + 1/2) + (b*x + a)*log(1/2*tan(b*x + a)^2 - tan(b*x + a) + 1/2) - I*
dilog((1/2*I + 1/2)*tan(b*x + a) - 1/2*I + 1/2) + I*dilog(-(1/2*I - 1/2)*ta
n(b*x + a) + 1/2*I + 1/2) + I*dilog((1/2*I - 1/2)*tan(b*x + a) + 1/2*I + 1/
2) - I*dilog(-(1/2*I + 1/2)*tan(b*x + a) - 1/2*I + 1/2))/b
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.01

$$\int \mathrm{acoth}\left(\tan\left(a + b\,x\right)\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(tan(a + b*x)),x)
```

```
[Out] int(acoth(tan(a + b*x)), x)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \mathrm{acoth}\left(\tan\left(a + bx\right)\right) dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(tan(b*x+a)),x)
```

```
[Out] Integral(acoth(tan(a + b*x)), x)
```

# 3.235 $\int \frac{\coth^{-1}(\tan(a+bx))}{e+fx} \, dx$

**Optimal**. Leaf size=18

$$\text{Int}\left(\frac{\coth^{-1}(\tan(a+bx))}{e+fx},x\right)$$

[Out] CannotIntegrate(arccoth(tan(b*x+a))/(f*x+e),x)

**Rubi [A]** time = 0.04, antiderivative size = 0, normalized size of antiderivative = 0.00, number of steps used = 0, number of rules used = 0, integrand size = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int \frac{\coth^{-1}(\tan(a+bx))}{e+fx} \, dx$$

Verification is Not applicable to the result.

[In] Int[ArcCoth[Tan[a + b*x]]/(e + f*x),x]

[Out] Defer[Int][ArcCoth[Tan[a + b*x]]/(e + f*x), x]

Rubi steps

$$\int \frac{\coth^{-1}(\tan(a+bx))}{e+fx} \, dx = \int \frac{\coth^{-1}(\tan(a+bx))}{e+fx} \, dx$$

**Mathematica [A]** time = 0.99, size = 0, normalized size = 0.00

$$\int \frac{\coth^{-1}(\tan(a+bx))}{e+fx} \, dx$$

Verification is Not applicable to the result.

[In] Integrate[ArcCoth[Tan[a + b*x]]/(e + f*x),x]

[Out] Integrate[ArcCoth[Tan[a + b*x]]/(e + f*x), x]

**fricas [A]** time = 0.56, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{\text{arcoth}(\tan(bx+a))}{fx+e},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

[In] integrate(arccoth(tan(b*x+a))/(f*x+e),x, algorithm="fricas")

[Out] integral(arccoth(tan(b*x + a))/(f*x + e), x)

**giac [A]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\text{arcoth}(\tan(bx+a))}{fx+e} \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

[In] integrate(arccoth(tan(b*x+a))/(f*x+e),x, algorithm="giac")

[Out] integrate(arccoth(tan(b*x + a))/(f*x + e), x)

**maple** [A] time = 4.15, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{arccoth}\left(\tan\left(bx+a\right)\right)}{fx+e}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(arccoth(tan(b*x+a))/(f*x+e),x)
[Out] int(arccoth(tan(b*x+a))/(f*x+e),x)
```

**maxima** [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{arcoth}\left(\tan\left(bx+a\right)\right)}{fx+e}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(tan(b*x+a))/(f*x+e),x, algorithm="maxima")
[Out] integrate(arccoth(tan(b*x + a))/(f*x + e), x)
```

**mupad** [A] time = 0.00, size = -1, normalized size = -0.06

$$\int \frac{\operatorname{acoth}\left(\tan\left(a+b\,x\right)\right)}{e+f\,x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(tan(a + b*x))/(e + f*x),x)
[Out] int(acoth(tan(a + b*x))/(e + f*x), x)
```

**sympy** [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{acoth}\left(\tan\left(a+bx\right)\right)}{e+fx}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(tan(b*x+a))/(f*x+e),x)
[Out] Integral(acoth(tan(a + b*x))/(e + f*x), x)
```

# 3.236 $\int x^2 \coth^{-1}(c + d\tan(a + bx))\,dx$

**Optimal**. Leaf size=395

$$\frac{i\text{Li}_4\left(-\frac{(-c+id+1)e^{2ia+2ibx}}{-c-id+1}\right)}{8b^3}-\frac{i\text{Li}_4\left(-\frac{(c-id+1)e^{2ia+2ibx}}{c+id+1}\right)}{8b^3}+\frac{x\text{Li}_3\left(-\frac{(-c+id+1)e^{2ia+2ibx}}{-c-id+1}\right)}{4b^2}-\frac{x\text{Li}_3\left(-\frac{(c-id+1)e^{2ia+2ibx}}{c+id+1}\right)}{4b^2}-\frac{ix^2\text{Li}_2\left(-\frac{(-c+id+}{-c}\right.}{4b}$$

```
[Out] 1/3*x^3*arccoth(c+d*tan(b*x+a))+1/6*x^3*ln(1+(1-c+I*d)*exp(2*I*a+2*I*b*x)/(
1-c-I*d))-1/6*x^3*ln(1+(1+c-I*d)*exp(2*I*a+2*I*b*x)/(1+c+I*d))-1/4*I*x^2*po
lylog(2,-(1-c+I*d)*exp(2*I*a+2*I*b*x)/(1-c-I*d))/b+1/4*I*x^2*polylog(2,-(1+
c-I*d)*exp(2*I*a+2*I*b*x)/(1+c+I*d))/b+1/4*x*polylog(3,-(1-c+I*d)*exp(2*I*a
+2*I*b*x)/(1-c-I*d))/b^2-1/4*x*polylog(3,-(1+c-I*d)*exp(2*I*a+2*I*b*x)/(1+c
+I*d))/b^2+1/8*I*polylog(4,-(1-c+I*d)*exp(2*I*a+2*I*b*x)/(1-c-I*d))/b^3-1/8
*I*polylog(4,-(1+c-I*d)*exp(2*I*a+2*I*b*x)/(1+c+I*d))/b^3
```

**Rubi [A]** time = 0.50, antiderivative size = 395, normalized size of antiderivative = 1.00, number of steps used = 11, number of rules used = 6, integrand size = 15, $\frac{\text{number of rules}}{\text{integrand size}} = 0.400$, Rules used = {6268, 2190, 2531, 6609, 2282, 6589}

$$\frac{x\text{PolyLog}\left(3,-\frac{(-c+id+1)e^{2ia+2ibx}}{-c-id+1}\right)}{4b^2}-\frac{x\text{PolyLog}\left(3,-\frac{(c-id+1)e^{2ia+2ibx}}{c+id+1}\right)}{4b^2}+\frac{i\text{PolyLog}\left(4,-\frac{(-c+id+1)e^{2ia+2ibx}}{-c-id+1}\right)}{8b^3}-\frac{i\text{PolyLog}\left(4,-\right.}{8}$$

Antiderivative was successfully verified.

```
[In] Int[x^2*ArcCoth[c + d*Tan[a + b*x]],x]
```

```
[Out] (x^3*ArcCoth[c + d*Tan[a + b*x]])/3 + (x^3*Log[1 + ((1 - c + I*d)*E^((2*I)*
a + (2*I)*b*x))/(1 - c - I*d)])/6 - (x^3*Log[1 + ((1 + c - I*d)*E^((2*I)*a
+ (2*I)*b*x))/(1 + c + I*d)])/6 - ((I/4)*x^2*PolyLog[2, -(((1 - c + I*d)*E^
((2*I)*a + (2*I)*b*x))/(1 - c - I*d))])/b + ((I/4)*x^2*PolyLog[2, -(((1 + c
 - I*d)*E^((2*I)*a + (2*I)*b*x))/(1 + c + I*d))])/b + (x*PolyLog[3, -(((1 -
 c + I*d)*E^((2*I)*a + (2*I)*b*x))/(1 - c - I*d))])/(4*b^2) - (x*PolyLog[3,
 -(((1 + c - I*d)*E^((2*I)*a + (2*I)*b*x))/(1 + c + I*d))])/(4*b^2) + ((I/8
)*PolyLog[4, -(((1 - c + I*d)*E^((2*I)*a + (2*I)*b*x))/(1 - c - I*d))])/b^3
 - ((I/8)*PolyLog[4, -(((1 + c - I*d)*E^((2*I)*a + (2*I)*b*x))/(1 + c + I*d
))])/b^3
```

Rule 2190

```
Int[(((F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m_.))/
((a_) + (b_.)*((F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)), x_Symbol] :> Simp
[((c + d*x)^m*Log[1 + (b*(F^(g*(e + f*x)))^n)/a])/(b*f*g*n*Log[F]), x] - Di
st[(d*m)/(b*f*g*n*Log[F]), Int[(c + d*x)^(m - 1)*Log[1 + (b*(F^(g*(e + f*x)
))^n)/a], x], x] /; FreeQ[{F, a, b, c, d, e, f, g, n}, x] && IGtQ[m, 0]
```

Rule 2282

```
Int[u_, x_Symbol] :> With[{v = FunctionOfExponential[u, x]}, Dist[v/D[v, x]
, Subst[Int[FunctionOfExponentialFunction[u, x]/x, x], x, v], x]] /; Functi
onOfExponentialQ[u, x] &&  !MatchQ[u, (w_)*((a_.)*(v_)^(n_))^(m_) /; FreeQ[
{a, m, n}, x] && IntegerQ[m*n]] &&  !MatchQ[u, E^((c_.)*((a_.) + (b_.)*x))*
(F_)[v_] /; FreeQ[{a, b, c}, x] && InverseFunctionQ[F[x]]]
```

Rule 2531

```
Int[Log[1 + (e_.)*((F_)^((c_.)*((a_.) + (b_.)*(x_))))^(n_.)]*((f_.) + (g_.)
*(x_))^(m_.), x_Symbol] :> -Simp[((f + g*x)^m*PolyLog[2, -(e*(F^(c*(a + b*x
)))^n)])/(b*c*n*Log[F]), x] + Dist[(g*m)/(b*c*n*Log[F]), Int[(f + g*x)^(m -
 1)*PolyLog[2, -(e*(F^(c*(a + b*x)))^n)], x], x] /; FreeQ[{F, a, b, c, e, f
```

```
, g, n}, x] && GtQ[m, 0]
```

Rule 6268

```
Int[ArcCoth[(c_.) + (d_.)*Tan[(a_.) + (b_.)*(x_)]]*((e_.) + (f_.)*(x_))^(m_
.), x_Symbol] :> Simp[((e + f*x)^(m + 1)*ArcCoth[c + d*Tan[a + b*x]])/(f*(m
 + 1)), x] + (-Dist[(I*b*(1 + c - I*d))/(f*(m + 1)), Int[((e + f*x)^(m + 1)
*E^(2*I*a + 2*I*b*x))/(1 + c + I*d + (1 + c - I*d)*E^(2*I*a + 2*I*b*x)), x]
, x] + Dist[(I*b*(1 - c + I*d))/(f*(m + 1)), Int[((e + f*x)^(m + 1)*E^(2*I*
a + 2*I*b*x))/(1 - c - I*d + (1 - c + I*d)*E^(2*I*a + 2*I*b*x)), x], x]) /;
 FreeQ[{a, b, c, d, e, f}, x] && IGtQ[m, 0] && NeQ[(c + I*d)^2, 1]
```

Rule 6589

```
Int[PolyLog[n_, (c_.)*((a_.) + (b_.)*(x_))^(p_.)]/((d_.) + (e_.)*(x_)), x_S
ymbol] :> Simp[PolyLog[n + 1, c*(a + b*x)^p]/(e*p), x] /; FreeQ[{a, b, c, d
, e, n, p}, x] && EqQ[b*d, a*e]
```

Rule 6609

```
Int[((e_.) + (f_.)*(x_))^(m_.)*PolyLog[n_, (d_.)*((F_)^((c_.)*((a_.) + (b_.
)*(x_))))^(p_.)], x_Symbol] :> Simp[((e + f*x)^m*PolyLog[n + 1, d*(F^(c*(a
+ b*x)))^p])/(b*c*p*Log[F]), x] - Dist[(f*m)/(b*c*p*Log[F]), Int[(e + f*x)^
(m - 1)*PolyLog[n + 1, d*(F^(c*(a + b*x)))^p], x], x] /; FreeQ[{F, a, b, c,
 d, e, f, n, p}, x] && GtQ[m, 0]
```

Rubi steps

$$\int x^2 \coth^{-1}(c+d\tan(a+bx))\,dx = \frac{1}{3}x^3\coth^{-1}(c+d\tan(a+bx)) + \frac{1}{3}(b(i(1-c)-d))\int \frac{e^{2ia+2ibx}x}{1-c-id+(1-c+}$$

$$= \frac{1}{3}x^3\coth^{-1}(c+d\tan(a+bx)) + \frac{1}{6}x^3\log\left(1+\frac{(1-c+id)e^{2ia+2ibx}}{1-c-id}\right) - \frac{1}{6}x^3$$

$$= \frac{1}{3}x^3\coth^{-1}(c+d\tan(a+bx)) + \frac{1}{6}x^3\log\left(1+\frac{(1-c+id)e^{2ia+2ibx}}{1-c-id}\right) - \frac{1}{6}x^3$$

$$= \frac{1}{3}x^3\coth^{-1}(c+d\tan(a+bx)) + \frac{1}{6}x^3\log\left(1+\frac{(1-c+id)e^{2ia+2ibx}}{1-c-id}\right) - \frac{1}{6}x^3$$

$$= \frac{1}{3}x^3\coth^{-1}(c+d\tan(a+bx)) + \frac{1}{6}x^3\log\left(1+\frac{(1-c+id)e^{2ia+2ibx}}{1-c-id}\right) - \frac{1}{6}x^3$$

$$= \frac{1}{3}x^3\coth^{-1}(c+d\tan(a+bx)) + \frac{1}{6}x^3\log\left(1+\frac{(1-c+id)e^{2ia+2ibx}}{1-c-id}\right) - \frac{1}{6}x^3$$

**Mathematica [A]** time = 0.34, size = 346, normalized size = 0.88

$$\frac{1}{3}x^3\coth^{-1}(d\tan(a+bx)+c)+\frac{4b^3x^3\log\left(1+\frac{(c-id-1)e^{2i(a+bx)}}{c+id-1}\right)-4b^3x^3\log\left(1+\frac{(c-id+1)e^{2i(a+bx)}}{c+id+1}\right)-6ib^2x^2\mathrm{Li}_2\left(\frac{(-c+id}{c}\right.}{}$$

Antiderivative was successfully verified.

```
[In] Integrate[x^2*ArcCoth[c + d*Tan[a + b*x]],x]
```

```
[Out] (x^3*ArcCoth[c + d*Tan[a + b*x]])/3 + (4*b^3*x^3*Log[1 + ((-1 + c - I*d)*E^
((2*I)*(a + b*x)))/(-1 + c + I*d)] - 4*b^3*x^3*Log[1 + ((1 + c - I*d)*E^((2
*I)*(a + b*x)))/(1 + c + I*d)] - (6*I)*b^2*x^2*PolyLog[2, ((1 - c + I*d)*E^
((2*I)*(a + b*x)))/(-1 + c + I*d)] + (6*I)*b^2*x^2*PolyLog[2, -(((1 + c - I
*d)*E^((2*I)*(a + b*x)))/(1 + c + I*d))] + 6*b*x*PolyLog[3, ((1 - c + I*d)*
E^((2*I)*(a + b*x)))/(-1 + c + I*d)] - 6*b*x*PolyLog[3, -(((1 + c - I*d)*E^
((2*I)*(a + b*x)))/(1 + c + I*d))] + (3*I)*PolyLog[4, ((1 - c + I*d)*E^((2*
I)*(a + b*x)))/(-1 + c + I*d)] - (3*I)*PolyLog[4, -(((1 + c - I*d)*E^((2*I)
*(a + b*x)))/(1 + c + I*d))])/(24*b^3)
```

**fricas [C]** time = 0.96, size = 2160, normalized size = 5.47

result too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*arccoth(c+d*tan(b*x+a)),x, algorithm="fricas")
```

```
[Out] 1/48*(8*b^3*x^3*log((d*tan(b*x + a) + c + 1)/(d*tan(b*x + a) + c - 1)) + 6*
I*b^2*x^2*dilog(-((2*I*(c + 1)*d + 2*d^2)*tan(b*x + a)^2 + 2*c^2 - 2*I*(c +
 1)*d + (2*I*c^2 + 4*(c + 1)*d - 2*I*d^2 + 4*I*c + 2*I)*tan(b*x + a) + 4*c
+ 2)/((c^2 + d^2 + 2*c + 1)*tan(b*x + a)^2 + c^2 + d^2 + 2*c + 1) + 1) - 6*
I*b^2*x^2*dilog(-((-2*I*(c + 1)*d + 2*d^2)*tan(b*x + a)^2 + 2*c^2 + 2*I*(c
+ 1)*d + (-2*I*c^2 + 4*(c + 1)*d + 2*I*d^2 - 4*I*c - 2*I)*tan(b*x + a) + 4*
c + 2)/((c^2 + d^2 + 2*c + 1)*tan(b*x + a)^2 + c^2 + d^2 + 2*c + 1) + 1) +
6*I*b^2*x^2*dilog((2*(I*(c - 1)*d - d^2)*tan(b*x + a)^2 - 2*c^2 - 2*I*(c -
1)*d - (-2*I*c^2 + 4*(c - 1)*d + 2*I*d^2 + 4*I*c - 2*I)*tan(b*x + a) + 4*c
- 2)/((c^2 + d^2 - 2*c + 1)*tan(b*x + a)^2 + c^2 + d^2 - 2*c + 1) + 1) - 6*
I*b^2*x^2*dilog((2*(-I*(c - 1)*d - d^2)*tan(b*x + a)^2 - 2*c^2 + 2*I*(c - 1
)*d - (2*I*c^2 + 4*(c - 1)*d - 2*I*d^2 - 4*I*c + 2*I)*tan(b*x + a) + 4*c -
2)/((c^2 + d^2 - 2*c + 1)*tan(b*x + a)^2 + c^2 + d^2 - 2*c + 1) + 1) + 4*a^
3*log(((I*(c + 1)*d + d^2)*tan(b*x + a)^2 - c^2 + I*(c + 1)*d + (I*c^2 + I*
d^2 + 2*I*c + I)*tan(b*x + a) - 2*c - 1)/(tan(b*x + a)^2 + 1)) + 4*a^3*log(
((I*(c + 1)*d - d^2)*tan(b*x + a)^2 + c^2 + I*(c + 1)*d + (I*c^2 + I*d^2 +
2*I*c + I)*tan(b*x + a) + 2*c + 1)/(tan(b*x + a)^2 + 1)) - 4*a^3*log(((I*(c
 - 1)*d + d^2)*tan(b*x + a)^2 - c^2 + I*(c - 1)*d + (I*c^2 + I*d^2 - 2*I*c
+ I)*tan(b*x + a) + 2*c - 1)/(tan(b*x + a)^2 + 1)) - 4*a^3*log(((I*(c - 1)*
d - d^2)*tan(b*x + a)^2 + c^2 + I*(c - 1)*d + (I*c^2 + I*d^2 - 2*I*c + I)*t
an(b*x + a) - 2*c + 1)/(tan(b*x + a)^2 + 1)) - 6*b*x*polylog(3, ((c^2 + 2*I
*(c + 1)*d - d^2 + 2*c + 1)*tan(b*x + a)^2 - c^2 - 2*I*(c + 1)*d + d^2 + (2
*I*c^2 - 4*(c + 1)*d - 2*I*d^2 + 4*I*c + 2*I)*tan(b*x + a) - 2*c - 1)/((c^2
 + d^2 + 2*c + 1)*tan(b*x + a)^2 + c^2 + d^2 + 2*c + 1)) - 6*b*x*polylog(3,
 ((c^2 - 2*I*(c + 1)*d - d^2 + 2*c + 1)*tan(b*x + a)^2 - c^2 + 2*I*(c + 1)*
d + d^2 + (-2*I*c^2 - 4*(c + 1)*d + 2*I*d^2 - 4*I*c - 2*I)*tan(b*x + a) - 2
*c - 1)/((c^2 + d^2 + 2*c + 1)*tan(b*x + a)^2 + c^2 + d^2 + 2*c + 1)) + 6*b
*x*polylog(3, ((c^2 + 2*I*(c - 1)*d - d^2 - 2*c + 1)*tan(b*x + a)^2 - c^2 -
 2*I*(c - 1)*d + d^2 + (2*I*c^2 - 4*(c - 1)*d - 2*I*d^2 - 4*I*c + 2*I)*tan(
b*x + a) + 2*c - 1)/((c^2 + d^2 - 2*c + 1)*tan(b*x + a)^2 + c^2 + d^2 - 2*c
 + 1)) + 6*b*x*polylog(3, ((c^2 - 2*I*(c - 1)*d - d^2 - 2*c + 1)*tan(b*x +
a)^2 - c^2 + 2*I*(c - 1)*d + d^2 + (-2*I*c^2 - 4*(c - 1)*d + 2*I*d^2 + 4*I*
c - 2*I)*tan(b*x + a) + 2*c - 1)/((c^2 + d^2 - 2*c + 1)*tan(b*x + a)^2 + c^
2 + d^2 - 2*c + 1)) - 4*(b^3*x^3 + a^3)*log(((2*I*(c + 1)*d + 2*d^2)*tan(b*
x + a)^2 + 2*c^2 - 2*I*(c + 1)*d + (2*I*c^2 + 4*(c + 1)*d - 2*I*d^2 + 4*I*c
 + 2*I)*tan(b*x + a) + 4*c + 2)/((c^2 + d^2 + 2*c + 1)*tan(b*x + a)^2 + c^2
 + d^2 + 2*c + 1)) - 4*(b^3*x^3 + a^3)*log(((-2*I*(c + 1)*d + 2*d^2)*tan(b*
x + a)^2 + 2*c^2 + 2*I*(c + 1)*d + (-2*I*c^2 + 4*(c + 1)*d + 2*I*d^2 - 4*I*
c - 2*I)*tan(b*x + a) + 4*c + 2)/((c^2 + d^2 + 2*c + 1)*tan(b*x + a)^2 + c^
2 + d^2 + 2*c + 1)) + 4*(b^3*x^3 + a^3)*log(-(2*(I*(c - 1)*d - d^2)*tan(b*x
 + a)^2 - 2*c^2 - 2*I*(c - 1)*d - (-2*I*c^2 + 4*(c - 1)*d + 2*I*d^2 + 4*I*c
 - 2*I)*tan(b*x + a) + 4*c - 2)/((c^2 + d^2 - 2*c + 1)*tan(b*x + a)^2 + c^2
 + d^2 - 2*c + 1)) + 4*(b^3*x^3 + a^3)*log(-(2*(-I*(c - 1)*d - d^2)*tan(b*x
```

```
 + a)^2 - 2*c^2 + 2*I*(c - 1)*d - (2*I*c^2 + 4*(c - 1)*d - 2*I*d^2 - 4*I*c
+ 2*I)*tan(b*x + a) + 4*c - 2)/((c^2 + d^2 - 2*c + 1)*tan(b*x + a)^2 + c^2
+ d^2 - 2*c + 1)) + 3*I*polylog(4, ((c^2 + 2*I*(c + 1)*d - d^2 + 2*c + 1)*t
an(b*x + a)^2 - c^2 - 2*I*(c + 1)*d + d^2 + (2*I*c^2 - 4*(c + 1)*d - 2*I*d^
2 + 4*I*c + 2*I)*tan(b*x + a) - 2*c - 1)/((c^2 + d^2 + 2*c + 1)*tan(b*x + a
)^2 + c^2 + d^2 + 2*c + 1)) - 3*I*polylog(4, ((c^2 - 2*I*(c + 1)*d - d^2 +
2*c + 1)*tan(b*x + a)^2 - c^2 + 2*I*(c + 1)*d + d^2 + (-2*I*c^2 - 4*(c + 1)
*d + 2*I*d^2 - 4*I*c - 2*I)*tan(b*x + a) - 2*c - 1)/((c^2 + d^2 + 2*c + 1)*
tan(b*x + a)^2 + c^2 + d^2 + 2*c + 1)) - 3*I*polylog(4, ((c^2 + 2*I*(c - 1)
*d - d^2 - 2*c + 1)*tan(b*x + a)^2 - c^2 - 2*I*(c - 1)*d + d^2 + (2*I*c^2 -
 4*(c - 1)*d - 2*I*d^2 - 4*I*c + 2*I)*tan(b*x + a) + 2*c - 1)/((c^2 + d^2 -
 2*c + 1)*tan(b*x + a)^2 + c^2 + d^2 - 2*c + 1)) + 3*I*polylog(4, ((c^2 - 2
*I*(c - 1)*d - d^2 - 2*c + 1)*tan(b*x + a)^2 - c^2 + 2*I*(c - 1)*d + d^2 +
(-2*I*c^2 - 4*(c - 1)*d + 2*I*d^2 + 4*I*c - 2*I)*tan(b*x + a) + 2*c - 1)/((
c^2 + d^2 - 2*c + 1)*tan(b*x + a)^2 + c^2 + d^2 - 2*c + 1)))/b^3
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int x^2 \operatorname{arcoth}(d \tan(bx+a)+c)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*arccoth(c+d*tan(b*x+a)),x, algorithm="giac")
```

```
[Out] integrate(x^2*arccoth(d*tan(b*x + a) + c), x)
```

**maple [C]** time = 34.68, size = 6892, normalized size = 17.45

output too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^2*arccoth(c+d*tan(b*x+a)),x)
```

```
[Out] result too large to display
```

**maxima [F]** time = 0.00, size = 0, normalized size = 0.00

$$\frac{1}{12}x^3\log\left(\left(c^2+d^2+2c+1\right)\cos\left(2bx+2a\right)^2+4(c+1)d\sin\left(2bx+2a\right)+\left(c^2+d^2+2c+1\right)\sin\left(2bx+2a\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*arccoth(c+d*tan(b*x+a)),x, algorithm="maxima")
```

```
[Out] 1/12*x^3*log((c^2 + d^2 + 2*c + 1)*cos(2*b*x + 2*a)^2 + 4*(c + 1)*d*sin(2*b
*x + 2*a) + (c^2 + d^2 + 2*c + 1)*sin(2*b*x + 2*a)^2 + c^2 + d^2 + 2*(c^2 -
 d^2 + 2*c + 1)*cos(2*b*x + 2*a) + 2*c + 1) - 1/12*x^3*log((c^2 + d^2 - 2*c
 + 1)*cos(2*b*x + 2*a)^2 + 4*(c - 1)*d*sin(2*b*x + 2*a) + (c^2 + d^2 - 2*c
+ 1)*sin(2*b*x + 2*a)^2 + c^2 + d^2 + 2*(c^2 - d^2 - 2*c + 1)*cos(2*b*x + 2
*a) - 2*c + 1) - 4*b*d*integrate(-1/3*(2*(c^2 + d^2 - 1)*x^3*cos(2*b*x + 2*
a)^2 + 2*c*d*x^3*sin(2*b*x + 2*a) + 2*(c^2 + d^2 - 1)*x^3*sin(2*b*x + 2*a)^
2 + (c^2 - d^2 - 1)*x^3*cos(2*b*x + 2*a) - (2*c*d*x^3*sin(2*b*x + 2*a) - (c
^2 - d^2 - 1)*x^3*cos(2*b*x + 2*a))*cos(4*b*x + 4*a) + (2*c*d*x^3*cos(2*b*x
 + 2*a) + (c^2 - d^2 - 1)*x^3*sin(2*b*x + 2*a))*sin(4*b*x + 4*a))/(c^4 + d^
4 + 2*(c^2 + 1)*d^2 + (c^4 + d^4 + 2*(c^2 + 1)*d^2 - 2*c^2 + 1)*cos(4*b*x +
 4*a)^2 + 4*(c^4 + d^4 + 2*(c^2 - 1)*d^2 - 2*c^2 + 1)*cos(2*b*x + 2*a)^2 +
(c^4 + d^4 + 2*(c^2 + 1)*d^2 - 2*c^2 + 1)*sin(4*b*x + 4*a)^2 + 4*(c^4 + d^4
 + 2*(c^2 - 1)*d^2 - 2*c^2 + 1)*sin(2*b*x + 2*a)^2 - 2*c^2 + 2*(c^4 + d^4 -
 2*(3*c^2 - 1)*d^2 - 2*c^2 + 2*(c^4 - d^4 - 2*c^2 + 1)*cos(2*b*x + 2*a) - 4
*(c*d^3 + (c^3 - c)*d)*sin(2*b*x + 2*a) + 1)*cos(4*b*x + 4*a) + 4*(c^4 - d^
```

```
4 - 2*c^2 + 1)*cos(2*b*x + 2*a) - 4*(2*c*d^3 - 2*(c^3 - c)*d - 2*(c*d^3 + (
c^3 - c)*d)*cos(2*b*x + 2*a) - (c^4 - d^4 - 2*c^2 + 1)*sin(2*b*x + 2*a))*si
n(4*b*x + 4*a) + 8*(c*d^3 + (c^3 - c)*d)*sin(2*b*x + 2*a) + 1), x)
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.00

$$\int x^2 \operatorname{acoth}(c + d \tan(a + b x)) \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^2*acoth(c + d*tan(a + b*x)),x)
```

```
[Out] int(x^2*acoth(c + d*tan(a + b*x)), x)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int x^2 \operatorname{acoth}(c + d \tan(a + bx)) \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**2*acoth(c+d*tan(b*x+a)),x)
```

```
[Out] Integral(x**2*acoth(c + d*tan(a + b*x)), x)
```

## 3.237 $\int x \coth^{-1}(c + d\tan(a + bx))\,dx$

**Optimal**. Leaf size=295

$$\frac{\text{Li}_3\left(-\frac{(-c+id+1)e^{2ia+2ibx}}{-c-id+1}\right)}{8b^2}-\frac{\text{Li}_3\left(-\frac{(c-id+1)e^{2ia+2ibx}}{c+id+1}\right)}{8b^2}-\frac{ix\text{Li}_2\left(-\frac{(-c+id+1)e^{2ia+2ibx}}{-c-id+1}\right)}{4b}+\frac{ix\text{Li}_2\left(-\frac{(c-id+1)e^{2ia+2ibx}}{c+id+1}\right)}{4b}+\frac{1}{4}x^2\log\left(1+\right.$$

```
[Out] 1/2*x^2*arccoth(c+d*tan(b*x+a))+1/4*x^2*ln(1+(1-c+I*d)*exp(2*I*a+2*I*b*x)/(
1-c-I*d))-1/4*x^2*ln(1+(1+c-I*d)*exp(2*I*a+2*I*b*x)/(1+c+I*d))-1/4*I*x*poly
log(2,-(1-c+I*d)*exp(2*I*a+2*I*b*x)/(1-c-I*d))/b+1/4*I*x*polylog(2,-(1+c-I*
d)*exp(2*I*a+2*I*b*x)/(1+c+I*d))/b+1/8*polylog(3,-(1-c+I*d)*exp(2*I*a+2*I*b
*x)/(1-c-I*d))/b^2-1/8*polylog(3,-(1+c-I*d)*exp(2*I*a+2*I*b*x)/(1+c+I*d))/b
^2
```

**Rubi** [A] time = 0.40, antiderivative size = 295, normalized size of antiderivative = 1.00, number of steps used = 9, number of rules used = 5, integrand size = 13, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.385, Rules used = {6268, 2190, 2531, 2282, 6589}

$$\frac{\text{PolyLog}\left(3,-\frac{(-c+id+1)e^{2ia+2ibx}}{-c-id+1}\right)}{8b^2}-\frac{\text{PolyLog}\left(3,-\frac{(c-id+1)e^{2ia+2ibx}}{c+id+1}\right)}{8b^2}-\frac{ix\text{PolyLog}\left(2,-\frac{(-c+id+1)e^{2ia+2ibx}}{-c-id+1}\right)}{4b}+\frac{ix\text{PolyLog}\left(\right.}{}$$

Antiderivative was successfully verified.

```
[In] Int[x*ArcCoth[c + d*Tan[a + b*x]],x]
```

```
[Out] (x^2*ArcCoth[c + d*Tan[a + b*x]])/2 + (x^2*Log[1 + ((1 - c + I*d)*E^((2*I)*
a + (2*I)*b*x))/(1 - c - I*d)])/4 - (x^2*Log[1 + ((1 + c - I*d)*E^((2*I)*a
+ (2*I)*b*x))/(1 + c + I*d)])/4 - ((I/4)*x*PolyLog[2, -(((1 - c + I*d)*E^((
2*I)*a + (2*I)*b*x))/(1 - c - I*d))])/b + ((I/4)*x*PolyLog[2, -(((1 + c - I
*d)*E^((2*I)*a + (2*I)*b*x))/(1 + c + I*d))])/b + PolyLog[3, -(((1 - c + I*
d)*E^((2*I)*a + (2*I)*b*x))/(1 - c - I*d))]/(8*b^2) - PolyLog[3, -(((1 + c
- I*d)*E^((2*I)*a + (2*I)*b*x))/(1 + c + I*d))]/(8*b^2)
```

Rule 2190

```
Int[(((F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m_.))/
((a_) + (b_.)*((F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)), x_Symbol] :> Simp
[((c + d*x)^m*Log[1 + (b*(F^(g*(e + f*x)))^n)/a])/(b*f*g*n*Log[F]), x] - Di
st[(d*m)/(b*f*g*n*Log[F]), Int[(c + d*x)^(m - 1)*Log[1 + (b*(F^(g*(e + f*x)
))^n)/a], x], x] /; FreeQ[{F, a, b, c, d, e, f, g, n}, x] && IGtQ[m, 0]
```

Rule 2282

```
Int[u_, x_Symbol] :> With[{v = FunctionOfExponential[u, x]}, Dist[v/D[v, x]
, Subst[Int[FunctionOfExponentialFunction[u, x]/x, x], x, v], x]] /; Functi
onOfExponentialQ[u, x] &&  !MatchQ[u, (w_)*((a_.)*(v_)^(n_))^(m_) /; FreeQ[
{a, m, n}, x] && IntegerQ[m*n]] &&  !MatchQ[u, E^((c_.)*((a_.) + (b_.)*x))*
(F_)[v_] /; FreeQ[{a, b, c}, x] && InverseFunctionQ[F[x]]]
```

Rule 2531

```
Int[Log[1 + (e_.)*((F_)^((c_.)*((a_.) + (b_.)*(x_))))^(n_.)]*((f_.) + (g_.)
*(x_))^(m_.), x_Symbol] :> -Simp[((f + g*x)^m*PolyLog[2, -(e*(F^(c*(a + b*x
)))^n)])/(b*c*n*Log[F]), x] + Dist[(g*m)/(b*c*n*Log[F]), Int[(f + g*x)^(m -
 1)*PolyLog[2, -(e*(F^(c*(a + b*x)))^n)], x], x] /; FreeQ[{F, a, b, c, e, f
, g, n}, x] && GtQ[m, 0]
```

Rule 6268

```
Int[ArcCoth[(c_.) + (d_.)*Tan[(a_.) + (b_.)*(x_)]]*((e_.) + (f_.)*(x_))^(m_
.), x_Symbol] :> Simp[((e + f*x)^(m + 1)*ArcCoth[c + d*Tan[a + b*x]])/(f*(m
 + 1)), x] + (-Dist[(I*b*(1 + c - I*d))/(f*(m + 1)), Int[((e + f*x)^(m + 1)
*E^(2*I*a + 2*I*b*x))/(1 + c + I*d + (1 + c - I*d)*E^(2*I*a + 2*I*b*x)), x]
, x] + Dist[(I*b*(1 - c + I*d))/(f*(m + 1)), Int[((e + f*x)^(m + 1)*E^(2*I*
a + 2*I*b*x))/(1 - c - I*d + (1 - c + I*d)*E^(2*I*a + 2*I*b*x)), x], x]) /;
 FreeQ[{a, b, c, d, e, f}, x] && IGtQ[m, 0] && NeQ[(c + I*d)^2, 1]
```

Rule 6589

```
Int[PolyLog[n_, (c_.)*((a_.) + (b_.)*(x_))^(p_.)]/((d_.) + (e_.)*(x_)), x_S
ymbol] :> Simp[PolyLog[n + 1, c*(a + b*x)^p]/(e*p), x] /; FreeQ[{a, b, c, d
, e, n, p}, x] && EqQ[b*d, a*e]
```

Rubi steps

$$\int x\coth^{-1}(c+d\tan(a+bx))\,dx=\frac{1}{2}x^2\coth^{-1}(c+d\tan(a+bx))+\frac{1}{2}(b(i(1-c)-d))\int\frac{e^{2ia+2ibx}x^2}{1-c-id+(1-c+id)}$$

$$=\frac{1}{2}x^2\coth^{-1}(c+d\tan(a+bx))+\frac{1}{4}x^2\log\left(1+\frac{(1-c+id)e^{2ia+2ibx}}{1-c-id}\right)-\frac{1}{4}x^2\log$$

$$=\frac{1}{2}x^2\coth^{-1}(c+d\tan(a+bx))+\frac{1}{4}x^2\log\left(1+\frac{(1-c+id)e^{2ia+2ibx}}{1-c-id}\right)-\frac{1}{4}x^2\log$$

$$=\frac{1}{2}x^2\coth^{-1}(c+d\tan(a+bx))+\frac{1}{4}x^2\log\left(1+\frac{(1-c+id)e^{2ia+2ibx}}{1-c-id}\right)-\frac{1}{4}x^2\log$$

$$=\frac{1}{2}x^2\coth^{-1}(c+d\tan(a+bx))+\frac{1}{4}x^2\log\left(1+\frac{(1-c+id)e^{2ia+2ibx}}{1-c-id}\right)-\frac{1}{4}x^2\log$$

**Mathematica [A]** time = 0.16, size = 257, normalized size = 0.87

$$\frac{1}{2}x^2\coth^{-1}(d\tan(a+bx)+c)+\frac{2b^2x^2\log\left(1+\frac{(c-id-1)e^{2i(a+bx)}}{c+id-1}\right)-2b^2x^2\log\left(1+\frac{(c-id+1)e^{2i(a+bx)}}{c+id+1}\right)-2ibx\text{Li}_2\left(\frac{(-c+id+1)e^{2i(}}{c+id-1}\right.}{8b^2}$$

Antiderivative was successfully verified.

```
[In] Integrate[x*ArcCoth[c + d*Tan[a + b*x]],x]
```

```
[Out] (x^2*ArcCoth[c + d*Tan[a + b*x]])/2 + (2*b^2*x^2*Log[1 + ((-1 + c - I*d)*E^
((2*I)*(a + b*x)))/(-1 + c + I*d)] - 2*b^2*x^2*Log[1 + ((1 + c - I*d)*E^((2
*I)*(a + b*x)))/(1 + c + I*d)] - (2*I)*b*x*PolyLog[2, ((1 - c + I*d)*E^((2*
I)*(a + b*x)))/(-1 + c + I*d)] + (2*I)*b*x*PolyLog[2, -(((1 + c - I*d)*E^((
2*I)*(a + b*x)))/(1 + c + I*d))] + PolyLog[3, ((1 - c + I*d)*E^((2*I)*(a +
b*x)))/(-1 + c + I*d)] - PolyLog[3, -(((1 + c - I*d)*E^((2*I)*(a + b*x)))/(
1 + c + I*d))])/(8*b^2)
```

**fricas [C]** time = 0.83, size = 1688, normalized size = 5.72

result too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*arccoth(c+d*tan(b*x+a)),x, algorithm="fricas")
```

```
[Out] 1/16*(4*b^2*x^2*log((d*tan(b*x + a) + c + 1)/(d*tan(b*x + a) + c - 1)) + 2*
I*b*x*dilog(-((2*I*(c + 1)*d + 2*d^2)*tan(b*x + a)^2 + 2*c^2 - 2*I*(c + 1)*
d + (2*I*c^2 + 4*(c + 1)*d - 2*I*d^2 + 4*I*c + 2*I)*tan(b*x + a) + 4*c + 2)
/((c^2 + d^2 + 2*c + 1)*tan(b*x + a)^2 + c^2 + d^2 + 2*c + 1) + 1) - 2*I*b*
x*dilog(-((-2*I*(c + 1)*d + 2*d^2)*tan(b*x + a)^2 + 2*c^2 + 2*I*(c + 1)*d +
 (-2*I*c^2 + 4*(c + 1)*d + 2*I*d^2 - 4*I*c - 2*I)*tan(b*x + a) + 4*c + 2)/(
(c^2 + d^2 + 2*c + 1)*tan(b*x + a)^2 + c^2 + d^2 + 2*c + 1) + 1) + 2*I*b*x*
dilog((2*(I*(c - 1)*d - d^2)*tan(b*x + a)^2 - 2*c^2 - 2*I*(c - 1)*d - (-2*I
*c^2 + 4*(c - 1)*d + 2*I*d^2 + 4*I*c - 2*I)*tan(b*x + a) + 4*c - 2)/((c^2 +
 d^2 - 2*c + 1)*tan(b*x + a)^2 + c^2 + d^2 - 2*c + 1) + 1) - 2*I*b*x*dilog(
(2*(-I*(c - 1)*d - d^2)*tan(b*x + a)^2 - 2*c^2 + 2*I*(c - 1)*d - (2*I*c^2 +
 4*(c - 1)*d - 2*I*d^2 - 4*I*c + 2*I)*tan(b*x + a) + 4*c - 2)/((c^2 + d^2 -
 2*c + 1)*tan(b*x + a)^2 + c^2 + d^2 - 2*c + 1) + 1) - 2*a^2*log(((I*(c + 1
)*d + d^2)*tan(b*x + a)^2 - c^2 + I*(c + 1)*d + (I*c^2 + I*d^2 + 2*I*c + I)
*tan(b*x + a) - 2*c - 1)/(tan(b*x + a)^2 + 1)) - 2*a^2*log(((I*(c + 1)*d -
d^2)*tan(b*x + a)^2 + c^2 + I*(c + 1)*d + (I*c^2 + I*d^2 + 2*I*c + I)*tan(b
*x + a) + 2*c + 1)/(tan(b*x + a)^2 + 1)) + 2*a^2*log(((I*(c - 1)*d + d^2)*t
an(b*x + a)^2 - c^2 + I*(c - 1)*d + (I*c^2 + I*d^2 - 2*I*c + I)*tan(b*x + a
) + 2*c - 1)/(tan(b*x + a)^2 + 1)) + 2*a^2*log(((I*(c - 1)*d - d^2)*tan(b*x
 + a)^2 + c^2 + I*(c - 1)*d + (I*c^2 + I*d^2 - 2*I*c + I)*tan(b*x + a) - 2*
c + 1)/(tan(b*x + a)^2 + 1)) - 2*(b^2*x^2 - a^2)*log(((2*I*(c + 1)*d + 2*d^
2)*tan(b*x + a)^2 + 2*c^2 - 2*I*(c + 1)*d + (2*I*c^2 + 4*(c + 1)*d - 2*I*d^
2 + 4*I*c + 2*I)*tan(b*x + a) + 4*c + 2)/((c^2 + d^2 + 2*c + 1)*tan(b*x + a
)^2 + c^2 + d^2 + 2*c + 1)) - 2*(b^2*x^2 - a^2)*log(((-2*I*(c + 1)*d + 2*d^
2)*tan(b*x + a)^2 + 2*c^2 + 2*I*(c + 1)*d + (-2*I*c^2 + 4*(c + 1)*d + 2*I*d
^2 - 4*I*c - 2*I)*tan(b*x + a) + 4*c + 2)/((c^2 + d^2 + 2*c + 1)*tan(b*x +
a)^2 + c^2 + d^2 + 2*c + 1)) + 2*(b^2*x^2 - a^2)*log(-(2*(I*(c - 1)*d - d^2
)*tan(b*x + a)^2 - 2*c^2 - 2*I*(c - 1)*d - (-2*I*c^2 + 4*(c - 1)*d + 2*I*d^
2 + 4*I*c - 2*I)*tan(b*x + a) + 4*c - 2)/((c^2 + d^2 - 2*c + 1)*tan(b*x + a
)^2 + c^2 + d^2 - 2*c + 1)) + 2*(b^2*x^2 - a^2)*log(-(2*(-I*(c - 1)*d - d^2
)*tan(b*x + a)^2 - 2*c^2 + 2*I*(c - 1)*d - (2*I*c^2 + 4*(c - 1)*d - 2*I*d^2
 - 4*I*c + 2*I)*tan(b*x + a) + 4*c - 2)/((c^2 + d^2 - 2*c + 1)*tan(b*x + a)
^2 + c^2 + d^2 - 2*c + 1)) - polylog(3, ((c^2 + 2*I*(c + 1)*d - d^2 + 2*c +
 1)*tan(b*x + a)^2 - c^2 - 2*I*(c + 1)*d + d^2 + (2*I*c^2 - 4*(c + 1)*d - 2
*I*d^2 + 4*I*c + 2*I)*tan(b*x + a) - 2*c - 1)/((c^2 + d^2 + 2*c + 1)*tan(b*
x + a)^2 + c^2 + d^2 + 2*c + 1)) - polylog(3, ((c^2 - 2*I*(c + 1)*d - d^2 +
 2*c + 1)*tan(b*x + a)^2 - c^2 + 2*I*(c + 1)*d + d^2 + (-2*I*c^2 - 4*(c + 1
)*d + 2*I*d^2 - 4*I*c - 2*I)*tan(b*x + a) - 2*c - 1)/((c^2 + d^2 + 2*c + 1)
*tan(b*x + a)^2 + c^2 + d^2 + 2*c + 1)) + polylog(3, ((c^2 + 2*I*(c - 1)*d
- d^2 - 2*c + 1)*tan(b*x + a)^2 - c^2 - 2*I*(c - 1)*d + d^2 + (2*I*c^2 - 4*
(c - 1)*d - 2*I*d^2 - 4*I*c + 2*I)*tan(b*x + a) + 2*c - 1)/((c^2 + d^2 - 2*
c + 1)*tan(b*x + a)^2 + c^2 + d^2 - 2*c + 1)) + polylog(3, ((c^2 - 2*I*(c -
 1)*d - d^2 - 2*c + 1)*tan(b*x + a)^2 - c^2 + 2*I*(c - 1)*d + d^2 + (-2*I*c
^2 - 4*(c - 1)*d + 2*I*d^2 + 4*I*c - 2*I)*tan(b*x + a) + 2*c - 1)/((c^2 + d
^2 - 2*c + 1)*tan(b*x + a)^2 + c^2 + d^2 - 2*c + 1)))/b^2
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int x \operatorname{arcoth}(d \tan(bx + a) + c) \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*arccoth(c+d*tan(b*x+a)),x, algorithm="giac")
```

```
[Out] integrate(x*arccoth(d*tan(b*x + a) + c), x)
```

**maple [C]** time = 4.68, size = 6518, normalized size = 22.09

output too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x*arccoth(c+d*tan(b*x+a)),x)
```

```
[Out] result too large to display
```

**maxima** [F] time = 0.00, size = 0, normalized size = 0.00

$$-2\,bd\int -\frac{}{c^4+d^4+2\left(c^2+1\right)d^2+\left(c^4+d^4+2\left(c^2+1\right)d^2-2\,c^2+1\right)\cos\left(4\,bx+4\,a\right)^2+4\left(c^4+d^4+2\left(c^2-1\right)d^2\right.}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*arccoth(c+d*tan(b*x+a)),x, algorithm="maxima")
```

```
[Out] -2*b*d*integrate(-(2*(c^2 + d^2 - 1)*x^2*cos(2*b*x + 2*a)^2 + 2*c*d*x^2*sin
(2*b*x + 2*a) + 2*(c^2 + d^2 - 1)*x^2*sin(2*b*x + 2*a)^2 + (c^2 - d^2 - 1)*
x^2*cos(2*b*x + 2*a) - (2*c*d*x^2*sin(2*b*x + 2*a) - (c^2 - d^2 - 1)*x^2*co
s(2*b*x + 2*a))*cos(4*b*x + 4*a) + (2*c*d*x^2*cos(2*b*x + 2*a) + (c^2 - d^2
 - 1)*x^2*sin(2*b*x + 2*a))*sin(4*b*x + 4*a))/(c^4 + d^4 + 2*(c^2 + 1)*d^2
+ (c^4 + d^4 + 2*(c^2 + 1)*d^2 - 2*c^2 + 1)*cos(4*b*x + 4*a)^2 + 4*(c^4 + d
^4 + 2*(c^2 - 1)*d^2 - 2*c^2 + 1)*cos(2*b*x + 2*a)^2 + (c^4 + d^4 + 2*(c^2
+ 1)*d^2 - 2*c^2 + 1)*sin(4*b*x + 4*a)^2 + 4*(c^4 + d^4 + 2*(c^2 - 1)*d^2 -
 2*c^2 + 1)*sin(2*b*x + 2*a)^2 - 2*c^2 + 2*(c^4 + d^4 - 2*(3*c^2 - 1)*d^2 -
 2*c^2 + 2*(c^4 - d^4 - 2*c^2 + 1)*cos(2*b*x + 2*a) - 4*(c*d^3 + (c^3 - c)*
d)*sin(2*b*x + 2*a) + 1)*cos(4*b*x + 4*a) + 4*(c^4 - d^4 - 2*c^2 + 1)*cos(2
*b*x + 2*a) - 4*(2*c*d^3 - 2*(c^3 - c)*d - 2*(c*d^3 + (c^3 - c)*d)*cos(2*b*
x + 2*a) - (c^4 - d^4 - 2*c^2 + 1)*sin(2*b*x + 2*a))*sin(4*b*x + 4*a) + 8*(
c*d^3 + (c^3 - c)*d)*sin(2*b*x + 2*a) + 1), x) + 1/8*x^2*log((c^2 + d^2 + 2
*c + 1)*cos(2*b*x + 2*a)^2 + 4*(c + 1)*d*sin(2*b*x + 2*a) + (c^2 + d^2 + 2*
c + 1)*sin(2*b*x + 2*a)^2 + c^2 + d^2 + 2*(c^2 - d^2 + 2*c + 1)*cos(2*b*x +
 2*a) + 2*c + 1) - 1/8*x^2*log((c^2 + d^2 - 2*c + 1)*cos(2*b*x + 2*a)^2 + 4
*(c - 1)*d*sin(2*b*x + 2*a) + (c^2 + d^2 - 2*c + 1)*sin(2*b*x + 2*a)^2 + c^
2 + d^2 + 2*(c^2 - d^2 - 2*c + 1)*cos(2*b*x + 2*a) - 2*c + 1)
```

**mupad** [F] time = 0.00, size = -1, normalized size = -0.00

$$\int x\,\mathrm{acoth}\left(c+d\tan\left(a+b\,x\right)\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x*acoth(c + d*tan(a + b*x)),x)
```

```
[Out] int(x*acoth(c + d*tan(a + b*x)), x)
```

**sympy** [F] time = 0.00, size = 0, normalized size = 0.00

$$\int x\,\mathrm{acoth}\left(c+d\tan\left(a+bx\right)\right)dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*acoth(c+d*tan(b*x+a)),x)
```

```
[Out] Integral(x*acoth(c + d*tan(a + b*x)), x)
```

# 3.238 $\int \coth^{-1}(c + d\tan(a + bx))\,dx$

**Optimal**. Leaf size=194

$$-\frac{i\text{Li}_2\left(-\frac{(-c+id+1)e^{2ia+2ibx}}{-c-id+1}\right)}{4b}+\frac{i\text{Li}_2\left(-\frac{(c-id+1)e^{2ia+2ibx}}{c+id+1}\right)}{4b}+\frac{1}{2}x\log\left(1+\frac{(-c+id+1)e^{2ia+2ibx}}{-c-id+1}\right)-\frac{1}{2}x\log\left(1+\frac{(c-id+1)e^{2ia+2ibx}}{c+id+1}\right)$$

```
[Out] x*arccoth(c+d*tan(b*x+a))+1/2*x*ln(1+(1-c+I*d)*exp(2*I*a+2*I*b*x)/(1-c-I*d)
)-1/2*x*ln(1+(1+c-I*d)*exp(2*I*a+2*I*b*x)/(1+c+I*d))-1/4*I*polylog(2,-(1-c+
I*d)*exp(2*I*a+2*I*b*x)/(1-c-I*d))/b+1/4*I*polylog(2,-(1+c-I*d)*exp(2*I*a+2
*I*b*x)/(1+c+I*d))/b
```

**Rubi [A]** time = 0.25, antiderivative size = 194, normalized size of antiderivative = 1.00, number of steps used = 7, number of rules used = 4, integrand size = 11, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.364, Rules used = {6260, 2190, 2279, 2391}

$$-\frac{i\text{PolyLog}\left(2,-\frac{(-c+id+1)e^{2ia+2ibx}}{-c-id+1}\right)}{4b}+\frac{i\text{PolyLog}\left(2,-\frac{(c-id+1)e^{2ia+2ibx}}{c+id+1}\right)}{4b}+\frac{1}{2}x\log\left(1+\frac{(-c+id+1)e^{2ia+2ibx}}{-c-id+1}\right)-\frac{1}{2}x\log\left(\ldots\right)$$

Antiderivative was successfully verified.

```
[In] Int[ArcCoth[c + d*Tan[a + b*x]],x]
```

```
[Out] x*ArcCoth[c + d*Tan[a + b*x]] + (x*Log[1 + ((1 - c + I*d)*E^((2*I)*a + (2*I
)*b*x))/(1 - c - I*d)])/2 - (x*Log[1 + ((1 + c - I*d)*E^((2*I)*a + (2*I)*b*
x))/(1 + c + I*d)])/2 - ((I/4)*PolyLog[2, -(((1 - c + I*d)*E^((2*I)*a + (2*
I)*b*x))/(1 - c - I*d))])/b + ((I/4)*PolyLog[2, -(((1 + c - I*d)*E^((2*I)*a
 + (2*I)*b*x))/(1 + c + I*d))])/b
```

Rule 2190

```
Int[(((F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m_.))/
((a_) + (b_.)*((F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)), x_Symbol] :> Simp
[((c + d*x)^m*Log[1 + (b*(F^(g*(e + f*x)))^n)/a])/(b*f*g*n*Log[F]), x] - Di
st[(d*m)/(b*f*g*n*Log[F]), Int[(c + d*x)^(m - 1)*Log[1 + (b*(F^(g*(e + f*x)
))^n)/a], x], x] /; FreeQ[{F, a, b, c, d, e, f, g, n}, x] && IGtQ[m, 0]
```

Rule 2279

```
Int[Log[(a_) + (b_.)*((F_)^((e_.)*((c_.) + (d_.)*(x_))))^(n_.)], x_Symbol]
:> Dist[1/(d*e*n*Log[F]), Subst[Int[Log[a + b*x]/x, x], x, (F^(e*(c + d*x))
)^n], x] /; FreeQ[{F, a, b, c, d, e, n}, x] && GtQ[a, 0]
```

Rule 2391

```
Int[Log[(c_.)*((d_) + (e_.)*(x_)^(n_.))]/(x_), x_Symbol] :> -Simp[PolyLog[2
, -(c*e*x^n)]/n, x] /; FreeQ[{c, d, e, n}, x] && EqQ[c*d, 1]
```

Rule 6260

```
Int[ArcCoth[(c_.) + (d_.)*Tan[(a_.) + (b_.)*(x_)]], x_Symbol] :> Simp[x*Arc
Coth[c + d*Tan[a + b*x]], x] + (-Dist[I*b*(1 + c - I*d), Int[(x*E^(2*I*a +
2*I*b*x))/(1 + c + I*d + (1 + c - I*d)*E^(2*I*a + 2*I*b*x)), x], x] + Dist[
I*b*(1 - c + I*d), Int[(x*E^(2*I*a + 2*I*b*x))/(1 - c - I*d + (1 - c + I*d)
*E^(2*I*a + 2*I*b*x)), x], x]) /; FreeQ[{a, b, c, d}, x] && NeQ[(c + I*d)^2
, 1]
```

Rubi steps

$$\int \coth^{-1}(c+d\tan(a+bx))\,dx = x\coth^{-1}(c+d\tan(a+bx)) + (b(i(1-c)-d))\int \frac{e^{2ia+2ibx}x}{1-c-id+(1-c+id)e^{2ia+2ib}}$$

$$= x\coth^{-1}(c+d\tan(a+bx)) + \frac{1}{2}x\log\left(1+\frac{(1-c+id)e^{2ia+2ibx}}{1-c-id}\right) - \frac{1}{2}x\log\left(1+\right.$$

$$= x\coth^{-1}(c+d\tan(a+bx)) + \frac{1}{2}x\log\left(1+\frac{(1-c+id)e^{2ia+2ibx}}{1-c-id}\right) - \frac{1}{2}x\log\left(1+\right.$$

$$= x\coth^{-1}(c+d\tan(a+bx)) + \frac{1}{2}x\log\left(1+\frac{(1-c+id)e^{2ia+2ibx}}{1-c-id}\right) - \frac{1}{2}x\log\left(1+\right.$$

**Mathematica [B]** time = 13.41, size = 4654, normalized size = 23.99

Result too large to show

Warning: Unable to verify antiderivative.

```
[In] Integrate[ArcCoth[c + d*Tan[a + b*x]],x]
```

```
[Out] x*ArcCoth[c + d*Tan[a + b*x]] + (d*(-(a*Log[-(Sec[(a + b*x)/2]^2*((-1 + c)*
Cos[a + b*x] + d*Sin[a + b*x]))]) + a*Log[Sec[(a + b*x)/2]^2*(Cos[a + b*x]
+ c*Cos[a + b*x] + d*Sin[a + b*x])] + (a + b*x)*Log[(-d + Sqrt[1 - 2*c + c^
2 + d^2])/(-1 + c) + Tan[(a + b*x)/2]] + I*Log[((-1 + c)*(1 + I*Tan[(a + b*
x)/2]))/(-1 + c + I*d - I*Sqrt[1 - 2*c + c^2 + d^2])]*Log[(-d + Sqrt[1 - 2*
c + c^2 + d^2])/(-1 + c) + Tan[(a + b*x)/2]] - I*Log[-(((-1 + c)*(I + Tan[(
a + b*x)/2]))/(I - I*c - d + Sqrt[1 - 2*c + c^2 + d^2]))]*Log[(-d + Sqrt[1
- 2*c + c^2 + d^2])/(-1 + c) + Tan[(a + b*x)/2]] + (a + b*x)*Log[(d + Sqrt[
1 - 2*c + c^2 + d^2])/(1 - c) + Tan[(a + b*x)/2]] + I*Log[((-1 + c)*(-I + T
an[(a + b*x)/2]))/(I - I*c + d + Sqrt[1 - 2*c + c^2 + d^2])]*Log[(d + Sqrt[
1 - 2*c + c^2 + d^2])/(1 - c) + Tan[(a + b*x)/2]] - I*Log[((-1 + c)*(I + Ta
n[(a + b*x)/2]))/(-I + I*c + d + Sqrt[1 - 2*c + c^2 + d^2])]*Log[(d + Sqrt[
1 - 2*c + c^2 + d^2])/(1 - c) + Tan[(a + b*x)/2]] - (a + b*x)*Log[-((d + Sq
rt[1 + 2*c + c^2 + d^2])/(1 + c)) + Tan[(a + b*x)/2]] - I*Log[((1 + c)*(-I
+ Tan[(a + b*x)/2]))/(-I - I*c + d + Sqrt[1 + 2*c + c^2 + d^2])]*Log[-((d +
 Sqrt[1 + 2*c + c^2 + d^2])/(1 + c)) + Tan[(a + b*x)/2]] + I*Log[((1 + c)*(
I + Tan[(a + b*x)/2]))/(I + I*c + d + Sqrt[1 + 2*c + c^2 + d^2])]*Log[-((d
+ Sqrt[1 + 2*c + c^2 + d^2])/(1 + c)) + Tan[(a + b*x)/2]] - (a + b*x)*Log[(
-d + Sqrt[1 + 2*c + c^2 + d^2] + (1 + c)*Tan[(a + b*x)/2])/(1 + c)] + I*Log
[((1 + c)*(1 - I*Tan[(a + b*x)/2]))/(1 + c - I*d + I*Sqrt[1 + 2*c + c^2 + d
^2])]*Log[(-d + Sqrt[1 + 2*c + c^2 + d^2] + (1 + c)*Tan[(a + b*x)/2])/(1 +
c)] - I*Log[((1 + c)*(1 + I*Tan[(a + b*x)/2]))/(1 + c + I*d - I*Sqrt[1 + 2*
c + c^2 + d^2])]*Log[(-d + Sqrt[1 + 2*c + c^2 + d^2] + (1 + c)*Tan[(a + b*x
)/2])/(1 + c)] + I*PolyLog[2, (d + Sqrt[1 - 2*c + c^2 + d^2] - (-1 + c)*Tan
[(a + b*x)/2])/(I - I*c + d + Sqrt[1 - 2*c + c^2 + d^2])] - I*PolyLog[2, (d
 + Sqrt[1 - 2*c + c^2 + d^2] - (-1 + c)*Tan[(a + b*x)/2])/(-I + I*c + d + S
qrt[1 - 2*c + c^2 + d^2])] - I*PolyLog[2, (-d + Sqrt[1 - 2*c + c^2 + d^2] +
 (-1 + c)*Tan[(a + b*x)/2])/(I - I*c - d + Sqrt[1 - 2*c + c^2 + d^2])] + I*
PolyLog[2, (-d + Sqrt[1 - 2*c + c^2 + d^2] + (-1 + c)*Tan[(a + b*x)/2])/(-I
 + I*c - d + Sqrt[1 - 2*c + c^2 + d^2])] - I*PolyLog[2, (d + Sqrt[1 + 2*c +
 c^2 + d^2] - (1 + c)*Tan[(a + b*x)/2])/(-I - I*c + d + Sqrt[1 + 2*c + c^2
+ d^2])] + I*PolyLog[2, (d + Sqrt[1 + 2*c + c^2 + d^2] - (1 + c)*Tan[(a + b
*x)/2])/(I + I*c + d + Sqrt[1 + 2*c + c^2 + d^2])] + I*PolyLog[2, (-d + Sqr
t[1 + 2*c + c^2 + d^2] + (1 + c)*Tan[(a + b*x)/2])/(-I - I*c - d + Sqrt[1 +
 2*c + c^2 + d^2])] - I*PolyLog[2, (-d + Sqrt[1 + 2*c + c^2 + d^2] + (1 + c
)*Tan[(a + b*x)/2])/(I + I*c - d + Sqrt[1 + 2*c + c^2 + d^2])])*((-2*a)/(b*
```

```
(-1 + c^2 + d^2 - Cos[2*(a + b*x)] + c^2*Cos[2*(a + b*x)] - d^2*Cos[2*(a +
b*x)] + 2*c*d*Sin[2*(a + b*x)])) + (2*(a + b*x))/(b*(-1 + c^2 + d^2 - Cos[2
*(a + b*x)] + c^2*Cos[2*(a + b*x)] - d^2*Cos[2*(a + b*x)] + 2*c*d*Sin[2*(a
+ b*x)]))))/(Log[(-d + Sqrt[1 - 2*c + c^2 + d^2])/(-1 + c) + Tan[(a + b*x)/
2]] + Log[(d + Sqrt[1 - 2*c + c^2 + d^2])/(1 - c) + Tan[(a + b*x)/2]] - Log
[-((d + Sqrt[1 + 2*c + c^2 + d^2])/(1 + c)) + Tan[(a + b*x)/2]] - Log[(-d +
 Sqrt[1 + 2*c + c^2 + d^2] + (1 + c)*Tan[(a + b*x)/2])/(1 + c)] + (Log[(-d
+ Sqrt[1 + 2*c + c^2 + d^2] + (1 + c)*Tan[(a + b*x)/2])/(1 + c)]*Sec[(a + b
*x)/2]^2)/(2*(1 - I*Tan[(a + b*x)/2])) - (Log[(-d + Sqrt[1 - 2*c + c^2 + d^
2])/(-1 + c) + Tan[(a + b*x)/2]]*Sec[(a + b*x)/2]^2)/(2*(1 + I*Tan[(a + b*x
)/2])) + (Log[(-d + Sqrt[1 + 2*c + c^2 + d^2] + (1 + c)*Tan[(a + b*x)/2])/(
1 + c)]*Sec[(a + b*x)/2]^2)/(2*(1 + I*Tan[(a + b*x)/2])) + ((I/2)*Log[(d +
Sqrt[1 - 2*c + c^2 + d^2])/(1 - c) + Tan[(a + b*x)/2]]*Sec[(a + b*x)/2]^2)/
(-I + Tan[(a + b*x)/2]) - ((I/2)*Log[-((d + Sqrt[1 + 2*c + c^2 + d^2])/(1 +
 c)) + Tan[(a + b*x)/2]]*Sec[(a + b*x)/2]^2)/(-I + Tan[(a + b*x)/2]) - ((I/
2)*Log[(-d + Sqrt[1 - 2*c + c^2 + d^2])/(-1 + c) + Tan[(a + b*x)/2]]*Sec[(a
 + b*x)/2]^2)/(I + Tan[(a + b*x)/2]) - ((I/2)*Log[(d + Sqrt[1 - 2*c + c^2 +
 d^2])/(1 - c) + Tan[(a + b*x)/2]]*Sec[(a + b*x)/2]^2)/(I + Tan[(a + b*x)/2
]) + ((I/2)*Log[-((d + Sqrt[1 + 2*c + c^2 + d^2])/(1 + c)) + Tan[(a + b*x)/
2]]*Sec[(a + b*x)/2]^2)/(I + Tan[(a + b*x)/2]) + ((a + b*x)*Sec[(a + b*x)/2
]^2)/(2*((-d + Sqrt[1 - 2*c + c^2 + d^2])/(-1 + c) + Tan[(a + b*x)/2])) + (
(I/2)*Log[((-1 + c)*(1 + I*Tan[(a + b*x)/2]))/(-1 + c + I*d - I*Sqrt[1 - 2*
c + c^2 + d^2])]*Sec[(a + b*x)/2]^2)/((-d + Sqrt[1 - 2*c + c^2 + d^2])/(-1
+ c) + Tan[(a + b*x)/2]) - ((I/2)*Log[-(((-1 + c)*(I + Tan[(a + b*x)/2]))/(
I - I*c - d + Sqrt[1 - 2*c + c^2 + d^2]))]*Sec[(a + b*x)/2]^2)/((-d + Sqrt[
1 - 2*c + c^2 + d^2])/(-1 + c) + Tan[(a + b*x)/2]) + ((a + b*x)*Sec[(a + b*
x)/2]^2)/(2*((d + Sqrt[1 - 2*c + c^2 + d^2])/(1 - c) + Tan[(a + b*x)/2])) +
 ((I/2)*Log[((-1 + c)*(-I + Tan[(a + b*x)/2]))/(I - I*c + d + Sqrt[1 - 2*c
+ c^2 + d^2])]*Sec[(a + b*x)/2]^2)/((d + Sqrt[1 - 2*c + c^2 + d^2])/(1 - c)
 + Tan[(a + b*x)/2]) - ((I/2)*Log[((-1 + c)*(I + Tan[(a + b*x)/2]))/(-I + I
*c + d + Sqrt[1 - 2*c + c^2 + d^2])]*Sec[(a + b*x)/2]^2)/((d + Sqrt[1 - 2*c
 + c^2 + d^2])/(1 - c) + Tan[(a + b*x)/2]) - ((a + b*x)*Sec[(a + b*x)/2]^2)
/(2*(-((d + Sqrt[1 + 2*c + c^2 + d^2])/(1 + c)) + Tan[(a + b*x)/2])) - ((I/
2)*Log[((1 + c)*(-I + Tan[(a + b*x)/2]))/(-I - I*c + d + Sqrt[1 + 2*c + c^2
 + d^2])]*Sec[(a + b*x)/2]^2)/(-((d + Sqrt[1 + 2*c + c^2 + d^2])/(1 + c)) +
 Tan[(a + b*x)/2]) + ((I/2)*Log[((1 + c)*(I + Tan[(a + b*x)/2]))/(I + I*c +
 d + Sqrt[1 + 2*c + c^2 + d^2])]*Sec[(a + b*x)/2]^2)/(-((d + Sqrt[1 + 2*c +
 c^2 + d^2])/(1 + c)) + Tan[(a + b*x)/2]) + ((I/2)*(-1 + c)*Log[1 - (d + Sq
rt[1 - 2*c + c^2 + d^2] - (-1 + c)*Tan[(a + b*x)/2])/(I - I*c + d + Sqrt[1
- 2*c + c^2 + d^2])]*Sec[(a + b*x)/2]^2)/(d + Sqrt[1 - 2*c + c^2 + d^2] - (
-1 + c)*Tan[(a + b*x)/2]) - ((I/2)*(-1 + c)*Log[1 - (d + Sqrt[1 - 2*c + c^2
 + d^2] - (-1 + c)*Tan[(a + b*x)/2])/(-I + I*c + d + Sqrt[1 - 2*c + c^2 + d
^2])]*Sec[(a + b*x)/2]^2)/(d + Sqrt[1 - 2*c + c^2 + d^2] - (-1 + c)*Tan[(a
+ b*x)/2]) + ((I/2)*(-1 + c)*Log[1 - (-d + Sqrt[1 - 2*c + c^2 + d^2] + (-1
+ c)*Tan[(a + b*x)/2])/(I - I*c - d + Sqrt[1 - 2*c + c^2 + d^2])]*Sec[(a +
b*x)/2]^2)/(-d + Sqrt[1 - 2*c + c^2 + d^2] + (-1 + c)*Tan[(a + b*x)/2]) - (
(I/2)*(-1 + c)*Log[1 - (-d + Sqrt[1 - 2*c + c^2 + d^2] + (-1 + c)*Tan[(a +
b*x)/2])/(-I + I*c - d + Sqrt[1 - 2*c + c^2 + d^2])]*Sec[(a + b*x)/2]^2)/(-
d + Sqrt[1 - 2*c + c^2 + d^2] + (-1 + c)*Tan[(a + b*x)/2]) - ((I/2)*(1 + c)
*Log[1 - (d + Sqrt[1 + 2*c + c^2 + d^2] - (1 + c)*Tan[(a + b*x)/2])/(-I - I
*c + d + Sqrt[1 + 2*c + c^2 + d^2])]*Sec[(a + b*x)/2]^2)/(d + Sqrt[1 + 2*c
+ c^2 + d^2] - (1 + c)*Tan[(a + b*x)/2]) + ((I/2)*(1 + c)*Log[1 - (d + Sqrt
[1 + 2*c + c^2 + d^2] - (1 + c)*Tan[(a + b*x)/2])/(I + I*c + d + Sqrt[1 + 2
*c + c^2 + d^2])]*Sec[(a + b*x)/2]^2)/(d + Sqrt[1 + 2*c + c^2 + d^2] - (1 +
 c)*Tan[(a + b*x)/2]) - ((1 + c)*(a + b*x)*Sec[(a + b*x)/2]^2)/(2*(-d + Sqr
t[1 + 2*c + c^2 + d^2] + (1 + c)*Tan[(a + b*x)/2])) + ((I/2)*(1 + c)*Log[((
1 + c)*(1 - I*Tan[(a + b*x)/2]))/(1 + c - I*d + I*Sqrt[1 + 2*c + c^2 + d^2]
)]*Sec[(a + b*x)/2]^2)/(-d + Sqrt[1 + 2*c + c^2 + d^2] + (1 + c)*Tan[(a + b
*x)/2]) - ((I/2)*(1 + c)*Log[((1 + c)*(1 + I*Tan[(a + b*x)/2]))/(1 + c + I*
```

```
d - I*Sqrt[1 + 2*c + c^2 + d^2])]*Sec[(a + b*x)/2]^2)/(-d + Sqrt[1 + 2*c +
c^2 + d^2] + (1 + c)*Tan[(a + b*x)/2]) - ((I/2)*(1 + c)*Log[1 - (-d + Sqrt[
1 + 2*c + c^2 + d^2] + (1 + c)*Tan[(a + b*x)/2])/(-I - I*c - d + Sqrt[1 + 2
*c + c^2 + d^2])]*Sec[(a + b*x)/2]^2)/(-d + Sqrt[1 + 2*c + c^2 + d^2] + (1
+ c)*Tan[(a + b*x)/2]) + ((I/2)*(1 + c)*Log[1 - (-d + Sqrt[1 + 2*c + c^2 +
d^2] + (1 + c)*Tan[(a + b*x)/2])/(I + I*c - d + Sqrt[1 + 2*c + c^2 + d^2])]
*Sec[(a + b*x)/2]^2)/(-d + Sqrt[1 + 2*c + c^2 + d^2] + (1 + c)*Tan[(a + b*x
)/2]) + (a*Cos[(a + b*x)/2]^2*(-(Sec[(a + b*x)/2]^2*(d*Cos[a + b*x] - (-1 +
 c)*Sin[a + b*x])) - Sec[(a + b*x)/2]^2*((-1 + c)*Cos[a + b*x] + d*Sin[a +
b*x])*Tan[(a + b*x)/2]))/((-1 + c)*Cos[a + b*x] + d*Sin[a + b*x]) + (a*Cos[
(a + b*x)/2]^2*(Sec[(a + b*x)/2]^2*(d*Cos[a + b*x] - Sin[a + b*x] - c*Sin[a
 + b*x]) + Sec[(a + b*x)/2]^2*(Cos[a + b*x] + c*Cos[a + b*x] + d*Sin[a + b*
x])*Tan[(a + b*x)/2]))/(Cos[a + b*x] + c*Cos[a + b*x] + d*Sin[a + b*x]))
```

**fricas [B]** time = 0.83, size = 1188, normalized size = 6.12

result too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(c+d*tan(b*x+a)),x, algorithm="fricas")
```

```
[Out] 1/8*(4*b*x*log((d*tan(b*x + a) + c + 1)/(d*tan(b*x + a) + c - 1)) - 2*(b*x
+ a)*log(((2*I*(c + 1)*d + 2*d^2)*tan(b*x + a)^2 + 2*c^2 - 2*I*(c + 1)*d +
(2*I*c^2 + 4*(c + 1)*d - 2*I*d^2 + 4*I*c + 2*I)*tan(b*x + a) + 4*c + 2)/((c
^2 + d^2 + 2*c + 1)*tan(b*x + a)^2 + c^2 + d^2 + 2*c + 1)) - 2*(b*x + a)*lo
g(((-2*I*(c + 1)*d + 2*d^2)*tan(b*x + a)^2 + 2*c^2 + 2*I*(c + 1)*d + (-2*I*
c^2 + 4*(c + 1)*d + 2*I*d^2 - 4*I*c - 2*I)*tan(b*x + a) + 4*c + 2)/((c^2 +
d^2 + 2*c + 1)*tan(b*x + a)^2 + c^2 + d^2 + 2*c + 1)) + 2*(b*x + a)*log(-(2
*(I*(c - 1)*d - d^2)*tan(b*x + a)^2 - 2*c^2 - 2*I*(c - 1)*d - (-2*I*c^2 + 4
*(c - 1)*d + 2*I*d^2 + 4*I*c - 2*I)*tan(b*x + a) + 4*c - 2)/((c^2 + d^2 - 2
*c + 1)*tan(b*x + a)^2 + c^2 + d^2 - 2*c + 1)) + 2*(b*x + a)*log(-(2*(-I*(c
 - 1)*d - d^2)*tan(b*x + a)^2 - 2*c^2 + 2*I*(c - 1)*d - (2*I*c^2 + 4*(c - 1
)*d - 2*I*d^2 - 4*I*c + 2*I)*tan(b*x + a) + 4*c - 2)/((c^2 + d^2 - 2*c + 1)
*tan(b*x + a)^2 + c^2 + d^2 - 2*c + 1)) + 2*a*log(((I*(c + 1)*d + d^2)*tan(
b*x + a)^2 - c^2 + I*(c + 1)*d + (I*c^2 + I*d^2 + 2*I*c + I)*tan(b*x + a) -
 2*c - 1)/(tan(b*x + a)^2 + 1)) + 2*a*log(((I*(c + 1)*d - d^2)*tan(b*x + a)
^2 + c^2 + I*(c + 1)*d + (I*c^2 + I*d^2 + 2*I*c + I)*tan(b*x + a) + 2*c + 1
)/(tan(b*x + a)^2 + 1)) - 2*a*log(((I*(c - 1)*d + d^2)*tan(b*x + a)^2 - c^2
 + I*(c - 1)*d + (I*c^2 + I*d^2 - 2*I*c + I)*tan(b*x + a) + 2*c - 1)/(tan(b
*x + a)^2 + 1)) - 2*a*log(((I*(c - 1)*d - d^2)*tan(b*x + a)^2 + c^2 + I*(c
- 1)*d + (I*c^2 + I*d^2 - 2*I*c + I)*tan(b*x + a) - 2*c + 1)/(tan(b*x + a)^
2 + 1)) + I*dilog(-((2*I*(c + 1)*d + 2*d^2)*tan(b*x + a)^2 + 2*c^2 - 2*I*(c
 + 1)*d + (2*I*c^2 + 4*(c + 1)*d - 2*I*d^2 + 4*I*c + 2*I)*tan(b*x + a) + 4*
c + 2)/((c^2 + d^2 + 2*c + 1)*tan(b*x + a)^2 + c^2 + d^2 + 2*c + 1) + 1) -
I*dilog(-((-2*I*(c + 1)*d + 2*d^2)*tan(b*x + a)^2 + 2*c^2 + 2*I*(c + 1)*d +
 (-2*I*c^2 + 4*(c + 1)*d + 2*I*d^2 - 4*I*c - 2*I)*tan(b*x + a) + 4*c + 2)/(
(c^2 + d^2 + 2*c + 1)*tan(b*x + a)^2 + c^2 + d^2 + 2*c + 1) + 1) + I*dilog(
(2*(I*(c - 1)*d - d^2)*tan(b*x + a)^2 - 2*c^2 - 2*I*(c - 1)*d - (-2*I*c^2 +
 4*(c - 1)*d + 2*I*d^2 + 4*I*c - 2*I)*tan(b*x + a) + 4*c - 2)/((c^2 + d^2 -
 2*c + 1)*tan(b*x + a)^2 + c^2 + d^2 - 2*c + 1) + 1) - I*dilog((2*(-I*(c -
1)*d - d^2)*tan(b*x + a)^2 - 2*c^2 + 2*I*(c - 1)*d - (2*I*c^2 + 4*(c - 1)*d
 - 2*I*d^2 - 4*I*c + 2*I)*tan(b*x + a) + 4*c - 2)/((c^2 + d^2 - 2*c + 1)*ta
n(b*x + a)^2 + c^2 + d^2 - 2*c + 1) + 1))/b
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \operatorname{arcoth}\left(d\tan\left(bx+a\right)+c\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(c+d*tan(b*x+a)),x, algorithm="giac")
```

```
[Out] integrate(arccoth(d*tan(b*x + a) + c), x)
```

**maple [B]** time = 0.33, size = 612, normalized size = 3.15

$$\frac{\arctan\left(\tan\left(bx+a\right)\right)\operatorname{arccoth}\left(c+d\tan\left(bx+a\right)\right)}{b}-\frac{\arctan\left(\frac{c+d\tan(bx+a)}{d}-\frac{c}{d}\right)\ln\left(d\left(\frac{c+d\tan(bx+a)}{d}-\frac{c}{d}\right)+c+1\right)}{2b}+$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(arccoth(c+d*tan(b*x+a)),x)
```

```
[Out] 1/b*arctan(tan(b*x+a))*arccoth(c+d*tan(b*x+a))-1/2/b*arctan((c+d*tan(b*x+a)
)/d-c/d)*ln(d*((c+d*tan(b*x+a))/d-c/d)+c+1)+1/2/b*arctan((c+d*tan(b*x+a))/d
-c/d)*ln(d*((c+d*tan(b*x+a))/d-c/d)+c-1)+1/4*I/b*ln(d*((c+d*tan(b*x+a))/d-c
/d)+c-1)*ln((I*d-d*((c+d*tan(b*x+a))/d-c/d))/(I*d+c-1))-1/4*I/b*ln(d*((c+d*
tan(b*x+a))/d-c/d)+c-1)*ln((I*d+d*((c+d*tan(b*x+a))/d-c/d))/(1-c+I*d))+1/4*
I/b*dilog((I*d-d*((c+d*tan(b*x+a))/d-c/d))/(I*d+c-1))-1/4*I/b*dilog((I*d+d*
((c+d*tan(b*x+a))/d-c/d))/(1-c+I*d))-1/4*I/b*ln(d*((c+d*tan(b*x+a))/d-c/d)+
c+1)*ln((I*d-d*((c+d*tan(b*x+a))/d-c/d))/(1+c+I*d))+1/4*I/b*ln(d*((c+d*tan(
b*x+a))/d-c/d)+c+1)*ln((I*d+d*((c+d*tan(b*x+a))/d-c/d))/(I*d-c-1))-1/4*I/b*
dilog((I*d-d*((c+d*tan(b*x+a))/d-c/d))/(1+c+I*d))+1/4*I/b*dilog((I*d+d*((c+
d*tan(b*x+a))/d-c/d))/(I*d-c-1))
```

**maxima [B]** time = 0.51, size = 372, normalized size = 1.92

$$4\left(bx+a\right)\operatorname{arcoth}\left(d\tan\left(bx+a\right)+c\right)+\left(\arctan\left(\frac{d^2\tan(bx+a)+(c+1)d}{c^2+d^2+2c+1},\frac{(c+1)d\tan(bx+a)+c^2+2c+1}{c^2+d^2+2c+1}\right)-\arctan\left(\frac{d^2\tan(bx+a)}{c^2+d^2-2}\right.\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(c+d*tan(b*x+a)),x, algorithm="maxima")
```

```
[Out] 1/4*(4*(b*x + a)*arccoth(d*tan(b*x + a) + c) + (arctan2((d^2*tan(b*x + a) +
 (c + 1)*d)/(c^2 + d^2 + 2*c + 1), ((c + 1)*d*tan(b*x + a) + c^2 + 2*c + 1)
/(c^2 + d^2 + 2*c + 1)) - arctan2((d^2*tan(b*x + a) + (c - 1)*d)/(c^2 + d^2
 - 2*c + 1), ((c - 1)*d*tan(b*x + a) + c^2 - 2*c + 1)/(c^2 + d^2 - 2*c + 1)
))*log(tan(b*x + a)^2 + 1) - (b*x + a)*log((d^2*tan(b*x + a)^2 + 2*(c + 1)*
d*tan(b*x + a) + c^2 + 2*c + 1)/(c^2 + d^2 + 2*c + 1)) + (b*x + a)*log((d^2
*tan(b*x + a)^2 + 2*(c - 1)*d*tan(b*x + a) + c^2 - 2*c + 1)/(c^2 + d^2 - 2*
c + 1)) - I*dilog(-(I*d*tan(b*x + a) - d)/(I*c + d + I)) + I*dilog(-(I*d*ta
n(b*x + a) - d)/(I*c + d - I)) - I*dilog((I*d*tan(b*x + a) + d)/(-I*c + d +
 I)) + I*dilog((I*d*tan(b*x + a) + d)/(-I*c + d - I)))/b
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.01

$$\int \operatorname{acoth}\left(c+d\tan\left(a+b\,x\right)\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(c + d*tan(a + b*x)),x)
```

```
[Out] int(acoth(c + d*tan(a + b*x)), x)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \operatorname{acoth}\left(c+d\tan\left(a+bx\right)\right)dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(c+d*tan(b*x+a)),x)
[Out] Integral(acoth(c + d*tan(a + b*x)), x)
```

## 3.239 $\int \frac{\coth^{-1}(c+d\tan(a+bx))}{x}\,dx$

**Optimal**. Leaf size=18

$$\text{Int}\left(\frac{\coth^{-1}(d\tan(a+bx)+c)}{x},x\right)$$

```
[Out] CannotIntegrate(arccoth(c+d*tan(b*x+a))/x,x)
```

**Rubi** [A] time = 0.15, antiderivative size = 0, normalized size of antiderivative = 0.00, number of steps used = 0, number of rules used = 0, integrand size = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int \frac{\coth^{-1}(c+d\tan(a+bx))}{x}\,dx$$

Verification is Not applicable to the result.

```
[In] Int[ArcCoth[c + d*Tan[a + b*x]]/x,x]
[Out] Defer[Int][ArcCoth[c + d*Tan[a + b*x]]/x, x]
```

Rubi steps

$$\int \frac{\coth^{-1}(c+d\tan(a+bx))}{x}\,dx = \int \frac{\coth^{-1}(c+d\tan(a+bx))}{x}\,dx$$

**Mathematica** [A] time = 0.39, size = 0, normalized size = 0.00

$$\int \frac{\coth^{-1}(c+d\tan(a+bx))}{x}\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[ArcCoth[c + d*Tan[a + b*x]]/x,x]
[Out] Integrate[ArcCoth[c + d*Tan[a + b*x]]/x, x]
```

**fricas** [A] time = 0.59, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{\text{arcoth}\left(d\tan\left(bx+a\right)+c\right)}{x},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(c+d*tan(b*x+a))/x,x, algorithm="fricas")
[Out] integral(arccoth(d*tan(b*x + a) + c)/x, x)
```

**giac** [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\text{arcoth}\left(d\tan\left(bx+a\right)+c\right)}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(c+d*tan(b*x+a))/x,x, algorithm="giac")
[Out] integrate(arccoth(d*tan(b*x + a) + c)/x, x)
```

**maple** [A] time = 1.27, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{arccoth}\left(c+d\tan\left(bx+a\right)\right)}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(arccoth(c+d*tan(b*x+a))/x,x)
```

```
[Out] int(arccoth(c+d*tan(b*x+a))/x,x)
```

**maxima** [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{arcoth}\left(d\tan\left(bx+a\right)+c\right)}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(c+d*tan(b*x+a))/x,x, algorithm="maxima")
```

```
[Out] integrate(arccoth(d*tan(b*x + a) + c)/x, x)
```

**mupad** [A] time = 0.00, size = -1, normalized size = -0.06

$$\int \frac{\operatorname{acoth}\left(c+d\tan\left(a+b\,x\right)\right)}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(c + d*tan(a + b*x))/x,x)
```

```
[Out] int(acoth(c + d*tan(a + b*x))/x, x)
```

**sympy** [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{acoth}\left(c+d\tan\left(a+bx\right)\right)}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(c+d*tan(b*x+a))/x,x)
```

```
[Out] Integral(acoth(c + d*tan(a + b*x))/x, x)
```

# 3.240 $\int x^2 \coth^{-1}(1 - id + d\tan(a + bx))\,dx$

**Optimal**. Leaf size=170

$$-\frac{i\text{Li}_4\left(-\left((1-id)e^{2ia+2ibx}\right)\right)}{8b^3}-\frac{x\text{Li}_3\left(-\left((1-id)e^{2ia+2ibx}\right)\right)}{4b^2}+\frac{ix^2\text{Li}_2\left(-\left((1-id)e^{2ia+2ibx}\right)\right)}{4b}-\frac{1}{6}x^3\log\left(1+(1-id)e^{2i\ldots}\right.$$

```
[Out] 1/12*I*b*x^4+1/3*x^3*arccoth(1-I*d+d*tan(b*x+a))-1/6*x^3*ln(1+(1-I*d)*exp(2
*I*a+2*I*b*x))+1/4*I*x^2*polylog(2,-(1-I*d)*exp(2*I*a+2*I*b*x))/b-1/4*x*pol
ylog(3,-(1-I*d)*exp(2*I*a+2*I*b*x))/b^2-1/8*I*polylog(4,-(1-I*d)*exp(2*I*a+
2*I*b*x))/b^3
```

**Rubi [A]** time = 0.30, antiderivative size = 170, normalized size of antiderivative = 1.00, number of steps used = 7, number of rules used = 7, integrand size = 20, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.350, Rules used = {6264, 2184, 2190, 2531, 6609, 2282, 6589}

$$-\frac{x\text{PolyLog}\left(3,-(1-id)e^{2ia+2ibx}\right)}{4b^2}-\frac{i\text{PolyLog}\left(4,-(1-id)e^{2ia+2ibx}\right)}{8b^3}+\frac{ix^2\text{PolyLog}\left(2,-(1-id)e^{2ia+2ibx}\right)}{4b}-\frac{1}{6}x^3\text{lo}\ldots$$

Antiderivative was successfully verified.

```
[In] Int[x^2*ArcCoth[1 - I*d + d*Tan[a + b*x]],x]
```

```
[Out] (I/12)*b*x^4 + (x^3*ArcCoth[1 - I*d + d*Tan[a + b*x]])/3 - (x^3*Log[1 + (1
- I*d)*E^((2*I)*a + (2*I)*b*x)])/6 + ((I/4)*x^2*PolyLog[2, -((1 - I*d)*E^((
2*I)*a + (2*I)*b*x))])/b - (x*PolyLog[3, -((1 - I*d)*E^((2*I)*a + (2*I)*b*x
))])/(4*b^2) - ((I/8)*PolyLog[4, -((1 - I*d)*E^((2*I)*a + (2*I)*b*x))])/b^3
```

Rule 2184

```
Int[((c_.) + (d_.)*(x_))^(m_.)/((a_) + (b_.)*((F_)^((g_.)*((e_.) + (f_.)*(x
_))))^(n_.)), x_Symbol] :> Simp[(c + d*x)^(m + 1)/(a*d*(m + 1)), x] - Dist[
b/a, Int[((c + d*x)^m*(F^(g*(e + f*x)))^n)/(a + b*(F^(g*(e + f*x)))^n), x],
 x] /; FreeQ[{F, a, b, c, d, e, f, g, n}, x] && IGtQ[m, 0]
```

Rule 2190

```
Int[(((F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m_.))/
((a_) + (b_.)*((F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)), x_Symbol] :> Simp
[((c + d*x)^m*Log[1 + (b*(F^(g*(e + f*x)))^n)/a])/(b*f*g*n*Log[F]), x] - Di
st[(d*m)/(b*f*g*n*Log[F]), Int[(c + d*x)^(m - 1)*Log[1 + (b*(F^(g*(e + f*x)
))^n)/a], x], x] /; FreeQ[{F, a, b, c, d, e, f, g, n}, x] && IGtQ[m, 0]
```

Rule 2282

```
Int[u_, x_Symbol] :> With[{v = FunctionOfExponential[u, x]}, Dist[v/D[v, x]
, Subst[Int[FunctionOfExponentialFunction[u, x]/x, x], x, v], x]] /; Functi
onOfExponentialQ[u, x] &&  !MatchQ[u, (w_)*((a_.)*(v_)^(n_))^(m_) /; FreeQ[
{a, m, n}, x] && IntegerQ[m*n]] &&  !MatchQ[u, E^((c_.)*((a_.) + (b_.)*x))*
(F_)[v_] /; FreeQ[{a, b, c}, x] && InverseFunctionQ[F[x]]]
```

Rule 2531

```
Int[Log[1 + (e_.)*((F_)^((c_.)*((a_.) + (b_.)*(x_))))^(n_.)]*((f_.) + (g_.)
*(x_))^(m_.), x_Symbol] :> -Simp[((f + g*x)^m*PolyLog[2, -(e*(F^(c*(a + b*x
)))^n)])/(b*c*n*Log[F]), x] + Dist[(g*m)/(b*c*n*Log[F]), Int[(f + g*x)^(m -
 1)*PolyLog[2, -(e*(F^(c*(a + b*x)))^n)], x], x] /; FreeQ[{F, a, b, c, e, f
, g, n}, x] && GtQ[m, 0]
```

Rule 6264

```
Int[ArcCoth[(c_.) + (d_.)*Tan[(a_.) + (b_.)*(x_)]]*((e_.) + (f_.)*(x_))^(m_
.), x_Symbol] :> Simp[((e + f*x)^(m + 1)*ArcCoth[c + d*Tan[a + b*x]])/(f*(m
 + 1)), x] + Dist[(I*b)/(f*(m + 1)), Int[(e + f*x)^(m + 1)/(c + I*d + c*E^(
2*I*a + 2*I*b*x)), x], x] /; FreeQ[{a, b, c, d, e, f}, x] && IGtQ[m, 0] &&
EqQ[(c + I*d)^2, 1]
```

Rule 6589

```
Int[PolyLog[n_, (c_.)*((a_.) + (b_.)*(x_))^(p_.)]/((d_.) + (e_.)*(x_)), x_S
ymbol] :> Simp[PolyLog[n + 1, c*(a + b*x)^p]/(e*p), x] /; FreeQ[{a, b, c, d
, e, n, p}, x] && EqQ[b*d, a*e]
```

Rule 6609

```
Int[((e_.) + (f_.)*(x_))^(m_.)*PolyLog[n_, (d_.)*((F_)^((c_.)*((a_.) + (b_.
)*(x_))))^(p_.)], x_Symbol] :> Simp[((e + f*x)^m*PolyLog[n + 1, d*(F^(c*(a
+ b*x)))^p])/(b*c*p*Log[F]), x] - Dist[(f*m)/(b*c*p*Log[F]), Int[(e + f*x)^
(m - 1)*PolyLog[n + 1, d*(F^(c*(a + b*x)))^p], x], x] /; FreeQ[{F, a, b, c,
 d, e, f, n, p}, x] && GtQ[m, 0]
```

Rubi steps

$$\int x^2 \coth^{-1}(1-id+d\tan(a+bx))\,dx = \frac{1}{3}x^3\coth^{-1}(1-id+d\tan(a+bx)) + \frac{1}{3}(ib)\int \frac{x^3}{1+(1-id)e^{2ia+2ibx}}\,dx$$

$$= \frac{1}{12}ibx^4 + \frac{1}{3}x^3\coth^{-1}(1-id+d\tan(a+bx)) - \frac{1}{3}(b(i+d))\int \frac{e^{2ia+2}}{1+(1-i}$$

$$= \frac{1}{12}ibx^4 + \frac{1}{3}x^3\coth^{-1}(1-id+d\tan(a+bx)) - \frac{1}{6}x^3\log\left(1+(1-id)e^{2ia}\right.$$

$$= \frac{1}{12}ibx^4 + \frac{1}{3}x^3\coth^{-1}(1-id+d\tan(a+bx)) - \frac{1}{6}x^3\log\left(1+(1-id)e^{2ia}\right.$$

$$= \frac{1}{12}ibx^4 + \frac{1}{3}x^3\coth^{-1}(1-id+d\tan(a+bx)) - \frac{1}{6}x^3\log\left(1+(1-id)e^{2ia}\right.$$

$$= \frac{1}{12}ibx^4 + \frac{1}{3}x^3\coth^{-1}(1-id+d\tan(a+bx)) - \frac{1}{6}x^3\log\left(1+(1-id)e^{2ia}\right.$$

$$= \frac{1}{12}ibx^4 + \frac{1}{3}x^3\coth^{-1}(1-id+d\tan(a+bx)) - \frac{1}{6}x^3\log\left(1+(1-id)e^{2ia}\right.$$

**Mathematica [A]** time = 0.22, size = 155, normalized size = 0.91

$$\frac{1}{3}x^3\coth^{-1}(d\tan(a+bx)-id+1) - \frac{4b^3x^3\log\left(1+\frac{ie^{-2i(a+bx)}}{d+i}\right) + 6ib^2x^2\text{Li}_2\left(-\frac{ie^{-2i(a+bx)}}{d+i}\right) + 6bx\text{Li}_3\left(-\frac{ie^{-2i(a+bx)}}{d+i}\right) - 3i\text{Li}_4\left(\right.}{24b^3}$$

Antiderivative was successfully verified.

```
[In] Integrate[x^2*ArcCoth[1 - I*d + d*Tan[a + b*x]],x]
```

```
[Out] (x^3*ArcCoth[1 - I*d + d*Tan[a + b*x]])/3 - (4*b^3*x^3*Log[1 + I/((I + d)*E
^((2*I)*(a + b*x)))] + (6*I)*b^2*x^2*PolyLog[2, (-I)/((I + d)*E^((2*I)*(a +
 b*x)))] + 6*b*x*PolyLog[3, (-I)/((I + d)*E^((2*I)*(a + b*x)))] - (3*I)*Pol
yLog[4, (-I)/((I + d)*E^((2*I)*(a + b*x)))])/(24*b^3)
```

**fricas [C]** time = 0.51, size = 348, normalized size = 2.05

$$\frac{i\,b^4x^4 + 2\,b^3x^3\log\left(\frac{\left((d+i)e^{(2i\,bx+2i\,a)}+i\right)e^{(-2i\,bx-2i\,a)}}{d}\right) + 6i\,b^2x^2\text{Li}_2\left(\frac{1}{2}\sqrt{4i\,d-4}\,e^{(i\,bx+i\,a)}\right) + 6i\,b^2x^2\text{Li}_2\left(-\frac{1}{2}\sqrt{4i\,d-4}\,e^{(i\,bx+i}\right.}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*arccoth(1-I*d+d*tan(b*x+a)),x, algorithm="fricas")
```

```
[Out] 1/12*(I*b^4*x^4 + 2*b^3*x^3*log(((d + I)*e^(2*I*b*x + 2*I*a) + I)*e^(-2*I*b
*x - 2*I*a)/d) + 6*I*b^2*x^2*dilog(1/2*sqrt(4*I*d - 4)*e^(I*b*x + I*a)) + 6
*I*b^2*x^2*dilog(-1/2*sqrt(4*I*d - 4)*e^(I*b*x + I*a)) - I*a^4 + 2*a^3*log(
((2*d + 2*I)*e^(I*b*x + I*a) + I*sqrt(4*I*d - 4))/(2*d + 2*I)) + 2*a^3*log(
((2*d + 2*I)*e^(I*b*x + I*a) - I*sqrt(4*I*d - 4))/(2*d + 2*I)) - 12*b*x*pol
ylog(3, 1/2*sqrt(4*I*d - 4)*e^(I*b*x + I*a)) - 12*b*x*polylog(3, -1/2*sqrt(
4*I*d - 4)*e^(I*b*x + I*a)) - 2*(b^3*x^3 + a^3)*log(1/2*sqrt(4*I*d - 4)*e^(
I*b*x + I*a) + 1) - 2*(b^3*x^3 + a^3)*log(-1/2*sqrt(4*I*d - 4)*e^(I*b*x + I
*a) + 1) - 12*I*polylog(4, 1/2*sqrt(4*I*d - 4)*e^(I*b*x + I*a)) - 12*I*poly
log(4, -1/2*sqrt(4*I*d - 4)*e^(I*b*x + I*a)))/b^3
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int x^2 \operatorname{arcoth}(d \tan(bx+a) - i d + 1)\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*arccoth(1-I*d+d*tan(b*x+a)),x, algorithm="giac")
```

```
[Out] integrate(x^2*arccoth(d*tan(b*x + a) - I*d + 1), x)
```

**maple [C]** time = 5.88, size = 2339, normalized size = 13.76

Expression too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^2*arccoth(1-I*d+d*tan(b*x+a)),x)
```

```
[Out] 1/6*x^3*ln(I*exp(2*I*(b*x+a))+exp(2*I*(b*x+a))*d+I)+1/12*I*x^3*Pi*csgn(I*(I
*exp(2*I*(b*x+a))+exp(2*I*(b*x+a))*d+I))*csgn(I*(I*exp(2*I*(b*x+a))+exp(2*I
*(b*x+a))*d+I)/(exp(2*I*(b*x+a))+1))^2-1/3*x^3*ln(exp(I*(b*x+a)))+1/12*I*b*
x^4+1/12*I*x^3*Pi*csgn(I/(exp(2*I*(b*x+a))+1))*csgn(I*(I*exp(2*I*(b*x+a))+e
xp(2*I*(b*x+a))*d+I)/(exp(2*I*(b*x+a))+1))^2-1/12*I*x^3*Pi*csgn(I/(exp(2*I*
(b*x+a))+1))*csgn(I*exp(2*I*(b*x+a))/(exp(2*I*(b*x+a))+1))^2-1/12*I*x^3*Pi*
csgn(I*exp(2*I*(b*x+a)))*csgn(I*exp(2*I*(b*x+a))/(exp(2*I*(b*x+a))+1))^2+1/
3/b^3*d/(I+d)*ln(1-I*(I+d)*exp(2*I*(b*x+a)))*a^3-1/2*I/b^3*a^3/(I+d)*ln(1-I
*exp(I*(b*x+a))*(-I*(I+d))^(1/2))-1/2*I/b^3*a^3/(I+d)*ln(1+I*exp(I*(b*x+a))
*(-I*(I+d))^(1/2))-1/8*I/b^3*d/(I+d)*polylog(4,I*(I+d)*exp(2*I*(b*x+a)))-1/
12*I*x^3*Pi*csgn(d/(exp(2*I*(b*x+a))+1)*exp(2*I*(b*x+a)))^2-1/12*I*x^3*Pi*c
sgn(I*(I*exp(2*I*(b*x+a))+exp(2*I*(b*x+a))*d+I)/(exp(2*I*(b*x+a))+1))^3+1/1
2*I*x^3*Pi*csgn(I*exp(2*I*(b*x+a)))^3+1/12*I*x^3*Pi*csgn(I*exp(2*I*(b*x+a))
/(exp(2*I*(b*x+a))+1))^3-1/12*I*x^3*Pi*csgn((I*exp(2*I*(b*x+a))+exp(2*I*(b*
x+a))*d+I)/(exp(2*I*(b*x+a))+1))^3-1/6*x^3*ln(d)+1/12*I*x^3*Pi*csgn(I*(I*ex
p(2*I*(b*x+a))+exp(2*I*(b*x+a))*d+I)/(exp(2*I*(b*x+a))+1))*csgn((I*exp(2*I*
(b*x+a))+exp(2*I*(b*x+a))*d+I)/(exp(2*I*(b*x+a))+1))^2+1/12*I*x^3*Pi*csgn(I
*exp(I*(b*x+a)))^2*csgn(I*exp(2*I*(b*x+a)))-1/6*I*x^3*Pi*csgn(I*exp(I*(b*x+
a)))*csgn(I*exp(2*I*(b*x+a)))^2+1/12*I*x^3*Pi*csgn((I*exp(2*I*(b*x+a))+exp(
2*I*(b*x+a))*d+I)/(exp(2*I*(b*x+a))+1))^2+1/8/b^3/(I+d)*polylog(4,I*(I+d)*e
xp(2*I*(b*x+a)))+1/12*I*x^3*Pi*csgn(I*d/(exp(2*I*(b*x+a))+1)*exp(2*I*(b*x+a
)))^3+1/12*I*x^3*Pi*csgn(d/(exp(2*I*(b*x+a))+1)*exp(2*I*(b*x+a)))^3-1/2/b^3
*a^2/(I+d)*dilog(1-I*exp(I*(b*x+a))*(-I*(I+d))^(1/2))-1/2/b^3*a^2/(I+d)*dil
og(1+I*exp(I*(b*x+a))*(-I*(I+d))^(1/2))-1/4/b/(I+d)*polylog(2,I*(I+d)*exp(2
*I*(b*x+a)))*x^2+1/4/b^3/(I+d)*polylog(2,I*(I+d)*exp(2*I*(b*x+a)))*a^2-1/6*
d/(I+d)*ln(1-I*(I+d)*exp(2*I*(b*x+a)))*x^3-1/6*I/(I+d)*ln(1-I*(I+d)*exp(2*I
*(b*x+a)))*x^3+1/12*I*x^3*Pi*csgn(I*d/(exp(2*I*(b*x+a))+1)*exp(2*I*(b*x+a))
)*csgn(d/(exp(2*I*(b*x+a))+1)*exp(2*I*(b*x+a)))+1/2/b^2*d/(I+d)*ln(1-I*(I+d
```

```
)*exp(2*I*(b*x+a))*x*a^2-1/2/b^2*a^2*d/(I+d)*ln(1-I*exp(I*(b*x+a))*(-I*(I+
d))^(1/2))*x-1/2/b^2*a^2*d/(I+d)*ln(1+I*exp(I*(b*x+a))*(-I*(I+d))^(1/2))*x+
1/6*I/b^3*a^3/(I+d)*ln(I*exp(2*I*(b*x+a))+exp(2*I*(b*x+a))*d+I)+1/3*I/b^3/(
I+d)*ln(1-I*(I+d)*exp(2*I*(b*x+a)))*a^3-1/4*I/b^2/(I+d)*polylog(3,I*(I+d)*e
xp(2*I*(b*x+a)))*x-1/2*I/b^2*a^2/(I+d)*ln(1-I*exp(I*(b*x+a))*(-I*(I+d))^(1/
2))*x-1/2*I/b^2*a^2/(I+d)*ln(1+I*exp(I*(b*x+a))*(-I*(I+d))^(1/2))*x+1/4*I/b
*d/(I+d)*polylog(2,I*(I+d)*exp(2*I*(b*x+a)))*x^2-1/4*I/b^3*d/(I+d)*polylog(
2,I*(I+d)*exp(2*I*(b*x+a)))*a^2-1/12*I*x^3*Pi*csgn(I*d)*csgn(I*d/(exp(2*I*(
b*x+a))+1)*exp(2*I*(b*x+a)))^2-1/12*I*x^3*Pi*csgn(I*exp(2*I*(b*x+a))/(exp(2
*I*(b*x+a))+1))*csgn(I*d/(exp(2*I*(b*x+a))+1)*exp(2*I*(b*x+a)))^2+1/12*I*x^
3*Pi*csgn(I*d)*csgn(I*exp(2*I*(b*x+a))/(exp(2*I*(b*x+a))+1))*csgn(I*d/(exp(
2*I*(b*x+a))+1)*exp(2*I*(b*x+a)))-1/12*I*x^3*Pi*csgn(I/(exp(2*I*(b*x+a))+1)
)*csgn(I*(I*exp(2*I*(b*x+a))+exp(2*I*(b*x+a))*d+I))*csgn(I*(I*exp(2*I*(b*x+
a))+exp(2*I*(b*x+a))*d+I)/(exp(2*I*(b*x+a))+1))-1/12*I*x^3*Pi*csgn(I*d/(exp
(2*I*(b*x+a))+1)*exp(2*I*(b*x+a)))*csgn(d/(exp(2*I*(b*x+a))+1)*exp(2*I*(b*x
+a)))^2-1/2/b^3*a^3*d/(I+d)*ln(1-I*exp(I*(b*x+a))*(-I*(I+d))^(1/2))-1/2/b^3
*a^3*d/(I+d)*ln(1+I*exp(I*(b*x+a))*(-I*(I+d))^(1/2))+1/2*I/b^2/(I+d)*ln(1-I
*(I+d)*exp(2*I*(b*x+a)))*x*a^2+1/2*I/b^3*a^2*d/(I+d)*dilog(1-I*exp(I*(b*x+a
))*(-I*(I+d))^(1/2))+1/2*I/b^3*a^2*d/(I+d)*dilog(1+I*exp(I*(b*x+a))*(-I*(I+
d))^(1/2))+1/6/b^3*a^3*d/(I+d)*ln(I*exp(2*I*(b*x+a))+exp(2*I*(b*x+a))*d+I)-
1/4/b^2*d/(I+d)*polylog(3,I*(I+d)*exp(2*I*(b*x+a)))*x-1/12*I*x^3*Pi*csgn(I*
(I*exp(2*I*(b*x+a))+exp(2*I*(b*x+a))*d+I)/(exp(2*I*(b*x+a))+1))*csgn((I*exp
(2*I*(b*x+a))+exp(2*I*(b*x+a))*d+I)/(exp(2*I*(b*x+a))+1))+1/12*I*x^3*Pi*csg
n(I/(exp(2*I*(b*x+a))+1))*csgn(I*exp(2*I*(b*x+a)))*csgn(I*exp(2*I*(b*x+a))/
(exp(2*I*(b*x+a))+1))
```

**maxima** [B] time = 0.35, size = 341, normalized size = 2.01

$$\frac{\frac{12\left((bx+a)^3-3\,(bx+a)^2a+3\,(bx+a)a^2\right)\operatorname{arcoth}(d\tan(bx+a)-i\,d+1)}{b^2}-\frac{-3i\,(bx+a)^4+12i\,(bx+a)^3a-18i\,(bx+a)^2a^2+\left(8i\,(bx+a)^3-18i\,(bx+a)^2a+18i\,(bx+a)a^2\right.}{}}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*arccoth(1-I*d+d*tan(b*x+a)),x, algorithm="maxima")
```

```
[Out] 1/36*(12*((b*x + a)^3 - 3*(b*x + a)^2*a + 3*(b*x + a)*a^2)*arccoth(d*tan(b*
x + a) - I*d + 1)/b^2 - (-3*I*(b*x + a)^4 + 12*I*(b*x + a)^3*a - 18*I*(b*x
+ a)^2*a^2 + (8*I*(b*x + a)^3 - 18*I*(b*x + a)^2*a + 18*I*(b*x + a)*a^2)*ar
ctan2(-d*cos(2*b*x + 2*a) + sin(2*b*x + 2*a), d*sin(2*b*x + 2*a) + cos(2*b*
x + 2*a) + 1) + (-12*I*(b*x + a)^2 + 18*I*(b*x + a)*a - 9*I*a^2)*dilog((I*d
 - 1)*e^(2*I*b*x + 2*I*a)) + (4*(b*x + a)^3 - 9*(b*x + a)^2*a + 9*(b*x + a)
*a^2)*log((d^2 + 1)*cos(2*b*x + 2*a)^2 + (d^2 + 1)*sin(2*b*x + 2*a)^2 + 2*d
*sin(2*b*x + 2*a) + 2*cos(2*b*x + 2*a) + 1) + 3*(4*b*x + a)*polylog(3, (I*d
 - 1)*e^(2*I*b*x + 2*I*a)) + 6*I*polylog(4, (I*d - 1)*e^(2*I*b*x + 2*I*a)))
/b^2)/b
```

**mupad** [F] time = 0.00, size = -1, normalized size = -0.01

$$\int x^2\,\mathrm{acoth}\left(d\tan\left(a+b\,x\right)+1-d\,1\mathrm{i}\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^2*acoth(d*tan(a + b*x) - d*1i + 1),x)
```

```
[Out] int(x^2*acoth(d*tan(a + b*x) - d*1i + 1), x)
```

**sympy** [F] time = 0.00, size = 0, normalized size = 0.00

$$\int x^2\operatorname{acoth}\left(d\tan\left(a+bx\right)-id+1\right)dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**2*acoth(1-I*d+d*tan(b*x+a)),x)
[Out] Integral(x**2*acoth(d*tan(a + b*x) - I*d + 1), x)
```

# 3.241 $\int x \coth^{-1}(1 - id + d\tan(a + bx))\,dx$

**Optimal**. Leaf size=133

$$-\frac{\text{Li}_3\left(-\left((1-id)e^{2ia+2ibx}\right)\right)}{8b^2}+\frac{ix\text{Li}_2\left(-\left((1-id)e^{2ia+2ibx}\right)\right)}{4b}-\frac{1}{4}x^2\log\left(1+(1-id)e^{2ia+2ibx}\right)+\frac{1}{2}x^2\coth^{-1}(d\tan(a+bx)-$$

```
[Out] 1/6*I*b*x^3+1/2*x^2*arccoth(1-I*d+d*tan(b*x+a))-1/4*x^2*ln(1+(1-I*d)*exp(2*
I*a+2*I*b*x))+1/4*I*x*polylog(2,-(1-I*d)*exp(2*I*a+2*I*b*x))/b-1/8*polylog(
3,-(1-I*d)*exp(2*I*a+2*I*b*x))/b^2
```

**Rubi [A]** time = 0.25, antiderivative size = 133, normalized size of antiderivative = 1.00, number of steps used = 6, number of rules used = 6, integrand size = 18, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.333, Rules used = {6264, 2184, 2190, 2531, 2282, 6589}

$$-\frac{\text{PolyLog}\left(3,-(1-id)e^{2ia+2ibx}\right)}{8b^2}+\frac{ix\text{PolyLog}\left(2,-(1-id)e^{2ia+2ibx}\right)}{4b}-\frac{1}{4}x^2\log\left(1+(1-id)e^{2ia+2ibx}\right)+\frac{1}{2}x^2\coth^{-1}(d$$

Antiderivative was successfully verified.

```
[In] Int[x*ArcCoth[1 - I*d + d*Tan[a + b*x]],x]
```

```
[Out] (I/6)*b*x^3 + (x^2*ArcCoth[1 - I*d + d*Tan[a + b*x]])/2 - (x^2*Log[1 + (1 -
 I*d)*E^((2*I)*a + (2*I)*b*x)])/4 + ((I/4)*x*PolyLog[2, -((1 - I*d)*E^((2*I
)*a + (2*I)*b*x))])/b - PolyLog[3, -((1 - I*d)*E^((2*I)*a + (2*I)*b*x))]/(8
*b^2)
```

Rule 2184

```
Int[((c_.) + (d_.)*(x_))^(m_.)/((a_) + (b_.)*((F_)^((g_.)*((e_.) + (f_.)*(x
_))))^(n_.)), x_Symbol] :> Simp[(c + d*x)^(m + 1)/(a*d*(m + 1)), x] - Dist[
b/a, Int[((c + d*x)^m*(F^(g*(e + f*x)))^n)/(a + b*(F^(g*(e + f*x)))^n), x],
 x] /; FreeQ[{F, a, b, c, d, e, f, g, n}, x] && IGtQ[m, 0]
```

Rule 2190

```
Int[(((F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m_.))/
((a_) + (b_.)*((F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)), x_Symbol] :> Simp
[((c + d*x)^m*Log[1 + (b*(F^(g*(e + f*x)))^n)/a])/(b*f*g*n*Log[F]), x] - Di
st[(d*m)/(b*f*g*n*Log[F]), Int[(c + d*x)^(m - 1)*Log[1 + (b*(F^(g*(e + f*x)
))^n)/a], x], x] /; FreeQ[{F, a, b, c, d, e, f, g, n}, x] && IGtQ[m, 0]
```

Rule 2282

```
Int[u_, x_Symbol] :> With[{v = FunctionOfExponential[u, x]}, Dist[v/D[v, x]
, Subst[Int[FunctionOfExponentialFunction[u, x]/x, x], x, v], x]] /; Functi
onOfExponentialQ[u, x] &&  !MatchQ[u, (w_)*((a_.)*(v_)^(n_))^(m_) /; FreeQ[
{a, m, n}, x] && IntegerQ[m*n]] &&  !MatchQ[u, E^((c_.)*((a_.) + (b_.)*x))*
(F_)[v_] /; FreeQ[{a, b, c}, x] && InverseFunctionQ[F[x]]]
```

Rule 2531

```
Int[Log[1 + (e_.)*((F_)^((c_.)*((a_.) + (b_.)*(x_))))^(n_.)]*((f_.) + (g_.)
*(x_))^(m_.), x_Symbol] :> -Simp[((f + g*x)^m*PolyLog[2, -(e*(F^(c*(a + b*x
)))^n)])/(b*c*n*Log[F]), x] + Dist[(g*m)/(b*c*n*Log[F]), Int[(f + g*x)^(m -
 1)*PolyLog[2, -(e*(F^(c*(a + b*x)))^n)], x], x] /; FreeQ[{F, a, b, c, e, f
, g, n}, x] && GtQ[m, 0]
```

Rule 6264

```
Int[ArcCoth[(c_.) + (d_.)*Tan[(a_.) + (b_.)*(x_)]]*((e_.) + (f_.)*(x_))^(m_
.), x_Symbol] :> Simp[((e + f*x)^(m + 1)*ArcCoth[c + d*Tan[a + b*x]])/(f*(m
 + 1)), x] + Dist[(I*b)/(f*(m + 1)), Int[(e + f*x)^(m + 1)/(c + I*d + c*E^(
2*I*a + 2*I*b*x)), x], x] /; FreeQ[{a, b, c, d, e, f}, x] && IGtQ[m, 0] &&
EqQ[(c + I*d)^2, 1]
```

Rule 6589

```
Int[PolyLog[n_, (c_.)*((a_.) + (b_.)*(x_))^(p_.)]/((d_.) + (e_.)*(x_)), x_S
ymbol] :> Simp[PolyLog[n + 1, c*(a + b*x)^p]/(e*p), x] /; FreeQ[{a, b, c, d
, e, n, p}, x] && EqQ[b*d, a*e]
```

Rubi steps

$$\int x\coth^{-1}(1-id+d\tan(a+bx))\,dx = \frac{1}{2}x^2\coth^{-1}(1-id+d\tan(a+bx))+\frac{1}{2}(ib)\int\frac{x^2}{1+(1-id)e^{2ia+2ibx}}\,dx$$
$$=\frac{1}{6}ibx^3+\frac{1}{2}x^2\coth^{-1}(1-id+d\tan(a+bx))-\frac{1}{2}(b(i+d))\int\frac{e^{2ia+}}{1+(1-}$$
$$=\frac{1}{6}ibx^3+\frac{1}{2}x^2\coth^{-1}(1-id+d\tan(a+bx))-\frac{1}{4}x^2\log\left(1+(1-id)e^{2i}\right.$$
$$=\frac{1}{6}ibx^3+\frac{1}{2}x^2\coth^{-1}(1-id+d\tan(a+bx))-\frac{1}{4}x^2\log\left(1+(1-id)e^{2i}\right.$$
$$=\frac{1}{6}ibx^3+\frac{1}{2}x^2\coth^{-1}(1-id+d\tan(a+bx))-\frac{1}{4}x^2\log\left(1+(1-id)e^{2i}\right.$$
$$=\frac{1}{6}ibx^3+\frac{1}{2}x^2\coth^{-1}(1-id+d\tan(a+bx))-\frac{1}{4}x^2\log\left(1+(1-id)e^{2i}\right.$$

**Mathematica [A]** time = 0.12, size = 119, normalized size = 0.89

$$\frac{1}{2}x^2\coth^{-1}(d\tan(a+bx)-id+1)-\frac{2b^2x^2\log\left(1+\frac{ie^{-2i(a+bx)}}{d+i}\right)+2ibx\text{Li}_2\left(-\frac{ie^{-2i(a+bx)}}{d+i}\right)+\text{Li}_3\left(-\frac{ie^{-2i(a+bx)}}{d+i}\right)}{8b^2}$$

Antiderivative was successfully verified.

```
[In] Integrate[x*ArcCoth[1 - I*d + d*Tan[a + b*x]],x]
```

```
[Out] (x^2*ArcCoth[1 - I*d + d*Tan[a + b*x]])/2 - (2*b^2*x^2*Log[1 + I/((I + d)*E
^((2*I)*(a + b*x)))] + (2*I)*b*x*PolyLog[2, (-I)/((I + d)*E^((2*I)*(a + b*x
)))] + PolyLog[3, (-I)/((I + d)*E^((2*I)*(a + b*x)))])/(8*b^2)
```

**fricas [C]** time = 0.58, size = 296, normalized size = 2.23

$$2i\,b^3x^3+3\,b^2x^2\log\left(\frac{\left((d+i)e^{(2i\,bx+2i\,a)}+i\right)e^{(-2i\,bx-2i\,a)}}{d}\right)+2i\,a^3+6i\,bx\text{Li}_2\left(\frac{1}{2}\sqrt{4i\,d-4}\,e^{(i\,bx+i\,a)}\right)+6i\,bx\text{Li}_2\left(-\frac{1}{2}\sqrt{4i\,d-}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*arccoth(1-I*d+d*tan(b*x+a)),x, algorithm="fricas")
```

```
[Out] 1/12*(2*I*b^3*x^3 + 3*b^2*x^2*log(((d + I)*e^(2*I*b*x + 2*I*a) + I)*e^(-2*I
*b*x - 2*I*a)/d) + 2*I*a^3 + 6*I*b*x*dilog(1/2*sqrt(4*I*d - 4)*e^(I*b*x + I
*a)) + 6*I*b*x*dilog(-1/2*sqrt(4*I*d - 4)*e^(I*b*x + I*a)) - 3*a^2*log(((2*
d + 2*I)*e^(I*b*x + I*a) + I*sqrt(4*I*d - 4))/(2*d + 2*I)) - 3*a^2*log(((2*
d + 2*I)*e^(I*b*x + I*a) - I*sqrt(4*I*d - 4))/(2*d + 2*I)) - 3*(b^2*x^2 - a
```

```
^2)*log(1/2*sqrt(4*I*d - 4)*e^(I*b*x + I*a) + 1) - 3*(b^2*x^2 - a^2)*log(-1
/2*sqrt(4*I*d - 4)*e^(I*b*x + I*a) + 1) - 6*polylog(3, 1/2*sqrt(4*I*d - 4)*
e^(I*b*x + I*a)) - 6*polylog(3, -1/2*sqrt(4*I*d - 4)*e^(I*b*x + I*a)))/b^2
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int x \operatorname{arcoth}(d \tan(bx+a) - i d + 1)\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*arccoth(1-I*d+d*tan(b*x+a)),x, algorithm="giac")
```

```
[Out] integrate(x*arccoth(d*tan(b*x + a) - I*d + 1), x)
```

**maple [C]** time = 5.06, size = 2249, normalized size = 16.91

Expression too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x*arccoth(1-I*d+d*tan(b*x+a)),x)
```

```
[Out] 1/2*I/b*a/(I+d)*ln(1-I*exp(I*(b*x+a))*(-I*(I+d))^(1/2))*x-1/2*I/b^2*a*d/(I+
d)*dilog(1-I*exp(I*(b*x+a))*(-I*(I+d))^(1/2))-1/2*I/b/(I+d)*ln(1-I*(I+d)*ex
p(2*I*(b*x+a)))*x*a+1/4*I/b*d/(I+d)*polylog(2,I*(I+d)*exp(2*I*(b*x+a)))*x-1
/8*I*x^2*Pi*csgn(I*(I*exp(2*I*(b*x+a))+exp(2*I*(b*x+a))*d+I)/(exp(2*I*(b*x+
a))+1))^3+1/6*I*b*x^3+1/8*I*x^2*Pi*csgn(I*exp(2*I*(b*x+a)))^3-1/4*x^2*ln(d)
-1/8*I*x^2*Pi*csgn(I*exp(2*I*(b*x+a))/(exp(2*I*(b*x+a))+1))*csgn(I*d/(exp(2
*I*(b*x+a))+1)*exp(2*I*(b*x+a)))^2+1/8*I*x^2*Pi*csgn(I*d/(exp(2*I*(b*x+a))+
1)*exp(2*I*(b*x+a)))*csgn(d/(exp(2*I*(b*x+a))+1)*exp(2*I*(b*x+a)))+1/8*I*x^
2*Pi*csgn(d/(exp(2*I*(b*x+a))+1)*exp(2*I*(b*x+a)))^3-1/8*I*x^2*Pi*csgn((I*e
xp(2*I*(b*x+a))+exp(2*I*(b*x+a))*d+I)/(exp(2*I*(b*x+a))+1))^3-1/8/b^2*d/(I+
d)*polylog(3,I*(I+d)*exp(2*I*(b*x+a)))+1/2/b^2*a/(I+d)*dilog(1-I*exp(I*(b*x
+a))*(-I*(I+d))^(1/2))+1/2/b^2*a/(I+d)*dilog(1+I*exp(I*(b*x+a))*(-I*(I+d))^
(1/2))-1/4/b/(I+d)*polylog(2,I*(I+d)*exp(2*I*(b*x+a)))*x-1/4/b^2/(I+d)*poly
log(2,I*(I+d)*exp(2*I*(b*x+a)))*a-1/8*I*x^2*Pi*csgn(I*exp(2*I*(b*x+a)))*csg
n(I*exp(2*I*(b*x+a))/(exp(2*I*(b*x+a))+1))^2-1/8*I*x^2*Pi*csgn(I*d)*csgn(I*
d/(exp(2*I*(b*x+a))+1)*exp(2*I*(b*x+a)))^2+1/4*x^2*ln(I*exp(2*I*(b*x+a))+ex
p(2*I*(b*x+a))*d+I)-1/2*x^2*ln(exp(I*(b*x+a)))-1/8*I*x^2*Pi*csgn(d/(exp(2*I
*(b*x+a))+1)*exp(2*I*(b*x+a)))^2+1/8*I*x^2*Pi*csgn(I*d/(exp(2*I*(b*x+a))+1)
*exp(2*I*(b*x+a)))^3+1/8*I*x^2*Pi*csgn(I*exp(2*I*(b*x+a))/(exp(2*I*(b*x+a))
+1))^3-1/8*I*x^2*Pi*csgn(I*d/(exp(2*I*(b*x+a))+1)*exp(2*I*(b*x+a)))*csgn(d/
(exp(2*I*(b*x+a))+1)*exp(2*I*(b*x+a)))^2-1/8*I*x^2*Pi*csgn(I/(exp(2*I*(b*x+
a))+1))*csgn(I*(I*exp(2*I*(b*x+a))+exp(2*I*(b*x+a))*d+I))*csgn(I*(I*exp(2*I
*(b*x+a))+exp(2*I*(b*x+a))*d+I)/(exp(2*I*(b*x+a))+1))+1/8*I*x^2*Pi*csgn(I*e
xp(I*(b*x+a)))^2*csgn(I*exp(2*I*(b*x+a)))-1/4*I*x^2*Pi*csgn(I*exp(I*(b*x+a)
))*csgn(I*exp(2*I*(b*x+a)))^2-1/8*I*x^2*Pi*csgn(I/(exp(2*I*(b*x+a))+1))*csg
n(I*exp(2*I*(b*x+a))/(exp(2*I*(b*x+a))+1))^2-1/4*d/(I+d)*ln(1-I*(I+d)*exp(2
*I*(b*x+a)))*x^2-1/8*I/b^2/(I+d)*polylog(3,I*(I+d)*exp(2*I*(b*x+a)))-1/4*I/
(I+d)*ln(1-I*(I+d)*exp(2*I*(b*x+a)))*x^2+1/8*I*x^2*Pi*csgn((I*exp(2*I*(b*x+
a))+exp(2*I*(b*x+a))*d+I)/(exp(2*I*(b*x+a))+1))^2+1/4*I/b^2*d/(I+d)*polylog
(2,I*(I+d)*exp(2*I*(b*x+a)))*a+1/2/b*a*d/(I+d)*ln(1+I*exp(I*(b*x+a))*(-I*(I
+d))^(1/2))*x-1/2/b*d/(I+d)*ln(1-I*(I+d)*exp(2*I*(b*x+a)))*x*a+1/2/b*a*d/(I
+d)*ln(1-I*exp(I*(b*x+a))*(-I*(I+d))^(1/2))*x+1/2*I/b*a/(I+d)*ln(1+I*exp(I*
(b*x+a))*(-I*(I+d))^(1/2))*x-1/2*I/b^2*a*d/(I+d)*dilog(1+I*exp(I*(b*x+a))*(
-I*(I+d))^(1/2))+1/2/b^2*a^2*d/(I+d)*ln(1-I*exp(I*(b*x+a))*(-I*(I+d))^(1/2)
)+1/2/b^2*a^2*d/(I+d)*ln(1+I*exp(I*(b*x+a))*(-I*(I+d))^(1/2))-1/4/b^2*d/(I+
d)*ln(1-I*(I+d)*exp(2*I*(b*x+a)))*a^2-1/4/b^2*a^2*d/(I+d)*ln(I*exp(2*I*(b*x
+a))+exp(2*I*(b*x+a))*d+I)+1/2*I/b^2*a^2/(I+d)*ln(1-I*exp(I*(b*x+a))*(-I*(I
+d))^(1/2))+1/2*I/b^2*a^2/(I+d)*ln(1+I*exp(I*(b*x+a))*(-I*(I+d))^(1/2))-1/4
*I/b^2/(I+d)*ln(1-I*(I+d)*exp(2*I*(b*x+a)))*a^2+1/8*I*x^2*Pi*csgn(I*d)*csgn
```

```
(I*exp(2*I*(b*x+a))/(exp(2*I*(b*x+a))+1))*csgn(I*d/(exp(2*I*(b*x+a))+1)*exp
(2*I*(b*x+a)))+1/8*I*x^2*Pi*csgn(I/(exp(2*I*(b*x+a))+1))*csgn(I*exp(2*I*(b*
x+a)))*csgn(I*exp(2*I*(b*x+a))/(exp(2*I*(b*x+a))+1))-1/8*I*x^2*Pi*csgn(I*(I
*exp(2*I*(b*x+a))+exp(2*I*(b*x+a))*d+I)/(exp(2*I*(b*x+a))+1))*csgn((I*exp(2
*I*(b*x+a))+exp(2*I*(b*x+a))*d+I)/(exp(2*I*(b*x+a))+1))-1/4*I/b^2*a^2/(I+d)
*ln(I*exp(2*I*(b*x+a))+exp(2*I*(b*x+a))*d+I)+1/8*I*x^2*Pi*csgn(I*(I*exp(2*I
*(b*x+a))+exp(2*I*(b*x+a))*d+I))*csgn(I*(I*exp(2*I*(b*x+a))+exp(2*I*(b*x+a)
)*d+I)/(exp(2*I*(b*x+a))+1))^2+1/8*I*x^2*Pi*csgn(I*(I*exp(2*I*(b*x+a))+exp(
2*I*(b*x+a))*d+I)/(exp(2*I*(b*x+a))+1))*csgn((I*exp(2*I*(b*x+a))+exp(2*I*(b
*x+a))*d+I)/(exp(2*I*(b*x+a))+1))^2+1/8*I*x^2*Pi*csgn(I/(exp(2*I*(b*x+a))+1
))*csgn(I*(I*exp(2*I*(b*x+a))+exp(2*I*(b*x+a))*d+I)/(exp(2*I*(b*x+a))+1))^2
```

**maxima [B]** time = 0.34, size = 247, normalized size = 1.86

$$\frac{\frac{12\left((bx+a)^2-2\,(bx+a)a\right)\operatorname{arcoth}(d\tan(bx+a)-i\,d+1)}{b}-\frac{-4i\,(bx+a)^3+12i\,(bx+a)^2a-6i\,bx\mathrm{Li}_2\left((i\,d-1)e^{(2i\,bx+2i\,a)}\right)+\left(6i\,(bx+a)^2-12i\,(bx+a)a\right)\arctan(-d}{}}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*arccoth(1-I*d+d*tan(b*x+a)),x, algorithm="maxima")
```

```
[Out] 1/24*(12*((b*x + a)^2 - 2*(b*x + a)*a)*arccoth(d*tan(b*x + a) - I*d + 1)/b
- (-4*I*(b*x + a)^3 + 12*I*(b*x + a)^2*a - 6*I*b*x*dilog((I*d - 1)*e^(2*I*b
*x + 2*I*a)) + (6*I*(b*x + a)^2 - 12*I*(b*x + a)*a)*arctan2(-d*cos(2*b*x +
2*a) + sin(2*b*x + 2*a), d*sin(2*b*x + 2*a) + cos(2*b*x + 2*a) + 1) + 3*((b
*x + a)^2 - 2*(b*x + a)*a)*log((d^2 + 1)*cos(2*b*x + 2*a)^2 + (d^2 + 1)*sin
(2*b*x + 2*a)^2 + 2*d*sin(2*b*x + 2*a) + 2*cos(2*b*x + 2*a) + 1) + 3*polylo
g(3, (I*d - 1)*e^(2*I*b*x + 2*I*a)))/b)/b
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.01

$$\int x\,\mathrm{acoth}\left(d\tan\left(a+b\,x\right)+1-d\,1\mathrm{i}\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x*acoth(d*tan(a + b*x) - d*1i + 1),x)
```

```
[Out] int(x*acoth(d*tan(a + b*x) - d*1i + 1), x)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int x\operatorname{acoth}\left(d\tan\left(a+bx\right)-id+1\right)dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*acoth(1-I*d+d*tan(b*x+a)),x)
```

```
[Out] Integral(x*acoth(d*tan(a + b*x) - I*d + 1), x)
```

# 3.242 $\int \coth^{-1}(1 - id + d\tan(a + bx))\,dx$

**Optimal**. Leaf size=93

$$\frac{i\text{Li}_2\left(-\left((1-id)e^{2ia+2ibx}\right)\right)}{4b}-\frac{1}{2}x\log\left(1+(1-id)e^{2ia+2ibx}\right)+x\coth^{-1}(d\tan(a+bx)-id+1)+\frac{1}{2}ibx^2$$

```
[Out] 1/2*I*b*x^2+x*arccoth(1-I*d+d*tan(b*x+a))-1/2*x*ln(1+(1-I*d)*exp(2*I*a+2*I*
b*x))+1/4*I*polylog(2,-(1-I*d)*exp(2*I*a+2*I*b*x))/b
```

**Rubi [A]** time = 0.15, antiderivative size = 93, normalized size of antiderivative = 1.00, number of steps used = 5, number of rules used = 5, integrand size = 16, $\frac{\text{number of rules}}{\text{integrand size}} = 0.312$, Rules used = {6256, 2184, 2190, 2279, 2391}

$$\frac{i\text{PolyLog}\left(2,-(1-id)e^{2ia+2ibx}\right)}{4b}-\frac{1}{2}x\log\left(1+(1-id)e^{2ia+2ibx}\right)+x\coth^{-1}(d\tan(a+bx)-id+1)+\frac{1}{2}ibx^2$$

Antiderivative was successfully verified.

```
[In] Int[ArcCoth[1 - I*d + d*Tan[a + b*x]],x]
```

```
[Out] (I/2)*b*x^2 + x*ArcCoth[1 - I*d + d*Tan[a + b*x]] - (x*Log[1 + (1 - I*d)*E^
((2*I)*a + (2*I)*b*x)])/2 + ((I/4)*PolyLog[2, -((1 - I*d)*E^((2*I)*a + (2*I
)*b*x))])/b
```

Rule 2184

```
Int[((c_.) + (d_.)*(x_))^(m_.)/((a_) + (b_.)*((F_)^((g_.)*((e_.) + (f_.)*(x
_))))^(n_.)), x_Symbol] :> Simp[(c + d*x)^(m + 1)/(a*d*(m + 1)), x] - Dist[
b/a, Int[((c + d*x)^m*(F^(g*(e + f*x)))^n)/(a + b*(F^(g*(e + f*x)))^n), x],
 x] /; FreeQ[{F, a, b, c, d, e, f, g, n}, x] && IGtQ[m, 0]
```

Rule 2190

```
Int[(((F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m_.))/
((a_) + (b_.)*((F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)), x_Symbol] :> Simp
[((c + d*x)^m*Log[1 + (b*(F^(g*(e + f*x)))^n)/a])/(b*f*g*n*Log[F]), x] - Di
st[(d*m)/(b*f*g*n*Log[F]), Int[(c + d*x)^(m - 1)*Log[1 + (b*(F^(g*(e + f*x)
))^n)/a], x], x] /; FreeQ[{F, a, b, c, d, e, f, g, n}, x] && IGtQ[m, 0]
```

Rule 2279

```
Int[Log[(a_) + (b_.)*((F_)^((e_.)*((c_.) + (d_.)*(x_))))^(n_.)], x_Symbol]
:> Dist[1/(d*e*n*Log[F]), Subst[Int[Log[a + b*x]/x, x], x, (F^(e*(c + d*x))
)^n], x] /; FreeQ[{F, a, b, c, d, e, n}, x] && GtQ[a, 0]
```

Rule 2391

```
Int[Log[(c_.)*((d_) + (e_.)*(x_)^(n_.))]/(x_), x_Symbol] :> -Simp[PolyLog[2
, -(c*e*x^n)]/n, x] /; FreeQ[{c, d, e, n}, x] && EqQ[c*d, 1]
```

Rule 6256

```
Int[ArcCoth[(c_.) + (d_.)*Tan[(a_.) + (b_.)*(x_)]], x_Symbol] :> Simp[x*Arc
Coth[c + d*Tan[a + b*x]], x] + Dist[I*b, Int[x/(c + I*d + c*E^(2*I*a + 2*I*
b*x)), x], x] /; FreeQ[{a, b, c, d}, x] && EqQ[(c + I*d)^2, 1]
```

Rubi steps

$$\int \coth^{-1}(1-id+d\tan(a+bx))\,dx = x\coth^{-1}(1-id+d\tan(a+bx)) + (ib)\int \frac{x}{1+(1-id)e^{2ia+2ibx}}\,dx$$
$$= \frac{1}{2}ibx^2 + x\coth^{-1}(1-id+d\tan(a+bx)) - (b(i+d))\int \frac{e^{2ia+2ibx}x}{1+(1-id)e^{2ia-}}$$
$$= \frac{1}{2}ibx^2 + x\coth^{-1}(1-id+d\tan(a+bx)) - \frac{1}{2}x\log\left(1+(1-id)e^{2ia+2ibx}\right)$$
$$= \frac{1}{2}ibx^2 + x\coth^{-1}(1-id+d\tan(a+bx)) - \frac{1}{2}x\log\left(1+(1-id)e^{2ia+2ibx}\right)$$
$$= \frac{1}{2}ibx^2 + x\coth^{-1}(1-id+d\tan(a+bx)) - \frac{1}{2}x\log\left(1+(1-id)e^{2ia+2ibx}\right)$$

**Mathematica [B]** time = 3.85, size = 766, normalized size = 8.24

$$\frac{x\sec^2(a+bx)(\cos(bx)+i\sin(bx))(\sin(bx)+i\cos(bx))(d\sin(a+bx)+(2-id)\cos(a+bx))\left(\mathrm{Li}_2\left(-\frac{1}{2}(\cos(a)+\right.\right.}{(\tan(a+bx)-i)(d\tan(a+bx)-id+2)(id\sin(a+bx)+(d+2i)\cos(a+bx))\left(\frac{\sec^2(bx)\log\left(\frac{\sec(bx)(d\sin(}{2\,\mathrm{cc}}\right.}{\tan(bx}\right.}$$

Warning: Unable to verify antiderivative.

```
[In] Integrate[ArcCoth[1 - I*d + d*Tan[a + b*x]],x]
```

```
[Out] x*ArcCoth[1 - I*d + d*Tan[a + b*x]] + (x*((2*I)*b*x*Log[2*Cos[b*x]*(Cos[b*x
] - I*Sin[b*x])] - Log[(Sec[b*x]*(Cos[a] - I*Sin[a])*((2*I + d)*Cos[a + b*x
] + I*d*Sin[a + b*x]))/(2*(I + d))]*Log[1 - I*Tan[b*x]] + Log[(Sec[b*x]*((2
 - I*d)*Cos[a + b*x] + d*Sin[a + b*x]))/(2*Cos[a] - (2*I)*Sin[a])]*Log[1 +
I*Tan[b*x]] - PolyLog[2, -Cos[2*b*x] + I*Sin[2*b*x]] - PolyLog[2, (Sec[b*x]
*(d*Cos[a] + I*(2*I + d)*Sin[a])*(Cos[a + b*x] - I*Sin[a + b*x]))/(2*(I + d
))] + PolyLog[2, -1/2*((Cos[a] + I*Sin[a])*(d*Cos[a] + I*(2*I + d)*Sin[a])*
(-I + Tan[b*x]))])*Sec[a + b*x]^2*(Cos[b*x] + I*Sin[b*x])*(I*Cos[b*x] + Sin
[b*x])*((2 - I*d)*Cos[a + b*x] + d*Sin[a + b*x]))/(((2*I + d)*Cos[a + b*x]
+ I*d*Sin[a + b*x])*((I*Log[1 + I*Tan[b*x]]*Sec[b*x]*(d*Cos[a] + I*(2*I + d
)*Sin[a]))/((2*I + d)*Cos[a + b*x] + I*d*Sin[a + b*x]) + (Log[1 - I*Tan[b*x
]]*Sec[b*x]*((-I)*d*Cos[a] + (2*I + d)*Sin[a]))/((2*I + d)*Cos[a + b*x] + I
*d*Sin[a + b*x]) + 2*b*x*(1 - I*Tan[b*x]) + (Log[(Sec[b*x]*((2 - I*d)*Cos[a
 + b*x] + d*Sin[a + b*x]))/(2*Cos[a] - (2*I)*Sin[a])]*Sec[b*x]^2)/(-I + Tan
[b*x]) - (Log[1 + ((Cos[a] + I*Sin[a])*(d*Cos[a] + I*(2*I + d)*Sin[a])*(-I
+ Tan[b*x]))/2]*Sec[b*x]^2)/(-I + Tan[b*x]) + Log[(Sec[b*x]*(Cos[a] - I*Sin
[a])*((2*I + d)*Cos[a + b*x] + I*d*Sin[a + b*x]))/(2*(I + d))]*(-I + Tan[b*
x]) - (Log[(Sec[b*x]*(Cos[a] - I*Sin[a])*((2*I + d)*Cos[a + b*x] + I*d*Sin[
a + b*x]))/(2*(I + d))]*Sec[b*x]^2)/(I + Tan[b*x]))*(-I + Tan[a + b*x])*(2
- I*d + d*Tan[a + b*x]))
```

**fricas [B]** time = 0.63, size = 221, normalized size = 2.38

$$i\,b^2x^2 + bx\log\left(\frac{\left((d+i)e^{(2i\,bx+2i\,a)}+i\right)e^{(-2i\,bx-2i\,a)}}{d}\right) - i\,a^2 - (bx+a)\log\left(\frac{1}{2}\sqrt{4i\,d-4}\,e^{(i\,bx+i\,a)}+1\right) - (bx+a)\log\left(-\frac{1}{2}\sqrt{4}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(1-I*d+d*tan(b*x+a)),x, algorithm="fricas")
```

```
[Out] 1/2*(I*b^2*x^2 + b*x*log(((d + I)*e^(2*I*b*x + 2*I*a) + I)*e^(-2*I*b*x - 2*
I*a)/d) - I*a^2 - (b*x + a)*log(1/2*sqrt(4*I*d - 4)*e^(I*b*x + I*a) + 1) -
(b*x + a)*log(-1/2*sqrt(4*I*d - 4)*e^(I*b*x + I*a) + 1) + a*log(((2*d + 2*I
```

```
)*e^(I*b*x + I*a) + I*sqrt(4*I*d - 4))/(2*d + 2*I)) + a*log(((2*d + 2*I)*e^
(I*b*x + I*a) - I*sqrt(4*I*d - 4))/(2*d + 2*I)) + I*dilog(1/2*sqrt(4*I*d -
4)*e^(I*b*x + I*a)) + I*dilog(-1/2*sqrt(4*I*d - 4)*e^(I*b*x + I*a)))/b
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \operatorname{arcoth}\left(d\tan\left(bx+a\right)-i\,d+1\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(1-I*d+d*tan(b*x+a)),x, algorithm="giac")
```

```
[Out] integrate(arccoth(d*tan(b*x + a) - I*d + 1), x)
```

**maple [B]** time = 0.52, size = 292, normalized size = 3.14

$$\frac{i\mathrm{arccoth}\left(1-id+d\tan\left(bx+a\right)\right)\ln\left(id+d\tan\left(bx+a\right)\right)}{2b}-\frac{i\mathrm{arccoth}\left(1-id+d\tan\left(bx+a\right)\right)\ln\left(-id+d\tan\left(bx+\right.\right.}{2b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(arccoth(1-I*d+d*tan(b*x+a)),x)
```

```
[Out] 1/2*I/b*arccoth(1-I*d+d*tan(b*x+a))*ln(I*d+d*tan(b*x+a))-1/2*I/b*arccoth(1-
I*d+d*tan(b*x+a))*ln(-I*d+d*tan(b*x+a))-1/8*I/b*ln(-I*d+d*tan(b*x+a))^2+1/4
*I/b*dilog(1-1/2*I*d+1/2*d*tan(b*x+a))+1/4*I/b*ln(-I*d+d*tan(b*x+a))*ln(1-1
/2*I*d+1/2*d*tan(b*x+a))+1/4*I/b*dilog(1/2*I*(-I*d+d*tan(b*x+a))/d)+1/4*I/b
*ln(I*d+d*tan(b*x+a))*ln(1/2*I*(-I*d+d*tan(b*x+a))/d)-1/4*I/b*dilog((2-I*d+
d*tan(b*x+a))/(-2*I*d+2))-1/4*I/b*ln(I*d+d*tan(b*x+a))*ln((2-I*d+d*tan(b*x+
a))/(-2*I*d+2))
```

**maxima [B]** time = 0.43, size = 265, normalized size = 2.85

$$-\frac{4\left(bx+a\right)d\left(\frac{\log(d\tan(bx+a)-i\,d+2)}{d}-\frac{\log(\tan(bx+a)-i)}{d}\right)-d\left(\frac{2i\left(\log(d\tan(bx+a)-i\,d+2)\log\left(-\frac{i\,d\tan(bx+a)+d+2i}{2\,d+2i}+1\right)+\mathrm{Li}_2\left(\frac{i\,d\tan(bx+a)+d+2i}{2\,d+2i}\right)\right)}{d}\right.}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(1-I*d+d*tan(b*x+a)),x, algorithm="maxima")
```

```
[Out] -1/8*(4*(b*x + a)*d*(log(d*tan(b*x + a) - I*d + 2)/d - log(tan(b*x + a) - I
)/d) - d*(2*I*(log(d*tan(b*x + a) - I*d + 2)*log(-(I*d*tan(b*x + a) + d + 2
*I)/(2*d + 2*I) + 1) + dilog((I*d*tan(b*x + a) + d + 2*I)/(2*d + 2*I)))/d -
 (2*I*log(d*tan(b*x + a) - I*d + 2)*log(tan(b*x + a) - I) - I*log(tan(b*x +
 a) - I)^2)/d + 2*I*(log(1/2*d*tan(b*x + a) - 1/2*I*d + 1)*log(tan(b*x + a)
 - I) + dilog(-1/2*d*tan(b*x + a) + 1/2*I*d))/d - 2*I*(log(tan(b*x + a) - I
)*log(-1/2*I*tan(b*x + a) + 1/2) + dilog(1/2*I*tan(b*x + a) + 1/2))/d) - 8*
(b*x + a)*arccoth(d*tan(b*x + a) - I*d + 1))/b
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.01

$$\int \mathrm{acoth}\left(d\tan\left(a+b\,x\right)+1-d\,1\mathrm{i}\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(d*tan(a + b*x) - d*1i + 1),x)
```

```
[Out] int(acoth(d*tan(a + b*x) - d*1i + 1), x)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \operatorname{acoth}\left(d\tan\left(a+bx\right)-id+1\right)dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(1-I*d+d*tan(b*x+a)),x)
```

```
[Out] Integral(acoth(d*tan(a + b*x) - I*d + 1), x)
```

## 3.243 $\int \frac{\coth^{-1}(1-id+d\tan(a+bx))}{x}\,dx$

**Optimal**. Leaf size=23

$$\text{Int}\left(\frac{\coth^{-1}(d\tan(a+bx)-id+1)}{x},x\right)$$

[Out] CannotIntegrate(arccoth(1-I*d+d*tan(b*x+a))/x,x)

**Rubi** [A] time = 0.09, antiderivative size = 0, normalized size of antiderivative = 0.00, number of steps used = 0, number of rules used = 0, integrand size = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int \frac{\coth^{-1}(1-id+d\tan(a+bx))}{x}\,dx$$

Verification is Not applicable to the result.

[In] Int[ArcCoth[1 - I*d + d*Tan[a + b*x]]/x,x]

[Out] Defer[Int][ArcCoth[1 - I*d + d*Tan[a + b*x]]/x, x]

Rubi steps

$$\int \frac{\coth^{-1}(1-id+d\tan(a+bx))}{x}\,dx = \int \frac{\coth^{-1}(1-id+d\tan(a+bx))}{x}\,dx$$

**Mathematica** [A] time = 0.81, size = 0, normalized size = 0.00

$$\int \frac{\coth^{-1}(1-id+d\tan(a+bx))}{x}\,dx$$

Verification is Not applicable to the result.

[In] Integrate[ArcCoth[1 - I*d + d*Tan[a + b*x]]/x,x]

[Out] Integrate[ArcCoth[1 - I*d + d*Tan[a + b*x]]/x, x]

**fricas** [A] time = 0.71, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{\log\left(\frac{\left((d+i)e^{(2i\,bx+2i\,a)}+i\right)e^{(-2i\,bx-2i\,a)}}{d}\right)}{2\,x},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

[In] integrate(arccoth(1-I*d+d*tan(b*x+a))/x,x, algorithm="fricas")

[Out] integral(1/2*log(((d + I)*e^(2*I*b*x + 2*I*a) + I)*e^(-2*I*b*x - 2*I*a)/d)/x, x)

**giac** [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\text{arcoth}\left(d\tan\left(bx+a\right)-i\,d+1\right)}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(1-I*d+d*tan(b*x+a))/x,x, algorithm="giac")
```

```
[Out] integrate(arccoth(d*tan(b*x + a) - I*d + 1)/x, x)
```

**maple [A]** time = 1.82, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{arccoth}\left(1-id+d\tan\left(bx+a\right)\right)}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(arccoth(1-I*d+d*tan(b*x+a))/x,x)
```

```
[Out] int(arccoth(1-I*d+d*tan(b*x+a))/x,x)
```

**maxima [A]** time = 0.00, size = 0, normalized size = 0.00

$$-i\,bx+\frac{1}{4}\left(-i\,\pi-4i\,a-2\,\log(d)\right)\log(x)-\frac{1}{2}i\int\frac{\arctan\left(-d\cos\left(2\,bx+2\,a\right)+\sin\left(2\,bx+2\,a\right),-d\sin\left(2\,bx+2\,a\right.\right.}{x}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(1-I*d+d*tan(b*x+a))/x,x, algorithm="maxima")
```

```
[Out] -I*b*x + 1/4*(-I*pi - 4*I*a - 2*log(d))*log(x) - 1/2*I*integrate(arctan2(-d
*cos(2*b*x + 2*a) + sin(2*b*x + 2*a), -d*sin(2*b*x + 2*a) - cos(2*b*x + 2*a
) - 1)/x, x) + 1/4*integrate(log((d^2 + 1)*cos(2*b*x + 2*a)^2 + (d^2 + 1)*s
in(2*b*x + 2*a)^2 + 2*d*sin(2*b*x + 2*a) + 2*cos(2*b*x + 2*a) + 1)/x, x)
```

**mupad [A]** time = 0.00, size = -1, normalized size = -0.04

$$\int \frac{\operatorname{acoth}\left(d\tan\left(a+b\,x\right)+1-d\,1\mathrm{i}\right)}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(d*tan(a + b*x) - d*1i + 1)/x,x)
```

```
[Out] int(acoth(d*tan(a + b*x) - d*1i + 1)/x, x)
```

**sympy [A]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{acoth}\left(d\tan\left(a+bx\right)-id+1\right)}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(1-I*d+d*tan(b*x+a))/x,x)
```

```
[Out] Integral(acoth(d*tan(a + b*x) - I*d + 1)/x, x)
```

## 3.244 $\int x^2 \coth^{-1}(1 + id - d\tan(a + bx))\,dx$

**Optimal**. Leaf size=171

$$-\frac{i\text{Li}_4\left(-\left((id+1)e^{2ia+2ibx}\right)\right)}{8b^3}-\frac{x\text{Li}_3\left(-\left((id+1)e^{2ia+2ibx}\right)\right)}{4b^2}+\frac{ix^2\text{Li}_2\left(-\left((id+1)e^{2ia+2ibx}\right)\right)}{4b}-\frac{1}{6}x^3\log\left(1+(1+id)e^{2ia+2\right.$$

```
[Out] 1/12*I*b*x^4+1/3*x^3*arccoth(1+I*d-d*tan(b*x+a))-1/6*x^3*ln(1+(1+I*d)*exp(2
*I*a+2*I*b*x))+1/4*I*x^2*polylog(2,-(1+I*d)*exp(2*I*a+2*I*b*x))/b-1/4*x*pol
ylog(3,-(1+I*d)*exp(2*I*a+2*I*b*x))/b^2-1/8*I*polylog(4,-(1+I*d)*exp(2*I*a+
2*I*b*x))/b^3
```

**Rubi [A]** time = 0.30, antiderivative size = 171, normalized size of antiderivative = 1.00, number of steps used = 7, number of rules used = 7, integrand size = 21, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.333, Rules used = {6264, 2184, 2190, 2531, 6609, 2282, 6589}

$$-\frac{x\text{PolyLog}\left(3,-(1+id)e^{2ia+2ibx}\right)}{4b^2}-\frac{i\text{PolyLog}\left(4,-(1+id)e^{2ia+2ibx}\right)}{8b^3}+\frac{ix^2\text{PolyLog}\left(2,-(1+id)e^{2ia+2ibx}\right)}{4b}-\frac{1}{6}x^3\log\left(\right.$$

Antiderivative was successfully verified.

```
[In] Int[x^2*ArcCoth[1 + I*d - d*Tan[a + b*x]],x]
```

```
[Out] (I/12)*b*x^4 + (x^3*ArcCoth[1 + I*d - d*Tan[a + b*x]])/3 - (x^3*Log[1 + (1
+ I*d)*E^((2*I)*a + (2*I)*b*x)])/6 + ((I/4)*x^2*PolyLog[2, -((1 + I*d)*E^((
2*I)*a + (2*I)*b*x))])/b - (x*PolyLog[3, -((1 + I*d)*E^((2*I)*a + (2*I)*b*x
))])/(4*b^2) - ((I/8)*PolyLog[4, -((1 + I*d)*E^((2*I)*a + (2*I)*b*x))])/b^3
```

Rule 2184

```
Int[((c_.) + (d_.)*(x_))^(m_.)/((a_) + (b_.)*((F_)^((g_.)*((e_.) + (f_.)*(x
_))))^(n_.)), x_Symbol] :> Simp[(c + d*x)^(m + 1)/(a*d*(m + 1)), x] - Dist[
b/a, Int[((c + d*x)^m*(F^(g*(e + f*x)))^n)/(a + b*(F^(g*(e + f*x)))^n), x],
 x] /; FreeQ[{F, a, b, c, d, e, f, g, n}, x] && IGtQ[m, 0]
```

Rule 2190

```
Int[(((F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m_.))/
((a_) + (b_.)*((F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)), x_Symbol] :> Simp
[((c + d*x)^m*Log[1 + (b*(F^(g*(e + f*x)))^n)/a])/(b*f*g*n*Log[F]), x] - Di
st[(d*m)/(b*f*g*n*Log[F]), Int[(c + d*x)^(m - 1)*Log[1 + (b*(F^(g*(e + f*x)
))^n)/a], x], x] /; FreeQ[{F, a, b, c, d, e, f, g, n}, x] && IGtQ[m, 0]
```

Rule 2282

```
Int[u_, x_Symbol] :> With[{v = FunctionOfExponential[u, x]}, Dist[v/D[v, x]
, Subst[Int[FunctionOfExponentialFunction[u, x]/x, x], x, v], x]] /; Functi
onOfExponentialQ[u, x] &&  !MatchQ[u, (w_)*((a_.)*(v_)^(n_))^(m_) /; FreeQ[
{a, m, n}, x] && IntegerQ[m*n]] &&  !MatchQ[u, E^((c_.)*((a_.) + (b_.)*x))*
(F_)[v_] /; FreeQ[{a, b, c}, x] && InverseFunctionQ[F[x]]]
```

Rule 2531

```
Int[Log[1 + (e_.)*((F_)^((c_.)*((a_.) + (b_.)*(x_))))^(n_.)]*((f_.) + (g_.)
*(x_))^(m_.), x_Symbol] :> -Simp[((f + g*x)^m*PolyLog[2, -(e*(F^(c*(a + b*x
)))^n)])/(b*c*n*Log[F]), x] + Dist[(g*m)/(b*c*n*Log[F]), Int[(f + g*x)^(m -
 1)*PolyLog[2, -(e*(F^(c*(a + b*x)))^n)], x], x] /; FreeQ[{F, a, b, c, e, f
, g, n}, x] && GtQ[m, 0]
```

Rule 6264

```
Int[ArcCoth[(c_.) + (d_.)*Tan[(a_.) + (b_.)*(x_)]]*((e_.) + (f_.)*(x_))^(m_
.), x_Symbol] :> Simp[((e + f*x)^(m + 1)*ArcCoth[c + d*Tan[a + b*x]])/(f*(m
 + 1)), x] + Dist[(I*b)/(f*(m + 1)), Int[(e + f*x)^(m + 1)/(c + I*d + c*E^(
2*I*a + 2*I*b*x)), x], x] /; FreeQ[{a, b, c, d, e, f}, x] && IGtQ[m, 0] &&
EqQ[(c + I*d)^2, 1]
```

Rule 6589

```
Int[PolyLog[n_, (c_.)*((a_.) + (b_.)*(x_))^(p_.)]/((d_.) + (e_.)*(x_)), x_S
ymbol] :> Simp[PolyLog[n + 1, c*(a + b*x)^p]/(e*p), x] /; FreeQ[{a, b, c, d
, e, n, p}, x] && EqQ[b*d, a*e]
```

Rule 6609

```
Int[((e_.) + (f_.)*(x_))^(m_.)*PolyLog[n_, (d_.)*((F_)^((c_.)*((a_.) + (b_.
)*(x_))))^(p_.)], x_Symbol] :> Simp[((e + f*x)^m*PolyLog[n + 1, d*(F^(c*(a
+ b*x)))^p])/(b*c*p*Log[F]), x] - Dist[(f*m)/(b*c*p*Log[F]), Int[(e + f*x)^
(m - 1)*PolyLog[n + 1, d*(F^(c*(a + b*x)))^p], x], x] /; FreeQ[{F, a, b, c,
 d, e, f, n, p}, x] && GtQ[m, 0]
```

Rubi steps

$$\int x^2 \coth^{-1}(1+id-d\tan(a+bx))\,dx = \frac{1}{3}x^3\coth^{-1}(1+id-d\tan(a+bx)) + \frac{1}{3}(ib)\int \frac{x^3}{1+(1+id)e^{2ia+2ibx}}\,dx$$

$$= \frac{1}{12}ibx^4 + \frac{1}{3}x^3\coth^{-1}(1+id-d\tan(a+bx)) - \frac{1}{3}(b(i-d))\int \frac{e^{2i}}{1+(1}$$

$$= \frac{1}{12}ibx^4 + \frac{1}{3}x^3\coth^{-1}(1+id-d\tan(a+bx)) - \frac{1}{6}x^3\log\left(1+(1+id)e\right.$$

$$= \frac{1}{12}ibx^4 + \frac{1}{3}x^3\coth^{-1}(1+id-d\tan(a+bx)) - \frac{1}{6}x^3\log\left(1+(1+id)e\right.$$

$$= \frac{1}{12}ibx^4 + \frac{1}{3}x^3\coth^{-1}(1+id-d\tan(a+bx)) - \frac{1}{6}x^3\log\left(1+(1+id)e\right.$$

$$= \frac{1}{12}ibx^4 + \frac{1}{3}x^3\coth^{-1}(1+id-d\tan(a+bx)) - \frac{1}{6}x^3\log\left(1+(1+id)e\right.$$

$$= \frac{1}{12}ibx^4 + \frac{1}{3}x^3\coth^{-1}(1+id-d\tan(a+bx)) - \frac{1}{6}x^3\log\left(1+(1+id)e\right.$$

**Mathematica [A]** time = 0.21, size = 156, normalized size = 0.91

$$\frac{1}{3}x^3\coth^{-1}(d(-\tan(a+bx))+id+1) - \frac{4b^3x^3\log\left(1-\frac{ie^{-2i(a+bx)}}{d-i}\right) + 6ib^2x^2\text{Li}_2\left(\frac{ie^{-2i(a+bx)}}{d-i}\right) + 6bx\text{Li}_3\left(\frac{ie^{-2i(a+bx)}}{d-i}\right) - 3i\text{Li}}{24b^3}$$

Antiderivative was successfully verified.

```
[In] Integrate[x^2*ArcCoth[1 + I*d - d*Tan[a + b*x]],x]
```

```
[Out] (x^3*ArcCoth[1 + I*d - d*Tan[a + b*x]])/3 - (4*b^3*x^3*Log[1 - I/((-I + d)*
E^((2*I)*(a + b*x)))] + (6*I)*b^2*x^2*PolyLog[2, I/((-I + d)*E^((2*I)*(a +
b*x)))] + 6*b*x*PolyLog[3, I/((-I + d)*E^((2*I)*(a + b*x)))] - (3*I)*PolyLo
g[4, I/((-I + d)*E^((2*I)*(a + b*x)))])/(24*b^3)
```

**fricas [C]** time = 0.67, size = 348, normalized size = 2.04

$$i\,b^4x^4 - 2\,b^3x^3\log\left(\frac{de^{(2i\,bx+2i\,a)}}{(d-i)e^{(2i\,bx+2i\,a)}-i}\right) + 6i\,b^2x^2\text{Li}_2\left(\frac{1}{2}\sqrt{-4i\,d-4}\,e^{(i\,bx+i\,a)}\right) + 6i\,b^2x^2\text{Li}_2\left(-\frac{1}{2}\sqrt{-4i\,d-4}\,e^{(i\,bx+i\,a)}\right) -$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*arccoth(1+I*d-d*tan(b*x+a)),x, algorithm="fricas")
```

```
[Out] 1/12*(I*b^4*x^4 - 2*b^3*x^3*log(d*e^(2*I*b*x + 2*I*a)/((d - I)*e^(2*I*b*x +
 2*I*a) - I)) + 6*I*b^2*x^2*dilog(1/2*sqrt(-4*I*d - 4)*e^(I*b*x + I*a)) + 6
*I*b^2*x^2*dilog(-1/2*sqrt(-4*I*d - 4)*e^(I*b*x + I*a)) - I*a^4 + 2*a^3*log
(((2*d - 2*I)*e^(I*b*x + I*a) + I*sqrt(-4*I*d - 4))/(2*d - 2*I)) + 2*a^3*lo
g(((2*d - 2*I)*e^(I*b*x + I*a) - I*sqrt(-4*I*d - 4))/(2*d - 2*I)) - 12*b*x*
polylog(3, 1/2*sqrt(-4*I*d - 4)*e^(I*b*x + I*a)) - 12*b*x*polylog(3, -1/2*s
qrt(-4*I*d - 4)*e^(I*b*x + I*a)) - 2*(b^3*x^3 + a^3)*log(1/2*sqrt(-4*I*d -
4)*e^(I*b*x + I*a) + 1) - 2*(b^3*x^3 + a^3)*log(-1/2*sqrt(-4*I*d - 4)*e^(I*
b*x + I*a) + 1) - 12*I*polylog(4, 1/2*sqrt(-4*I*d - 4)*e^(I*b*x + I*a)) - 1
2*I*polylog(4, -1/2*sqrt(-4*I*d - 4)*e^(I*b*x + I*a)))/b^3
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int x^2 \operatorname{arccoth}(-d\tan(bx+a) + i\,d + 1)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*arccoth(1+I*d-d*tan(b*x+a)),x, algorithm="giac")
```

```
[Out] integrate(x^2*arccoth(-d*tan(b*x + a) + I*d + 1), x)
```

**maple [C]** time = 5.93, size = 2449, normalized size = 14.32

Expression too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^2*arccoth(1+I*d-d*tan(b*x+a)),x)
```

```
[Out] -1/3*x^3*ln(exp(I*(b*x+a)))+1/12*I*b*x^4-1/12*I*x^3*Pi*csgn(I/(exp(2*I*(b*x
+a))+1))*csgn(I*exp(2*I*(b*x+a))/(exp(2*I*(b*x+a))+1))^2-1/12*I*x^3*Pi*csgn
(I*exp(2*I*(b*x+a)))*csgn(I*exp(2*I*(b*x+a))/(exp(2*I*(b*x+a))+1))^2+1/12*I
*x^3*Pi*csgn(I*exp(2*I*(b*x+a)))^3+1/12*I*x^3*Pi*csgn(I*exp(2*I*(b*x+a))/(e
xp(2*I*(b*x+a))+1))^3-1/6*x^3*ln(d)+1/12*I*x^3*Pi*csgn(I*exp(I*(b*x+a)))^2*
csgn(I*exp(2*I*(b*x+a)))-1/6*I*x^3*Pi*csgn(I*exp(I*(b*x+a)))*csgn(I*exp(2*I
*(b*x+a)))^2+1/3*I/b^3/(I-d)*ln(1-I*(I-d)*exp(2*I*(b*x+a)))*a^3-1/12*I*x^3*
Pi*csgn((exp(2*I*(b*x+a))*d-I*exp(2*I*(b*x+a))-I)/(exp(2*I*(b*x+a))+1))^2+1
/6*I/b^3*a^3/(I-d)*ln(I*exp(2*I*(b*x+a))-exp(2*I*(b*x+a))*d+I)+1/12*I*x^3*P
i*csgn(I*d/(exp(2*I*(b*x+a))+1)*exp(2*I*(b*x+a)))^3+1/12*I*x^3*Pi*csgn(I*d/
(exp(2*I*(b*x+a))+1)*exp(2*I*(b*x+a)))*csgn(d/(exp(2*I*(b*x+a))+1)*exp(2*I*
(b*x+a)))-1/2*I/b^3*a^3/(I-d)*ln(1+I*exp(I*(b*x+a))*(-I*(I-d))^(1/2))-1/2*I
/b^3*a^3/(I-d)*ln(1-I*exp(I*(b*x+a))*(-I*(I-d))^(1/2))-1/12*I*x^3*Pi*csgn(d
/(exp(2*I*(b*x+a))+1)*exp(2*I*(b*x+a)))^3-1/12*I*x^3*Pi*csgn(I*(exp(2*I*(b*
x+a))*d-I*exp(2*I*(b*x+a))-I)/(exp(2*I*(b*x+a))+1))^3-1/6*I/(I-d)*ln(1-I*(I
-d)*exp(2*I*(b*x+a)))*x^3-1/2/b^3*a^2/(I-d)*dilog(1+I*exp(I*(b*x+a))*(-I*(I
-d))^(1/2))-1/2/b^3*a^2/(I-d)*dilog(1-I*exp(I*(b*x+a))*(-I*(I-d))^(1/2))-1/
4/b/(I-d)*polylog(2,I*(I-d)*exp(2*I*(b*x+a)))*x^2+1/4/b^3/(I-d)*polylog(2,I
*(I-d)*exp(2*I*(b*x+a)))*a^2+1/6*d/(I-d)*ln(1-I*(I-d)*exp(2*I*(b*x+a)))*x^3
+1/12*I*x^3*Pi*csgn(d/(exp(2*I*(b*x+a))+1)*exp(2*I*(b*x+a)))^2+1/2/b^3*a^3*
d/(I-d)*ln(1+I*exp(I*(b*x+a))*(-I*(I-d))^(1/2))-1/12*I*x^3*Pi*csgn(I*d)*csg
n(I*d/(exp(2*I*(b*x+a))+1)*exp(2*I*(b*x+a)))^2-1/12*I*x^3*Pi*csgn(I*exp(2*I
*(b*x+a))/(exp(2*I*(b*x+a))+1))*csgn(I*d/(exp(2*I*(b*x+a))+1)*exp(2*I*(b*x+
a)))^2-1/4*I/b^2/(I-d)*polylog(3,I*(I-d)*exp(2*I*(b*x+a)))*x+1/8/b^3/(I-d)*
polylog(4,I*(I-d)*exp(2*I*(b*x+a)))+1/12*I*x^3*Pi*csgn(I*d)*csgn(I*exp(2*I*
(b*x+a))/(exp(2*I*(b*x+a))+1))*csgn(I*d/(exp(2*I*(b*x+a))+1)*exp(2*I*(b*x+a
)))+1/6*x^3*ln(exp(2*I*(b*x+a))*d-I*exp(2*I*(b*x+a))-I)+1/12*I*x^3*Pi*csgn(
(exp(2*I*(b*x+a))*d-I*exp(2*I*(b*x+a))-I)/(exp(2*I*(b*x+a))+1))^3-1/12*I*x^
```

```
3*Pi*csgn(I*d/(exp(2*I*(b*x+a))+1)*exp(2*I*(b*x+a)))*csgn(d/(exp(2*I*(b*x+a
))+1)*exp(2*I*(b*x+a)))^2+1/12*I*x^3*Pi*csgn(I*(exp(2*I*(b*x+a))*d-I*exp(2*
I*(b*x+a))-I))*csgn(I*(exp(2*I*(b*x+a))*d-I*exp(2*I*(b*x+a))-I)/(exp(2*I*(b
*x+a))+1))^2+1/12*I*x^3*Pi*csgn(I*(exp(2*I*(b*x+a))*d-I*exp(2*I*(b*x+a))-I)
/(exp(2*I*(b*x+a))+1))*csgn((exp(2*I*(b*x+a))*d-I*exp(2*I*(b*x+a))-I)/(exp(
2*I*(b*x+a))+1))^2+1/2/b^2*a^2*d/(I-d)*ln(1-I*exp(I*(b*x+a))*(-I*(I-d))^(1/
2))*x-1/12*I*x^3*Pi*csgn(I*(exp(2*I*(b*x+a))*d-I*exp(2*I*(b*x+a))-I)/(exp(2
*I*(b*x+a))+1))*csgn((exp(2*I*(b*x+a))*d-I*exp(2*I*(b*x+a))-I)/(exp(2*I*(b*
x+a))+1))+1/8*I/b^3*d/(I-d)*polylog(4,I*(I-d)*exp(2*I*(b*x+a)))+1/12*I*x^3*
Pi*csgn(I/(exp(2*I*(b*x+a))+1))*csgn(I*(exp(2*I*(b*x+a))*d-I*exp(2*I*(b*x+a
))-I)/(exp(2*I*(b*x+a))+1))^2+1/4/b^2*d/(I-d)*polylog(3,I*(I-d)*exp(2*I*(b*
x+a)))*x+1/2/b^3*a^3*d/(I-d)*ln(1-I*exp(I*(b*x+a))*(-I*(I-d))^(1/2))-1/3/b^
3*d/(I-d)*ln(1-I*(I-d)*exp(2*I*(b*x+a)))*a^3-1/6/b^3*a^3*d/(I-d)*ln(I*exp(2
*I*(b*x+a))-exp(2*I*(b*x+a))*d+I)+1/12*I*x^3*Pi*csgn(I/(exp(2*I*(b*x+a))+1)
)*csgn(I*exp(2*I*(b*x+a)))*csgn(I*exp(2*I*(b*x+a))/(exp(2*I*(b*x+a))+1))-1/
2/b^2*d/(I-d)*ln(1-I*(I-d)*exp(2*I*(b*x+a)))*x*a^2-1/2*I/b^2*a^2/(I-d)*ln(1
+I*exp(I*(b*x+a))*(-I*(I-d))^(1/2))*x+1/2/b^2*a^2*d/(I-d)*ln(1+I*exp(I*(b*x
+a))*(-I*(I-d))^(1/2))*x-1/12*I*x^3*Pi*csgn(I/(exp(2*I*(b*x+a))+1))*csgn(I*
(exp(2*I*(b*x+a))*d-I*exp(2*I*(b*x+a))-I))*csgn(I*(exp(2*I*(b*x+a))*d-I*exp
(2*I*(b*x+a))-I)/(exp(2*I*(b*x+a))+1))-1/2*I/b^3*a^2*d/(I-d)*dilog(1+I*exp(
I*(b*x+a))*(-I*(I-d))^(1/2))-1/4*I/b*d/(I-d)*polylog(2,I*(I-d)*exp(2*I*(b*x
+a)))*x^2+1/2*I/b^2/(I-d)*ln(1-I*(I-d)*exp(2*I*(b*x+a)))*x*a^2-1/2*I/b^3*a^
2*d/(I-d)*dilog(1-I*exp(I*(b*x+a))*(-I*(I-d))^(1/2))+1/4*I/b^3*d/(I-d)*poly
log(2,I*(I-d)*exp(2*I*(b*x+a)))*a^2-1/2*I/b^2*a^2/(I-d)*ln(1-I*exp(I*(b*x+a
))*(-I*(I-d))^(1/2))*x
```

**maxima [B]** time = 0.35, size = 340, normalized size = 1.99

$$-\frac{\frac{12\left((bx+a)^3-3\,(bx+a)^2a+3\,(bx+a)a^2\right)\,\mathrm{arcoth}(d\tan(bx+a)-i\,d-1)}{b^2}+\frac{-3i\,(bx+a)^4+12i\,(bx+a)^3a-18i\,(bx+a)^2a^2+\left(8i\,(bx+a)^3-18i\,(bx+a)^2a+18i\,(bx\cdots\right.}{\cdots}}{\cdots}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*arccoth(1+I*d-d*tan(b*x+a)),x, algorithm="maxima")
```

```
[Out] -1/36*(12*((b*x + a)^3 - 3*(b*x + a)^2*a + 3*(b*x + a)*a^2)*arccoth(d*tan(b
*x + a) - I*d - 1)/b^2 + (-3*I*(b*x + a)^4 + 12*I*(b*x + a)^3*a - 18*I*(b*x
 + a)^2*a^2 + (8*I*(b*x + a)^3 - 18*I*(b*x + a)^2*a + 18*I*(b*x + a)*a^2)*a
rctan2(d*cos(2*b*x + 2*a) + sin(2*b*x + 2*a), -d*sin(2*b*x + 2*a) + cos(2*b
*x + 2*a) + 1) + (-12*I*(b*x + a)^2 + 18*I*(b*x + a)*a - 9*I*a^2)*dilog((-I
*d - 1)*e^(2*I*b*x + 2*I*a)) + (4*(b*x + a)^3 - 9*(b*x + a)^2*a + 9*(b*x +
a)*a^2)*log((d^2 + 1)*cos(2*b*x + 2*a)^2 + (d^2 + 1)*sin(2*b*x + 2*a)^2 - 2
*d*sin(2*b*x + 2*a) + 2*cos(2*b*x + 2*a) + 1) + 3*(4*b*x + a)*polylog(3, (-
I*d - 1)*e^(2*I*b*x + 2*I*a)) + 6*I*polylog(4, (-I*d - 1)*e^(2*I*b*x + 2*I*
a)))/b^2)/b
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.01

$$\int x^2\,\mathrm{acoth}\left(1-d\,\tan\left(a+b\,x\right)+d\,1\mathrm{i}\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^2*acoth(d*1i - d*tan(a + b*x) + 1),x)
```

```
[Out] int(x^2*acoth(d*1i - d*tan(a + b*x) + 1), x)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int x^2\,\mathrm{acoth}\left(-d\tan\left(a+bx\right)+id+1\right)dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**2*acoth(1+I*d-d*tan(b*x+a)),x)
[Out] Integral(x**2*acoth(-d*tan(a + b*x) + I*d + 1), x)
```

# 3.245 $\int x\coth^{-1}(1+id-d\tan(a+bx))\,dx$

**Optimal**. Leaf size=134

$$-\frac{\text{Li}_3\left(-\left((id+1)e^{2ia+2ibx}\right)\right)}{8b^2}+\frac{ix\text{Li}_2\left(-\left((id+1)e^{2ia+2ibx}\right)\right)}{4b}-\frac{1}{4}x^2\log\left(1+(1+id)e^{2ia+2ibx}\right)+\frac{1}{2}x^2\coth^{-1}(d(-\tan(a$$

```
[Out] 1/6*I*b*x^3+1/2*x^2*arccoth(1+I*d-d*tan(b*x+a))-1/4*x^2*ln(1+(1+I*d)*exp(2*
I*a+2*I*b*x))+1/4*I*x*polylog(2,-(1+I*d)*exp(2*I*a+2*I*b*x))/b-1/8*polylog(
3,-(1+I*d)*exp(2*I*a+2*I*b*x))/b^2
```

**Rubi [A]** time = 0.25, antiderivative size = 134, normalized size of antiderivative = 1.00, number of steps used = 6, number of rules used = 6, integrand size = 19, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.316, Rules used = {6264, 2184, 2190, 2531, 2282, 6589}

$$-\frac{\text{PolyLog}\left(3,-(1+id)e^{2ia+2ibx}\right)}{8b^2}+\frac{ix\text{PolyLog}\left(2,-(1+id)e^{2ia+2ibx}\right)}{4b}-\frac{1}{4}x^2\log\left(1+(1+id)e^{2ia+2ibx}\right)+\frac{1}{2}x^2\coth^{-}$$

Antiderivative was successfully verified.

```
[In] Int[x*ArcCoth[1 + I*d - d*Tan[a + b*x]],x]
```

```
[Out] (I/6)*b*x^3 + (x^2*ArcCoth[1 + I*d - d*Tan[a + b*x]])/2 - (x^2*Log[1 + (1 +
 I*d)*E^((2*I)*a + (2*I)*b*x)])/4 + ((I/4)*x*PolyLog[2, -((1 + I*d)*E^((2*I
)*a + (2*I)*b*x))])/b - PolyLog[3, -((1 + I*d)*E^((2*I)*a + (2*I)*b*x))]/(8
*b^2)
```

Rule 2184

```
Int[((c_.) + (d_.)*(x_))^(m_.)/((a_) + (b_.)*((F_)^((g_.)*((e_.) + (f_.)*(x
_))))^(n_.)), x_Symbol] :> Simp[(c + d*x)^(m + 1)/(a*d*(m + 1)), x] - Dist[
b/a, Int[((c + d*x)^m*(F^(g*(e + f*x)))^n)/(a + b*(F^(g*(e + f*x)))^n), x],
 x] /; FreeQ[{F, a, b, c, d, e, f, g, n}, x] && IGtQ[m, 0]
```

Rule 2190

```
Int[(((F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m_.))/
((a_) + (b_.)*((F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)), x_Symbol] :> Simp
[((c + d*x)^m*Log[1 + (b*(F^(g*(e + f*x)))^n)/a])/(b*f*g*n*Log[F]), x] - Di
st[(d*m)/(b*f*g*n*Log[F]), Int[(c + d*x)^(m - 1)*Log[1 + (b*(F^(g*(e + f*x)
))^n)/a], x], x] /; FreeQ[{F, a, b, c, d, e, f, g, n}, x] && IGtQ[m, 0]
```

Rule 2282

```
Int[u_, x_Symbol] :> With[{v = FunctionOfExponential[u, x]}, Dist[v/D[v, x]
, Subst[Int[FunctionOfExponentialFunction[u, x]/x, x], x, v], x]] /; Functi
onOfExponentialQ[u, x] &&  !MatchQ[u, (w_)*((a_.)*(v_)^(n_))^(m_) /; FreeQ[
{a, m, n}, x] && IntegerQ[m*n]] &&  !MatchQ[u, E^((c_.)*((a_.) + (b_.)*x))*
(F_)[v_] /; FreeQ[{a, b, c}, x] && InverseFunctionQ[F[x]]]
```

Rule 2531

```
Int[Log[1 + (e_.)*((F_)^((c_.)*((a_.) + (b_.)*(x_))))^(n_.)]*((f_.) + (g_.)
*(x_))^(m_.), x_Symbol] :> -Simp[((f + g*x)^m*PolyLog[2, -(e*(F^(c*(a + b*x
)))^n)])/(b*c*n*Log[F]), x] + Dist[(g*m)/(b*c*n*Log[F]), Int[(f + g*x)^(m -
 1)*PolyLog[2, -(e*(F^(c*(a + b*x)))^n)], x], x] /; FreeQ[{F, a, b, c, e, f
, g, n}, x] && GtQ[m, 0]
```

Rule 6264

```
Int[ArcCoth[(c_.) + (d_.)*Tan[(a_.) + (b_.)*(x_)]]*((e_.) + (f_.)*(x_))^(m_
.), x_Symbol] :> Simp[((e + f*x)^(m + 1)*ArcCoth[c + d*Tan[a + b*x]])/(f*(m
 + 1)), x] + Dist[(I*b)/(f*(m + 1)), Int[(e + f*x)^(m + 1)/(c + I*d + c*E^(
2*I*a + 2*I*b*x)), x], x] /; FreeQ[{a, b, c, d, e, f}, x] && IGtQ[m, 0] &&
EqQ[(c + I*d)^2, 1]
```

Rule 6589

```
Int[PolyLog[n_, (c_.)*((a_.) + (b_.)*(x_))^(p_.)]/((d_.) + (e_.)*(x_)), x_S
ymbol] :> Simp[PolyLog[n + 1, c*(a + b*x)^p]/(e*p), x] /; FreeQ[{a, b, c, d
, e, n, p}, x] && EqQ[b*d, a*e]
```

Rubi steps

$$\int x\coth^{-1}(1+id-d\tan(a+bx))\,dx=\frac{1}{2}x^2\coth^{-1}(1+id-d\tan(a+bx))+\frac{1}{2}(ib)\int\frac{x^2}{1+(1+id)e^{2ia+2ibx}}\,dx$$
$$=\frac{1}{6}ibx^3+\frac{1}{2}x^2\coth^{-1}(1+id-d\tan(a+bx))-\frac{1}{2}(b(i-d))\int\frac{e^{2ia+2ibx}}{1+(1+id)e}$$
$$=\frac{1}{6}ibx^3+\frac{1}{2}x^2\coth^{-1}(1+id-d\tan(a+bx))-\frac{1}{4}x^2\log\left(1+(1+id)e^{2ia+2}\right.$$
$$=\frac{1}{6}ibx^3+\frac{1}{2}x^2\coth^{-1}(1+id-d\tan(a+bx))-\frac{1}{4}x^2\log\left(1+(1+id)e^{2ia+2}\right.$$
$$=\frac{1}{6}ibx^3+\frac{1}{2}x^2\coth^{-1}(1+id-d\tan(a+bx))-\frac{1}{4}x^2\log\left(1+(1+id)e^{2ia+2}\right.$$
$$=\frac{1}{6}ibx^3+\frac{1}{2}x^2\coth^{-1}(1+id-d\tan(a+bx))-\frac{1}{4}x^2\log\left(1+(1+id)e^{2ia+2}\right.$$

**Mathematica [A]** time = 0.12, size = 120, normalized size = 0.90

$$\frac{1}{2}x^2\coth^{-1}(d(-\tan(a+bx))+id+1)-\frac{2b^2x^2\log\left(1-\frac{ie^{-2i(a+bx)}}{d-i}\right)+2ibx\text{Li}_2\left(\frac{ie^{-2i(a+bx)}}{d-i}\right)+\text{Li}_3\left(\frac{ie^{-2i(a+bx)}}{d-i}\right)}{8b^2}$$

Antiderivative was successfully verified.

```
[In] Integrate[x*ArcCoth[1 + I*d - d*Tan[a + b*x]],x]
```

```
[Out] (x^2*ArcCoth[1 + I*d - d*Tan[a + b*x]])/2 - (2*b^2*x^2*Log[1 - I/((-I + d)*
E^((2*I)*(a + b*x)))] + (2*I)*b*x*PolyLog[2, I/((-I + d)*E^((2*I)*(a + b*x)
))] + PolyLog[3, I/((-I + d)*E^((2*I)*(a + b*x)))])/(8*b^2)
```

**fricas [C]** time = 0.74, size = 296, normalized size = 2.21

$$2ib^3x^3-3b^2x^2\log\left(\frac{de^{(2ibx+2ia)}}{(d-i)e^{(2ibx+2ia)}-i}\right)+2ia^3+6ibx\text{Li}_2\left(\frac{1}{2}\sqrt{-4id-4}\,e^{(ibx+ia)}\right)+6ibx\text{Li}_2\left(-\frac{1}{2}\sqrt{-4id-4}\,e^{(ibx+ia)}\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*arccoth(1+I*d-d*tan(b*x+a)),x, algorithm="fricas")
```

```
[Out] 1/12*(2*I*b^3*x^3 - 3*b^2*x^2*log(d*e^(2*I*b*x + 2*I*a)/((d - I)*e^(2*I*b*x
 + 2*I*a) - I)) + 2*I*a^3 + 6*I*b*x*dilog(1/2*sqrt(-4*I*d - 4)*e^(I*b*x + I
*a)) + 6*I*b*x*dilog(-1/2*sqrt(-4*I*d - 4)*e^(I*b*x + I*a)) - 3*a^2*log(((2
*d - 2*I)*e^(I*b*x + I*a) + I*sqrt(-4*I*d - 4))/(2*d - 2*I)) - 3*a^2*log(((
2*d - 2*I)*e^(I*b*x + I*a) - I*sqrt(-4*I*d - 4))/(2*d - 2*I)) - 3*(b^2*x^2
```

```
- a^2)*log(1/2*sqrt(-4*I*d - 4)*e^(I*b*x + I*a) + 1) - 3*(b^2*x^2 - a^2)*lo
g(-1/2*sqrt(-4*I*d - 4)*e^(I*b*x + I*a) + 1) - 6*polylog(3, 1/2*sqrt(-4*I*d
 - 4)*e^(I*b*x + I*a)) - 6*polylog(3, -1/2*sqrt(-4*I*d - 4)*e^(I*b*x + I*a)
))/b^2
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int x \operatorname{arcoth}\left(-d \tan\left(bx+a\right)+i d+1\right) dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*arccoth(1+I*d-d*tan(b*x+a)),x, algorithm="giac")
```

```
[Out] integrate(x*arccoth(-d*tan(b*x + a) + I*d + 1), x)
```

**maple [C]** time = 4.91, size = 2351, normalized size = 17.54

Expression too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x*arccoth(1+I*d-d*tan(b*x+a)),x)
```

```
[Out] 1/6*I*b*x^3+1/8*I*x^2*Pi*csgn(I*exp(2*I*(b*x+a)))^3-1/4*x^2*ln(d)-1/8*I*x^2
*Pi*csgn(I*exp(2*I*(b*x+a))/(exp(2*I*(b*x+a))+1))*csgn(I*d/(exp(2*I*(b*x+a)
)+1)*exp(2*I*(b*x+a)))^2-1/4*I/b^2/(I-d)*ln(1-I*(I-d)*exp(2*I*(b*x+a)))*a^2
+1/8*I*x^2*Pi*csgn(I*d/(exp(2*I*(b*x+a))+1)*exp(2*I*(b*x+a)))*csgn(d/(exp(2
*I*(b*x+a))+1)*exp(2*I*(b*x+a)))-1/8*I*x^2*Pi*csgn(I*(exp(2*I*(b*x+a))*d-I*
exp(2*I*(b*x+a))-I)/(exp(2*I*(b*x+a))+1))^3-1/8*I*x^2*Pi*csgn((exp(2*I*(b*x
+a))*d-I*exp(2*I*(b*x+a))-I)/(exp(2*I*(b*x+a))+1))^2+1/4*d/(I-d)*ln(1-I*(I-
d)*exp(2*I*(b*x+a)))*x^2-1/8*I*x^2*Pi*csgn(I*exp(2*I*(b*x+a)))*csgn(I*exp(2
*I*(b*x+a))/(exp(2*I*(b*x+a))+1))^2-1/8*I*x^2*Pi*csgn(I*d)*csgn(I*d/(exp(2*
I*(b*x+a))+1)*exp(2*I*(b*x+a)))^2-1/2/b^2*a^2*d/(I-d)*ln(1+I*exp(I*(b*x+a))
*(-I*(I-d))^(1/2))-1/2*x^2*ln(exp(I*(b*x+a)))+1/2*I/b^2*a*d/(I-d)*dilog(1+I
*exp(I*(b*x+a))*(-I*(I-d))^(1/2))-1/4*I/b*d/(I-d)*polylog(2,I*(I-d)*exp(2*I
*(b*x+a)))*x+1/8*I*x^2*Pi*csgn((exp(2*I*(b*x+a))*d-I*exp(2*I*(b*x+a))-I)/(e
xp(2*I*(b*x+a))+1))^3+1/2/b*d/(I-d)*ln(1-I*(I-d)*exp(2*I*(b*x+a)))*x*a+1/2/
b^2*a/(I-d)*dilog(1+I*exp(I*(b*x+a))*(-I*(I-d))^(1/2))+1/8*I*x^2*Pi*csgn(I*
d/(exp(2*I*(b*x+a))+1)*exp(2*I*(b*x+a)))^3+1/2/b^2*a/(I-d)*dilog(1-I*exp(I*
(b*x+a))*(-I*(I-d))^(1/2))-1/4/b/(I-d)*polylog(2,I*(I-d)*exp(2*I*(b*x+a)))*
x-1/8*I/b^2/(I-d)*polylog(3,I*(I-d)*exp(2*I*(b*x+a)))-1/4*I/(I-d)*ln(1-I*(I
-d)*exp(2*I*(b*x+a)))*x^2-1/8*I*x^2*Pi*csgn(I/(exp(2*I*(b*x+a))+1))*csgn(I*
(exp(2*I*(b*x+a))*d-I*exp(2*I*(b*x+a))-I))*csgn(I*(exp(2*I*(b*x+a))*d-I*exp
(2*I*(b*x+a))-I)/(exp(2*I*(b*x+a))+1))+1/4*x^2*ln(exp(2*I*(b*x+a))*d-I*exp(
2*I*(b*x+a))-I)+1/8*I*x^2*Pi*csgn(I*exp(2*I*(b*x+a))/(exp(2*I*(b*x+a))+1))^
3+1/8/b^2*d/(I-d)*polylog(3,I*(I-d)*exp(2*I*(b*x+a)))-1/4/b^2/(I-d)*polylog
(2,I*(I-d)*exp(2*I*(b*x+a)))*a-1/8*I*x^2*Pi*csgn(I*d/(exp(2*I*(b*x+a))+1)*e
xp(2*I*(b*x+a)))*csgn(d/(exp(2*I*(b*x+a))+1)*exp(2*I*(b*x+a)))^2+1/8*I*x^2*
Pi*csgn(I*(exp(2*I*(b*x+a))*d-I*exp(2*I*(b*x+a))-I)/(exp(2*I*(b*x+a))+1))*c
sgn((exp(2*I*(b*x+a))*d-I*exp(2*I*(b*x+a))-I)/(exp(2*I*(b*x+a))+1))^2-1/8*I
*x^2*Pi*csgn(I*(exp(2*I*(b*x+a))*d-I*exp(2*I*(b*x+a))-I)/(exp(2*I*(b*x+a))+
1))*csgn((exp(2*I*(b*x+a))*d-I*exp(2*I*(b*x+a))-I)/(exp(2*I*(b*x+a))+1))-1/
2/b*a*d/(I-d)*ln(1+I*exp(I*(b*x+a))*(-I*(I-d))^(1/2))*x-1/2/b*a*d/(I-d)*ln(
1-I*exp(I*(b*x+a))*(-I*(I-d))^(1/2))*x+1/8*I*x^2*Pi*csgn(I*exp(I*(b*x+a)))^
2*csgn(I*exp(2*I*(b*x+a)))-1/4*I*x^2*Pi*csgn(I*exp(I*(b*x+a)))*csgn(I*exp(2
*I*(b*x+a)))^2+1/8*I*x^2*Pi*csgn(I/(exp(2*I*(b*x+a))+1))*csgn(I*(exp(2*I*(b
*x+a))*d-I*exp(2*I*(b*x+a))-I)/(exp(2*I*(b*x+a))+1))^2-1/8*I*x^2*Pi*csgn(I/
(exp(2*I*(b*x+a))+1))*csgn(I*exp(2*I*(b*x+a))/(exp(2*I*(b*x+a))+1))^2+1/8*I
*x^2*Pi*csgn(I*(exp(2*I*(b*x+a))*d-I*exp(2*I*(b*x+a))-I))*csgn(I*(exp(2*I*(
b*x+a))*d-I*exp(2*I*(b*x+a))-I)/(exp(2*I*(b*x+a))+1))^2+1/8*I*x^2*Pi*csgn(d
/(exp(2*I*(b*x+a))+1)*exp(2*I*(b*x+a)))^2-1/2/b^2*a^2*d/(I-d)*ln(1-I*exp(I*
```

```
(b*x+a))*(-I*(I-d))^(1/2))+1/4/b^2*d/(I-d)*ln(1-I*(I-d)*exp(2*I*(b*x+a)))*a
^2+1/4/b^2*a^2*d/(I-d)*ln(I*exp(2*I*(b*x+a))-exp(2*I*(b*x+a))*d+I)+1/2*I/b^
2*a^2/(I-d)*ln(1+I*exp(I*(b*x+a))*(-I*(I-d))^(1/2))+1/2*I/b^2*a^2/(I-d)*ln(
1-I*exp(I*(b*x+a))*(-I*(I-d))^(1/2))-1/4*I/b^2*a^2/(I-d)*ln(I*exp(2*I*(b*x+
a))-exp(2*I*(b*x+a))*d+I)-1/8*I*x^2*Pi*csgn(d/(exp(2*I*(b*x+a))+1)*exp(2*I*
(b*x+a)))^3+1/2*I/b*a/(I-d)*ln(1+I*exp(I*(b*x+a))*(-I*(I-d))^(1/2))*x+1/2*I
/b*a/(I-d)*ln(1-I*exp(I*(b*x+a))*(-I*(I-d))^(1/2))*x+1/2*I/b^2*a*d/(I-d)*di
log(1-I*exp(I*(b*x+a))*(-I*(I-d))^(1/2))-1/4*I/b^2*d/(I-d)*polylog(2,I*(I-d
)*exp(2*I*(b*x+a)))*a-1/2*I/b/(I-d)*ln(1-I*(I-d)*exp(2*I*(b*x+a)))*x*a+1/8*
I*x^2*Pi*csgn(I*d)*csgn(I*exp(2*I*(b*x+a))/(exp(2*I*(b*x+a))+1))*csgn(I*d/(
exp(2*I*(b*x+a))+1)*exp(2*I*(b*x+a)))+1/8*I*x^2*Pi*csgn(I/(exp(2*I*(b*x+a))
+1))*csgn(I*exp(2*I*(b*x+a)))*csgn(I*exp(2*I*(b*x+a))/(exp(2*I*(b*x+a))+1))
```

**maxima [B]** time = 0.34, size = 246, normalized size = 1.84

$$-\frac{\frac{12\left((bx+a)^2-2(bx+a)a\right)\operatorname{arcoth}(d\tan(bx+a)-id-1)}{b}+\frac{-4i(bx+a)^3+12i(bx+a)^2a-6ibx\operatorname{Li}_2\left((-id-1)e^{(2ibx+2ia)}\right)+\left(6i(bx+a)^2-12i(bx+a)a\right)\arctan(d\,c}{}}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*arccoth(1+I*d-d*tan(b*x+a)),x, algorithm="maxima")
```

```
[Out] -1/24*(12*((b*x + a)^2 - 2*(b*x + a)*a)*arccoth(d*tan(b*x + a) - I*d - 1)/b
 + (-4*I*(b*x + a)^3 + 12*I*(b*x + a)^2*a - 6*I*b*x*dilog((-I*d - 1)*e^(2*I
*b*x + 2*I*a)) + (6*I*(b*x + a)^2 - 12*I*(b*x + a)*a)*arctan2(d*cos(2*b*x +
 2*a) + sin(2*b*x + 2*a), -d*sin(2*b*x + 2*a) + cos(2*b*x + 2*a) + 1) + 3*(
(b*x + a)^2 - 2*(b*x + a)*a)*log((d^2 + 1)*cos(2*b*x + 2*a)^2 + (d^2 + 1)*s
in(2*b*x + 2*a)^2 - 2*d*sin(2*b*x + 2*a) + 2*cos(2*b*x + 2*a) + 1) + 3*poly
log(3, (-I*d - 1)*e^(2*I*b*x + 2*I*a)))/b)/b
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.01

$$\int x\,\mathrm{acoth}\left(1-d\tan\left(a+b\,x\right)+d\,1\mathrm{i}\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x*acoth(d*1i - d*tan(a + b*x) + 1),x)
```

```
[Out] int(x*acoth(d*1i - d*tan(a + b*x) + 1), x)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int x\operatorname{acoth}\left(-d\tan\left(a+bx\right)+id+1\right)dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*acoth(1+I*d-d*tan(b*x+a)),x)
```

```
[Out] Integral(x*acoth(-d*tan(a + b*x) + I*d + 1), x)
```

# 3.246 $\int \coth^{-1}(1 + id - d\tan(a + bx))\,dx$

**Optimal**. Leaf size=94

$$\frac{i\text{Li}_2\left(-\left((id+1)e^{2ia+2ibx}\right)\right)}{4b}-\frac{1}{2}x\log\left(1+(1+id)e^{2ia+2ibx}\right)+x\coth^{-1}(d(-\tan(a+bx))+id+1)+\frac{1}{2}ibx^2$$

```
[Out] 1/2*I*b*x^2+x*arccoth(1+I*d-d*tan(b*x+a))-1/2*x*ln(1+(1+I*d)*exp(2*I*a+2*I*
b*x))+1/4*I*polylog(2,-(1+I*d)*exp(2*I*a+2*I*b*x))/b
```

**Rubi** [A] time = 0.16, antiderivative size = 94, normalized size of antiderivative = 1.00, number of steps used = 5, number of rules used = 5, integrand size = 17, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.294, Rules used = {6256, 2184, 2190, 2279, 2391}

$$\frac{i\text{PolyLog}\left(2,-(1+id)e^{2ia+2ibx}\right)}{4b}-\frac{1}{2}x\log\left(1+(1+id)e^{2ia+2ibx}\right)+x\coth^{-1}(d(-\tan(a+bx))+id+1)+\frac{1}{2}ibx^2$$

Antiderivative was successfully verified.

```
[In] Int[ArcCoth[1 + I*d - d*Tan[a + b*x]],x]
```

```
[Out] (I/2)*b*x^2 + x*ArcCoth[1 + I*d - d*Tan[a + b*x]] - (x*Log[1 + (1 + I*d)*E^
((2*I)*a + (2*I)*b*x)])/2 + ((I/4)*PolyLog[2, -((1 + I*d)*E^((2*I)*a + (2*I
)*b*x))])/b
```

Rule 2184

```
Int[((c_.) + (d_.)*(x_))^(m_.)/((a_) + (b_.)*((F_)^((g_.)*((e_.) + (f_.)*(x
_))))^(n_.)), x_Symbol] :> Simp[(c + d*x)^(m + 1)/(a*d*(m + 1)), x] - Dist[
b/a, Int[((c + d*x)^m*(F^(g*(e + f*x)))^n)/(a + b*(F^(g*(e + f*x)))^n), x],
 x] /; FreeQ[{F, a, b, c, d, e, f, g, n}, x] && IGtQ[m, 0]
```

Rule 2190

```
Int[(((F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m_.))/
((a_) + (b_.)*((F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)), x_Symbol] :> Simp
[((c + d*x)^m*Log[1 + (b*(F^(g*(e + f*x)))^n)/a])/(b*f*g*n*Log[F]), x] - Di
st[(d*m)/(b*f*g*n*Log[F]), Int[(c + d*x)^(m - 1)*Log[1 + (b*(F^(g*(e + f*x)
))^n)/a], x], x] /; FreeQ[{F, a, b, c, d, e, f, g, n}, x] && IGtQ[m, 0]
```

Rule 2279

```
Int[Log[(a_) + (b_.)*((F_)^((e_.)*((c_.) + (d_.)*(x_))))^(n_.)], x_Symbol]
:> Dist[1/(d*e*n*Log[F]), Subst[Int[Log[a + b*x]/x, x], x, (F^(e*(c + d*x))
)^n], x] /; FreeQ[{F, a, b, c, d, e, n}, x] && GtQ[a, 0]
```

Rule 2391

```
Int[Log[(c_.)*((d_) + (e_.)*(x_)^(n_.))]/(x_), x_Symbol] :> -Simp[PolyLog[2
, -(c*e*x^n)]/n, x] /; FreeQ[{c, d, e, n}, x] && EqQ[c*d, 1]
```

Rule 6256

```
Int[ArcCoth[(c_.) + (d_.)*Tan[(a_.) + (b_.)*(x_)]], x_Symbol] :> Simp[x*Arc
Coth[c + d*Tan[a + b*x]], x] + Dist[I*b, Int[x/(c + I*d + c*E^(2*I*a + 2*I*
b*x)), x], x] /; FreeQ[{a, b, c, d}, x] && EqQ[(c + I*d)^2, 1]
```

Rubi steps

$$\int \coth^{-1}(1+id-d\tan(a+bx))\,dx = x\coth^{-1}(1+id-d\tan(a+bx)) + (ib)\int \frac{x}{1+(1+id)e^{2ia+2ibx}}\,dx$$
$$= \frac{1}{2}ibx^2 + x\coth^{-1}(1+id-d\tan(a+bx)) - (b(i-d))\int \frac{e^{2ia+2ibx}x}{1+(1+id)e^{2ia+2ib}}$$
$$= \frac{1}{2}ibx^2 + x\coth^{-1}(1+id-d\tan(a+bx)) - \frac{1}{2}x\log\left(1+(1+id)e^{2ia+2ibx}\right) +$$
$$= \frac{1}{2}ibx^2 + x\coth^{-1}(1+id-d\tan(a+bx)) - \frac{1}{2}x\log\left(1+(1+id)e^{2ia+2ibx}\right) -$$
$$= \frac{1}{2}ibx^2 + x\coth^{-1}(1+id-d\tan(a+bx)) - \frac{1}{2}x\log\left(1+(1+id)e^{2ia+2ibx}\right) +$$

**Mathematica [B]** time = 3.24, size = 723, normalized size = 7.69

$$x\coth^{-1}(d(-\tan(a+bx))+id+1) - \frac{x\sec(a+bx)(\cos(bx)+i\sin(bx))(\sin(bx)+i\cos(bx))\left(-\text{Li}_2\left(\frac{1}{2}(\cos(a)+i\sin(a\right.\right.}{(\tan(a+bx)-i)(id\sin(a+bx)+(d-2i)\cos(a+bx))\left(-\frac{\sec^2(bx)\log\left(\frac{\sec(bx)(-d\sin(}{2\cos}\right.}{\tan(bx}\right.}$$

Warning: Unable to verify antiderivative.

```
[In] Integrate[ArcCoth[1 + I*d - d*Tan[a + b*x]],x]
```

```
[Out] x*ArcCoth[1 + I*d - d*Tan[a + b*x]] - (x*((-2*I)*b*x*Log[2*Cos[b*x]*(Cos[b*
x] - I*Sin[b*x])] + Log[(Sec[b*x]*(Cos[a] - I*Sin[a])*((-2*I + d)*Cos[a + b
*x] + I*d*Sin[a + b*x]))/(2*(-I + d))]*Log[1 - I*Tan[b*x]] - Log[(Sec[b*x]*
((2 + I*d)*Cos[a + b*x] - d*Sin[a + b*x]))/(2*Cos[a] - (2*I)*Sin[a])]*Log[1
 + I*Tan[b*x]] + PolyLog[2, -Cos[2*b*x] + I*Sin[2*b*x]] + PolyLog[2, (Sec[b
*x]*(d*Cos[a] + (2 + I*d)*Sin[a])*(Cos[a + b*x] - I*Sin[a + b*x]))/(2*(-I +
 d))] - PolyLog[2, ((Cos[a] + I*Sin[a])*(d*Cos[a] + (2 + I*d)*Sin[a])*(-I +
 Tan[b*x]))/2])*Sec[a + b*x]*(Cos[b*x] + I*Sin[b*x])*(I*Cos[b*x] + Sin[b*x]
))/(((-2*I + d)*Cos[a + b*x] + I*d*Sin[a + b*x])*((I*Log[1 - I*Tan[b*x]]*Se
c[b*x]*(d*Cos[a] + (2 + I*d)*Sin[a]))/((-2*I + d)*Cos[a + b*x] + I*d*Sin[a
+ b*x]) + (Log[1 + I*Tan[b*x]]*Sec[b*x]*((-I)*d*Cos[a] + (-2*I + d)*Sin[a])
)/((-2*I + d)*Cos[a + b*x] + I*d*Sin[a + b*x]) - (Log[(Sec[b*x]*((2 + I*d)*
Cos[a + b*x] - d*Sin[a + b*x]))/(2*Cos[a] - (2*I)*Sin[a])]*Sec[b*x]^2)/(-I
+ Tan[b*x]) + (Log[1 - ((Cos[a] + I*Sin[a])*(d*Cos[a] + (2 + I*d)*Sin[a])*(
-I + Tan[b*x]))/2]*Sec[b*x]^2)/(-I + Tan[b*x]) - Log[1 - (Sec[b*x]*(d*Cos[a
] + (2 + I*d)*Sin[a])*(Cos[a + b*x] - I*Sin[a + b*x]))/(2*(-I + d))]*(-I +
Tan[b*x]) + (Log[(Sec[b*x]*(Cos[a] - I*Sin[a])*((-2*I + d)*Cos[a + b*x] + I
*d*Sin[a + b*x]))/(2*(-I + d))]*Sec[b*x]^2)/(I + Tan[b*x]) + (2*I)*b*x*(I +
 Tan[b*x]))*(-I + Tan[a + b*x]))
```

**fricas [B]** time = 0.48, size = 222, normalized size = 2.36

$$\frac{i b^2x^2 - bx\log\left(\frac{de^{(2i\,bx+2i\,a)}}{(d-i)e^{(2i\,bx+2i\,a)}-i}\right) - i\,a^2 - (bx+a)\log\left(\frac{1}{2}\sqrt{-4i\,d-4}\,e^{(i\,bx+i\,a)}+1\right) - (bx+a)\log\left(-\frac{1}{2}\sqrt{-4i\,d-4}\,e^{(i\,b}\right.}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(1+I*d-d*tan(b*x+a)),x, algorithm="fricas")
```

```
[Out] 1/2*(I*b^2*x^2 - b*x*log(d*e^(2*I*b*x + 2*I*a)/((d - I)*e^(2*I*b*x + 2*I*a)
 - I)) - I*a^2 - (b*x + a)*log(1/2*sqrt(-4*I*d - 4)*e^(I*b*x + I*a) + 1) -
(b*x + a)*log(-1/2*sqrt(-4*I*d - 4)*e^(I*b*x + I*a) + 1) + a*log(((2*d - 2*
I)*e^(I*b*x + I*a) + I*sqrt(-4*I*d - 4))/(2*d - 2*I)) + a*log(((2*d - 2*I)*
```

```
e^(I*b*x + I*a) - I*sqrt(-4*I*d - 4))/(2*d - 2*I)) + I*dilog(1/2*sqrt(-4*I*
d - 4)*e^(I*b*x + I*a)) + I*dilog(-1/2*sqrt(-4*I*d - 4)*e^(I*b*x + I*a)))/b
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \operatorname{arcoth}\left(-d\tan\left(bx+a\right)+i\,d+1\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(1+I*d-d*tan(b*x+a)),x, algorithm="giac")
```

```
[Out] integrate(arccoth(-d*tan(b*x + a) + I*d + 1), x)
```

**maple [B]** time = 0.51, size = 297, normalized size = 3.16

$$\frac{i\operatorname{arccoth}\left(1+id-d\tan\left(bx+a\right)\right)\ln\left(id+d\tan\left(bx+a\right)\right)}{2b}-\frac{i\operatorname{arccoth}\left(1+id-d\tan\left(bx+a\right)\right)\ln\left(id-d\tan\left(bx+\right.\right.}{2b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(arccoth(1+I*d-d*tan(b*x+a)),x)
```

```
[Out] 1/2*I/b*arccoth(1+I*d-d*tan(b*x+a))*ln(I*d+d*tan(b*x+a))-1/2*I/b*arccoth(1+
I*d-d*tan(b*x+a))*ln(I*d-d*tan(b*x+a))-1/8*I/b*ln(I*d-d*tan(b*x+a))^2+1/4*I
/b*dilog(1+1/2*I*d-1/2*d*tan(b*x+a))+1/4*I/b*ln(I*d-d*tan(b*x+a))*ln(1+1/2*
I*d-1/2*d*tan(b*x+a))-1/4*I/b*dilog((-2-I*d+d*tan(b*x+a))/(-2*I*d-2))-1/4*I
/b*ln(I*d+d*tan(b*x+a))*ln((-2-I*d+d*tan(b*x+a))/(-2*I*d-2))+1/4*I/b*dilog(
1/2*I*(-I*d+d*tan(b*x+a))/d)+1/4*I/b*ln(I*d+d*tan(b*x+a))*ln(1/2*I*(-I*d+d*
tan(b*x+a))/d)
```

**maxima [B]** time = 0.42, size = 263, normalized size = 2.80

$$-\frac{4\left(bx+a\right)d\left(\frac{\log\left(d\tan\left(bx+a\right)-i\,d-2\right)}{d}-\frac{\log\left(\tan\left(bx+a\right)-i\right)}{d}\right)+d\left(-\frac{2i\left(\log\left(d\tan\left(bx+a\right)-i\,d-2\right)\log\left(-\frac{i\,d\tan\left(bx+a\right)+d-2i}{2\,d-2i}+1\right)+\mathrm{Li}_2\left(\frac{i\,d\tan\left(bx+a\right)+d}{2\,d-2i}\right.\right.}{d}\right.}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(1+I*d-d*tan(b*x+a)),x, algorithm="maxima")
```

```
[Out] -1/8*(4*(b*x + a)*d*(log(d*tan(b*x + a) - I*d - 2)/d - log(tan(b*x + a) - I
)/d) + d*(-2*I*(log(d*tan(b*x + a) - I*d - 2)*log(-(I*d*tan(b*x + a) + d -
2*I)/(2*d - 2*I) + 1) + dilog((I*d*tan(b*x + a) + d - 2*I)/(2*d - 2*I)))/d
+ (2*I*log(d*tan(b*x + a) - I*d - 2)*log(tan(b*x + a) - I) - I*log(tan(b*x
+ a) - I)^2)/d - 2*I*(log(-1/2*d*tan(b*x + a) + 1/2*I*d + 1)*log(tan(b*x +
a) - I) + dilog(1/2*d*tan(b*x + a) - 1/2*I*d))/d + 2*I*(log(tan(b*x + a) -
I)*log(-1/2*I*tan(b*x + a) + 1/2) + dilog(1/2*I*tan(b*x + a) + 1/2))/d) + 8
*(b*x + a)*arccoth(d*tan(b*x + a) - I*d - 1))/b
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.01

$$\int \operatorname{acoth}\left(1-d\tan\left(a+b\,x\right)+d\,1\mathrm{i}\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(d*1i - d*tan(a + b*x) + 1),x)
```

```
[Out] int(acoth(d*1i - d*tan(a + b*x) + 1), x)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \operatorname{acoth}\left(-d\tan\left(a+bx\right)+id+1\right)dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(1+I*d-d*tan(b*x+a)),x)
```

```
[Out] Integral(acoth(-d*tan(a + b*x) + I*d + 1), x)
```

## 3.247 $\int \frac{\coth^{-1}(1+id-d\tan(a+bx))}{x}\,dx$

**Optimal**. Leaf size=24

$$\text{Int}\left(\frac{\coth^{-1}(d(-\tan(a+bx))+id+1)}{x},x\right)$$

```
[Out] CannotIntegrate(arccoth(1+I*d-d*tan(b*x+a))/x,x)
```

**Rubi [A]** time = 0.08, antiderivative size = 0, normalized size of antiderivative = 0.00, number of steps used = 0, number of rules used = 0, integrand size = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int \frac{\coth^{-1}(1+id-d\tan(a+bx))}{x}\,dx$$

Verification is Not applicable to the result.

```
[In] Int[ArcCoth[1 + I*d - d*Tan[a + b*x]]/x,x]
```

```
[Out] Defer[Int][ArcCoth[1 + I*d - d*Tan[a + b*x]]/x, x]
```

Rubi steps

$$\int \frac{\coth^{-1}(1+id-d\tan(a+bx))}{x}\,dx = \int \frac{\coth^{-1}(1+id-d\tan(a+bx))}{x}\,dx$$

**Mathematica [A]** time = 0.80, size = 0, normalized size = 0.00

$$\int \frac{\coth^{-1}(1+id-d\tan(a+bx))}{x}\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[ArcCoth[1 + I*d - d*Tan[a + b*x]]/x,x]
```

```
[Out] Integrate[ArcCoth[1 + I*d - d*Tan[a + b*x]]/x, x]
```

**fricas [A]** time = 0.63, size = 0, normalized size = 0.00

$$\text{integral}\left(-\frac{\log\left(\frac{de^{(2i\,bx+2i\,a)}}{(d-i)e^{(2i\,bx+2i\,a)}-i}\right)}{2\,x},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(1+I*d-d*tan(b*x+a))/x,x, algorithm="fricas")
```

```
[Out] integral(-1/2*log(d*e^(2*I*b*x + 2*I*a)/((d - I)*e^(2*I*b*x + 2*I*a) - I))/
x, x)
```

**giac [A]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{arcoth}\left(-d\tan\left(bx+a\right)+i\,d+1\right)}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(1+I*d-d*tan(b*x+a))/x,x, algorithm="giac")
```

```
[Out] integrate(arccoth(-d*tan(b*x + a) + I*d + 1)/x, x)
```

**maple** [A] time = 1.82, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{arccoth}(1 + id - d\tan(bx + a))}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(arccoth(1+I*d-d*tan(b*x+a))/x,x)
```

```
[Out] int(arccoth(1+I*d-d*tan(b*x+a))/x,x)
```

**maxima** [A] time = 0.00, size = 0, normalized size = 0.00

$$-i\,bx+\frac{1}{4}\left(-i\,\pi-4i\,a-2\,\log(d)\right)\log(x)+\frac{1}{2}i\int \frac{\arctan\left(d\cos\left(2\,bx+2\,a\right)+\sin\left(2\,bx+2\,a\right),-d\sin\left(2\,bx+2\,a\right)+\right.}{x}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(1+I*d-d*tan(b*x+a))/x,x, algorithm="maxima")
```

```
[Out] -I*b*x + 1/4*(-I*pi - 4*I*a - 2*log(d))*log(x) + 1/2*I*integrate(arctan2(d*
cos(2*b*x + 2*a) + sin(2*b*x + 2*a), -d*sin(2*b*x + 2*a) + cos(2*b*x + 2*a)
 + 1)/x, x) + 1/4*integrate(log((d^2 + 1)*cos(2*b*x + 2*a)^2 + (d^2 + 1)*si
n(2*b*x + 2*a)^2 - 2*d*sin(2*b*x + 2*a) + 2*cos(2*b*x + 2*a) + 1)/x, x)
```

**mupad** [A] time = 0.00, size = -1, normalized size = -0.04

$$\int \frac{\operatorname{acoth}\left(1 - d\tan\left(a + b\,x\right) + d\,1\mathrm{i}\right)}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(d*1i - d*tan(a + b*x) + 1)/x,x)
```

```
[Out] int(acoth(d*1i - d*tan(a + b*x) + 1)/x, x)
```

**sympy** [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{acoth}(-d\tan(a + bx) + id + 1)}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(1+I*d-d*tan(b*x+a))/x,x)
```

```
[Out] Integral(acoth(-d*tan(a + b*x) + I*d + 1)/x, x)
```

# 3.248 $\int (e+fx)^3 \coth^{-1}(\cot(a+bx))\,dx$

**Optimal**. Leaf size=302

$$-\frac{3f^3\text{Li}_5\left(-ie^{2i(a+bx)}\right)}{16b^4}+\frac{3f^3\text{Li}_5\left(ie^{2i(a+bx)}\right)}{16b^4}+\frac{3if^2(e+fx)\text{Li}_4\left(-ie^{2i(a+bx)}\right)}{8b^3}-\frac{3if^2(e+fx)\text{Li}_4\left(ie^{2i(a+bx)}\right)}{8b^3}+\frac{3f(e+f}{}$$

```
[Out] 1/4*(f*x+e)^4*arccoth(cot(b*x+a))/f+1/4*I*(f*x+e)^4*arctan(exp(2*I*(b*x+a))
)/f-1/4*I*(f*x+e)^3*polylog(2,-I*exp(2*I*(b*x+a)))/b+1/4*I*(f*x+e)^3*polylo
g(2,I*exp(2*I*(b*x+a)))/b+3/8*f*(f*x+e)^2*polylog(3,-I*exp(2*I*(b*x+a)))/b^
2-3/8*f*(f*x+e)^2*polylog(3,I*exp(2*I*(b*x+a)))/b^2+3/8*I*f^2*(f*x+e)*polyl
og(4,-I*exp(2*I*(b*x+a)))/b^3-3/8*I*f^2*(f*x+e)*polylog(4,I*exp(2*I*(b*x+a)
))/b^3-3/16*f^3*polylog(5,-I*exp(2*I*(b*x+a)))/b^4+3/16*f^3*polylog(5,I*exp
(2*I*(b*x+a)))/b^4
```

**Rubi [A]** time = 0.24, antiderivative size = 302, normalized size of antiderivative = 1.00, number of steps used = 12, number of rules used = 6, integrand size = 15, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.400, Rules used = {6254, 4181, 2531, 6609, 2282, 6589}

$$\frac{3if^2(e+fx)\text{PolyLog}\left(4,-ie^{2i(a+bx)}\right)}{8b^3}-\frac{3if^2(e+fx)\text{PolyLog}\left(4,ie^{2i(a+bx)}\right)}{8b^3}+\frac{3f(e+fx)^2\text{PolyLog}\left(3,-ie^{2i(a+bx)}\right)}{8b^2}$$

Antiderivative was successfully verified.

```
[In] Int[(e + f*x)^3*ArcCoth[Cot[a + b*x]],x]
```

```
[Out] ((e + f*x)^4*ArcCoth[Cot[a + b*x]])/(4*f) + ((I/4)*(e + f*x)^4*ArcTan[E^((2
*I)*(a + b*x))])/f - ((I/4)*(e + f*x)^3*PolyLog[2, (-I)*E^((2*I)*(a + b*x))
])/b + ((I/4)*(e + f*x)^3*PolyLog[2, I*E^((2*I)*(a + b*x))])/b + (3*f*(e +
f*x)^2*PolyLog[3, (-I)*E^((2*I)*(a + b*x))])/(8*b^2) - (3*f*(e + f*x)^2*Pol
yLog[3, I*E^((2*I)*(a + b*x))])/(8*b^2) + (((3*I)/8)*f^2*(e + f*x)*PolyLog[
4, (-I)*E^((2*I)*(a + b*x))])/b^3 - (((3*I)/8)*f^2*(e + f*x)*PolyLog[4, I*E
^((2*I)*(a + b*x))])/b^3 - (3*f^3*PolyLog[5, (-I)*E^((2*I)*(a + b*x))])/(16
*b^4) + (3*f^3*PolyLog[5, I*E^((2*I)*(a + b*x))])/(16*b^4)
```

Rule 2282

```
Int[u_, x_Symbol] :> With[{v = FunctionOfExponential[u, x]}, Dist[v/D[v, x]
, Subst[Int[FunctionOfExponentialFunction[u, x]/x, x], x, v], x]] /; Functi
onOfExponentialQ[u, x] && !MatchQ[u, (w_)*((a_.)*(v_)^(n_))^(m_) /; FreeQ[
{a, m, n}, x] && IntegerQ[m*n]] && !MatchQ[u, E^((c_.)*((a_.) + (b_.)*x))*
(F_)[v_] /; FreeQ[{a, b, c}, x] && InverseFunctionQ[F[x]]]
```

Rule 2531

```
Int[Log[1 + (e_.)*((F_)^((c_.)*((a_.) + (b_.)*(x_))))^(n_.)]*((f_.) + (g_.)
*(x_))^(m_.), x_Symbol] :> -Simp[((f + g*x)^m*PolyLog[2, -(e*(F^(c*(a + b*x
)))^n)])/(b*c*n*Log[F]), x] + Dist[(g*m)/(b*c*n*Log[F]), Int[(f + g*x)^(m -
 1)*PolyLog[2, -(e*(F^(c*(a + b*x)))^n)], x], x] /; FreeQ[{F, a, b, c, e, f
, g, n}, x] && GtQ[m, 0]
```

Rule 4181

```
Int[csc[(e_.) + Pi*(k_.) + (f_.)*(x_)]*((c_.) + (d_.)*(x_))^(m_.), x_Symbol
] :> Simp[(-2*(c + d*x)^m*ArcTanh[E^(I*k*Pi)*E^(I*(e + f*x))])/f, x] + (-Di
st[(d*m)/f, Int[(c + d*x)^(m - 1)*Log[1 - E^(I*k*Pi)*E^(I*(e + f*x))], x],
x] + Dist[(d*m)/f, Int[(c + d*x)^(m - 1)*Log[1 + E^(I*k*Pi)*E^(I*(e + f*x))
], x], x]) /; FreeQ[{c, d, e, f}, x] && IntegerQ[2*k] && IGtQ[m, 0]
```

Rule 6254

```
Int[ArcCoth[Cot[(a_.) + (b_.)*(x_)]]*((e_.) + (f_.)*(x_))^(m_.), x_Symbol]
:> Simp[((e + f*x)^(m + 1)*ArcCoth[Cot[a + b*x]])/(f*(m + 1)), x] - Dist[b/
(f*(m + 1)), Int[(e + f*x)^(m + 1)*Sec[2*a + 2*b*x], x], x] /; FreeQ[{a, b,
 e, f}, x] && IGtQ[m, 0]
```

Rule 6589

```
Int[PolyLog[n_, (c_.)*((a_.) + (b_.)*(x_))^(p_.)]/((d_.) + (e_.)*(x_)), x_S
ymbol] :> Simp[PolyLog[n + 1, c*(a + b*x)^p]/(e*p), x] /; FreeQ[{a, b, c, d
, e, n, p}, x] && EqQ[b*d, a*e]
```

Rule 6609

```
Int[((e_.) + (f_.)*(x_))^(m_.)*PolyLog[n_, (d_.)*((F_)^((c_.)*((a_.) + (b_.
)*(x_))))^(p_.)], x_Symbol] :> Simp[((e + f*x)^m*PolyLog[n + 1, d*(F^(c*(a
+ b*x)))^p])/(b*c*p*Log[F]), x] - Dist[(f*m)/(b*c*p*Log[F]), Int[(e + f*x)^
(m - 1)*PolyLog[n + 1, d*(F^(c*(a + b*x)))^p], x], x] /; FreeQ[{F, a, b, c,
 d, e, f, n, p}, x] && GtQ[m, 0]
```

Rubi steps

$$\int (e+fx)^3 \coth^{-1}(\cot(a+bx))\,dx = \frac{(e+fx)^4 \coth^{-1}(\cot(a+bx))}{4f} - \frac{b\int (e+fx)^4 \sec(2a+2bx)\,dx}{4f}$$

$$= \frac{(e+fx)^4 \coth^{-1}(\cot(a+bx))}{4f} + \frac{i(e+fx)^4 \tan^{-1}\left(e^{2i(a+bx)}\right)}{4f} + \frac{1}{2}\int (e+fx)^3$$

$$= \frac{(e+fx)^4 \coth^{-1}(\cot(a+bx))}{4f} + \frac{i(e+fx)^4 \tan^{-1}\left(e^{2i(a+bx)}\right)}{4f} - \frac{i(e+fx)^3\mathrm{Li}_2}{4b}$$

$$= \frac{(e+fx)^4 \coth^{-1}(\cot(a+bx))}{4f} + \frac{i(e+fx)^4 \tan^{-1}\left(e^{2i(a+bx)}\right)}{4f} - \frac{i(e+fx)^3\mathrm{Li}_2}{4b}$$

$$= \frac{(e+fx)^4 \coth^{-1}(\cot(a+bx))}{4f} + \frac{i(e+fx)^4 \tan^{-1}\left(e^{2i(a+bx)}\right)}{4f} - \frac{i(e+fx)^3\mathrm{Li}_2}{4b}$$

$$= \frac{(e+fx)^4 \coth^{-1}(\cot(a+bx))}{4f} + \frac{i(e+fx)^4 \tan^{-1}\left(e^{2i(a+bx)}\right)}{4f} - \frac{i(e+fx)^3\mathrm{Li}_2}{4b}$$

$$= \frac{(e+fx)^4 \coth^{-1}(\cot(a+bx))}{4f} + \frac{i(e+fx)^4 \tan^{-1}\left(e^{2i(a+bx)}\right)}{4f} - \frac{i(e+fx)^3\mathrm{Li}_2}{4b}$$

**Mathematica [B]** time = 0.31, size = 654, normalized size = 2.17

$$\frac{1}{4}x\left(4e^3+6e^2fx+4ef^2x^2+f^3x^3\right)\coth^{-1}(\cot(a+bx)) + \frac{-8b^4e^3x\log\left(1-ie^{2i(a+bx)}\right)+8b^4e^3x\log\left(1+ie^{2i(a+bx)}\right)-1}{}$$

Antiderivative was successfully verified.

```
[In] Integrate[(e + f*x)^3*ArcCoth[Cot[a + b*x]],x]
```

```
[Out] (x*(4*e^3 + 6*e^2*f*x + 4*e*f^2*x^2 + f^3*x^3)*ArcCoth[Cot[a + b*x]])/4 + (
-8*b^4*e^3*x*Log[1 - I*E^((2*I)*(a + b*x))] - 12*b^4*e^2*f*x^2*Log[1 - I*E^
((2*I)*(a + b*x))] - 8*b^4*e*f^2*x^3*Log[1 - I*E^((2*I)*(a + b*x))] - 2*b^4
*f^3*x^4*Log[1 - I*E^((2*I)*(a + b*x))] + 8*b^4*e^3*x*Log[1 + I*E^((2*I)*(a
 + b*x))] + 12*b^4*e^2*f*x^2*Log[1 + I*E^((2*I)*(a + b*x))] + 8*b^4*e*f^2*x
^3*Log[1 + I*E^((2*I)*(a + b*x))] + 2*b^4*f^3*x^4*Log[1 + I*E^((2*I)*(a + b
*x))] - (4*I)*b^3*(e + f*x)^3*PolyLog[2, (-I)*E^((2*I)*(a + b*x))] + (4*I)*
```

```
b^3*(e + f*x)^3*PolyLog[2, I*E^((2*I)*(a + b*x))] + 6*b^2*e^2*f*PolyLog[3,
(-I)*E^((2*I)*(a + b*x))] + 12*b^2*e*f^2*x*PolyLog[3, (-I)*E^((2*I)*(a + b*
x))] + 6*b^2*f^3*x^2*PolyLog[3, (-I)*E^((2*I)*(a + b*x))] - 6*b^2*e^2*f*Pol
yLog[3, I*E^((2*I)*(a + b*x))] - 12*b^2*e*f^2*x*PolyLog[3, I*E^((2*I)*(a +
b*x))] - 6*b^2*f^3*x^2*PolyLog[3, I*E^((2*I)*(a + b*x))] + (6*I)*b*e*f^2*Po
lyLog[4, (-I)*E^((2*I)*(a + b*x))] + (6*I)*b*f^3*x*PolyLog[4, (-I)*E^((2*I)
*(a + b*x))] - (6*I)*b*e*f^2*PolyLog[4, I*E^((2*I)*(a + b*x))] - (6*I)*b*f^
3*x*PolyLog[4, I*E^((2*I)*(a + b*x))] - 3*f^3*PolyLog[5, (-I)*E^((2*I)*(a +
 b*x))] + 3*f^3*PolyLog[5, I*E^((2*I)*(a + b*x))])/(16*b^4)
```

**fricas [C]** time = 0.80, size = 1566, normalized size = 5.19

result too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((f*x+e)^3*arccoth(cot(b*x+a)),x, algorithm="fricas")
```

```
[Out] -1/32*(3*f^3*polylog(5, I*cos(2*b*x + 2*a) + sin(2*b*x + 2*a)) - 3*f^3*poly
log(5, I*cos(2*b*x + 2*a) - sin(2*b*x + 2*a)) + 3*f^3*polylog(5, -I*cos(2*b
*x + 2*a) + sin(2*b*x + 2*a)) - 3*f^3*polylog(5, -I*cos(2*b*x + 2*a) - sin(
2*b*x + 2*a)) - (4*I*b^3*f^3*x^3 + 12*I*b^3*e*f^2*x^2 + 12*I*b^3*e^2*f*x +
4*I*b^3*e^3)*dilog(I*cos(2*b*x + 2*a) + sin(2*b*x + 2*a)) - (4*I*b^3*f^3*x^
3 + 12*I*b^3*e*f^2*x^2 + 12*I*b^3*e^2*f*x + 4*I*b^3*e^3)*dilog(I*cos(2*b*x
+ 2*a) - sin(2*b*x + 2*a)) - (-4*I*b^3*f^3*x^3 - 12*I*b^3*e*f^2*x^2 - 12*I*
b^3*e^2*f*x - 4*I*b^3*e^3)*dilog(-I*cos(2*b*x + 2*a) + sin(2*b*x + 2*a)) -
(-4*I*b^3*f^3*x^3 - 12*I*b^3*e*f^2*x^2 - 12*I*b^3*e^2*f*x - 4*I*b^3*e^3)*di
log(-I*cos(2*b*x + 2*a) - sin(2*b*x + 2*a)) - 4*(b^4*f^3*x^4 + 4*b^4*e*f^2*
x^3 + 6*b^4*e^2*f*x^2 + 4*b^4*e^3*x)*log((cos(2*b*x + 2*a) + sin(2*b*x + 2*
a) + 1)/(cos(2*b*x + 2*a) - sin(2*b*x + 2*a) + 1)) - 2*(4*a*b^3*e^3 - 6*a^2
*b^2*e^2*f + 4*a^3*b*e*f^2 - a^4*f^3)*log(cos(2*b*x + 2*a) + I*sin(2*b*x +
2*a) + I) + 2*(4*a*b^3*e^3 - 6*a^2*b^2*e^2*f + 4*a^3*b*e*f^2 - a^4*f^3)*log
(cos(2*b*x + 2*a) - I*sin(2*b*x + 2*a) + I) + 2*(b^4*f^3*x^4 + 4*b^4*e*f^2*
x^3 + 6*b^4*e^2*f*x^2 + 4*b^4*e^3*x + 4*a*b^3*e^3 - 6*a^2*b^2*e^2*f + 4*a^3
*b*e*f^2 - a^4*f^3)*log(I*cos(2*b*x + 2*a) + sin(2*b*x + 2*a) + 1) - 2*(b^4
*f^3*x^4 + 4*b^4*e*f^2*x^3 + 6*b^4*e^2*f*x^2 + 4*b^4*e^3*x + 4*a*b^3*e^3 -
6*a^2*b^2*e^2*f + 4*a^3*b*e*f^2 - a^4*f^3)*log(I*cos(2*b*x + 2*a) - sin(2*b
*x + 2*a) + 1) + 2*(b^4*f^3*x^4 + 4*b^4*e*f^2*x^3 + 6*b^4*e^2*f*x^2 + 4*b^4
*e^3*x + 4*a*b^3*e^3 - 6*a^2*b^2*e^2*f + 4*a^3*b*e*f^2 - a^4*f^3)*log(-I*co
s(2*b*x + 2*a) + sin(2*b*x + 2*a) + 1) - 2*(b^4*f^3*x^4 + 4*b^4*e*f^2*x^3 +
 6*b^4*e^2*f*x^2 + 4*b^4*e^3*x + 4*a*b^3*e^3 - 6*a^2*b^2*e^2*f + 4*a^3*b*e*
f^2 - a^4*f^3)*log(-I*cos(2*b*x + 2*a) - sin(2*b*x + 2*a) + 1) - 2*(4*a*b^3
*e^3 - 6*a^2*b^2*e^2*f + 4*a^3*b*e*f^2 - a^4*f^3)*log(-cos(2*b*x + 2*a) + I
*sin(2*b*x + 2*a) + I) + 2*(4*a*b^3*e^3 - 6*a^2*b^2*e^2*f + 4*a^3*b*e*f^2 -
 a^4*f^3)*log(-cos(2*b*x + 2*a) - I*sin(2*b*x + 2*a) + I) - (-6*I*b*f^3*x -
 6*I*b*e*f^2)*polylog(4, I*cos(2*b*x + 2*a) + sin(2*b*x + 2*a)) - (-6*I*b*f
^3*x - 6*I*b*e*f^2)*polylog(4, I*cos(2*b*x + 2*a) - sin(2*b*x + 2*a)) - (6*
I*b*f^3*x + 6*I*b*e*f^2)*polylog(4, -I*cos(2*b*x + 2*a) + sin(2*b*x + 2*a))
 - (6*I*b*f^3*x + 6*I*b*e*f^2)*polylog(4, -I*cos(2*b*x + 2*a) - sin(2*b*x +
 2*a)) - 6*(b^2*f^3*x^2 + 2*b^2*e*f^2*x + b^2*e^2*f)*polylog(3, I*cos(2*b*x
 + 2*a) + sin(2*b*x + 2*a)) + 6*(b^2*f^3*x^2 + 2*b^2*e*f^2*x + b^2*e^2*f)*p
olylog(3, I*cos(2*b*x + 2*a) - sin(2*b*x + 2*a)) - 6*(b^2*f^3*x^2 + 2*b^2*e
*f^2*x + b^2*e^2*f)*polylog(3, -I*cos(2*b*x + 2*a) + sin(2*b*x + 2*a)) + 6*
(b^2*f^3*x^2 + 2*b^2*e*f^2*x + b^2*e^2*f)*polylog(3, -I*cos(2*b*x + 2*a) -
sin(2*b*x + 2*a)))/b^4
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \left(fx+e\right)^{3} \operatorname{arcoth}\left(\cot\left(bx+a\right)\right)\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((f*x+e)^3*arccoth(cot(b*x+a)),x, algorithm="giac")
```

```
[Out] integrate((f*x + e)^3*arccoth(cot(b*x + a)), x)
```

**maple [C]** time = 49.15, size = 7429, normalized size = 24.60

output too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((f*x+e)^3*arccoth(cot(b*x+a)),x)
```

```
[Out] result too large to display
```

**maxima [F]** time = 0.00, size = 0, normalized size = 0.00

$$\frac{1}{16}\left(f^3x^4 + 4\,ef^2x^3 + 6\,e^2fx^2 + 4\,e^3x\right)\log\left(2\,\cos\left(2\,bx + 2\,a\right)^2 + 2\,\sin\left(2\,bx + 2\,a\right)^2 + 4\,\sin\left(2\,bx + 2\,a\right) + 2\right) - \frac{1}{16}\left(\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((f*x+e)^3*arccoth(cot(b*x+a)),x, algorithm="maxima")
```

```
[Out] 1/16*(f^3*x^4 + 4*e*f^2*x^3 + 6*e^2*f*x^2 + 4*e^3*x)*log(2*cos(2*b*x + 2*a)
^2 + 2*sin(2*b*x + 2*a)^2 + 4*sin(2*b*x + 2*a) + 2) - 1/16*(f^3*x^4 + 4*e*f
^2*x^3 + 6*e^2*f*x^2 + 4*e^3*x)*log(2*cos(2*b*x + 2*a)^2 + 2*sin(2*b*x + 2*
a)^2 - 4*sin(2*b*x + 2*a) + 2) - integrate(1/2*((b*f^3*x^4 + 4*b*e*f^2*x^3
+ 6*b*e^2*f*x^2 + 4*b*e^3*x)*cos(4*b*x + 4*a)*cos(2*b*x + 2*a) + (b*f^3*x^4
 + 4*b*e*f^2*x^3 + 6*b*e^2*f*x^2 + 4*b*e^3*x)*sin(4*b*x + 4*a)*sin(2*b*x +
2*a) + (b*f^3*x^4 + 4*b*e*f^2*x^3 + 6*b*e^2*f*x^2 + 4*b*e^3*x)*cos(2*b*x +
2*a))/(cos(4*b*x + 4*a)^2 + sin(4*b*x + 4*a)^2 + 2*cos(4*b*x + 4*a) + 1), x
)
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.00

$$\int \mathrm{acoth}\left(\cot\left(a + b\,x\right)\right)\,{\left(e + f\,x\right)}^3 \,d x$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(cot(a + b*x))*(e + f*x)^3,x)
```

```
[Out] int(acoth(cot(a + b*x))*(e + f*x)^3, x)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \left(e + fx\right)^{3} \operatorname{acoth}{\left(\cot{\left(a + bx \right)} \right)}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((f*x+e)**3*acoth(cot(b*x+a)),x)
```

```
[Out] Integral((e + f*x)**3*acoth(cot(a + b*x)), x)
```

# 3.249 $\int (e+fx)^2 \coth^{-1}(\cot(a+bx))\,dx$

**Optimal**. Leaf size=234

$$\frac{if^2\mathrm{Li}_4\left(-ie^{2i(a+bx)}\right)}{8b^3}-\frac{if^2\mathrm{Li}_4\left(ie^{2i(a+bx)}\right)}{8b^3}+\frac{f(e+fx)\mathrm{Li}_3\left(-ie^{2i(a+bx)}\right)}{4b^2}-\frac{f(e+fx)\mathrm{Li}_3\left(ie^{2i(a+bx)}\right)}{4b^2}-\frac{i(e+fx)^2\mathrm{Li}_2\left(-ie\right.}{4b}$$

```
[Out] 1/3*(f*x+e)^3*arccoth(cot(b*x+a))/f+1/3*I*(f*x+e)^3*arctan(exp(2*I*(b*x+a))
)/f-1/4*I*(f*x+e)^2*polylog(2,-I*exp(2*I*(b*x+a)))/b+1/4*I*(f*x+e)^2*polylo
g(2,I*exp(2*I*(b*x+a)))/b+1/4*f*(f*x+e)*polylog(3,-I*exp(2*I*(b*x+a)))/b^2-
1/4*f*(f*x+e)*polylog(3,I*exp(2*I*(b*x+a)))/b^2+1/8*I*f^2*polylog(4,-I*exp(
2*I*(b*x+a)))/b^3-1/8*I*f^2*polylog(4,I*exp(2*I*(b*x+a)))/b^3
```

**Rubi [A]** time = 0.17, antiderivative size = 234, normalized size of antiderivative = 1.00, number of steps used = 10, number of rules used = 6, integrand size = 15, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.400, Rules used = {6254, 4181, 2531, 6609, 2282, 6589}

$$\frac{f(e+fx)\text{PolyLog}\left(3,-ie^{2i(a+bx)}\right)}{4b^2}-\frac{f(e+fx)\text{PolyLog}\left(3,ie^{2i(a+bx)}\right)}{4b^2}+\frac{if^2\text{PolyLog}\left(4,-ie^{2i(a+bx)}\right)}{8b^3}-\frac{if^2\text{PolyLog}}{8}$$

Antiderivative was successfully verified.

```
[In] Int[(e + f*x)^2*ArcCoth[Cot[a + b*x]],x]
```

```
[Out] ((e + f*x)^3*ArcCoth[Cot[a + b*x]])/(3*f) + ((I/3)*(e + f*x)^3*ArcTan[E^((2
*I)*(a + b*x))])/f - ((I/4)*(e + f*x)^2*PolyLog[2, (-I)*E^((2*I)*(a + b*x))
])/b + ((I/4)*(e + f*x)^2*PolyLog[2, I*E^((2*I)*(a + b*x))])/b + (f*(e + f*
x)*PolyLog[3, (-I)*E^((2*I)*(a + b*x))])/(4*b^2) - (f*(e + f*x)*PolyLog[3,
I*E^((2*I)*(a + b*x))])/(4*b^2) + ((I/8)*f^2*PolyLog[4, (-I)*E^((2*I)*(a +
b*x))])/b^3 - ((I/8)*f^2*PolyLog[4, I*E^((2*I)*(a + b*x))])/b^3
```

Rule 2282

```
Int[u_, x_Symbol] :> With[{v = FunctionOfExponential[u, x]}, Dist[v/D[v, x]
, Subst[Int[FunctionOfExponentialFunction[u, x]/x, x], x, v], x]] /; Functi
onOfExponentialQ[u, x] &&  !MatchQ[u, (w_)*((a_.)*(v_)^(n_))^(m_) /; FreeQ[
{a, m, n}, x] && IntegerQ[m*n]] &&  !MatchQ[u, E^((c_.)*((a_.) + (b_.)*x))*
(F_)[v_] /; FreeQ[{a, b, c}, x] && InverseFunctionQ[F[x]]]
```

Rule 2531

```
Int[Log[1 + (e_.)*((F_)^((c_.)*((a_.) + (b_.)*(x_))))^(n_.)]*((f_.) + (g_.)
*(x_))^(m_.), x_Symbol] :> -Simp[((f + g*x)^m*PolyLog[2, -(e*(F^(c*(a + b*x
)))^n)])/(b*c*n*Log[F]), x] + Dist[(g*m)/(b*c*n*Log[F]), Int[(f + g*x)^(m -
 1)*PolyLog[2, -(e*(F^(c*(a + b*x)))^n)], x], x] /; FreeQ[{F, a, b, c, e, f
, g, n}, x] && GtQ[m, 0]
```

Rule 4181

```
Int[csc[(e_.) + Pi*(k_.) + (f_.)*(x_)]*((c_.) + (d_.)*(x_))^(m_.), x_Symbol
] :> Simp[(-2*(c + d*x)^m*ArcTanh[E^(I*k*Pi)*E^(I*(e + f*x))])/f, x] + (-Di
st[(d*m)/f, Int[(c + d*x)^(m - 1)*Log[1 - E^(I*k*Pi)*E^(I*(e + f*x))], x],
x] + Dist[(d*m)/f, Int[(c + d*x)^(m - 1)*Log[1 + E^(I*k*Pi)*E^(I*(e + f*x))
], x], x]) /; FreeQ[{c, d, e, f}, x] && IntegerQ[2*k] && IGtQ[m, 0]
```

Rule 6254

```
Int[ArcCoth[Cot[(a_.) + (b_.)*(x_)]]*((e_.) + (f_.)*(x_))^(m_.), x_Symbol]
:> Simp[((e + f*x)^(m + 1)*ArcCoth[Cot[a + b*x]])/(f*(m + 1)), x] - Dist[b/
(f*(m + 1)), Int[(e + f*x)^(m + 1)*Sec[2*a + 2*b*x], x], x] /; FreeQ[{a, b,
```

```
e, f}, x] && IGtQ[m, 0]
```

Rule 6589

```
Int[PolyLog[n_, (c_.)*((a_.) + (b_.)*(x_))^(p_.)]/((d_.) + (e_.)*(x_)), x_S
ymbol] :> Simp[PolyLog[n + 1, c*(a + b*x)^p]/(e*p), x] /; FreeQ[{a, b, c, d
, e, n, p}, x] && EqQ[b*d, a*e]
```

Rule 6609

```
Int[((e_.) + (f_.)*(x_))^(m_.)*PolyLog[n_, (d_.)*((F_)^((c_.)*((a_.) + (b_.
)*(x_))))^(p_.)], x_Symbol] :> Simp[((e + f*x)^m*PolyLog[n + 1, d*(F^(c*(a
+ b*x)))^p])/(b*c*p*Log[F]), x] - Dist[(f*m)/(b*c*p*Log[F]), Int[(e + f*x)^
(m - 1)*PolyLog[n + 1, d*(F^(c*(a + b*x)))^p], x], x] /; FreeQ[{F, a, b, c,
 d, e, f, n, p}, x] && GtQ[m, 0]
```

Rubi steps

$$\int (e+fx)^2\coth^{-1}(\cot(a+bx))\,dx = \frac{(e+fx)^3\coth^{-1}(\cot(a+bx))}{3f} - \frac{b\int (e+fx)^3\sec(2a+2bx)\,dx}{3f}$$

$$= \frac{(e+fx)^3\coth^{-1}(\cot(a+bx))}{3f} + \frac{i(e+fx)^3\tan^{-1}\left(e^{2i(a+bx)}\right)}{3f} + \frac{1}{2}\int (e+fx)^2$$

$$= \frac{(e+fx)^3\coth^{-1}(\cot(a+bx))}{3f} + \frac{i(e+fx)^3\tan^{-1}\left(e^{2i(a+bx)}\right)}{3f} - \frac{i(e+fx)^2\mathrm{Li}_2}{4b}$$

$$= \frac{(e+fx)^3\coth^{-1}(\cot(a+bx))}{3f} + \frac{i(e+fx)^3\tan^{-1}\left(e^{2i(a+bx)}\right)}{3f} - \frac{i(e+fx)^2\mathrm{Li}_2}{4b}$$

$$= \frac{(e+fx)^3\coth^{-1}(\cot(a+bx))}{3f} + \frac{i(e+fx)^3\tan^{-1}\left(e^{2i(a+bx)}\right)}{3f} - \frac{i(e+fx)^2\mathrm{Li}_2}{4b}$$

$$= \frac{(e+fx)^3\coth^{-1}(\cot(a+bx))}{3f} + \frac{i(e+fx)^3\tan^{-1}\left(e^{2i(a+bx)}\right)}{3f} - \frac{i(e+fx)^2\mathrm{Li}_2}{4b}$$

**Mathematica [A]** time = 0.20, size = 409, normalized size = 1.75

$$\frac{1}{3}x\left(3e^2+3efx+f^2x^2\right)\coth^{-1}(\cot(a+bx)) + \frac{-12b^3e^2x\log\left(1-ie^{2i(a+bx)}\right)+12b^3e^2x\log\left(1+ie^{2i(a+bx)}\right)-12b^3efx^2}{}$$

Antiderivative was successfully verified.

```
[In] Integrate[(e + f*x)^2*ArcCoth[Cot[a + b*x]],x]
```

```
[Out] (x*(3*e^2 + 3*e*f*x + f^2*x^2)*ArcCoth[Cot[a + b*x]])/3 + (-12*b^3*e^2*x*Lo
g[1 - I*E^((2*I)*(a + b*x))] - 12*b^3*e*f*x^2*Log[1 - I*E^((2*I)*(a + b*x))
] - 4*b^3*f^2*x^3*Log[1 - I*E^((2*I)*(a + b*x))] + 12*b^3*e^2*x*Log[1 + I*E
^((2*I)*(a + b*x))] + 12*b^3*e*f*x^2*Log[1 + I*E^((2*I)*(a + b*x))] + 4*b^3
*f^2*x^3*Log[1 + I*E^((2*I)*(a + b*x))] - (6*I)*b^2*(e + f*x)^2*PolyLog[2,
(-I)*E^((2*I)*(a + b*x))] + (6*I)*b^2*(e + f*x)^2*PolyLog[2, I*E^((2*I)*(a
+ b*x))] + 6*b*e*f*PolyLog[3, (-I)*E^((2*I)*(a + b*x))] + 6*b*f^2*x*PolyLog
[3, (-I)*E^((2*I)*(a + b*x))] - 6*b*e*f*PolyLog[3, I*E^((2*I)*(a + b*x))] -
 6*b*f^2*x*PolyLog[3, I*E^((2*I)*(a + b*x))] + (3*I)*f^2*PolyLog[4, (-I)*E^
((2*I)*(a + b*x))] - (3*I)*f^2*PolyLog[4, I*E^((2*I)*(a + b*x))])/(24*b^3)
```

**fricas [C]** time = 0.72, size = 1080, normalized size = 4.62

result too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((f*x+e)^2*arccoth(cot(b*x+a)),x, algorithm="fricas")
```

```
[Out] 1/48*(-3*I*f^2*polylog(4, I*cos(2*b*x + 2*a) + sin(2*b*x + 2*a)) - 3*I*f^2*
polylog(4, I*cos(2*b*x + 2*a) - sin(2*b*x + 2*a)) + 3*I*f^2*polylog(4, -I*c
os(2*b*x + 2*a) + sin(2*b*x + 2*a)) + 3*I*f^2*polylog(4, -I*cos(2*b*x + 2*a
) - sin(2*b*x + 2*a)) + (6*I*b^2*f^2*x^2 + 12*I*b^2*e*f*x + 6*I*b^2*e^2)*di
log(I*cos(2*b*x + 2*a) + sin(2*b*x + 2*a)) + (6*I*b^2*f^2*x^2 + 12*I*b^2*e*
f*x + 6*I*b^2*e^2)*dilog(I*cos(2*b*x + 2*a) - sin(2*b*x + 2*a)) + (-6*I*b^2
*f^2*x^2 - 12*I*b^2*e*f*x - 6*I*b^2*e^2)*dilog(-I*cos(2*b*x + 2*a) + sin(2*
b*x + 2*a)) + (-6*I*b^2*f^2*x^2 - 12*I*b^2*e*f*x - 6*I*b^2*e^2)*dilog(-I*co
s(2*b*x + 2*a) - sin(2*b*x + 2*a)) + 8*(b^3*f^2*x^3 + 3*b^3*e*f*x^2 + 3*b^3
*e^2*x)*log((cos(2*b*x + 2*a) + sin(2*b*x + 2*a) + 1)/(cos(2*b*x + 2*a) - s
in(2*b*x + 2*a) + 1)) + 4*(3*a*b^2*e^2 - 3*a^2*b*e*f + a^3*f^2)*log(cos(2*b
*x + 2*a) + I*sin(2*b*x + 2*a) + I) - 4*(3*a*b^2*e^2 - 3*a^2*b*e*f + a^3*f^
2)*log(cos(2*b*x + 2*a) - I*sin(2*b*x + 2*a) + I) - 4*(b^3*f^2*x^3 + 3*b^3*
e*f*x^2 + 3*b^3*e^2*x + 3*a*b^2*e^2 - 3*a^2*b*e*f + a^3*f^2)*log(I*cos(2*b*
x + 2*a) + sin(2*b*x + 2*a) + 1) + 4*(b^3*f^2*x^3 + 3*b^3*e*f*x^2 + 3*b^3*e
^2*x + 3*a*b^2*e^2 - 3*a^2*b*e*f + a^3*f^2)*log(I*cos(2*b*x + 2*a) - sin(2*
b*x + 2*a) + 1) - 4*(b^3*f^2*x^3 + 3*b^3*e*f*x^2 + 3*b^3*e^2*x + 3*a*b^2*e^
2 - 3*a^2*b*e*f + a^3*f^2)*log(-I*cos(2*b*x + 2*a) + sin(2*b*x + 2*a) + 1)
+ 4*(b^3*f^2*x^3 + 3*b^3*e*f*x^2 + 3*b^3*e^2*x + 3*a*b^2*e^2 - 3*a^2*b*e*f
+ a^3*f^2)*log(-I*cos(2*b*x + 2*a) - sin(2*b*x + 2*a) + 1) + 4*(3*a*b^2*e^2
 - 3*a^2*b*e*f + a^3*f^2)*log(-cos(2*b*x + 2*a) + I*sin(2*b*x + 2*a) + I) -
 4*(3*a*b^2*e^2 - 3*a^2*b*e*f + a^3*f^2)*log(-cos(2*b*x + 2*a) - I*sin(2*b*
x + 2*a) + I) + 6*(b*f^2*x + b*e*f)*polylog(3, I*cos(2*b*x + 2*a) + sin(2*b
*x + 2*a)) - 6*(b*f^2*x + b*e*f)*polylog(3, I*cos(2*b*x + 2*a) - sin(2*b*x
+ 2*a)) + 6*(b*f^2*x + b*e*f)*polylog(3, -I*cos(2*b*x + 2*a) + sin(2*b*x +
2*a)) - 6*(b*f^2*x + b*e*f)*polylog(3, -I*cos(2*b*x + 2*a) - sin(2*b*x + 2*
a)))/b^3
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int (fx+e)^2 \operatorname{arcoth}(\cot(bx+a))\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((f*x+e)^2*arccoth(cot(b*x+a)),x, algorithm="giac")
```

```
[Out] integrate((f*x + e)^2*arccoth(cot(b*x + a)), x)
```

**maple [C]** time = 40.20, size = 5543, normalized size = 23.69

output too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((f*x+e)^2*arccoth(cot(b*x+a)),x)
```

```
[Out] result too large to display
```

**maxima [F]** time = 0.00, size = 0, normalized size = 0.00

$$\frac{1}{12}\left(f^2x^3 + 3efx^2 + 3e^2x\right)\log\left(2\cos(2bx+2a)^2 + 2\sin(2bx+2a)^2 + 4\sin(2bx+2a) + 2\right) - \frac{1}{12}\left(f^2x^3 + 3\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((f*x+e)^2*arccoth(cot(b*x+a)),x, algorithm="maxima")
```

```
[Out] 1/12*(f^2*x^3 + 3*e*f*x^2 + 3*e^2*x)*log(2*cos(2*b*x + 2*a)^2 + 2*sin(2*b*x
 + 2*a)^2 + 4*sin(2*b*x + 2*a) + 2) - 1/12*(f^2*x^3 + 3*e*f*x^2 + 3*e^2*x)*
log(2*cos(2*b*x + 2*a)^2 + 2*sin(2*b*x + 2*a)^2 - 4*sin(2*b*x + 2*a) + 2) -
 integrate(2/3*((b*f^2*x^3 + 3*b*e*f*x^2 + 3*b*e^2*x)*cos(4*b*x + 4*a)*cos(
2*b*x + 2*a) + (b*f^2*x^3 + 3*b*e*f*x^2 + 3*b*e^2*x)*sin(4*b*x + 4*a)*sin(2
*b*x + 2*a) + (b*f^2*x^3 + 3*b*e*f*x^2 + 3*b*e^2*x)*cos(2*b*x + 2*a))/(cos(
4*b*x + 4*a)^2 + sin(4*b*x + 4*a)^2 + 2*cos(4*b*x + 4*a) + 1), x)
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.00

$$\int \mathrm{acoth}\left(\cot\left(a+b\,x\right)\right)\,{\left(e+f\,x\right)}^2 \,d x$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(cot(a + b*x))*(e + f*x)^2,x)
```

```
[Out] int(acoth(cot(a + b*x))*(e + f*x)^2, x)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \left(e + f x\right)^{2} \operatorname{acoth}{\left(\cot{\left(a + b x \right)} \right)}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((f*x+e)**2*acoth(cot(b*x+a)),x)
```

```
[Out] Integral((e + f*x)**2*acoth(cot(a + b*x)), x)
```

## 3.250 $\int (e+fx)\coth^{-1}(\cot(a+bx))\,dx$

**Optimal**. Leaf size=162

$$\frac{f\text{Li}_3\left(-ie^{2i(a+bx)}\right)}{8b^2}-\frac{f\text{Li}_3\left(ie^{2i(a+bx)}\right)}{8b^2}-\frac{i(e+fx)\text{Li}_2\left(-ie^{2i(a+bx)}\right)}{4b}+\frac{i(e+fx)\text{Li}_2\left(ie^{2i(a+bx)}\right)}{4b}+\frac{i(e+fx)^2\tan^{-1}\left(e^{2i(a+\right.}}{2f}$$

```
[Out] 1/2*(f*x+e)^2*arccoth(cot(b*x+a))/f+1/2*I*(f*x+e)^2*arctan(exp(2*I*(b*x+a))
)/f-1/4*I*(f*x+e)*polylog(2,-I*exp(2*I*(b*x+a)))/b+1/4*I*(f*x+e)*polylog(2,
I*exp(2*I*(b*x+a)))/b+1/8*f*polylog(3,-I*exp(2*I*(b*x+a)))/b^2-1/8*f*polylo
g(3,I*exp(2*I*(b*x+a)))/b^2
```

**Rubi** [A] time = 0.11, antiderivative size = 162, normalized size of antiderivative = 1.00, number of steps used = 8, number of rules used = 5, integrand size = 13, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.385, Rules used = {6254, 4181, 2531, 2282, 6589}

$$\frac{f\text{PolyLog}\left(3,-ie^{2i(a+bx)}\right)}{8b^2}-\frac{f\text{PolyLog}\left(3,ie^{2i(a+bx)}\right)}{8b^2}-\frac{i(e+fx)\text{PolyLog}\left(2,-ie^{2i(a+bx)}\right)}{4b}+\frac{i(e+fx)\text{PolyLog}\left(2,ie\right.}{4b}$$

Antiderivative was successfully verified.

```
[In] Int[(e + f*x)*ArcCoth[Cot[a + b*x]],x]
```

```
[Out] ((e + f*x)^2*ArcCoth[Cot[a + b*x]])/(2*f) + ((I/2)*(e + f*x)^2*ArcTan[E^((2
*I)*(a + b*x))])/f - ((I/4)*(e + f*x)*PolyLog[2, (-I)*E^((2*I)*(a + b*x))])
/b + ((I/4)*(e + f*x)*PolyLog[2, I*E^((2*I)*(a + b*x))])/b + (f*PolyLog[3,
(-I)*E^((2*I)*(a + b*x))])/(8*b^2) - (f*PolyLog[3, I*E^((2*I)*(a + b*x))])/
(8*b^2)
```

Rule 2282

```
Int[u_, x_Symbol] :> With[{v = FunctionOfExponential[u, x]}, Dist[v/D[v, x]
, Subst[Int[FunctionOfExponentialFunction[u, x]/x, x], x, v], x]] /; Functi
onOfExponentialQ[u, x] && !MatchQ[u, (w_)*((a_.)*(v_)^(n_))^(m_) /; FreeQ[
{a, m, n}, x] && IntegerQ[m*n]] && !MatchQ[u, E^((c_.)*((a_.) + (b_.)*x))*
(F_)[v_] /; FreeQ[{a, b, c}, x] && InverseFunctionQ[F[x]]]
```

Rule 2531

```
Int[Log[1 + (e_.)*((F_)^((c_.)*((a_.) + (b_.)*(x_))))^(n_.)]*((f_.) + (g_.)
*(x_))^(m_.), x_Symbol] :> -Simp[((f + g*x)^m*PolyLog[2, -(e*(F^(c*(a + b*x
)))^n)])/(b*c*n*Log[F]), x] + Dist[(g*m)/(b*c*n*Log[F]), Int[(f + g*x)^(m -
 1)*PolyLog[2, -(e*(F^(c*(a + b*x)))^n)], x], x] /; FreeQ[{F, a, b, c, e, f
, g, n}, x] && GtQ[m, 0]
```

Rule 4181

```
Int[csc[(e_.) + Pi*(k_.) + (f_.)*(x_)]*((c_.) + (d_.)*(x_))^(m_.), x_Symbol
] :> Simp[(-2*(c + d*x)^m*ArcTanh[E^(I*k*Pi)*E^(I*(e + f*x))])/f, x] + (-Di
st[(d*m)/f, Int[(c + d*x)^(m - 1)*Log[1 - E^(I*k*Pi)*E^(I*(e + f*x))], x],
x] + Dist[(d*m)/f, Int[(c + d*x)^(m - 1)*Log[1 + E^(I*k*Pi)*E^(I*(e + f*x))
], x], x]) /; FreeQ[{c, d, e, f}, x] && IntegerQ[2*k] && IGtQ[m, 0]
```

Rule 6254

```
Int[ArcCoth[Cot[(a_.) + (b_.)*(x_)]]*((e_.) + (f_.)*(x_))^(m_.), x_Symbol]
:> Simp[((e + f*x)^(m + 1)*ArcCoth[Cot[a + b*x]])/(f*(m + 1)), x] - Dist[b/
(f*(m + 1)), Int[(e + f*x)^(m + 1)*Sec[2*a + 2*b*x], x], x] /; FreeQ[{a, b,
 e, f}, x] && IGtQ[m, 0]
```

Rule 6589

```
Int[PolyLog[n_, (c_.)*((a_.) + (b_.)*(x_))^(p_.)]/((d_.) + (e_.)*(x_)), x_S
ymbol] :> Simp[PolyLog[n + 1, c*(a + b*x)^p]/(e*p), x] /; FreeQ[{a, b, c, d
, e, n, p}, x] && EqQ[b*d, a*e]
```

Rubi steps

$$\int (e+fx)\coth^{-1}(\cot(a+bx))\,dx = \frac{(e+fx)^2\coth^{-1}(\cot(a+bx))}{2f} - \frac{b\int (e+fx)^2\sec(2a+2bx)\,dx}{2f}$$
$$= \frac{(e+fx)^2\coth^{-1}(\cot(a+bx))}{2f} + \frac{i(e+fx)^2\tan^{-1}\left(e^{2i(a+bx)}\right)}{2f} + \frac{1}{2}\int (e+fx)\,\mathrm{l}$$
$$= \frac{(e+fx)^2\coth^{-1}(\cot(a+bx))}{2f} + \frac{i(e+fx)^2\tan^{-1}\left(e^{2i(a+bx)}\right)}{2f} - \frac{i(e+fx)\mathrm{Li}_2\left(-\right.}{4b}$$
$$= \frac{(e+fx)^2\coth^{-1}(\cot(a+bx))}{2f} + \frac{i(e+fx)^2\tan^{-1}\left(e^{2i(a+bx)}\right)}{2f} - \frac{i(e+fx)\mathrm{Li}_2\left(-\right.}{4b}$$
$$= \frac{(e+fx)^2\coth^{-1}(\cot(a+bx))}{2f} + \frac{i(e+fx)^2\tan^{-1}\left(e^{2i(a+bx)}\right)}{2f} - \frac{i(e+fx)\mathrm{Li}_2\left(-\right.}{4b}$$

**Mathematica [A]** time = 0.12, size = 263, normalized size = 1.62

$$-be\left(\frac{i\mathrm{Li}_2\left(-ie^{i(2a+2bx)}\right)}{4b^2} - \frac{i\mathrm{Li}_2\left(ie^{i(2a+2bx)}\right)}{4b^2} - \frac{ix\tan^{-1}\left(e^{2ia+2ibx}\right)}{b}\right) + \frac{f\left(4ib^2x^2\tan^{-1}(\cos(2(a+bx))+i\sin(2(a+bx)\right.}{}$$

Warning: Unable to verify antiderivative.

```
[In] Integrate[(e + f*x)*ArcCoth[Cot[a + b*x]],x]
```

```
[Out] e*x*ArcCoth[Cot[a + b*x]] + (f*x^2*ArcCoth[Cot[a + b*x]])/2 - b*e*(((-I)*x*
ArcTan[E^((2*I)*a + (2*I)*b*x)])/b + ((I/4)*PolyLog[2, (-I)*E^(I*(2*a + 2*b
*x))])/b^2 - ((I/4)*PolyLog[2, I*E^(I*(2*a + 2*b*x))])/b^2) + (f*((4*I)*b^2
*x^2*ArcTan[Cos[2*(a + b*x)] + I*Sin[2*(a + b*x)]] + (2*I)*b*x*PolyLog[2, I
*Cos[2*(a + b*x)] - Sin[2*(a + b*x)]] - (2*I)*b*x*PolyLog[2, (-I)*Cos[2*(a
+ b*x)] + Sin[2*(a + b*x)]] - PolyLog[3, I*Cos[2*(a + b*x)] - Sin[2*(a + b*
x)]] + PolyLog[3, (-I)*Cos[2*(a + b*x)] + Sin[2*(a + b*x)]]))/(8*b^2)
```

**fricas [C]** time = 0.56, size = 676, normalized size = 4.17

$$\frac{\left(2i\,bfx+2i\,be\right)\mathrm{Li}_2\left(i\,\cos\left(2\,bx+2\,a\right)+\sin\left(2\,bx+2\,a\right)\right)+\left(2i\,bfx+2i\,be\right)\mathrm{Li}_2\left(i\,\cos\left(2\,bx+2\,a\right)-\sin\left(2\,bx+2\,a\right)\right)}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((f*x+e)*arccoth(cot(b*x+a)),x, algorithm="fricas")
```

```
[Out] 1/16*((2*I*b*f*x + 2*I*b*e)*dilog(I*cos(2*b*x + 2*a) + sin(2*b*x + 2*a)) +
(2*I*b*f*x + 2*I*b*e)*dilog(I*cos(2*b*x + 2*a) - sin(2*b*x + 2*a)) + (-2*I*
b*f*x - 2*I*b*e)*dilog(-I*cos(2*b*x + 2*a) + sin(2*b*x + 2*a)) + (-2*I*b*f*
x - 2*I*b*e)*dilog(-I*cos(2*b*x + 2*a) - sin(2*b*x + 2*a)) + 4*(b^2*f*x^2 +
 2*b^2*e*x)*log((cos(2*b*x + 2*a) + sin(2*b*x + 2*a) + 1)/(cos(2*b*x + 2*a)
 - sin(2*b*x + 2*a) + 1)) + 2*(2*a*b*e - a^2*f)*log(cos(2*b*x + 2*a) + I*si
n(2*b*x + 2*a) + I) - 2*(2*a*b*e - a^2*f)*log(cos(2*b*x + 2*a) - I*sin(2*b*
x + 2*a) + I) - 2*(b^2*f*x^2 + 2*b^2*e*x + 2*a*b*e - a^2*f)*log(I*cos(2*b*x
 + 2*a) + sin(2*b*x + 2*a) + 1) + 2*(b^2*f*x^2 + 2*b^2*e*x + 2*a*b*e - a^2*
```

```
f)*log(I*cos(2*b*x + 2*a) - sin(2*b*x + 2*a) + 1) - 2*(b^2*f*x^2 + 2*b^2*e*
x + 2*a*b*e - a^2*f)*log(-I*cos(2*b*x + 2*a) + sin(2*b*x + 2*a) + 1) + 2*(b
^2*f*x^2 + 2*b^2*e*x + 2*a*b*e - a^2*f)*log(-I*cos(2*b*x + 2*a) - sin(2*b*x
 + 2*a) + 1) + 2*(2*a*b*e - a^2*f)*log(-cos(2*b*x + 2*a) + I*sin(2*b*x + 2*
a) + I) - 2*(2*a*b*e - a^2*f)*log(-cos(2*b*x + 2*a) - I*sin(2*b*x + 2*a) +
I) + f*polylog(3, I*cos(2*b*x + 2*a) + sin(2*b*x + 2*a)) - f*polylog(3, I*c
os(2*b*x + 2*a) - sin(2*b*x + 2*a)) + f*polylog(3, -I*cos(2*b*x + 2*a) + si
n(2*b*x + 2*a)) - f*polylog(3, -I*cos(2*b*x + 2*a) - sin(2*b*x + 2*a)))/b^2
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int (fx + e) \operatorname{arcoth}(\cot(bx + a)) \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((f*x+e)*arccoth(cot(b*x+a)),x, algorithm="giac")
```

```
[Out] integrate((f*x + e)*arccoth(cot(b*x + a)), x)
```

**maple [C]** time = 4.35, size = 2543, normalized size = 15.70

Expression too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((f*x+e)*arccoth(cot(b*x+a)),x)
```

```
[Out] -1/4*I*Pi*x*e*csgn(I*(exp(2*I*(b*x+a))+I)/(exp(2*I*(b*x+a))-1))^3+1/4/b^2*f
*(I*b*x+I*a)^2*ln(1-I*exp(2*I*(b*x+a)))+1/4/b^2*f*(I*b*x+I*a)*polylog(2,I*e
xp(2*I*(b*x+a)))-1/4*ln(exp(2*I*(b*x+a))-I)*x^2*f-1/2*ln(exp(2*I*(b*x+a))-I
)*x*e+1/8*f*polylog(3,-I*exp(2*I*(b*x+a)))/b^2-1/8*f*polylog(3,I*exp(2*I*(b
*x+a)))/b^2-1/2*I/b*e*dilog(1+exp(I*(b*x+a))*(-1)^(3/4))-1/2*I/b*e*dilog(1-
exp(I*(b*x+a))*(-1)^(3/4))+1/4*I*Pi*x*e*csgn(I*(exp(2*I*(b*x+a))-I)/(exp(2*
I*(b*x+a))-1))^3+1/8*I*Pi*f*csgn(I*(exp(2*I*(b*x+a))+I))*csgn(I*(exp(2*I*(b
*x+a))+I)/(exp(2*I*(b*x+a))-1))^2*x^2+1/8*I*Pi*f*csgn(I/(exp(2*I*(b*x+a))-1
))*csgn(I*(exp(2*I*(b*x+a))+I)/(exp(2*I*(b*x+a))-1))^2*x^2+1/4*I*Pi*x*e*csg
n(I*(exp(2*I*(b*x+a))+I))*csgn(I*(exp(2*I*(b*x+a))+I)/(exp(2*I*(b*x+a))-1))
^2+1/2*I/b*e*dilog(((-I)^(1/2)-exp(I*(b*x+a)))/(-I)^(1/2))+1/2*I/b*e*dilog(
((-I)^(1/2)+exp(I*(b*x+a)))/(-I)^(1/2))-1/2/b*a*e*ln(-exp(2*I*(b*x+a))+I)+1
/2/b*a*e*ln(exp(2*I*(b*x+a))+I)-1/4/b^2*a^2*f*ln(exp(2*I*(b*x+a))+I)-1/4/b^
2*f*(I*b*x+I*a)^2*ln(1+I*exp(2*I*(b*x+a)))-1/4/b^2*f*(I*b*x+I*a)*polylog(2,
-I*exp(2*I*(b*x+a)))-1/8*I*Pi*f*csgn(I*(exp(2*I*(b*x+a))+I)/(exp(2*I*(b*x+a
))-1))^3*x^2+(1/4*f*x^2+1/2*e*x)*ln(exp(2*I*(b*x+a))+I)+1/4*I*Pi*x*e*csgn(I
/(exp(2*I*(b*x+a))-1))*csgn(I*(exp(2*I*(b*x+a))+I)/(exp(2*I*(b*x+a))-1))^2+
1/4*I*Pi*x*e*csgn(I*(exp(2*I*(b*x+a))+I)/(exp(2*I*(b*x+a))-1))*csgn((1-I)*(
exp(2*I*(b*x+a))+I)/(exp(2*I*(b*x+a))-1))^2+1/8*I*Pi*f*csgn(I*(exp(2*I*(b*x
+a))+I)/(exp(2*I*(b*x+a))-1))*csgn((1-I)*(exp(2*I*(b*x+a))+I)/(exp(2*I*(b*x
+a))-1))^2*x^2+1/4/b^2*a^2*f*ln(-exp(2*I*(b*x+a))+I)-1/8*I*Pi*f*csgn((1-I)*
(exp(2*I*(b*x+a))+I)/(exp(2*I*(b*x+a))-1))^2*x^2-1/4*I*Pi*x*e*csgn((1-I)*(e
xp(2*I*(b*x+a))+I)/(exp(2*I*(b*x+a))-1))^2+1/4*I*Pi*x*e*csgn((1+I)*(exp(2*I
*(b*x+a))-I)/(exp(2*I*(b*x+a))-1))^2-1/4*I*Pi*x*e*csgn(I*(exp(2*I*(b*x+a))+
I)/(exp(2*I*(b*x+a))-1))*csgn((1-I)*(exp(2*I*(b*x+a))+I)/(exp(2*I*(b*x+a))-
1))-1/4*I*Pi*x*e*csgn(I*(exp(2*I*(b*x+a))+I))*csgn(I/(exp(2*I*(b*x+a))-1))*
csgn(I*(exp(2*I*(b*x+a))+I)/(exp(2*I*(b*x+a))-1))-1/8*I*Pi*f*csgn(I*(exp(2*
I*(b*x+a))+I)/(exp(2*I*(b*x+a))-1))*csgn((1-I)*(exp(2*I*(b*x+a))+I)/(exp(2*
I*(b*x+a))-1))*x^2-1/8*I*Pi*f*csgn(I*(exp(2*I*(b*x+a))+I))*csgn(I/(exp(2*I*
(b*x+a))-1))*csgn(I*(exp(2*I*(b*x+a))+I)/(exp(2*I*(b*x+a))-1))*x^2+1/4*I*Pi
*x*e*csgn(I*(exp(2*I*(b*x+a))-I))*csgn(I/(exp(2*I*(b*x+a))-1))*csgn(I*(exp(
2*I*(b*x+a))-I)/(exp(2*I*(b*x+a))-1))+1/8*I*Pi*f*csgn(I*(exp(2*I*(b*x+a))-I
))*csgn(I/(exp(2*I*(b*x+a))-1))*csgn(I*(exp(2*I*(b*x+a))-I)/(exp(2*I*(b*x+a
))-1))*x^2+1/4*I*Pi*x*e*csgn(I*(exp(2*I*(b*x+a))-I)/(exp(2*I*(b*x+a))-1))*c
```

```
sgn((1+I)*(exp(2*I*(b*x+a))-I)/(exp(2*I*(b*x+a))-1))+1/8*I*Pi*f*csgn(I*(exp
(2*I*(b*x+a))-I)/(exp(2*I*(b*x+a))-1))*csgn((1+I)*(exp(2*I*(b*x+a))-I)/(exp
(2*I*(b*x+a))-1))*x^2-1/4*I*Pi*x*e*csgn(I*(exp(2*I*(b*x+a))-I))*csgn(I*(exp
(2*I*(b*x+a))-I)/(exp(2*I*(b*x+a))-1))^2-1/8*I*Pi*f*csgn(I*(exp(2*I*(b*x+a)
)-I))*csgn(I*(exp(2*I*(b*x+a))-I)/(exp(2*I*(b*x+a))-1))^2*x^2-1/4*I*Pi*x*e*
csgn(I*(exp(2*I*(b*x+a))-I)/(exp(2*I*(b*x+a))-1))*csgn((1+I)*(exp(2*I*(b*x+
a))-I)/(exp(2*I*(b*x+a))-1))^2-1/8*I*Pi*f*csgn(I*(exp(2*I*(b*x+a))-I)/(exp(
2*I*(b*x+a))-1))*csgn((1+I)*(exp(2*I*(b*x+a))-I)/(exp(2*I*(b*x+a))-1))^2*x^
2+1/2*I/b^2*f*a*(I*b*x+I*a)*ln(1+exp(I*(b*x+a))*(-1)^(3/4))+1/2*I/b^2*f*a*(
I*b*x+I*a)*ln(1-exp(I*(b*x+a))*(-1)^(3/4))+1/2*I/b*e*(I*b*x+I*a)*ln(((-I)^(
1/2)+exp(I*(b*x+a)))/(-I)^(1/2))+1/2*I/b^2*f*a*dilog(1-exp(I*(b*x+a))*(-1)^
(3/4))+1/2*I/b*e*(I*b*x+I*a)*ln(((-I)^(1/2)-exp(I*(b*x+a)))/(-I)^(1/2))+1/4
*I*Pi*x*e*csgn((1-I)*(exp(2*I*(b*x+a))+I)/(exp(2*I*(b*x+a))-1))^3+1/8*I*Pi*
f*csgn((1-I)*(exp(2*I*(b*x+a))+I)/(exp(2*I*(b*x+a))-1))^3*x^2+1/8*I*Pi*f*cs
gn(I*(exp(2*I*(b*x+a))-I)/(exp(2*I*(b*x+a))-1))^3*x^2+1/2*I/b^2*f*a*dilog(1
+exp(I*(b*x+a))*(-1)^(3/4))-1/2*I/b^2*f*a*dilog(((-I)^(1/2)+exp(I*(b*x+a)))
/(-I)^(1/2))-1/4*I*Pi*x*e*csgn((1+I)*(exp(2*I*(b*x+a))-I)/(exp(2*I*(b*x+a))
-1))^3-1/8*I*Pi*f*csgn((1+I)*(exp(2*I*(b*x+a))-I)/(exp(2*I*(b*x+a))-1))^3*x
^2+1/8*I*Pi*f*csgn((1+I)*(exp(2*I*(b*x+a))-I)/(exp(2*I*(b*x+a))-1))^2*x^2-1
/2*I/b^2*f*a*(I*b*x+I*a)*ln(((-I)^(1/2)-exp(I*(b*x+a)))/(-I)^(1/2))-1/2*I/b
^2*f*a*(I*b*x+I*a)*ln(((-I)^(1/2)+exp(I*(b*x+a)))/(-I)^(1/2))-1/8*I*Pi*f*x^
2-1/4*I*Pi*x*e-1/2*I/b^2*f*a*dilog(((-I)^(1/2)-exp(I*(b*x+a)))/(-I)^(1/2))-
1/2*I/b*e*(I*b*x+I*a)*ln(1+exp(I*(b*x+a))*(-1)^(3/4))-1/2*I/b*e*(I*b*x+I*a)
*ln(1-exp(I*(b*x+a))*(-1)^(3/4))-1/8*I*Pi*f*csgn(I/(exp(2*I*(b*x+a))-1))*cs
gn(I*(exp(2*I*(b*x+a))-I)/(exp(2*I*(b*x+a))-1))^2*x^2-1/4*I*Pi*x*e*csgn(I/(
exp(2*I*(b*x+a))-1))*csgn(I*(exp(2*I*(b*x+a))-I)/(exp(2*I*(b*x+a))-1))^2
```

**maxima [F]** time = 0.00, size = 0, normalized size = 0.00

$$\frac{1}{8}\left(fx^2+2\,ex\right)\log\left(2\,\cos\left(2\,bx+2\,a\right)^2+2\,\sin\left(2\,bx+2\,a\right)^2+4\,\sin\left(2\,bx+2\,a\right)+2\right)-\frac{1}{8}\left(fx^2+2\,ex\right)\log\left(2\,\cos\left(2\right.\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((f*x+e)*arccoth(cot(b*x+a)),x, algorithm="maxima")
```

```
[Out] 1/8*(f*x^2 + 2*e*x)*log(2*cos(2*b*x + 2*a)^2 + 2*sin(2*b*x + 2*a)^2 + 4*sin
(2*b*x + 2*a) + 2) - 1/8*(f*x^2 + 2*e*x)*log(2*cos(2*b*x + 2*a)^2 + 2*sin(2
*b*x + 2*a)^2 - 4*sin(2*b*x + 2*a) + 2) - integrate(((b*f*x^2 + 2*b*e*x)*co
s(4*b*x + 4*a)*cos(2*b*x + 2*a) + (b*f*x^2 + 2*b*e*x)*sin(4*b*x + 4*a)*sin(
2*b*x + 2*a) + (b*f*x^2 + 2*b*e*x)*cos(2*b*x + 2*a))/(cos(4*b*x + 4*a)^2 +
sin(4*b*x + 4*a)^2 + 2*cos(4*b*x + 4*a) + 1), x)
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.01

$$\int \mathrm{acoth}\left(\cot\left(a+b\,x\right)\right)\,\left(e+f\,x\right) \,d x$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(cot(a + b*x))*(e + f*x),x)
```

```
[Out] int(acoth(cot(a + b*x))*(e + f*x), x)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \left(e + f x\right) \operatorname{acoth}{\left(\cot{\left(a + b x \right)} \right)}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((f*x+e)*acoth(cot(b*x+a)),x)
```

```
[Out] Integral((e + f*x)*acoth(cot(a + b*x)), x)
```

# 3.251 $\int \coth^{-1}(\cot(a+bx))\,dx$

**Optimal**. Leaf size=79

$$-\frac{i\text{Li}_2\left(-ie^{2i(a+bx)}\right)}{4b}+\frac{i\text{Li}_2\left(ie^{2i(a+bx)}\right)}{4b}+ix\tan^{-1}\left(e^{2i(a+bx)}\right)+x\coth^{-1}(\cot(a+bx))$$

```
[Out] x*arccoth(cot(b*x+a))+I*x*arctan(exp(2*I*(b*x+a)))-1/4*I*polylog(2,-I*exp(2
*I*(b*x+a)))/b+1/4*I*polylog(2,I*exp(2*I*(b*x+a)))/b
```

**Rubi** [A] time = 0.05, antiderivative size = 79, normalized size of antiderivative = 1.00, number of steps used = 6, number of rules used = 4, integrand size = 7, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.571, Rules used = {6250, 4181, 2279, 2391}

$$-\frac{i\text{PolyLog}\left(2,-ie^{2i(a+bx)}\right)}{4b}+\frac{i\text{PolyLog}\left(2,ie^{2i(a+bx)}\right)}{4b}+ix\tan^{-1}\left(e^{2i(a+bx)}\right)+x\coth^{-1}(\cot(a+bx))$$

Antiderivative was successfully verified.

```
[In] Int[ArcCoth[Cot[a + b*x]],x]
```

```
[Out] x*ArcCoth[Cot[a + b*x]] + I*x*ArcTan[E^((2*I)*(a + b*x))] - ((I/4)*PolyLog[
2, (-I)*E^((2*I)*(a + b*x))])/b + ((I/4)*PolyLog[2, I*E^((2*I)*(a + b*x))])
/b
```

Rule 2279

```
Int[Log[(a_) + (b_.)*((F_)^((e_.)*((c_.) + (d_.)*(x_))))^(n_.)], x_Symbol]
:> Dist[1/(d*e*n*Log[F]), Subst[Int[Log[a + b*x]/x, x], x, (F^(e*(c + d*x))
)^n], x] /; FreeQ[{F, a, b, c, d, e, n}, x] && GtQ[a, 0]
```

Rule 2391

```
Int[Log[(c_.)*((d_) + (e_.)*(x_)^(n_.))]/(x_), x_Symbol] :> -Simp[PolyLog[2
, -(c*e*x^n)]/n, x] /; FreeQ[{c, d, e, n}, x] && EqQ[c*d, 1]
```

Rule 4181

```
Int[csc[(e_.) + Pi*(k_.) + (f_.)*(x_)]*((c_.) + (d_.)*(x_))^(m_.), x_Symbol
] :> Simp[(-2*(c + d*x)^m*ArcTanh[E^(I*k*Pi)*E^(I*(e + f*x))])/f, x] + (-Di
st[(d*m)/f, Int[(c + d*x)^(m - 1)*Log[1 - E^(I*k*Pi)*E^(I*(e + f*x))], x],
x] + Dist[(d*m)/f, Int[(c + d*x)^(m - 1)*Log[1 + E^(I*k*Pi)*E^(I*(e + f*x))
], x], x]) /; FreeQ[{c, d, e, f}, x] && IntegerQ[2*k] && IGtQ[m, 0]
```

Rule 6250

```
Int[ArcCoth[Cot[(a_.) + (b_.)*(x_)]], x_Symbol] :> Simp[x*ArcCoth[Cot[a + b
*x]], x] - Dist[b, Int[x*Sec[2*a + 2*b*x], x], x] /; FreeQ[{a, b}, x]
```

Rubi steps

$$\begin{aligned}\int \coth^{-1}(\cot(a+bx))\,dx &= x\coth^{-1}(\cot(a+bx))-b\int x\sec(2a+2bx)\,dx\\ &= x\coth^{-1}(\cot(a+bx))+ix\tan^{-1}\left(e^{2i(a+bx)}\right)+\frac{1}{2}\int\log\left(1-ie^{i(2a+2bx)}\right)dx-\frac{1}{2}\int \text{lo}\\ &= x\coth^{-1}(\cot(a+bx))+ix\tan^{-1}\left(e^{2i(a+bx)}\right)-\frac{i\,\text{Subst}\left(\int\frac{\log(1-ix)}{x}\,dx,x,e^{i(2a+2bx)}\right)}{4b}+\\ &= x\coth^{-1}(\cot(a+bx))+ix\tan^{-1}\left(e^{2i(a+bx)}\right)-\frac{i\text{Li}_2\left(-ie^{2i(a+bx)}\right)}{4b}+\frac{i\text{Li}_2\left(ie^{2i(a+bx)}\right)}{4b}\end{aligned}$$

**Mathematica [A]** time = 0.03, size = 78, normalized size = 0.99

$$\frac{-i\text{Li}_2\left(-ie^{2i(a+bx)}\right)+i\text{Li}_2\left(ie^{2i(a+bx)}\right)+4bx\left(\coth^{-1}(\cot(a+bx))+i\tan^{-1}\left(e^{2i(a+bx)}\right)\right)}{4b}$$

Antiderivative was successfully verified.

```
[In] Integrate[ArcCoth[Cot[a + b*x]],x]
```

```
[Out] (4*b*x*(ArcCoth[Cot[a + b*x]] + I*ArcTan[E^((2*I)*(a + b*x))]) - I*PolyLog[
2, (-I)*E^((2*I)*(a + b*x))] + I*PolyLog[2, I*E^((2*I)*(a + b*x))])/(4*b)
```

**fricas [B]** time = 0.69, size = 388, normalized size = 4.91

$$4\,bx\log\left(\frac{\cos(2\,bx+2\,a)+\sin(2\,bx+2\,a)+1}{\cos(2\,bx+2\,a)-\sin(2\,bx+2\,a)+1}\right)+2\,a\log\left(\cos\left(2\,bx+2\,a\right)+i\,\sin\left(2\,bx+2\,a\right)+i\right)-2\,a\log\left(\cos\left(2\,bx+2\,a\right)-\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(cot(b*x+a)),x, algorithm="fricas")
```

```
[Out] 1/8*(4*b*x*log((cos(2*b*x + 2*a) + sin(2*b*x + 2*a) + 1)/(cos(2*b*x + 2*a)
- sin(2*b*x + 2*a) + 1)) + 2*a*log(cos(2*b*x + 2*a) + I*sin(2*b*x + 2*a) +
I) - 2*a*log(cos(2*b*x + 2*a) - I*sin(2*b*x + 2*a) + I) - 2*(b*x + a)*log(I
*cos(2*b*x + 2*a) + sin(2*b*x + 2*a) + 1) + 2*(b*x + a)*log(I*cos(2*b*x + 2
*a) - sin(2*b*x + 2*a) + 1) - 2*(b*x + a)*log(-I*cos(2*b*x + 2*a) + sin(2*b
*x + 2*a) + 1) + 2*(b*x + a)*log(-I*cos(2*b*x + 2*a) - sin(2*b*x + 2*a) + 1
) + 2*a*log(-cos(2*b*x + 2*a) + I*sin(2*b*x + 2*a) + I) - 2*a*log(-cos(2*b*
x + 2*a) - I*sin(2*b*x + 2*a) + I) + I*dilog(I*cos(2*b*x + 2*a) + sin(2*b*x
 + 2*a)) + I*dilog(I*cos(2*b*x + 2*a) - sin(2*b*x + 2*a)) - I*dilog(-I*cos(
2*b*x + 2*a) + sin(2*b*x + 2*a)) - I*dilog(-I*cos(2*b*x + 2*a) - sin(2*b*x
+ 2*a)))/b
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \operatorname{arcoth}\left(\cot\left(bx+a\right)\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(cot(b*x+a)),x, algorithm="giac")
```

```
[Out] integrate(arccoth(cot(b*x + a)), x)
```

**maple [B]** time = 0.55, size = 267, normalized size = 3.38

$$-\frac{\operatorname{arccoth}\left(\cot\left(bx+a\right)\right)\pi}{2b}+\frac{\operatorname{arccoth}\left(\cot\left(bx+a\right)\right)\operatorname{arccot}\left(\cot\left(bx+a\right)\right)}{b}-\frac{\ln\left(1+\frac{i(1+i\cot(bx+a))^2}{\cot^2(bx+a)+1}\right)\pi}{4b}+\frac{\ln\left(1+\frac{i(1+i\cot}{\cot^2(b}\right.}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(arccoth(cot(b*x+a)),x)
```

```
[Out] -1/2/b*arccoth(cot(b*x+a))*Pi+1/b*arccoth(cot(b*x+a))*arccot(cot(b*x+a))-1/
4/b*ln(1+I*(1+I*cot(b*x+a))^2/(cot(b*x+a)^2+1))*Pi+1/2/b*ln(1+I*(1+I*cot(b*
x+a))^2/(cot(b*x+a)^2+1))*arccot(cot(b*x+a))+1/4/b*ln(1-I*(1+I*cot(b*x+a))^
2/(cot(b*x+a)^2+1))*Pi-1/2/b*ln(1-I*(1+I*cot(b*x+a))^2/(cot(b*x+a)^2+1))*ar
ccot(cot(b*x+a))+1/4*I/b*dilog(1+I*(1+I*cot(b*x+a))^2/(cot(b*x+a)^2+1))-1/4
*I/b*dilog(1-I*(1+I*cot(b*x+a))^2/(cot(b*x+a)^2+1))
```

**maxima [B]** time = 0.47, size = 184, normalized size = 2.33

$$4\left(bx+a\right)\operatorname{arcoth}\left(\frac{1}{\tan(bx+a)}\right)+\left(\arctan\left(\frac{1}{2}\,\tan\left(bx+a\right)+\frac{1}{2},\frac{1}{2}\,\tan\left(bx+a\right)+\frac{1}{2}\right)-\arctan\left(\frac{1}{2}\,\tan\left(bx+a\right)-\frac{1}{2},-\frac{1}{2}\right.\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(cot(b*x+a)),x, algorithm="maxima")
```

```
[Out] 1/4*(4*(b*x + a)*arccoth(1/tan(b*x + a)) + (arctan2(1/2*tan(b*x + a) + 1/2,
 1/2*tan(b*x + a) + 1/2) - arctan2(1/2*tan(b*x + a) - 1/2, -1/2*tan(b*x + a
) + 1/2))*log(tan(b*x + a)^2 + 1) - (b*x + a)*log(1/2*tan(b*x + a)^2 + tan(
b*x + a) + 1/2) + (b*x + a)*log(1/2*tan(b*x + a)^2 - tan(b*x + a) + 1/2) -
I*dilog((1/2*I + 1/2)*tan(b*x + a) - 1/2*I + 1/2) + I*dilog(-(1/2*I - 1/2)*
tan(b*x + a) + 1/2*I + 1/2) + I*dilog((1/2*I - 1/2)*tan(b*x + a) + 1/2*I +
1/2) - I*dilog(-(1/2*I + 1/2)*tan(b*x + a) - 1/2*I + 1/2))/b
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.01

$$\int \operatorname{acoth}\left(\cot\left(a+b\,x\right)\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(cot(a + b*x)),x)
```

```
[Out] int(acoth(cot(a + b*x)), x)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \operatorname{acoth}\left(\cot\left(a+bx\right)\right)dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(cot(b*x+a)),x)
```

```
[Out] Integral(acoth(cot(a + b*x)), x)
```

# 3.252 $\int \frac{\coth^{-1}(\cot(a+bx))}{e+fx}\,dx$

**Optimal**. Leaf size=18

$$\text{Int}\left(\frac{\coth^{-1}(\cot(a+bx))}{e+fx},x\right)$$

[Out] CannotIntegrate(arccoth(cot(b*x+a))/(f*x+e),x)

**Rubi** [A] time = 0.04, antiderivative size = 0, normalized size of antiderivative = 0.00, number of steps used = 0, number of rules used = 0, integrand size = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int \frac{\coth^{-1}(\cot(a+bx))}{e+fx}\,dx$$

Verification is Not applicable to the result.

[In] Int[ArcCoth[Cot[a + b*x]]/(e + f*x),x]

[Out] Defer[Int][ArcCoth[Cot[a + b*x]]/(e + f*x), x]

Rubi steps

$$\int \frac{\coth^{-1}(\cot(a+bx))}{e+fx}\,dx = \int \frac{\coth^{-1}(\cot(a+bx))}{e+fx}\,dx$$

**Mathematica** [A] time = 0.12, size = 0, normalized size = 0.00

$$\int \frac{\coth^{-1}(\cot(a+bx))}{e+fx}\,dx$$

Verification is Not applicable to the result.

[In] Integrate[ArcCoth[Cot[a + b*x]]/(e + f*x),x]

[Out] Integrate[ArcCoth[Cot[a + b*x]]/(e + f*x), x]

**fricas** [A] time = 0.59, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{\text{arcoth}\left(\cot\left(bx+a\right)\right)}{fx+e},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

[In] integrate(arccoth(cot(b*x+a))/(f*x+e),x, algorithm="fricas")

[Out] integral(arccoth(cot(b*x + a))/(f*x + e), x)

**giac** [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\text{arcoth}\left(\cot\left(bx+a\right)\right)}{fx+e}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

[In] integrate(arccoth(cot(b*x+a))/(f*x+e),x, algorithm="giac")

[Out] integrate(arccoth(cot(b*x + a))/(f*x + e), x)

**maple** [A] time = 4.19, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{arccoth}(\cot(bx+a))}{fx+e}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(arccoth(cot(b*x+a))/(f*x+e),x)
```

```
[Out] int(arccoth(cot(b*x+a))/(f*x+e),x)
```

**maxima** [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{arcoth}(\cot(bx+a))}{fx+e}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(cot(b*x+a))/(f*x+e),x, algorithm="maxima")
```

```
[Out] integrate(arccoth(cot(b*x + a))/(f*x + e), x)
```

**mupad** [A] time = 0.00, size = -1, normalized size = -0.06

$$\int \frac{\operatorname{acoth}(\cot(a+b\,x))}{e+f\,x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(cot(a + b*x))/(e + f*x),x)
```

```
[Out] int(acoth(cot(a + b*x))/(e + f*x), x)
```

**sympy** [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{acoth}(\cot(a+bx))}{e+fx}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(cot(b*x+a))/(f*x+e),x)
```

```
[Out] Integral(acoth(cot(a + b*x))/(e + f*x), x)
```

# 3.253 $\int x^2 \coth^{-1}(c + d\cot(a + bx))\,dx$

**Optimal**. Leaf size=391

$$\frac{i\text{Li}_4\left(\frac{(-c-id+1)e^{2ia+2ibx}}{-c+id+1}\right)}{8b^3}-\frac{i\text{Li}_4\left(\frac{(c+id+1)e^{2ia+2ibx}}{c-id+1}\right)}{8b^3}+\frac{x\text{Li}_3\left(\frac{(-c-id+1)e^{2ia+2ibx}}{-c+id+1}\right)}{4b^2}-\frac{x\text{Li}_3\left(\frac{(c+id+1)e^{2ia+2ibx}}{c-id+1}\right)}{4b^2}-\frac{ix^2\text{Li}_2\left(\frac{(-c-id+1)e^{2ia+2ibx}}{-c+id+1}\right)}{4b}$$

```
[Out] 1/3*x^3*arccoth(c+d*cot(b*x+a))+1/6*x^3*ln(1-(1-c-I*d)*exp(2*I*a+2*I*b*x)/(
1-c+I*d))-1/6*x^3*ln(1-(1+c+I*d)*exp(2*I*a+2*I*b*x)/(1+c-I*d))-1/4*I*x^2*po
lylog(2,(1-c-I*d)*exp(2*I*a+2*I*b*x)/(1-c+I*d))/b+1/4*I*x^2*polylog(2,(1+c+
I*d)*exp(2*I*a+2*I*b*x)/(1+c-I*d))/b+1/4*x*polylog(3,(1-c-I*d)*exp(2*I*a+2*
I*b*x)/(1-c+I*d))/b^2-1/4*x*polylog(3,(1+c+I*d)*exp(2*I*a+2*I*b*x)/(1+c-I*d
))/b^2+1/8*I*polylog(4,(1-c-I*d)*exp(2*I*a+2*I*b*x)/(1-c+I*d))/b^3-1/8*I*po
lylog(4,(1+c+I*d)*exp(2*I*a+2*I*b*x)/(1+c-I*d))/b^3
```

**Rubi [A]** time = 0.50, antiderivative size = 391, normalized size of antiderivative = 1.00, number of steps used = 11, number of rules used = 6, integrand size = 15, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.400, Rules used = {6270, 2190, 2531, 6609, 2282, 6589}

$$\frac{x\text{PolyLog}\left(3,\frac{(-c-id+1)e^{2ia+2ibx}}{-c+id+1}\right)}{4b^2}-\frac{x\text{PolyLog}\left(3,\frac{(c+id+1)e^{2ia+2ibx}}{c-id+1}\right)}{4b^2}+\frac{i\text{PolyLog}\left(4,\frac{(-c-id+1)e^{2ia+2ibx}}{-c+id+1}\right)}{8b^3}-\frac{i\text{PolyLog}\left(4,\frac{(c+id+1)e^{2ia+2ibx}}{c-id+1}\right)}{8b^3}$$

Antiderivative was successfully verified.

```
[In] Int[x^2*ArcCoth[c + d*Cot[a + b*x]],x]
```

```
[Out] (x^3*ArcCoth[c + d*Cot[a + b*x]])/3 + (x^3*Log[1 - ((1 - c - I*d)*E^((2*I)*
a + (2*I)*b*x))/(1 - c + I*d)])/6 - (x^3*Log[1 - ((1 + c + I*d)*E^((2*I)*a
+ (2*I)*b*x))/(1 + c - I*d)])/6 - ((I/4)*x^2*PolyLog[2, ((1 - c - I*d)*E^((
2*I)*a + (2*I)*b*x))/(1 - c + I*d)])/b + ((I/4)*x^2*PolyLog[2, ((1 + c + I*
d)*E^((2*I)*a + (2*I)*b*x))/(1 + c - I*d)])/b + (x*PolyLog[3, ((1 - c - I*d
)*E^((2*I)*a + (2*I)*b*x))/(1 - c + I*d)])/(4*b^2) - (x*PolyLog[3, ((1 + c
+ I*d)*E^((2*I)*a + (2*I)*b*x))/(1 + c - I*d)])/(4*b^2) + ((I/8)*PolyLog[4,
 ((1 - c - I*d)*E^((2*I)*a + (2*I)*b*x))/(1 - c + I*d)])/b^3 - ((I/8)*PolyL
og[4, ((1 + c + I*d)*E^((2*I)*a + (2*I)*b*x))/(1 + c - I*d)])/b^3
```

Rule 2190

```
Int[(((F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m_.))/
((a_) + (b_.)*((F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)), x_Symbol] :> Simp
[((c + d*x)^m*Log[1 + (b*(F^(g*(e + f*x)))^n)/a])/(b*f*g*n*Log[F]), x] - Di
st[(d*m)/(b*f*g*n*Log[F]), Int[(c + d*x)^(m - 1)*Log[1 + (b*(F^(g*(e + f*x)
))^n)/a], x], x] /; FreeQ[{F, a, b, c, d, e, f, g, n}, x] && IGtQ[m, 0]
```

Rule 2282

```
Int[u_, x_Symbol] :> With[{v = FunctionOfExponential[u, x]}, Dist[v/D[v, x]
, Subst[Int[FunctionOfExponentialFunction[u, x]/x, x], x, v], x]] /; Functi
onOfExponentialQ[u, x] &&  !MatchQ[u, (w_)*((a_.)*(v_)^(n_))^(m_) /; FreeQ[
{a, m, n}, x] && IntegerQ[m*n]] &&  !MatchQ[u, E^((c_.)*((a_.) + (b_.)*x))*
(F_)[v_] /; FreeQ[{a, b, c}, x] && InverseFunctionQ[F[x]]]
```

Rule 2531

```
Int[Log[1 + (e_.)*((F_)^((c_.)*((a_.) + (b_.)*(x_))))^(n_.)]*((f_.) + (g_.)
*(x_))^(m_.), x_Symbol] :> -Simp[((f + g*x)^m*PolyLog[2, -(e*(F^(c*(a + b*x
)))^n)])/(b*c*n*Log[F]), x] + Dist[(g*m)/(b*c*n*Log[F]), Int[(f + g*x)^(m -
 1)*PolyLog[2, -(e*(F^(c*(a + b*x)))^n)], x], x] /; FreeQ[{F, a, b, c, e, f
```

```
, g, n}, x] && GtQ[m, 0]
```

Rule 6270

```
Int[ArcCoth[(c_.) + Cot[(a_.) + (b_.)*(x_)]*(d_.)]*((e_.) + (f_.)*(x_))^(m_
.), x_Symbol] :> Simp[((e + f*x)^(m + 1)*ArcCoth[c + d*Cot[a + b*x]])/(f*(m
 + 1)), x] + (-Dist[(I*b*(1 - c - I*d))/(f*(m + 1)), Int[((e + f*x)^(m + 1)
*E^(2*I*a + 2*I*b*x))/(1 - c + I*d - (1 - c - I*d)*E^(2*I*a + 2*I*b*x)), x]
, x] + Dist[(I*b*(1 + c + I*d))/(f*(m + 1)), Int[((e + f*x)^(m + 1)*E^(2*I*
a + 2*I*b*x))/(1 + c - I*d - (1 + c + I*d)*E^(2*I*a + 2*I*b*x)), x], x]) /;
 FreeQ[{a, b, c, d, e, f}, x] && IGtQ[m, 0] && NeQ[(c - I*d)^2, 1]
```

Rule 6589

```
Int[PolyLog[n_, (c_.)*((a_.) + (b_.)*(x_))^(p_.)]/((d_.) + (e_.)*(x_)), x_S
ymbol] :> Simp[PolyLog[n + 1, c*(a + b*x)^p]/(e*p), x] /; FreeQ[{a, b, c, d
, e, n, p}, x] && EqQ[b*d, a*e]
```

Rule 6609

```
Int[((e_.) + (f_.)*(x_))^(m_.)*PolyLog[n_, (d_.)*((F_)^((c_.)*((a_.) + (b_.
)*(x_))))^(p_.)], x_Symbol] :> Simp[((e + f*x)^m*PolyLog[n + 1, d*(F^(c*(a
+ b*x)))^p])/(b*c*p*Log[F]), x] - Dist[(f*m)/(b*c*p*Log[F]), Int[(e + f*x)^
(m - 1)*PolyLog[n + 1, d*(F^(c*(a + b*x)))^p], x], x] /; FreeQ[{F, a, b, c,
 d, e, f, n, p}, x] && GtQ[m, 0]
```

Rubi steps

$$\int x^2 \coth^{-1}(c+d\cot(a+bx))\,dx = \frac{1}{3}x^3\coth^{-1}(c+d\cot(a+bx)) + \frac{1}{3}(b(i(1+c)-d))\int \frac{e^{2ia+2ibx}x}{1+c-id+(-1-c \cdots}$$

$$= \frac{1}{3}x^3\coth^{-1}(c+d\cot(a+bx)) + \frac{1}{6}x^3\log\left(1-\frac{(1-c-id)e^{2ia+2ibx}}{1-c+id}\right) - \frac{1}{6}x^3 \cdots$$

$$= \frac{1}{3}x^3\coth^{-1}(c+d\cot(a+bx)) + \frac{1}{6}x^3\log\left(1-\frac{(1-c-id)e^{2ia+2ibx}}{1-c+id}\right) - \frac{1}{6}x^3 \cdots$$

$$= \frac{1}{3}x^3\coth^{-1}(c+d\cot(a+bx)) + \frac{1}{6}x^3\log\left(1-\frac{(1-c-id)e^{2ia+2ibx}}{1-c+id}\right) - \frac{1}{6}x^3 \cdots$$

$$= \frac{1}{3}x^3\coth^{-1}(c+d\cot(a+bx)) + \frac{1}{6}x^3\log\left(1-\frac{(1-c-id)e^{2ia+2ibx}}{1-c+id}\right) - \frac{1}{6}x^3 \cdots$$

$$= \frac{1}{3}x^3\coth^{-1}(c+d\cot(a+bx)) + \frac{1}{6}x^3\log\left(1-\frac{(1-c-id)e^{2ia+2ibx}}{1-c+id}\right) - \frac{1}{6}x^3 \cdots$$

**Mathematica [A]** time = 0.33, size = 339, normalized size = 0.87

$$\frac{1}{3}x^3\coth^{-1}(d\cot(a+bx)+c)+\frac{4b^3x^3\log\left(1-\frac{(c+id-1)e^{2i(a+bx)}}{c-id-1}\right)-4b^3x^3\log\left(1-\frac{(c+id+1)e^{2i(a+bx)}}{c-id+1}\right)-6ib^2x^2\text{Li}_2\left(\frac{(c+id-1 \cdots}{c- \cdots}\right. \cdots}{\cdots}$$

Antiderivative was successfully verified.

```
[In] Integrate[x^2*ArcCoth[c + d*Cot[a + b*x]],x]
```

```
[Out] (x^3*ArcCoth[c + d*Cot[a + b*x]])/3 + (4*b^3*x^3*Log[1 - ((-1 + c + I*d)*E^
((2*I)*(a + b*x)))/(-1 + c - I*d)] - 4*b^3*x^3*Log[1 - ((1 + c + I*d)*E^((2
*I)*(a + b*x)))/(1 + c - I*d)] - (6*I)*b^2*x^2*PolyLog[2, ((-1 + c + I*d)*E
^((2*I)*(a + b*x)))/(-1 + c - I*d)] + (6*I)*b^2*x^2*PolyLog[2, ((1 + c + I*
d)*E^((2*I)*(a + b*x)))/(1 + c - I*d)] + 6*b*x*PolyLog[3, ((-1 + c + I*d)*E
^((2*I)*(a + b*x)))/(-1 + c - I*d)] - 6*b*x*PolyLog[3, ((1 + c + I*d)*E^((2
*I)*(a + b*x)))/(1 + c - I*d)] + (3*I)*PolyLog[4, ((-1 + c + I*d)*E^((2*I)*
(a + b*x)))/(-1 + c - I*d)] - (3*I)*PolyLog[4, ((1 + c + I*d)*E^((2*I)*(a +
 b*x)))/(1 + c - I*d)])/(24*b^3)
```

**fricas [C]** time = 0.83, size = 1798, normalized size = 4.60

result too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*arccoth(c+d*cot(b*x+a)),x, algorithm="fricas")
```

```
[Out] 1/48*(8*b^3*x^3*log((d*cos(2*b*x + 2*a) + (c + 1)*sin(2*b*x + 2*a) + d)/(d*
cos(2*b*x + 2*a) + (c - 1)*sin(2*b*x + 2*a) + d)) + 6*I*b^2*x^2*dilog(-(c^2
 + d^2 - (c^2 + 2*I*(c + 1)*d - d^2 + 2*c + 1)*cos(2*b*x + 2*a) + (-I*c^2 +
 2*(c + 1)*d + I*d^2 - 2*I*c - I)*sin(2*b*x + 2*a) + 2*c + 1)/(c^2 + d^2 +
2*c + 1) + 1) - 6*I*b^2*x^2*dilog(-(c^2 + d^2 - (c^2 - 2*I*(c + 1)*d - d^2
+ 2*c + 1)*cos(2*b*x + 2*a) + (I*c^2 + 2*(c + 1)*d - I*d^2 + 2*I*c + I)*sin
(2*b*x + 2*a) + 2*c + 1)/(c^2 + d^2 + 2*c + 1) + 1) - 6*I*b^2*x^2*dilog(-(c
^2 + d^2 - (c^2 + 2*I*(c - 1)*d - d^2 - 2*c + 1)*cos(2*b*x + 2*a) + (-I*c^2
 + 2*(c - 1)*d + I*d^2 + 2*I*c - I)*sin(2*b*x + 2*a) - 2*c + 1)/(c^2 + d^2
- 2*c + 1) + 1) + 6*I*b^2*x^2*dilog(-(c^2 + d^2 - (c^2 - 2*I*(c - 1)*d - d^
2 - 2*c + 1)*cos(2*b*x + 2*a) + (I*c^2 + 2*(c - 1)*d - I*d^2 - 2*I*c + I)*s
in(2*b*x + 2*a) - 2*c + 1)/(c^2 + d^2 - 2*c + 1) + 1) + 4*a^3*log(1/2*c^2 +
 I*(c + 1)*d - 1/2*d^2 - 1/2*(c^2 + d^2 + 2*c + 1)*cos(2*b*x + 2*a) + 1/2*(
I*c^2 + I*d^2 + 2*I*c + I)*sin(2*b*x + 2*a) + c + 1/2) - 4*a^3*log(1/2*c^2
+ I*(c - 1)*d - 1/2*d^2 - 1/2*(c^2 + d^2 - 2*c + 1)*cos(2*b*x + 2*a) + 1/2*
(I*c^2 + I*d^2 - 2*I*c + I)*sin(2*b*x + 2*a) - c + 1/2) + 4*a^3*log(-1/2*c^
2 + I*(c + 1)*d + 1/2*d^2 + 1/2*(c^2 + d^2 + 2*c + 1)*cos(2*b*x + 2*a) + 1/
2*(I*c^2 + I*d^2 + 2*I*c + I)*sin(2*b*x + 2*a) - c - 1/2) - 4*a^3*log(-1/2*
c^2 + I*(c - 1)*d + 1/2*d^2 + 1/2*(c^2 + d^2 - 2*c + 1)*cos(2*b*x + 2*a) +
1/2*(I*c^2 + I*d^2 - 2*I*c + I)*sin(2*b*x + 2*a) + c - 1/2) - 6*b*x*polylog
(3, ((c^2 + 2*I*(c + 1)*d - d^2 + 2*c + 1)*cos(2*b*x + 2*a) + (I*c^2 - 2*(c
 + 1)*d - I*d^2 + 2*I*c + I)*sin(2*b*x + 2*a))/(c^2 + d^2 + 2*c + 1)) - 6*b
*x*polylog(3, ((c^2 - 2*I*(c + 1)*d - d^2 + 2*c + 1)*cos(2*b*x + 2*a) + (-I
*c^2 - 2*(c + 1)*d + I*d^2 - 2*I*c - I)*sin(2*b*x + 2*a))/(c^2 + d^2 + 2*c
+ 1)) + 6*b*x*polylog(3, ((c^2 + 2*I*(c - 1)*d - d^2 - 2*c + 1)*cos(2*b*x +
 2*a) + (I*c^2 - 2*(c - 1)*d - I*d^2 - 2*I*c + I)*sin(2*b*x + 2*a))/(c^2 +
d^2 - 2*c + 1)) + 6*b*x*polylog(3, ((c^2 - 2*I*(c - 1)*d - d^2 - 2*c + 1)*c
os(2*b*x + 2*a) + (-I*c^2 - 2*(c - 1)*d + I*d^2 + 2*I*c - I)*sin(2*b*x + 2*
a))/(c^2 + d^2 - 2*c + 1)) - 4*(b^3*x^3 + a^3)*log((c^2 + d^2 - (c^2 + 2*I*
(c + 1)*d - d^2 + 2*c + 1)*cos(2*b*x + 2*a) + (-I*c^2 + 2*(c + 1)*d + I*d^2
 - 2*I*c - I)*sin(2*b*x + 2*a) + 2*c + 1)/(c^2 + d^2 + 2*c + 1)) - 4*(b^3*x
^3 + a^3)*log((c^2 + d^2 - (c^2 - 2*I*(c + 1)*d - d^2 + 2*c + 1)*cos(2*b*x
+ 2*a) + (I*c^2 + 2*(c + 1)*d - I*d^2 + 2*I*c + I)*sin(2*b*x + 2*a) + 2*c +
 1)/(c^2 + d^2 + 2*c + 1)) + 4*(b^3*x^3 + a^3)*log((c^2 + d^2 - (c^2 + 2*I*
(c - 1)*d - d^2 - 2*c + 1)*cos(2*b*x + 2*a) + (-I*c^2 + 2*(c - 1)*d + I*d^2
 + 2*I*c - I)*sin(2*b*x + 2*a) - 2*c + 1)/(c^2 + d^2 - 2*c + 1)) + 4*(b^3*x
^3 + a^3)*log((c^2 + d^2 - (c^2 - 2*I*(c - 1)*d - d^2 - 2*c + 1)*cos(2*b*x
+ 2*a) + (I*c^2 + 2*(c - 1)*d - I*d^2 - 2*I*c + I)*sin(2*b*x + 2*a) - 2*c +
 1)/(c^2 + d^2 - 2*c + 1)) - 3*I*polylog(4, ((c^2 + 2*I*(c + 1)*d - d^2 + 2
*c + 1)*cos(2*b*x + 2*a) + (I*c^2 - 2*(c + 1)*d - I*d^2 + 2*I*c + I)*sin(2*
b*x + 2*a))/(c^2 + d^2 + 2*c + 1)) + 3*I*polylog(4, ((c^2 - 2*I*(c + 1)*d -
 d^2 + 2*c + 1)*cos(2*b*x + 2*a) + (-I*c^2 - 2*(c + 1)*d + I*d^2 - 2*I*c -
I)*sin(2*b*x + 2*a))/(c^2 + d^2 + 2*c + 1)) + 3*I*polylog(4, ((c^2 + 2*I*(c
```

```
- 1)*d - d^2 - 2*c + 1)*cos(2*b*x + 2*a) + (I*c^2 - 2*(c - 1)*d - I*d^2 -
2*I*c + I)*sin(2*b*x + 2*a))/(c^2 + d^2 - 2*c + 1)) - 3*I*polylog(4, ((c^2
- 2*I*(c - 1)*d - d^2 - 2*c + 1)*cos(2*b*x + 2*a) + (-I*c^2 - 2*(c - 1)*d +
I*d^2 + 2*I*c - I)*sin(2*b*x + 2*a))/(c^2 + d^2 - 2*c + 1)))/b^3
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int x^2 \operatorname{arcoth}(d \cot(bx + a) + c)\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*arccoth(c+d*cot(b*x+a)),x, algorithm="giac")
```

```
[Out] integrate(x^2*arccoth(d*cot(b*x + a) + c), x)
```

**maple [C]** time = 39.34, size = 6698, normalized size = 17.13

output too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^2*arccoth(c+d*cot(b*x+a)),x)
```

```
[Out] result too large to display
```

**maxima [F]** time = 0.00, size = 0, normalized size = 0.00

$$\frac{1}{12} x^3 \log\left(\left(c^2 + d^2 + 2c + 1\right) \cos(2bx + 2a)^2 + 4(c + 1)d \sin(2bx + 2a) + \left(c^2 + d^2 + 2c + 1\right) \sin(2bx + 2a\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*arccoth(c+d*cot(b*x+a)),x, algorithm="maxima")
```

```
[Out] 1/12*x^3*log((c^2 + d^2 + 2*c + 1)*cos(2*b*x + 2*a)^2 + 4*(c + 1)*d*sin(2*b
*x + 2*a) + (c^2 + d^2 + 2*c + 1)*sin(2*b*x + 2*a)^2 + c^2 + d^2 - 2*(c^2 -
d^2 + 2*c + 1)*cos(2*b*x + 2*a) + 2*c + 1) - 1/12*x^3*log((c^2 + d^2 - 2*c
+ 1)*cos(2*b*x + 2*a)^2 + 4*(c - 1)*d*sin(2*b*x + 2*a) + (c^2 + d^2 - 2*c
+ 1)*sin(2*b*x + 2*a)^2 + c^2 + d^2 - 2*(c^2 - d^2 - 2*c + 1)*cos(2*b*x + 2
*a) - 2*c + 1) - 4*b*d*integrate(1/3*(2*(c^2 + d^2 - 1)*x^3*cos(2*b*x + 2*a
)^2 + 2*c*d*x^3*sin(2*b*x + 2*a) + 2*(c^2 + d^2 - 1)*x^3*sin(2*b*x + 2*a)^2
- (c^2 - d^2 - 1)*x^3*cos(2*b*x + 2*a) - (2*c*d*x^3*sin(2*b*x + 2*a) + (c^
2 - d^2 - 1)*x^3*cos(2*b*x + 2*a))*cos(4*b*x + 4*a) + (2*c*d*x^3*cos(2*b*x
+ 2*a) - (c^2 - d^2 - 1)*x^3*sin(2*b*x + 2*a))*sin(4*b*x + 4*a))/(c^4 + d^4
+ 2*(c^2 + 1)*d^2 + (c^4 + d^4 + 2*(c^2 + 1)*d^2 - 2*c^2 + 1)*cos(4*b*x +
4*a)^2 + 4*(c^4 + d^4 + 2*(c^2 - 1)*d^2 - 2*c^2 + 1)*cos(2*b*x + 2*a)^2 + (
c^4 + d^4 + 2*(c^2 + 1)*d^2 - 2*c^2 + 1)*sin(4*b*x + 4*a)^2 + 4*(c^4 + d^4
+ 2*(c^2 - 1)*d^2 - 2*c^2 + 1)*sin(2*b*x + 2*a)^2 - 2*c^2 + 2*(c^4 + d^4 -
2*(3*c^2 - 1)*d^2 - 2*c^2 - 2*(c^4 - d^4 - 2*c^2 + 1)*cos(2*b*x + 2*a) - 4*
(c*d^3 + (c^3 - c)*d)*sin(2*b*x + 2*a) + 1)*cos(4*b*x + 4*a) - 4*(c^4 - d^4
- 2*c^2 + 1)*cos(2*b*x + 2*a) + 4*(2*c*d^3 - 2*(c^3 - c)*d + 2*(c*d^3 + (c
^3 - c)*d)*cos(2*b*x + 2*a) - (c^4 - d^4 - 2*c^2 + 1)*sin(2*b*x + 2*a))*sin
(4*b*x + 4*a) + 8*(c*d^3 + (c^3 - c)*d)*sin(2*b*x + 2*a) + 1), x)
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.00

$$\int x^2 \operatorname{acoth}(c + d \cot(a + b x))\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^2*acoth(c + d*cot(a + b*x)),x)
```

```
[Out] int(x^2*acoth(c + d*cot(a + b*x)), x)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int x^2 \operatorname{acoth}(c + d\cot(a + bx))\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**2*acoth(c+d*cot(b*x+a)),x)
[Out] Integral(x**2*acoth(c + d*cot(a + b*x)), x)
```

# 3.254 $\int x \coth^{-1}(c + d\cot(a + bx))\, dx$

**Optimal**. Leaf size=293

$$\frac{\text{Li}_3\left(\frac{(-c-id+1)e^{2ia+2ibx}}{-c+id+1}\right)}{8b^2} - \frac{\text{Li}_3\left(\frac{(c+id+1)e^{2ia+2ibx}}{c-id+1}\right)}{8b^2} - \frac{ix\text{Li}_2\left(\frac{(-c-id+1)e^{2ia+2ibx}}{-c+id+1}\right)}{4b} + \frac{ix\text{Li}_2\left(\frac{(c+id+1)e^{2ia+2ibx}}{c-id+1}\right)}{4b} + \frac{1}{4}x^2 \log\left(1 - \frac{(-c -}{}\right.$$

```
[Out] 1/2*x^2*arccoth(c+d*cot(b*x+a))+1/4*x^2*ln(1-(1-c-I*d)*exp(2*I*a+2*I*b*x)/(
1-c+I*d))-1/4*x^2*ln(1-(1+c+I*d)*exp(2*I*a+2*I*b*x)/(1+c-I*d))-1/4*I*x*poly
log(2,(1-c-I*d)*exp(2*I*a+2*I*b*x)/(1-c+I*d))/b+1/4*I*x*polylog(2,(1+c+I*d)
*exp(2*I*a+2*I*b*x)/(1+c-I*d))/b+1/8*polylog(3,(1-c-I*d)*exp(2*I*a+2*I*b*x)
/(1-c+I*d))/b^2-1/8*polylog(3,(1+c+I*d)*exp(2*I*a+2*I*b*x)/(1+c-I*d))/b^2
```

**Rubi** [A] time = 0.40, antiderivative size = 293, normalized size of antiderivative = 1.00, number of steps used = 9, number of rules used = 5, integrand size = 13, $\frac{\text{number of rules}}{\text{integrand size}} = 0.385$, Rules used = {6270, 2190, 2531, 2282, 6589}

$$\frac{\text{PolyLog}\left(3, \frac{(-c-id+1)e^{2ia+2ibx}}{-c+id+1}\right)}{8b^2} - \frac{\text{PolyLog}\left(3, \frac{(c+id+1)e^{2ia+2ibx}}{c-id+1}\right)}{8b^2} - \frac{ix\text{PolyLog}\left(2, \frac{(-c-id+1)e^{2ia+2ibx}}{-c+id+1}\right)}{4b} + \frac{ix\text{PolyLog}\left(2, \frac{(c+}{}\right.}{4b}$$

Antiderivative was successfully verified.

```
[In] Int[x*ArcCoth[c + d*Cot[a + b*x]],x]
```

```
[Out] (x^2*ArcCoth[c + d*Cot[a + b*x]])/2 + (x^2*Log[1 - ((1 - c - I*d)*E^((2*I)*
a + (2*I)*b*x))/(1 - c + I*d)])/4 - (x^2*Log[1 - ((1 + c + I*d)*E^((2*I)*a
+ (2*I)*b*x))/(1 + c - I*d)])/4 - ((I/4)*x*PolyLog[2, ((1 - c - I*d)*E^((2*
I)*a + (2*I)*b*x))/(1 - c + I*d)])/b + ((I/4)*x*PolyLog[2, ((1 + c + I*d)*E
^((2*I)*a + (2*I)*b*x))/(1 + c - I*d)])/b + PolyLog[3, ((1 - c - I*d)*E^((2
*I)*a + (2*I)*b*x))/(1 - c + I*d)]/(8*b^2) - PolyLog[3, ((1 + c + I*d)*E^((
2*I)*a + (2*I)*b*x))/(1 + c - I*d)]/(8*b^2)
```

Rule 2190

```
Int[(((F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m_.))/
((a_) + (b_.)*((F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)), x_Symbol] :> Simp
[((c + d*x)^m*Log[1 + (b*(F^(g*(e + f*x)))^n)/a])/(b*f*g*n*Log[F]), x] - Di
st[(d*m)/(b*f*g*n*Log[F]), Int[(c + d*x)^(m - 1)*Log[1 + (b*(F^(g*(e + f*x)
))^n)/a], x], x] /; FreeQ[{F, a, b, c, d, e, f, g, n}, x] && IGtQ[m, 0]
```

Rule 2282

```
Int[u_, x_Symbol] :> With[{v = FunctionOfExponential[u, x]}, Dist[v/D[v, x]
, Subst[Int[FunctionOfExponentialFunction[u, x]/x, x], x, v], x]] /; Functi
onOfExponentialQ[u, x] &&  !MatchQ[u, (w_)*((a_.)*(v_)^(n_))^(m_) /; FreeQ[
{a, m, n}, x] && IntegerQ[m*n]] &&  !MatchQ[u, E^((c_.)*((a_.) + (b_.)*x))*
(F_)[v_] /; FreeQ[{a, b, c}, x] && InverseFunctionQ[F[x]]]
```

Rule 2531

```
Int[Log[1 + (e_.)*((F_)^((c_.)*((a_.) + (b_.)*(x_))))^(n_.)]*((f_.) + (g_.)
*(x_))^(m_.), x_Symbol] :> -Simp[((f + g*x)^m*PolyLog[2, -(e*(F^(c*(a + b*x
)))^n)])/(b*c*n*Log[F]), x] + Dist[(g*m)/(b*c*n*Log[F]), Int[(f + g*x)^(m -
 1)*PolyLog[2, -(e*(F^(c*(a + b*x)))^n)], x], x] /; FreeQ[{F, a, b, c, e, f
, g, n}, x] && GtQ[m, 0]
```

Rule 6270

```
Int[ArcCoth[(c_.) + Cot[(a_.) + (b_.)*(x_)]*(d_.)]*((e_.) + (f_.)*(x_))^(m_
.), x_Symbol] :> Simp[((e + f*x)^(m + 1)*ArcCoth[c + d*Cot[a + b*x]])/(f*(m
```

```
 + 1)), x] + (-Dist[(I*b*(1 - c - I*d))/(f*(m + 1)), Int[((e + f*x)^(m + 1)
*E^(2*I*a + 2*I*b*x))/(1 - c + I*d - (1 - c - I*d)*E^(2*I*a + 2*I*b*x)), x]
, x] + Dist[(I*b*(1 + c + I*d))/(f*(m + 1)), Int[((e + f*x)^(m + 1)*E^(2*I*
a + 2*I*b*x))/(1 + c - I*d - (1 + c + I*d)*E^(2*I*a + 2*I*b*x)), x], x]) /;
 FreeQ[{a, b, c, d, e, f}, x] && IGtQ[m, 0] && NeQ[(c - I*d)^2, 1]
```

Rule 6589

```
Int[PolyLog[n_, (c_.)*((a_.) + (b_.)*(x_))^(p_.)]/((d_.) + (e_.)*(x_)), x_S
ymbol] :> Simp[PolyLog[n + 1, c*(a + b*x)^p]/(e*p), x] /; FreeQ[{a, b, c, d
, e, n, p}, x] && EqQ[b*d, a*e]
```

Rubi steps

$$\int x\coth^{-1}(c+d\cot(a+bx))\,dx = \frac{1}{2}x^2\coth^{-1}(c+d\cot(a+bx))+\frac{1}{2}(b(i(1+c)-d))\int\frac{e^{2ia+2ibx}x^2}{1+c-id+(-1-c-id$$

$$=\frac{1}{2}x^2\coth^{-1}(c+d\cot(a+bx))+\frac{1}{4}x^2\log\left(1-\frac{(1-c-id)e^{2ia+2ibx}}{1-c+id}\right)-\frac{1}{4}x^2\log$$

$$=\frac{1}{2}x^2\coth^{-1}(c+d\cot(a+bx))+\frac{1}{4}x^2\log\left(1-\frac{(1-c-id)e^{2ia+2ibx}}{1-c+id}\right)-\frac{1}{4}x^2\log$$

$$=\frac{1}{2}x^2\coth^{-1}(c+d\cot(a+bx))+\frac{1}{4}x^2\log\left(1-\frac{(1-c-id)e^{2ia+2ibx}}{1-c+id}\right)-\frac{1}{4}x^2\log$$

$$=\frac{1}{2}x^2\coth^{-1}(c+d\cot(a+bx))+\frac{1}{4}x^2\log\left(1-\frac{(1-c-id)e^{2ia+2ibx}}{1-c+id}\right)-\frac{1}{4}x^2\log$$

**Mathematica [A]** time = 0.13, size = 253, normalized size = 0.86

$$\frac{1}{2}x^2\coth^{-1}(d\cot(a+bx)+c)+\frac{2b^2x^2\log\left(1-\frac{(c+id-1)e^{2i(a+bx)}}{c-id-1}\right)-2b^2x^2\log\left(1-\frac{(c+id+1)e^{2i(a+bx)}}{c-id+1}\right)-2ibx\mathrm{Li}_2\left(\frac{(c+id-1)e^{2i(a+}}{c-id-1}\right.}{8b^2}$$

Antiderivative was successfully verified.

```
[In] Integrate[x*ArcCoth[c + d*Cot[a + b*x]],x]
```

```
[Out] (x^2*ArcCoth[c + d*Cot[a + b*x]])/2 + (2*b^2*x^2*Log[1 - ((-1 + c + I*d)*E^
((2*I)*(a + b*x)))/(-1 + c - I*d)] - 2*b^2*x^2*Log[1 - ((1 + c + I*d)*E^((2
*I)*(a + b*x)))/(1 + c - I*d)] - (2*I)*b*x*PolyLog[2, ((-1 + c + I*d)*E^((2
*I)*(a + b*x)))/(-1 + c - I*d)] + (2*I)*b*x*PolyLog[2, ((1 + c + I*d)*E^((2
*I)*(a + b*x)))/(1 + c - I*d)] + PolyLog[3, ((-1 + c + I*d)*E^((2*I)*(a + b
*x)))/(-1 + c - I*d)] - PolyLog[3, ((1 + c + I*d)*E^((2*I)*(a + b*x)))/(1 +
 c - I*d)])/(8*b^2)
```

**fricas [C]** time = 0.89, size = 1462, normalized size = 4.99

result too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*arccoth(c+d*cot(b*x+a)),x, algorithm="fricas")
```

```
[Out] 1/16*(4*b^2*x^2*log((d*cos(2*b*x + 2*a) + (c + 1)*sin(2*b*x + 2*a) + d)/(d*
cos(2*b*x + 2*a) + (c - 1)*sin(2*b*x + 2*a) + d)) + 2*I*b*x*dilog(-(c^2 + d
```

```
^2 - (c^2 + 2*I*(c + 1)*d - d^2 + 2*c + 1)*cos(2*b*x + 2*a) + (-I*c^2 + 2*(
c + 1)*d + I*d^2 - 2*I*c - I)*sin(2*b*x + 2*a) + 2*c + 1)/(c^2 + d^2 + 2*c
+ 1) + 1) - 2*I*b*x*dilog(-(c^2 + d^2 - (c^2 - 2*I*(c + 1)*d - d^2 + 2*c +
1)*cos(2*b*x + 2*a) + (I*c^2 + 2*(c + 1)*d - I*d^2 + 2*I*c + I)*sin(2*b*x +
 2*a) + 2*c + 1)/(c^2 + d^2 + 2*c + 1) + 1) - 2*I*b*x*dilog(-(c^2 + d^2 - (
c^2 + 2*I*(c - 1)*d - d^2 - 2*c + 1)*cos(2*b*x + 2*a) + (-I*c^2 + 2*(c - 1)
*d + I*d^2 + 2*I*c - I)*sin(2*b*x + 2*a) - 2*c + 1)/(c^2 + d^2 - 2*c + 1) +
 1) + 2*I*b*x*dilog(-(c^2 + d^2 - (c^2 - 2*I*(c - 1)*d - d^2 - 2*c + 1)*cos
(2*b*x + 2*a) + (I*c^2 + 2*(c - 1)*d - I*d^2 - 2*I*c + I)*sin(2*b*x + 2*a)
- 2*c + 1)/(c^2 + d^2 - 2*c + 1) + 1) - 2*a^2*log(1/2*c^2 + I*(c + 1)*d - 1
/2*d^2 - 1/2*(c^2 + d^2 + 2*c + 1)*cos(2*b*x + 2*a) + 1/2*(I*c^2 + I*d^2 +
2*I*c + I)*sin(2*b*x + 2*a) + c + 1/2) + 2*a^2*log(1/2*c^2 + I*(c - 1)*d -
1/2*d^2 - 1/2*(c^2 + d^2 - 2*c + 1)*cos(2*b*x + 2*a) + 1/2*(I*c^2 + I*d^2 -
 2*I*c + I)*sin(2*b*x + 2*a) - c + 1/2) - 2*a^2*log(-1/2*c^2 + I*(c + 1)*d
+ 1/2*d^2 + 1/2*(c^2 + d^2 + 2*c + 1)*cos(2*b*x + 2*a) + 1/2*(I*c^2 + I*d^2
 + 2*I*c + I)*sin(2*b*x + 2*a) - c - 1/2) + 2*a^2*log(-1/2*c^2 + I*(c - 1)*
d + 1/2*d^2 + 1/2*(c^2 + d^2 - 2*c + 1)*cos(2*b*x + 2*a) + 1/2*(I*c^2 + I*d
^2 - 2*I*c + I)*sin(2*b*x + 2*a) + c - 1/2) - 2*(b^2*x^2 - a^2)*log((c^2 +
d^2 - (c^2 + 2*I*(c + 1)*d - d^2 + 2*c + 1)*cos(2*b*x + 2*a) + (-I*c^2 + 2*
(c + 1)*d + I*d^2 - 2*I*c - I)*sin(2*b*x + 2*a) + 2*c + 1)/(c^2 + d^2 + 2*c
 + 1)) - 2*(b^2*x^2 - a^2)*log((c^2 + d^2 - (c^2 - 2*I*(c + 1)*d - d^2 + 2*
c + 1)*cos(2*b*x + 2*a) + (I*c^2 + 2*(c + 1)*d - I*d^2 + 2*I*c + I)*sin(2*b
*x + 2*a) + 2*c + 1)/(c^2 + d^2 + 2*c + 1)) + 2*(b^2*x^2 - a^2)*log((c^2 +
d^2 - (c^2 + 2*I*(c - 1)*d - d^2 - 2*c + 1)*cos(2*b*x + 2*a) + (-I*c^2 + 2*
(c - 1)*d + I*d^2 + 2*I*c - I)*sin(2*b*x + 2*a) - 2*c + 1)/(c^2 + d^2 - 2*c
 + 1)) + 2*(b^2*x^2 - a^2)*log((c^2 + d^2 - (c^2 - 2*I*(c - 1)*d - d^2 - 2*
c + 1)*cos(2*b*x + 2*a) + (I*c^2 + 2*(c - 1)*d - I*d^2 - 2*I*c + I)*sin(2*b
*x + 2*a) - 2*c + 1)/(c^2 + d^2 - 2*c + 1)) - polylog(3, ((c^2 + 2*I*(c + 1
)*d - d^2 + 2*c + 1)*cos(2*b*x + 2*a) + (I*c^2 - 2*(c + 1)*d - I*d^2 + 2*I*
c + I)*sin(2*b*x + 2*a))/(c^2 + d^2 + 2*c + 1)) - polylog(3, ((c^2 - 2*I*(c
 + 1)*d - d^2 + 2*c + 1)*cos(2*b*x + 2*a) + (-I*c^2 - 2*(c + 1)*d + I*d^2 -
 2*I*c - I)*sin(2*b*x + 2*a))/(c^2 + d^2 + 2*c + 1)) + polylog(3, ((c^2 + 2
*I*(c - 1)*d - d^2 - 2*c + 1)*cos(2*b*x + 2*a) + (I*c^2 - 2*(c - 1)*d - I*d
^2 - 2*I*c + I)*sin(2*b*x + 2*a))/(c^2 + d^2 - 2*c + 1)) + polylog(3, ((c^2
 - 2*I*(c - 1)*d - d^2 - 2*c + 1)*cos(2*b*x + 2*a) + (-I*c^2 - 2*(c - 1)*d
+ I*d^2 + 2*I*c - I)*sin(2*b*x + 2*a))/(c^2 + d^2 - 2*c + 1)))/b^2
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int x \operatorname{arcoth}\left(d \cot\left(bx + a\right) + c\right)\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*arccoth(c+d*cot(b*x+a)),x, algorithm="giac")
```

```
[Out] integrate(x*arccoth(d*cot(b*x + a) + c), x)
```

**maple [C]** time = 4.92, size = 6348, normalized size = 21.67

output too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x*arccoth(c+d*cot(b*x+a)),x)
```

```
[Out] result too large to display
```

**maxima [F]** time = 0.00, size = 0, normalized size = 0.00

$$-2\,bd \int \frac{}{c^4 + d^4 + 2\left(c^2+1\right)d^2 + \left(c^4 + d^4 + 2\left(c^2+1\right)d^2 - 2\,c^2 + 1\right)\cos\left(4\,bx + 4\,a\right)^2 + 4\left(c^4 + d^4 + 2\left(c^2-1\right)d\right.}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*arccoth(c+d*cot(b*x+a)),x, algorithm="maxima")
```

```
[Out] -2*b*d*integrate((2*(c^2 + d^2 - 1)*x^2*cos(2*b*x + 2*a)^2 + 2*c*d*x^2*sin(
2*b*x + 2*a) + 2*(c^2 + d^2 - 1)*x^2*sin(2*b*x + 2*a)^2 - (c^2 - d^2 - 1)*x
^2*cos(2*b*x + 2*a) - (2*c*d*x^2*sin(2*b*x + 2*a) + (c^2 - d^2 - 1)*x^2*cos
(2*b*x + 2*a))*cos(4*b*x + 4*a) + (2*c*d*x^2*cos(2*b*x + 2*a) - (c^2 - d^2
- 1)*x^2*sin(2*b*x + 2*a))*sin(4*b*x + 4*a))/(c^4 + d^4 + 2*(c^2 + 1)*d^2 +
 (c^4 + d^4 + 2*(c^2 + 1)*d^2 - 2*c^2 + 1)*cos(4*b*x + 4*a)^2 + 4*(c^4 + d^
4 + 2*(c^2 - 1)*d^2 - 2*c^2 + 1)*cos(2*b*x + 2*a)^2 + (c^4 + d^4 + 2*(c^2 +
 1)*d^2 - 2*c^2 + 1)*sin(4*b*x + 4*a)^2 + 4*(c^4 + d^4 + 2*(c^2 - 1)*d^2 -
2*c^2 + 1)*sin(2*b*x + 2*a)^2 - 2*c^2 + 2*(c^4 + d^4 - 2*(3*c^2 - 1)*d^2 -
2*c^2 - 2*(c^4 - d^4 - 2*c^2 + 1)*cos(2*b*x + 2*a) - 4*(c*d^3 + (c^3 - c)*d
)*sin(2*b*x + 2*a) + 1)*cos(4*b*x + 4*a) - 4*(c^4 - d^4 - 2*c^2 + 1)*cos(2*
b*x + 2*a) + 4*(2*c*d^3 - 2*(c^3 - c)*d + 2*(c*d^3 + (c^3 - c)*d)*cos(2*b*x
 + 2*a) - (c^4 - d^4 - 2*c^2 + 1)*sin(2*b*x + 2*a))*sin(4*b*x + 4*a) + 8*(c
*d^3 + (c^3 - c)*d)*sin(2*b*x + 2*a) + 1), x) + 1/8*x^2*log((c^2 + d^2 + 2*
c + 1)*cos(2*b*x + 2*a)^2 + 4*(c + 1)*d*sin(2*b*x + 2*a) + (c^2 + d^2 + 2*c
 + 1)*sin(2*b*x + 2*a)^2 + c^2 + d^2 - 2*(c^2 - d^2 + 2*c + 1)*cos(2*b*x +
2*a) + 2*c + 1) - 1/8*x^2*log((c^2 + d^2 - 2*c + 1)*cos(2*b*x + 2*a)^2 + 4*
(c - 1)*d*sin(2*b*x + 2*a) + (c^2 + d^2 - 2*c + 1)*sin(2*b*x + 2*a)^2 + c^2
 + d^2 - 2*(c^2 - d^2 - 2*c + 1)*cos(2*b*x + 2*a) - 2*c + 1)
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.00

$$\int x\,\mathrm{acoth}\left(c+d\cot\left(a+b\,x\right)\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x*acoth(c + d*cot(a + b*x)),x)
```

```
[Out] int(x*acoth(c + d*cot(a + b*x)), x)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int x\,\mathrm{acoth}\left(c+d\cot\left(a+bx\right)\right)dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*acoth(c+d*cot(b*x+a)),x)
```

```
[Out] Integral(x*acoth(c + d*cot(a + b*x)), x)
```

# 3.255 $\int \coth^{-1}(c + d\cot(a + bx))\,dx$

**Optimal**. Leaf size=194

$$-\frac{i\text{Li}_2\left(\frac{(-c-id+1)e^{2ia+2ibx}}{-c+id+1}\right)}{4b}+\frac{i\text{Li}_2\left(\frac{(c+id+1)e^{2ia+2ibx}}{c-id+1}\right)}{4b}+\frac{1}{2}x\log\left(1-\frac{(-c-id+1)e^{2ia+2ibx}}{-c+id+1}\right)-\frac{1}{2}x\log\left(1-\frac{(c+id+1)e^{2ia-}}{c-id+1}\right.$$

```
[Out] x*arccoth(c+d*cot(b*x+a))+1/2*x*ln(1-(1-c-I*d)*exp(2*I*a+2*I*b*x)/(1-c+I*d)
)-1/2*x*ln(1-(1+c+I*d)*exp(2*I*a+2*I*b*x)/(1+c-I*d))-1/4*I*polylog(2,(1-c-I
*d)*exp(2*I*a+2*I*b*x)/(1-c+I*d))/b+1/4*I*polylog(2,(1+c+I*d)*exp(2*I*a+2*I
*b*x)/(1+c-I*d))/b
```

**Rubi [A]** time = 0.25, antiderivative size = 194, normalized size of antiderivative = 1.00, number of steps used = 7, number of rules used = 4, integrand size = 11, $\frac{\text{number of rules}}{\text{integrand size}} = 0.364$, Rules used = {6262, 2190, 2279, 2391}

$$-\frac{i\text{PolyLog}\left(2,\frac{(-c-id+1)e^{2ia+2ibx}}{-c+id+1}\right)}{4b}+\frac{i\text{PolyLog}\left(2,\frac{(c+id+1)e^{2ia+2ibx}}{c-id+1}\right)}{4b}+\frac{1}{2}x\log\left(1-\frac{(-c-id+1)e^{2ia+2ibx}}{-c+id+1}\right)-\frac{1}{2}x\log\left(1-\right.$$

Antiderivative was successfully verified.

```
[In] Int[ArcCoth[c + d*Cot[a + b*x]],x]
```

```
[Out] x*ArcCoth[c + d*Cot[a + b*x]] + (x*Log[1 - ((1 - c - I*d)*E^((2*I)*a + (2*I
)*b*x))/(1 - c + I*d)])/2 - (x*Log[1 - ((1 + c + I*d)*E^((2*I)*a + (2*I)*b*
x))/(1 + c - I*d)])/2 - ((I/4)*PolyLog[2, ((1 - c - I*d)*E^((2*I)*a + (2*I)
*b*x))/(1 - c + I*d)])/b + ((I/4)*PolyLog[2, ((1 + c + I*d)*E^((2*I)*a + (2
*I)*b*x))/(1 + c - I*d)])/b
```

Rule 2190

```
Int[(((F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m_.))/
((a_) + (b_.)*((F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)), x_Symbol] :> Simp
[((c + d*x)^m*Log[1 + (b*(F^(g*(e + f*x)))^n)/a])/(b*f*g*n*Log[F]), x] - Di
st[(d*m)/(b*f*g*n*Log[F]), Int[(c + d*x)^(m - 1)*Log[1 + (b*(F^(g*(e + f*x)
))^n)/a], x], x] /; FreeQ[{F, a, b, c, d, e, f, g, n}, x] && IGtQ[m, 0]
```

Rule 2279

```
Int[Log[(a_) + (b_.)*((F_)^((e_.)*((c_.) + (d_.)*(x_))))^(n_.)], x_Symbol]
:> Dist[1/(d*e*n*Log[F]), Subst[Int[Log[a + b*x]/x, x], x, (F^(e*(c + d*x))
)^n], x] /; FreeQ[{F, a, b, c, d, e, n}, x] && GtQ[a, 0]
```

Rule 2391

```
Int[Log[(c_.)*((d_) + (e_.)*(x_)^(n_.))]/(x_), x_Symbol] :> -Simp[PolyLog[2
, -(c*e*x^n)]/n, x] /; FreeQ[{c, d, e, n}, x] && EqQ[c*d, 1]
```

Rule 6262

```
Int[ArcCoth[(c_.) + Cot[(a_.) + (b_.)*(x_)]*(d_.)], x_Symbol] :> Simp[x*Arc
Coth[c + d*Cot[a + b*x]], x] + (-Dist[I*b*(1 - c - I*d), Int[(x*E^(2*I*a +
2*I*b*x))/(1 - c + I*d - (1 - c - I*d)*E^(2*I*a + 2*I*b*x)), x], x] + Dist[
I*b*(1 + c + I*d), Int[(x*E^(2*I*a + 2*I*b*x))/(1 + c - I*d - (1 + c + I*d)
*E^(2*I*a + 2*I*b*x)), x], x]) /; FreeQ[{a, b, c, d}, x] && NeQ[(c - I*d)^2
, 1]
```

Rubi steps

$$\int \coth^{-1}(c + d\cot(a + bx))\,dx = x\coth^{-1}(c + d\cot(a + bx)) + (b(i(1 + c) - d))\int \frac{e^{2ia+2ibx}x}{1 + c - id + (-1 - c - id)e^{2ia+2\cdots}}$$

$$= x\coth^{-1}(c + d\cot(a + bx)) + \frac{1}{2}x\log\left(1 - \frac{(1 - c - id)e^{2ia+2ibx}}{1 - c + id}\right) - \frac{1}{2}x\log\left(1 - \frac{(1\cdots}{\cdots}\right.$$

$$= x\coth^{-1}(c + d\cot(a + bx)) + \frac{1}{2}x\log\left(1 - \frac{(1 - c - id)e^{2ia+2ibx}}{1 - c + id}\right) - \frac{1}{2}x\log\left(1 - \frac{(1\cdots}{\cdots}\right.$$

$$= x\coth^{-1}(c + d\cot(a + bx)) + \frac{1}{2}x\log\left(1 - \frac{(1 - c - id)e^{2ia+2ibx}}{1 - c + id}\right) - \frac{1}{2}x\log\left(1 - \frac{(1\cdots}{\cdots}\right.$$

**Mathematica** [B] time = 13.10, size = 4463, normalized size = 23.01

Result too large to show

Warning: Unable to verify antiderivative.

```
[In] Integrate[ArcCoth[c + d*Cot[a + b*x]],x]
```

```
[Out] x*ArcCoth[c + d*Cot[a + b*x]] - (d*(a*Log[-(Sec[(a + b*x)/2]^2*(d*Cos[a + b
*x] + (-1 + c)*Sin[a + b*x]))] - a*Log[-(Sec[(a + b*x)/2]^2*(d*Cos[a + b*x]
 + Sin[a + b*x] + c*Sin[a + b*x]))] - (a + b*x)*Log[-((-1 + c + Sqrt[1 - 2*
c + c^2 + d^2])/d) + Tan[(a + b*x)/2]] - I*Log[(d*(-I + Tan[(a + b*x)/2]))/
(-1 + c - I*d + Sqrt[1 - 2*c + c^2 + d^2])]*Log[-((-1 + c + Sqrt[1 - 2*c +
c^2 + d^2])/d) + Tan[(a + b*x)/2]] + I*Log[(d*(I + Tan[(a + b*x)/2]))/(-1 +
 c + I*d + Sqrt[1 - 2*c + c^2 + d^2])]*Log[-((-1 + c + Sqrt[1 - 2*c + c^2 +
 d^2])/d) + Tan[(a + b*x)/2]] + (a + b*x)*Log[-((1 + c + Sqrt[1 + 2*c + c^2
 + d^2])/d) + Tan[(a + b*x)/2]] + I*Log[(d*(-I + Tan[(a + b*x)/2]))/(1 + c
- I*d + Sqrt[1 + 2*c + c^2 + d^2])]*Log[-((1 + c + Sqrt[1 + 2*c + c^2 + d^2
])/d) + Tan[(a + b*x)/2]] - I*Log[(d*(I + Tan[(a + b*x)/2]))/(1 + c + I*d +
 Sqrt[1 + 2*c + c^2 + d^2])]*Log[-((1 + c + Sqrt[1 + 2*c + c^2 + d^2])/d) +
 Tan[(a + b*x)/2]] - (a + b*x)*Log[(1 - c + Sqrt[1 - 2*c + c^2 + d^2] + d*T
an[(a + b*x)/2])/d] - I*Log[-((d*(-I + Tan[(a + b*x)/2]))/(1 - c + I*d + Sq
rt[1 - 2*c + c^2 + d^2]))]*Log[(1 - c + Sqrt[1 - 2*c + c^2 + d^2] + d*Tan[(
a + b*x)/2])/d] + I*Log[-((d*(I + Tan[(a + b*x)/2]))/(1 - c - I*d + Sqrt[1
- 2*c + c^2 + d^2]))]*Log[(1 - c + Sqrt[1 - 2*c + c^2 + d^2] + d*Tan[(a + b
*x)/2])/d] + (a + b*x)*Log[(-1 - c + Sqrt[1 + 2*c + c^2 + d^2] + d*Tan[(a +
 b*x)/2])/d] + I*Log[-((d*(-I + Tan[(a + b*x)/2]))/(-1 - c + I*d + Sqrt[1 +
 2*c + c^2 + d^2]))]*Log[(-1 - c + Sqrt[1 + 2*c + c^2 + d^2] + d*Tan[(a + b
*x)/2])/d] - I*Log[-((d*(I + Tan[(a + b*x)/2]))/(-1 - c - I*d + Sqrt[1 + 2*
c + c^2 + d^2]))]*Log[(-1 - c + Sqrt[1 + 2*c + c^2 + d^2] + d*Tan[(a + b*x)
/2])/d] - I*PolyLog[2, (-1 + c + Sqrt[1 - 2*c + c^2 + d^2] - d*Tan[(a + b*x
)/2])/(-1 + c - I*d + Sqrt[1 - 2*c + c^2 + d^2])] + I*PolyLog[2, (-1 + c +
Sqrt[1 - 2*c + c^2 + d^2] - d*Tan[(a + b*x)/2])/(-1 + c + I*d + Sqrt[1 - 2*
c + c^2 + d^2])] - I*PolyLog[2, (1 + c - Sqrt[1 + 2*c + c^2 + d^2] - d*Tan[
(a + b*x)/2])/(1 + c + I*d - Sqrt[1 + 2*c + c^2 + d^2])] + I*PolyLog[2, (1
+ c + Sqrt[1 + 2*c + c^2 + d^2] - d*Tan[(a + b*x)/2])/(1 + c - I*d + Sqrt[1
 + 2*c + c^2 + d^2])] - I*PolyLog[2, (1 + c + Sqrt[1 + 2*c + c^2 + d^2] - d
*Tan[(a + b*x)/2])/(1 + c + I*d + Sqrt[1 + 2*c + c^2 + d^2])] + I*PolyLog[2
, (1 - c + Sqrt[1 - 2*c + c^2 + d^2] + d*Tan[(a + b*x)/2])/(1 - c - I*d + S
qrt[1 - 2*c + c^2 + d^2])] - I*PolyLog[2, (1 - c + Sqrt[1 - 2*c + c^2 + d^2
] + d*Tan[(a + b*x)/2])/(1 - c + I*d + Sqrt[1 - 2*c + c^2 + d^2])] + I*Poly
Log[2, (-1 - c + Sqrt[1 + 2*c + c^2 + d^2] + d*Tan[(a + b*x)/2])/(-1 - c +
I*d + Sqrt[1 + 2*c + c^2 + d^2])])*((2*a)/(b*(1 - c^2 - d^2 - Cos[2*(a + b*
x)] + c^2*Cos[2*(a + b*x)] - d^2*Cos[2*(a + b*x)] - 2*c*d*Sin[2*(a + b*x)])
```

```
) - (2*(a + b*x))/(b*(1 - c^2 - d^2 - Cos[2*(a + b*x)] + c^2*Cos[2*(a + b*x
)] - d^2*Cos[2*(a + b*x)] - 2*c*d*Sin[2*(a + b*x)]))))/(-Log[-((-1 + c + Sq
rt[1 - 2*c + c^2 + d^2])/d) + Tan[(a + b*x)/2]] + Log[-((1 + c + Sqrt[1 + 2
*c + c^2 + d^2])/d) + Tan[(a + b*x)/2]] - Log[(1 - c + Sqrt[1 - 2*c + c^2 +
 d^2] + d*Tan[(a + b*x)/2])/d] + Log[(-1 - c + Sqrt[1 + 2*c + c^2 + d^2] +
d*Tan[(a + b*x)/2])/d] - ((I/2)*Log[-((-1 + c + Sqrt[1 - 2*c + c^2 + d^2])/
d) + Tan[(a + b*x)/2]]*Sec[(a + b*x)/2]^2)/(-I + Tan[(a + b*x)/2]) + ((I/2)
*Log[-((1 + c + Sqrt[1 + 2*c + c^2 + d^2])/d) + Tan[(a + b*x)/2]]*Sec[(a +
b*x)/2]^2)/(-I + Tan[(a + b*x)/2]) - ((I/2)*Log[(1 - c + Sqrt[1 - 2*c + c^2
 + d^2] + d*Tan[(a + b*x)/2])/d]*Sec[(a + b*x)/2]^2)/(-I + Tan[(a + b*x)/2]
) + ((I/2)*Log[(-1 - c + Sqrt[1 + 2*c + c^2 + d^2] + d*Tan[(a + b*x)/2])/d]
*Sec[(a + b*x)/2]^2)/(-I + Tan[(a + b*x)/2]) + ((I/2)*Log[-((-1 + c + Sqrt[
1 - 2*c + c^2 + d^2])/d) + Tan[(a + b*x)/2]]*Sec[(a + b*x)/2]^2)/(I + Tan[(
a + b*x)/2]) - ((I/2)*Log[-((1 + c + Sqrt[1 + 2*c + c^2 + d^2])/d) + Tan[(a
 + b*x)/2]]*Sec[(a + b*x)/2]^2)/(I + Tan[(a + b*x)/2]) + ((I/2)*Log[(1 - c
+ Sqrt[1 - 2*c + c^2 + d^2] + d*Tan[(a + b*x)/2])/d]*Sec[(a + b*x)/2]^2)/(I
 + Tan[(a + b*x)/2]) - ((I/2)*Log[(-1 - c + Sqrt[1 + 2*c + c^2 + d^2] + d*T
an[(a + b*x)/2])/d]*Sec[(a + b*x)/2]^2)/(I + Tan[(a + b*x)/2]) - ((a + b*x)
*Sec[(a + b*x)/2]^2)/(2*(-((-1 + c + Sqrt[1 - 2*c + c^2 + d^2])/d) + Tan[(a
 + b*x)/2])) - ((I/2)*Log[(d*(-I + Tan[(a + b*x)/2]))/(-1 + c - I*d + Sqrt[
1 - 2*c + c^2 + d^2])]*Sec[(a + b*x)/2]^2)/(-((-1 + c + Sqrt[1 - 2*c + c^2
+ d^2])/d) + Tan[(a + b*x)/2]) + ((I/2)*Log[(d*(I + Tan[(a + b*x)/2]))/(-1
+ c + I*d + Sqrt[1 - 2*c + c^2 + d^2])]*Sec[(a + b*x)/2]^2)/(-((-1 + c + Sq
rt[1 - 2*c + c^2 + d^2])/d) + Tan[(a + b*x)/2]) + ((a + b*x)*Sec[(a + b*x)/
2]^2)/(2*(-((1 + c + Sqrt[1 + 2*c + c^2 + d^2])/d) + Tan[(a + b*x)/2])) + (
(I/2)*Log[(d*(-I + Tan[(a + b*x)/2]))/(1 + c - I*d + Sqrt[1 + 2*c + c^2 + d
^2])]*Sec[(a + b*x)/2]^2)/(-((1 + c + Sqrt[1 + 2*c + c^2 + d^2])/d) + Tan[(
a + b*x)/2]) - ((I/2)*Log[(d*(I + Tan[(a + b*x)/2]))/(1 + c + I*d + Sqrt[1
+ 2*c + c^2 + d^2])]*Sec[(a + b*x)/2]^2)/(-((1 + c + Sqrt[1 + 2*c + c^2 + d
^2])/d) + Tan[(a + b*x)/2]) - ((I/2)*d*Log[1 - (-1 + c + Sqrt[1 - 2*c + c^2
 + d^2] - d*Tan[(a + b*x)/2])/(-1 + c - I*d + Sqrt[1 - 2*c + c^2 + d^2])]*S
ec[(a + b*x)/2]^2)/(-1 + c + Sqrt[1 - 2*c + c^2 + d^2] - d*Tan[(a + b*x)/2]
) + ((I/2)*d*Log[1 - (-1 + c + Sqrt[1 - 2*c + c^2 + d^2] - d*Tan[(a + b*x)/
2])/(-1 + c + I*d + Sqrt[1 - 2*c + c^2 + d^2])]*Sec[(a + b*x)/2]^2)/(-1 + c
 + Sqrt[1 - 2*c + c^2 + d^2] - d*Tan[(a + b*x)/2]) - ((I/2)*d*Log[1 - (1 +
c - Sqrt[1 + 2*c + c^2 + d^2] - d*Tan[(a + b*x)/2])/(1 + c + I*d - Sqrt[1 +
 2*c + c^2 + d^2])]*Sec[(a + b*x)/2]^2)/(1 + c - Sqrt[1 + 2*c + c^2 + d^2]
- d*Tan[(a + b*x)/2]) + ((I/2)*d*Log[1 - (1 + c + Sqrt[1 + 2*c + c^2 + d^2]
 - d*Tan[(a + b*x)/2])/(1 + c - I*d + Sqrt[1 + 2*c + c^2 + d^2])]*Sec[(a +
b*x)/2]^2)/(1 + c + Sqrt[1 + 2*c + c^2 + d^2] - d*Tan[(a + b*x)/2]) - ((I/2
)*d*Log[1 - (1 + c + Sqrt[1 + 2*c + c^2 + d^2] - d*Tan[(a + b*x)/2])/(1 + c
 + I*d + Sqrt[1 + 2*c + c^2 + d^2])]*Sec[(a + b*x)/2]^2)/(1 + c + Sqrt[1 +
2*c + c^2 + d^2] - d*Tan[(a + b*x)/2]) - (d*(a + b*x)*Sec[(a + b*x)/2]^2)/(
2*(1 - c + Sqrt[1 - 2*c + c^2 + d^2] + d*Tan[(a + b*x)/2])) - ((I/2)*d*Log[
-((d*(-I + Tan[(a + b*x)/2]))/(1 - c + I*d + Sqrt[1 - 2*c + c^2 + d^2]))]*S
ec[(a + b*x)/2]^2)/(1 - c + Sqrt[1 - 2*c + c^2 + d^2] + d*Tan[(a + b*x)/2])
 + ((I/2)*d*Log[-((d*(I + Tan[(a + b*x)/2]))/(1 - c - I*d + Sqrt[1 - 2*c +
c^2 + d^2]))]*Sec[(a + b*x)/2]^2)/(1 - c + Sqrt[1 - 2*c + c^2 + d^2] + d*Ta
n[(a + b*x)/2]) - ((I/2)*d*Log[1 - (1 - c + Sqrt[1 - 2*c + c^2 + d^2] + d*T
an[(a + b*x)/2])/(1 - c - I*d + Sqrt[1 - 2*c + c^2 + d^2])]*Sec[(a + b*x)/2
]^2)/(1 - c + Sqrt[1 - 2*c + c^2 + d^2] + d*Tan[(a + b*x)/2]) + ((I/2)*d*Lo
g[1 - (1 - c + Sqrt[1 - 2*c + c^2 + d^2] + d*Tan[(a + b*x)/2])/(1 - c + I*d
 + Sqrt[1 - 2*c + c^2 + d^2])]*Sec[(a + b*x)/2]^2)/(1 - c + Sqrt[1 - 2*c +
c^2 + d^2] + d*Tan[(a + b*x)/2]) + (d*(a + b*x)*Sec[(a + b*x)/2]^2)/(2*(-1
- c + Sqrt[1 + 2*c + c^2 + d^2] + d*Tan[(a + b*x)/2])) + ((I/2)*d*Log[-((d*
(-I + Tan[(a + b*x)/2]))/(-1 - c + I*d + Sqrt[1 + 2*c + c^2 + d^2]))]*Sec[(
a + b*x)/2]^2)/(-1 - c + Sqrt[1 + 2*c + c^2 + d^2] + d*Tan[(a + b*x)/2]) -
((I/2)*d*Log[-((d*(I + Tan[(a + b*x)/2]))/(-1 - c - I*d + Sqrt[1 + 2*c + c^
2 + d^2]))]*Sec[(a + b*x)/2]^2)/(-1 - c + Sqrt[1 + 2*c + c^2 + d^2] + d*Tan
```

```
[(a + b*x)/2]) - ((I/2)*d*Log[1 - (-1 - c + Sqrt[1 + 2*c + c^2 + d^2] + d*T
an[(a + b*x)/2])/(-1 - c + I*d + Sqrt[1 + 2*c + c^2 + d^2])]*Sec[(a + b*x)/
2]^2)/(-1 - c + Sqrt[1 + 2*c + c^2 + d^2] + d*Tan[(a + b*x)/2]) - (a*Cos[(a
 + b*x)/2]^2*(-(Sec[(a + b*x)/2]^2*((-1 + c)*Cos[a + b*x] - d*Sin[a + b*x])
) - Sec[(a + b*x)/2]^2*(d*Cos[a + b*x] + (-1 + c)*Sin[a + b*x])*Tan[(a + b*
x)/2]))/(d*Cos[a + b*x] + (-1 + c)*Sin[a + b*x]) + (a*Cos[(a + b*x)/2]^2*(-
(Sec[(a + b*x)/2]^2*(Cos[a + b*x] + c*Cos[a + b*x] - d*Sin[a + b*x])) - Sec
[(a + b*x)/2]^2*(d*Cos[a + b*x] + Sin[a + b*x] + c*Sin[a + b*x])*Tan[(a + b
*x)/2]))/(d*Cos[a + b*x] + Sin[a + b*x] + c*Sin[a + b*x]))
```

**fricas [B]** time = 0.75, size = 1098, normalized size = 5.66

result too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(c+d*cot(b*x+a)),x, algorithm="fricas")
```

```
[Out] 1/8*(4*b*x*log((d*cos(2*b*x + 2*a) + (c + 1)*sin(2*b*x + 2*a) + d)/(d*cos(2
*b*x + 2*a) + (c - 1)*sin(2*b*x + 2*a) + d)) + 2*a*log(1/2*c^2 + I*(c + 1)*
d - 1/2*d^2 - 1/2*(c^2 + d^2 + 2*c + 1)*cos(2*b*x + 2*a) + 1/2*(I*c^2 + I*d
^2 + 2*I*c + I)*sin(2*b*x + 2*a) + c + 1/2) - 2*a*log(1/2*c^2 + I*(c - 1)*d
 - 1/2*d^2 - 1/2*(c^2 + d^2 - 2*c + 1)*cos(2*b*x + 2*a) + 1/2*(I*c^2 + I*d^
2 - 2*I*c + I)*sin(2*b*x + 2*a) - c + 1/2) + 2*a*log(-1/2*c^2 + I*(c + 1)*d
 + 1/2*d^2 + 1/2*(c^2 + d^2 + 2*c + 1)*cos(2*b*x + 2*a) + 1/2*(I*c^2 + I*d^
2 + 2*I*c + I)*sin(2*b*x + 2*a) - c - 1/2) - 2*a*log(-1/2*c^2 + I*(c - 1)*d
 + 1/2*d^2 + 1/2*(c^2 + d^2 - 2*c + 1)*cos(2*b*x + 2*a) + 1/2*(I*c^2 + I*d^
2 - 2*I*c + I)*sin(2*b*x + 2*a) + c - 1/2) - 2*(b*x + a)*log((c^2 + d^2 - (
c^2 + 2*I*(c + 1)*d - d^2 + 2*c + 1)*cos(2*b*x + 2*a) + (-I*c^2 + 2*(c + 1)
*d + I*d^2 - 2*I*c - I)*sin(2*b*x + 2*a) + 2*c + 1)/(c^2 + d^2 + 2*c + 1))
- 2*(b*x + a)*log((c^2 + d^2 - (c^2 - 2*I*(c + 1)*d - d^2 + 2*c + 1)*cos(2*
b*x + 2*a) + (I*c^2 + 2*(c + 1)*d - I*d^2 + 2*I*c + I)*sin(2*b*x + 2*a) + 2
*c + 1)/(c^2 + d^2 + 2*c + 1)) + 2*(b*x + a)*log((c^2 + d^2 - (c^2 + 2*I*(c
 - 1)*d - d^2 - 2*c + 1)*cos(2*b*x + 2*a) + (-I*c^2 + 2*(c - 1)*d + I*d^2 +
 2*I*c - I)*sin(2*b*x + 2*a) - 2*c + 1)/(c^2 + d^2 - 2*c + 1)) + 2*(b*x + a
)*log((c^2 + d^2 - (c^2 - 2*I*(c - 1)*d - d^2 - 2*c + 1)*cos(2*b*x + 2*a) +
 (I*c^2 + 2*(c - 1)*d - I*d^2 - 2*I*c + I)*sin(2*b*x + 2*a) - 2*c + 1)/(c^2
 + d^2 - 2*c + 1)) + I*dilog(-(c^2 + d^2 - (c^2 + 2*I*(c + 1)*d - d^2 + 2*c
 + 1)*cos(2*b*x + 2*a) + (-I*c^2 + 2*(c + 1)*d + I*d^2 - 2*I*c - I)*sin(2*b
*x + 2*a) + 2*c + 1)/(c^2 + d^2 + 2*c + 1) + 1) - I*dilog(-(c^2 + d^2 - (c^
2 - 2*I*(c + 1)*d - d^2 + 2*c + 1)*cos(2*b*x + 2*a) + (I*c^2 + 2*(c + 1)*d
- I*d^2 + 2*I*c + I)*sin(2*b*x + 2*a) + 2*c + 1)/(c^2 + d^2 + 2*c + 1) + 1)
 - I*dilog(-(c^2 + d^2 - (c^2 + 2*I*(c - 1)*d - d^2 - 2*c + 1)*cos(2*b*x +
2*a) + (-I*c^2 + 2*(c - 1)*d + I*d^2 + 2*I*c - I)*sin(2*b*x + 2*a) - 2*c +
1)/(c^2 + d^2 - 2*c + 1) + 1) + I*dilog(-(c^2 + d^2 - (c^2 - 2*I*(c - 1)*d
- d^2 - 2*c + 1)*cos(2*b*x + 2*a) + (I*c^2 + 2*(c - 1)*d - I*d^2 - 2*I*c +
I)*sin(2*b*x + 2*a) - 2*c + 1)/(c^2 + d^2 - 2*c + 1) + 1))/b
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \operatorname{arccoth}\left(d\cot\left(bx+a\right)+c\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(c+d*cot(b*x+a)),x, algorithm="giac")
```

```
[Out] integrate(arccoth(d*cot(b*x + a) + c), x)
```

**maple [B]** time = 0.58, size = 629, normalized size = 3.24

$$-\frac{\operatorname{arccoth}\left(c+d\cot\left(bx+a\right)\right)\pi}{2b}+\frac{\operatorname{arccoth}\left(c+d\cot\left(bx+a\right)\right)\operatorname{arccot}\left(\cot\left(bx+a\right)\right)}{b}+\frac{\arctan\left(\frac{c+d\cot(bx+a)}{d}-\frac{c}{d}\right)\ln\left(c\right.}{2b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(arccoth(c+d*cot(b*x+a)),x)
```

```
[Out] -1/2/b*arccoth(c+d*cot(b*x+a))*Pi+1/b*arccoth(c+d*cot(b*x+a))*arccot(cot(b*
x+a))+1/2/b*arctan((c+d*cot(b*x+a))/d-c/d)*ln(d*((c+d*cot(b*x+a))/d-c/d)+c+
1)-1/2/b*arctan((c+d*cot(b*x+a))/d-c/d)*ln(d*((c+d*cot(b*x+a))/d-c/d)+c-1)-
1/4*I/b*ln(d*((c+d*cot(b*x+a))/d-c/d)+c-1)*ln((I*d-d*((c+d*cot(b*x+a))/d-c/
d))/(I*d+c-1))+1/4*I/b*ln(d*((c+d*cot(b*x+a))/d-c/d)+c-1)*ln((I*d+d*((c+d*c
ot(b*x+a))/d-c/d))/(1-c+I*d))-1/4*I/b*dilog((I*d-d*((c+d*cot(b*x+a))/d-c/d)
)/(I*d+c-1))+1/4*I/b*dilog((I*d+d*((c+d*cot(b*x+a))/d-c/d))/(1-c+I*d))+1/4*
I/b*ln(d*((c+d*cot(b*x+a))/d-c/d)+c+1)*ln((I*d-d*((c+d*cot(b*x+a))/d-c/d))/
(1+c+I*d))-1/4*I/b*ln(d*((c+d*cot(b*x+a))/d-c/d)+c+1)*ln((I*d+d*((c+d*cot(b
*x+a))/d-c/d))/(I*d-c-1))+1/4*I/b*dilog((I*d-d*((c+d*cot(b*x+a))/d-c/d))/(1
+c+I*d))-1/4*I/b*dilog((I*d+d*((c+d*cot(b*x+a))/d-c/d))/(I*d-c-1))
```

**maxima [B]** time = 0.54, size = 392, normalized size = 2.02

$$\frac{4\,(bx+a)\,\mathrm{arcoth}\left(c+\frac{d}{\tan(bx+a)}\right)+\left(\arctan\left(\frac{(c+1)d+\left(c^2+2\,c+1\right)\tan(bx+a)}{c^2+d^2+2\,c+1},\frac{(c+1)d\tan(bx+a)+d^2}{c^2+d^2+2\,c+1}\right)-\arctan\left(\frac{(c-1)d+\left(c^2-2\,c+1\right.}{c^2+d^2-2}\right.\right.}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(c+d*cot(b*x+a)),x, algorithm="maxima")
```

```
[Out] 1/4*(4*(b*x + a)*arccoth(c + d/tan(b*x + a)) + (arctan2(((c + 1)*d + (c^2 +
 2*c + 1)*tan(b*x + a))/(c^2 + d^2 + 2*c + 1), ((c + 1)*d*tan(b*x + a) + d^
2)/(c^2 + d^2 + 2*c + 1)) - arctan2(((c - 1)*d + (c^2 - 2*c + 1)*tan(b*x +
a))/(c^2 + d^2 - 2*c + 1), ((c - 1)*d*tan(b*x + a) + d^2)/(c^2 + d^2 - 2*c
+ 1)))*log(tan(b*x + a)^2 + 1) - (b*x + a)*log((2*(c + 1)*d*tan(b*x + a) +
(c^2 + 2*c + 1)*tan(b*x + a)^2 + d^2)/(c^2 + d^2 + 2*c + 1)) + (b*x + a)*lo
g((2*(c - 1)*d*tan(b*x + a) + (c^2 - 2*c + 1)*tan(b*x + a)^2 + d^2)/(c^2 +
d^2 - 2*c + 1)) + I*dilog(-((c + 1)*tan(b*x + a) - I*c - I)/(I*c + d + I))
- I*dilog(-((c - 1)*tan(b*x + a) - I*c + I)/(I*c + d - I)) + I*dilog(-((c -
 1)*tan(b*x + a) + I*c - I)/(-I*c + d + I)) - I*dilog(-((c + 1)*tan(b*x + a
) + I*c + I)/(-I*c + d - I)))/b
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.01

$$\int \mathrm{acoth}\left(c+d\cot\left(a+b\,x\right)\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(c + d*cot(a + b*x)),x)
```

```
[Out] int(acoth(c + d*cot(a + b*x)), x)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \mathrm{acoth}\left(c+d\cot\left(a+bx\right)\right)dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(c+d*cot(b*x+a)),x)
```

```
[Out] Integral(acoth(c + d*cot(a + b*x)), x)
```

# 3.256 $\int \frac{\coth^{-1}(c+d\cot(a+bx))}{x} dx$

**Optimal**. Leaf size=18

$$\text{Int}\left(\frac{\coth^{-1}(d\cot(a+bx)+c)}{x},x\right)$$

```
[Out] CannotIntegrate(arccoth(c+d*cot(b*x+a))/x,x)
```

**Rubi [A]** time = 0.09, antiderivative size = 0, normalized size of antiderivative = 0.00, number of steps used = 0, number of rules used = 0, integrand size = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int \frac{\coth^{-1}(c+d\cot(a+bx))}{x} dx$$

Verification is Not applicable to the result.

```
[In] Int[ArcCoth[c + d*Cot[a + b*x]]/x,x]
```

```
[Out] Defer[Int][ArcCoth[c + d*Cot[a + b*x]]/x, x]
```

Rubi steps

$$\int \frac{\coth^{-1}(c+d\cot(a+bx))}{x} dx = \int \frac{\coth^{-1}(c+d\cot(a+bx))}{x} dx$$

**Mathematica [A]** time = 0.44, size = 0, normalized size = 0.00

$$\int \frac{\coth^{-1}(c+d\cot(a+bx))}{x} dx$$

Verification is Not applicable to the result.

```
[In] Integrate[ArcCoth[c + d*Cot[a + b*x]]/x,x]
```

```
[Out] Integrate[ArcCoth[c + d*Cot[a + b*x]]/x, x]
```

**fricas [A]** time = 0.58, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{\text{arcoth}(d\cot(bx+a)+c)}{x},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(c+d*cot(b*x+a))/x,x, algorithm="fricas")
```

```
[Out] integral(arccoth(d*cot(b*x + a) + c)/x, x)
```

**giac [A]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\text{arcoth}(d\cot(bx+a)+c)}{x} dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(c+d*cot(b*x+a))/x,x, algorithm="giac")
```

```
[Out] integrate(arccoth(d*cot(b*x + a) + c)/x, x)
```

**maple** [A] time = 1.46, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{arccoth}(c + d\cot(bx + a))}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(arccoth(c+d*cot(b*x+a))/x,x)
```

```
[Out] int(arccoth(c+d*cot(b*x+a))/x,x)
```

**maxima** [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{arcoth}(d\cot(bx + a) + c)}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(c+d*cot(b*x+a))/x,x, algorithm="maxima")
```

```
[Out] integrate(arccoth(d*cot(b*x + a) + c)/x, x)
```

**mupad** [A] time = 0.00, size = -1, normalized size = -0.06

$$\int \frac{\operatorname{acoth}(c + d\cot(a + b\,x))}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(c + d*cot(a + b*x))/x,x)
```

```
[Out] int(acoth(c + d*cot(a + b*x))/x, x)
```

**sympy** [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{acoth}(c + d\cot(a + bx))}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(c+d*cot(b*x+a))/x,x)
```

```
[Out] Integral(acoth(c + d*cot(a + b*x))/x, x)
```

## 3.257 $\int x^2 \coth^{-1}(1 + id + d\cot(a + bx))\,dx$

**Optimal**. Leaf size=168

$$-\frac{i\text{Li}_4\left((id+1)e^{2ia+2ibx}\right)}{8b^3}-\frac{x\text{Li}_3\left((id+1)e^{2ia+2ibx}\right)}{4b^2}+\frac{ix^2\text{Li}_2\left((id+1)e^{2ia+2ibx}\right)}{4b}-\frac{1}{6}x^3\log\left(1-(1+id)e^{2ia+2ibx}\right)+\frac{1}{3}x^3\text{co}$$

```
[Out] 1/12*I*b*x^4+1/3*x^3*arccoth(1+I*d+d*cot(b*x+a))-1/6*x^3*ln(1-(1+I*d)*exp(2
*I*a+2*I*b*x))+1/4*I*x^2*polylog(2,(1+I*d)*exp(2*I*a+2*I*b*x))/b-1/4*x*poly
log(3,(1+I*d)*exp(2*I*a+2*I*b*x))/b^2-1/8*I*polylog(4,(1+I*d)*exp(2*I*a+2*I
*b*x))/b^3
```

**Rubi [A]** time = 0.31, antiderivative size = 168, normalized size of antiderivative = 1.00, number of steps used = 7, number of rules used = 7, integrand size = 20, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.350, Rules used = {6266, 2184, 2190, 2531, 6609, 2282, 6589}

$$-\frac{x\text{PolyLog}\left(3,(1+id)e^{2ia+2ibx}\right)}{4b^2}-\frac{i\text{PolyLog}\left(4,(1+id)e^{2ia+2ibx}\right)}{8b^3}+\frac{ix^2\text{PolyLog}\left(2,(1+id)e^{2ia+2ibx}\right)}{4b}-\frac{1}{6}x^3\log\left(1-\right.$$

Antiderivative was successfully verified.

```
[In] Int[x^2*ArcCoth[1 + I*d + d*Cot[a + b*x]],x]
```

```
[Out] (I/12)*b*x^4 + (x^3*ArcCoth[1 + I*d + d*Cot[a + b*x]])/3 - (x^3*Log[1 - (1
+ I*d)*E^((2*I)*a + (2*I)*b*x)])/6 + ((I/4)*x^2*PolyLog[2, (1 + I*d)*E^((2*
I)*a + (2*I)*b*x)])/b - (x*PolyLog[3, (1 + I*d)*E^((2*I)*a + (2*I)*b*x)])/(
4*b^2) - ((I/8)*PolyLog[4, (1 + I*d)*E^((2*I)*a + (2*I)*b*x)])/b^3
```

Rule 2184

```
Int[((c_.) + (d_.)*(x_))^(m_.)/((a_) + (b_.)*((F_)^((g_.)*((e_.) + (f_.)*(x
_))))^(n_.)), x_Symbol] :> Simp[(c + d*x)^(m + 1)/(a*d*(m + 1)), x] - Dist[
b/a, Int[((c + d*x)^m*(F^(g*(e + f*x)))^n)/(a + b*(F^(g*(e + f*x)))^n), x],
 x] /; FreeQ[{F, a, b, c, d, e, f, g, n}, x] && IGtQ[m, 0]
```

Rule 2190

```
Int[(((F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m_.))/
((a_) + (b_.)*((F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)), x_Symbol] :> Simp
[((c + d*x)^m*Log[1 + (b*(F^(g*(e + f*x)))^n)/a])/(b*f*g*n*Log[F]), x] - Di
st[(d*m)/(b*f*g*n*Log[F]), Int[(c + d*x)^(m - 1)*Log[1 + (b*(F^(g*(e + f*x)
))^n)/a], x], x] /; FreeQ[{F, a, b, c, d, e, f, g, n}, x] && IGtQ[m, 0]
```

Rule 2282

```
Int[u_, x_Symbol] :> With[{v = FunctionOfExponential[u, x]}, Dist[v/D[v, x]
, Subst[Int[FunctionOfExponentialFunction[u, x]/x, x], x, v], x]] /; Functi
onOfExponentialQ[u, x] &&  !MatchQ[u, (w_)*((a_.)*(v_)^(n_))^(m_) /; FreeQ[
{a, m, n}, x] && IntegerQ[m*n]] &&  !MatchQ[u, E^((c_.)*((a_.) + (b_.)*x))*
(F_)[v_] /; FreeQ[{a, b, c}, x] && InverseFunctionQ[F[x]]]
```

Rule 2531

```
Int[Log[1 + (e_.)*((F_)^((c_.)*((a_.) + (b_.)*(x_))))^(n_.)]*((f_.) + (g_.)
*(x_))^(m_.), x_Symbol] :> -Simp[((f + g*x)^m*PolyLog[2, -(e*(F^(c*(a + b*x
)))^n)])/(b*c*n*Log[F]), x] + Dist[(g*m)/(b*c*n*Log[F]), Int[(f + g*x)^(m -
 1)*PolyLog[2, -(e*(F^(c*(a + b*x)))^n)], x], x] /; FreeQ[{F, a, b, c, e, f
, g, n}, x] && GtQ[m, 0]
```

Rule 6266

```
Int[ArcCoth[(c_.) + Cot[(a_.) + (b_.)*(x_)]*(d_.)]*((e_.) + (f_.)*(x_))^(m_
.), x_Symbol] :> Simp[((e + f*x)^(m + 1)*ArcCoth[c + d*Cot[a + b*x]])/(f*(m
 + 1)), x] + Dist[(I*b)/(f*(m + 1)), Int[(e + f*x)^(m + 1)/(c - I*d - c*E^(
2*I*a + 2*I*b*x)), x], x] /; FreeQ[{a, b, c, d, e, f}, x] && IGtQ[m, 0] &&
EqQ[(c - I*d)^2, 1]
```

Rule 6589

```
Int[PolyLog[n_, (c_.)*((a_.) + (b_.)*(x_))^(p_.)]/((d_.) + (e_.)*(x_)), x_S
ymbol] :> Simp[PolyLog[n + 1, c*(a + b*x)^p]/(e*p), x] /; FreeQ[{a, b, c, d
, e, n, p}, x] && EqQ[b*d, a*e]
```

Rule 6609

```
Int[((e_.) + (f_.)*(x_))^(m_.)*PolyLog[n_, (d_.)*((F_)^((c_.)*((a_.) + (b_.
)*(x_))))^(p_.)], x_Symbol] :> Simp[((e + f*x)^m*PolyLog[n + 1, d*(F^(c*(a
+ b*x)))^p])/(b*c*p*Log[F]), x] - Dist[(f*m)/(b*c*p*Log[F]), Int[(e + f*x)^
(m - 1)*PolyLog[n + 1, d*(F^(c*(a + b*x)))^p], x], x] /; FreeQ[{F, a, b, c,
 d, e, f, n, p}, x] && GtQ[m, 0]
```

Rubi steps

$$\int x^2 \coth^{-1}(1+id+d\cot(a+bx))\,dx = \frac{1}{3}x^3\coth^{-1}(1+id+d\cot(a+bx)) + \frac{1}{3}(ib)\int \frac{x^3}{1+(-1-id)e^{2ia+2ibx}}\,d$$

$$= \frac{1}{12}ibx^4 + \frac{1}{3}x^3\coth^{-1}(1+id+d\cot(a+bx)) + \frac{1}{3}(b(i-d))\int \frac{e^2}{1+(-1}$$

$$= \frac{1}{12}ibx^4 + \frac{1}{3}x^3\coth^{-1}(1+id+d\cot(a+bx)) - \frac{1}{6}x^3\log\left(1-(1+id)e\right.$$

$$= \frac{1}{12}ibx^4 + \frac{1}{3}x^3\coth^{-1}(1+id+d\cot(a+bx)) - \frac{1}{6}x^3\log\left(1-(1+id)e\right.$$

$$= \frac{1}{12}ibx^4 + \frac{1}{3}x^3\coth^{-1}(1+id+d\cot(a+bx)) - \frac{1}{6}x^3\log\left(1-(1+id)e\right.$$

$$= \frac{1}{12}ibx^4 + \frac{1}{3}x^3\coth^{-1}(1+id+d\cot(a+bx)) - \frac{1}{6}x^3\log\left(1-(1+id)e\right.$$

$$= \frac{1}{12}ibx^4 + \frac{1}{3}x^3\coth^{-1}(1+id+d\cot(a+bx)) - \frac{1}{6}x^3\log\left(1-(1+id)e\right.$$

**Mathematica [A]** time = 0.20, size = 155, normalized size = 0.92

$$\frac{1}{3}x^3\coth^{-1}(d\cot(a+bx)+id+1) - \frac{4b^3x^3\log\left(1+\frac{ie^{-2i(a+bx)}}{d-i}\right) + 6ib^2x^2\mathrm{Li}_2\left(-\frac{ie^{-2i(a+bx)}}{d-i}\right) + 6bx\mathrm{Li}_3\left(-\frac{ie^{-2i(a+bx)}}{d-i}\right) - 3i\mathrm{Li}}{24b^3}$$

Antiderivative was successfully verified.

```
[In] Integrate[x^2*ArcCoth[1 + I*d + d*Cot[a + b*x]],x]
```

```
[Out] (x^3*ArcCoth[1 + I*d + d*Cot[a + b*x]])/3 - (4*b^3*x^3*Log[1 + I/((-I + d)*
E^((2*I)*(a + b*x)))] + (6*I)*b^2*x^2*PolyLog[2, (-I)/((-I + d)*E^((2*I)*(a
 + b*x)))] + 6*b*x*PolyLog[3, (-I)/((-I + d)*E^((2*I)*(a + b*x)))] - (3*I)*
PolyLog[4, (-I)/((-I + d)*E^((2*I)*(a + b*x)))])/(24*b^3)
```

**fricas [C]** time = 0.67, size = 179, normalized size = 1.07

$$2i\,b^4x^4 + 4\,b^3x^3\log\left(\frac{\left((d-i)e^{(2i\,bx+2i\,a)}+i\right)e^{(-2i\,bx-2i\,a)}}{d}\right) + 6i\,b^2x^2\mathrm{Li}_2\left(-(-i\,d-1)e^{(2i\,bx+2i\,a)}\right) - 2i\,a^4 + 4\,a^3\log\left(\frac{(d-i)e^{(2i\,bx+}}{d-i}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*arccoth(1+I*d+d*cot(b*x+a)),x, algorithm="fricas")
```

```
[Out] 1/24*(2*I*b^4*x^4 + 4*b^3*x^3*log(((d - I)*e^(2*I*b*x + 2*I*a) + I)*e^(-2*I
*b*x - 2*I*a)/d) + 6*I*b^2*x^2*dilog(-(-I*d - 1)*e^(2*I*b*x + 2*I*a)) - 2*I
*a^4 + 4*a^3*log(((d - I)*e^(2*I*b*x + 2*I*a) + I)/(d - I)) - 6*b*x*polylog
(3, (I*d + 1)*e^(2*I*b*x + 2*I*a)) - 4*(b^3*x^3 + a^3)*log((-I*d - 1)*e^(2*
I*b*x + 2*I*a) + 1) - 3*I*polylog(4, (I*d + 1)*e^(2*I*b*x + 2*I*a)))/b^3
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int x^2 \operatorname{arcoth}\left(d\cot\left(bx+a\right)+i\,d+1\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*arccoth(1+I*d+d*cot(b*x+a)),x, algorithm="giac")
```

```
[Out] integrate(x^2*arccoth(d*cot(b*x + a) + I*d + 1), x)
```

**maple [C]** time = 6.23, size = 2449, normalized size = 14.58

Expression too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^2*arccoth(1+I*d+d*cot(b*x+a)),x)
```

```
[Out] -1/4/b/(I-d)*polylog(2,-I*(I-d)*exp(2*I*(b*x+a)))*x^2+1/4/b^3/(I-d)*polylog
(2,-I*(I-d)*exp(2*I*(b*x+a)))*a^2-1/2/b^3*a^2/(I-d)*dilog(1-I*exp(I*(b*x+a)
)*(I*(I-d))^(1/2))-1/2/b^3*a^2/(I-d)*dilog(1+I*exp(I*(b*x+a))*(I*(I-d))^(1/
2))+1/6*d/(I-d)*ln(1+I*(I-d)*exp(2*I*(b*x+a)))*x^3-1/3*x^3*ln(exp(I*(b*x+a)
))+1/12*I*b*x^4-1/4*I/b*d/(I-d)*polylog(2,-I*(I-d)*exp(2*I*(b*x+a)))*x^2+1/
4*I/b^3*d/(I-d)*polylog(2,-I*(I-d)*exp(2*I*(b*x+a)))*a^2+1/2*I/b^2/(I-d)*ln
(1+I*(I-d)*exp(2*I*(b*x+a)))*x*a^2-1/12*I*x^3*Pi*csgn((exp(2*I*(b*x+a))*d-I
*exp(2*I*(b*x+a))+I)/(exp(2*I*(b*x+a))-1))^2+1/12*I*x^3*Pi*csgn(I*exp(2*I*(
b*x+a)))^3-1/6*x^3*ln(d)+1/12*I*x^3*Pi*csgn(I*exp(I*(b*x+a)))^2*csgn(I*exp(
2*I*(b*x+a)))-1/6*I*x^3*Pi*csgn(I*exp(I*(b*x+a)))*csgn(I*exp(2*I*(b*x+a)))^
2-1/12*I*x^3*Pi*csgn(d/(exp(2*I*(b*x+a))-1)*exp(2*I*(b*x+a)))^3+1/8/b^3/(I-
d)*polylog(4,-I*(I-d)*exp(2*I*(b*x+a)))+1/12*I*x^3*Pi*csgn(d/(exp(2*I*(b*x+
a))-1)*exp(2*I*(b*x+a)))^2-1/12*I*x^3*Pi*csgn(I*(exp(2*I*(b*x+a))*d-I*exp(2
*I*(b*x+a))+I)/(exp(2*I*(b*x+a))-1))^3-1/6*I/(I-d)*ln(1+I*(I-d)*exp(2*I*(b*
x+a)))*x^3+1/12*I*x^3*Pi*csgn(I*exp(2*I*(b*x+a))/(exp(2*I*(b*x+a))-1))^3+1/
12*I*x^3*Pi*csgn(I*d/(exp(2*I*(b*x+a))-1)*exp(2*I*(b*x+a)))^3+1/12*I*x^3*Pi
*csgn((exp(2*I*(b*x+a))*d-I*exp(2*I*(b*x+a))+I)/(exp(2*I*(b*x+a))-1))^3-1/1
2*I*x^3*Pi*csgn(I/(exp(2*I*(b*x+a))-1))*csgn(I*(exp(2*I*(b*x+a))*d-I*exp(2*
I*(b*x+a))+I))*csgn(I*(exp(2*I*(b*x+a))*d-I*exp(2*I*(b*x+a))+I)/(exp(2*I*(b
*x+a))-1))+1/12*I*x^3*Pi*csgn(I*exp(2*I*(b*x+a)))*csgn(I/(exp(2*I*(b*x+a))-
1))*csgn(I*exp(2*I*(b*x+a))/(exp(2*I*(b*x+a))-1))+1/12*I*x^3*Pi*csgn(I*d)*c
sgn(I*exp(2*I*(b*x+a))/(exp(2*I*(b*x+a))-1))*csgn(I*d/(exp(2*I*(b*x+a))-1)*
exp(2*I*(b*x+a)))-1/12*I*x^3*Pi*csgn(I*exp(2*I*(b*x+a))/(exp(2*I*(b*x+a))-1
))*csgn(I*d/(exp(2*I*(b*x+a))-1)*exp(2*I*(b*x+a)))^2-1/2*I/b^2*a^2/(I-d)*ln
(1-I*exp(I*(b*x+a))*(I*(I-d))^(1/2))*x-1/2*I/b^2*a^2/(I-d)*ln(1+I*exp(I*(b*
x+a))*(I*(I-d))^(1/2))*x-1/2*I/b^3*a^2*d/(I-d)*dilog(1-I*exp(I*(b*x+a))*(I*
(I-d))^(1/2))-1/2*I/b^3*a^2*d/(I-d)*dilog(1+I*exp(I*(b*x+a))*(I*(I-d))^(1/2
))-1/3/b^3*d/(I-d)*ln(1+I*(I-d)*exp(2*I*(b*x+a)))*a^3+1/4/b^2*d/(I-d)*polyl
og(3,-I*(I-d)*exp(2*I*(b*x+a)))*x-1/12*I*x^3*Pi*csgn(I*d/(exp(2*I*(b*x+a))-
1)*exp(2*I*(b*x+a)))*csgn(d/(exp(2*I*(b*x+a))-1)*exp(2*I*(b*x+a)))^2+1/2/b^
3*a^3*d/(I-d)*ln(1-I*exp(I*(b*x+a))*(I*(I-d))^(1/2))+1/2/b^3*a^3*d/(I-d)*ln
(1+I*exp(I*(b*x+a))*(I*(I-d))^(1/2))-1/6/b^3*a^3*d/(I-d)*ln(I*exp(2*I*(b*x+
a))-exp(2*I*(b*x+a))*d-I)-1/2*I/b^3*a^3/(I-d)*ln(1+I*exp(I*(b*x+a))*(I*(I-d
```

```
))^(1/2))+1/6*I/b^3*a^3/(I-d)*ln(I*exp(2*I*(b*x+a))-exp(2*I*(b*x+a))*d-I)+1
/8*I/b^3*d/(I-d)*polylog(4,-I*(I-d)*exp(2*I*(b*x+a)))-1/4*I/b^2/(I-d)*polyl
og(3,-I*(I-d)*exp(2*I*(b*x+a)))*x+1/3*I/b^3/(I-d)*ln(1+I*(I-d)*exp(2*I*(b*x
+a)))*a^3+1/12*I*x^3*Pi*csgn(I*d/(exp(2*I*(b*x+a))-1)*exp(2*I*(b*x+a)))*csg
n(d/(exp(2*I*(b*x+a))-1)*exp(2*I*(b*x+a)))+1/12*I*x^3*Pi*csgn(I*(exp(2*I*(b
*x+a))*d-I*exp(2*I*(b*x+a))+I)/(exp(2*I*(b*x+a))-1))*csgn((exp(2*I*(b*x+a))
*d-I*exp(2*I*(b*x+a))+I)/(exp(2*I*(b*x+a))-1))^2-1/2*I/b^3*a^3/(I-d)*ln(1-I
*exp(I*(b*x+a))*(I*(I-d))^(1/2))-1/2/b^2*d/(I-d)*ln(1+I*(I-d)*exp(2*I*(b*x+
a)))*x*a^2+1/2/b^2*a^2*d/(I-d)*ln(1-I*exp(I*(b*x+a))*(I*(I-d))^(1/2))*x+1/2
/b^2*a^2*d/(I-d)*ln(1+I*exp(I*(b*x+a))*(I*(I-d))^(1/2))*x+1/6*x^3*ln(exp(2*
I*(b*x+a))*d-I*exp(2*I*(b*x+a))+I)-1/12*I*x^3*Pi*csgn(I*(exp(2*I*(b*x+a))*d
-I*exp(2*I*(b*x+a))+I)/(exp(2*I*(b*x+a))-1))*csgn((exp(2*I*(b*x+a))*d-I*exp
(2*I*(b*x+a))+I)/(exp(2*I*(b*x+a))-1))+1/12*I*x^3*Pi*csgn(I*(exp(2*I*(b*x+a
))*d-I*exp(2*I*(b*x+a))+I))*csgn(I*(exp(2*I*(b*x+a))*d-I*exp(2*I*(b*x+a))+I
)/(exp(2*I*(b*x+a))-1))^2+1/12*I*x^3*Pi*csgn(I/(exp(2*I*(b*x+a))-1))*csgn(I
*(exp(2*I*(b*x+a))*d-I*exp(2*I*(b*x+a))+I)/(exp(2*I*(b*x+a))-1))^2-1/12*I*x
^3*Pi*csgn(I*exp(2*I*(b*x+a)))*csgn(I*exp(2*I*(b*x+a))/(exp(2*I*(b*x+a))-1)
)^2-1/12*I*x^3*Pi*csgn(I/(exp(2*I*(b*x+a))-1))*csgn(I*exp(2*I*(b*x+a))/(exp
(2*I*(b*x+a))-1))^2-1/12*I*x^3*Pi*csgn(I*d)*csgn(I*d/(exp(2*I*(b*x+a))-1)*e
xp(2*I*(b*x+a)))^2
```

**maxima [B]** time = 0.38, size = 342, normalized size = 2.04

$$\frac{\frac{12\left((bx+a)^3-3\,(bx+a)^2a+3\,(bx+a)a^2\right)\operatorname{arcoth}(d\cot(bx+a)+i\,d+1)}{b^2}-\frac{-3i\,(bx+a)^4+12i\,(bx+a)^3a-18i\,(bx+a)^2a^2+\left(-8i\,(bx+a)^3+18i\,(bx+a)^2a-18i\,(bx\cdots}{}}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*arccoth(1+I*d+d*cot(b*x+a)),x, algorithm="maxima")
```

```
[Out] 1/36*(12*((b*x + a)^3 - 3*(b*x + a)^2*a + 3*(b*x + a)*a^2)*arccoth(d*cot(b*
x + a) + I*d + 1)/b^2 - (-3*I*(b*x + a)^4 + 12*I*(b*x + a)^3*a - 18*I*(b*x
+ a)^2*a^2 + (-8*I*(b*x + a)^3 + 18*I*(b*x + a)^2*a - 18*I*(b*x + a)*a^2)*a
rctan2(d*cos(2*b*x + 2*a) + sin(2*b*x + 2*a), d*sin(2*b*x + 2*a) - cos(2*b*
x + 2*a) + 1) + (-12*I*(b*x + a)^2 + 18*I*(b*x + a)*a - 9*I*a^2)*dilog((I*d
 + 1)*e^(2*I*b*x + 2*I*a)) + (4*(b*x + a)^3 - 9*(b*x + a)^2*a + 9*(b*x + a)
*a^2)*log((d^2 + 1)*cos(2*b*x + 2*a)^2 + (d^2 + 1)*sin(2*b*x + 2*a)^2 + 2*d
*sin(2*b*x + 2*a) - 2*cos(2*b*x + 2*a) + 1) + 3*(4*b*x + a)*polylog(3, (I*d
 + 1)*e^(2*I*b*x + 2*I*a)) + 6*I*polylog(4, (I*d + 1)*e^(2*I*b*x + 2*I*a)))
/b^2)/b
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.01

$$\int x^2\,\operatorname{acoth}\left(d\cot\left(a+b\,x\right)+1+d\,1\mathrm{i}\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^2*acoth(d*1i + d*cot(a + b*x) + 1),x)
```

```
[Out] int(x^2*acoth(d*1i + d*cot(a + b*x) + 1), x)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int x^2\operatorname{acoth}\left(d\cot\left(a+bx\right)+id+1\right)dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**2*acoth(1+I*d+d*cot(b*x+a)),x)
```

```
[Out] Integral(x**2*acoth(d*cot(a + b*x) + I*d + 1), x)
```

# 3.258 $\int x \coth^{-1}(1 + id + d\cot(a + bx))\,dx$

**Optimal**. Leaf size=132

$$-\frac{\mathrm{Li}_3\left((id+1)e^{2ia+2ibx}\right)}{8b^2}+\frac{ix\mathrm{Li}_2\left((id+1)e^{2ia+2ibx}\right)}{4b}-\frac{1}{4}x^2\log\left(1-(1+id)e^{2ia+2ibx}\right)+\frac{1}{2}x^2\coth^{-1}(d\cot(a+bx)+id+1)+$$

```
[Out] 1/6*I*b*x^3+1/2*x^2*arccoth(1+I*d+d*cot(b*x+a))-1/4*x^2*ln(1-(1+I*d)*exp(2*
I*a+2*I*b*x))+1/4*I*x*polylog(2,(1+I*d)*exp(2*I*a+2*I*b*x))/b-1/8*polylog(3
,(1+I*d)*exp(2*I*a+2*I*b*x))/b^2
```

**Rubi [A]** time = 0.26, antiderivative size = 132, normalized size of antiderivative = 1.00, number of steps used = 6, number of rules used = 6, integrand size = 18, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.333, Rules used = {6266, 2184, 2190, 2531, 2282, 6589}

$$-\frac{\text{PolyLog}\left(3,(1+id)e^{2ia+2ibx}\right)}{8b^2}+\frac{ix\text{PolyLog}\left(2,(1+id)e^{2ia+2ibx}\right)}{4b}-\frac{1}{4}x^2\log\left(1-(1+id)e^{2ia+2ibx}\right)+\frac{1}{2}x^2\coth^{-1}(d\,\mathrm{co}$$

Antiderivative was successfully verified.

```
[In] Int[x*ArcCoth[1 + I*d + d*Cot[a + b*x]],x]
```

```
[Out] (I/6)*b*x^3 + (x^2*ArcCoth[1 + I*d + d*Cot[a + b*x]])/2 - (x^2*Log[1 - (1 +
 I*d)*E^((2*I)*a + (2*I)*b*x)])/4 + ((I/4)*x*PolyLog[2, (1 + I*d)*E^((2*I)*
a + (2*I)*b*x)])/b - PolyLog[3, (1 + I*d)*E^((2*I)*a + (2*I)*b*x)]/(8*b^2)
```

Rule 2184

```
Int[((c_.) + (d_.)*(x_))^(m_.)/((a_) + (b_.)*((F_)^((g_.)*((e_.) + (f_.)*(x
_))))^(n_.)), x_Symbol] :> Simp[(c + d*x)^(m + 1)/(a*d*(m + 1)), x] - Dist[
b/a, Int[((c + d*x)^m*(F^(g*(e + f*x)))^n)/(a + b*(F^(g*(e + f*x)))^n), x],
 x] /; FreeQ[{F, a, b, c, d, e, f, g, n}, x] && IGtQ[m, 0]
```

Rule 2190

```
Int[(((F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m_.))/
((a_) + (b_.)*((F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)), x_Symbol] :> Simp
[((c + d*x)^m*Log[1 + (b*(F^(g*(e + f*x)))^n)/a])/(b*f*g*n*Log[F]), x] - Di
st[(d*m)/(b*f*g*n*Log[F]), Int[(c + d*x)^(m - 1)*Log[1 + (b*(F^(g*(e + f*x)
))^n)/a], x], x] /; FreeQ[{F, a, b, c, d, e, f, g, n}, x] && IGtQ[m, 0]
```

Rule 2282

```
Int[u_, x_Symbol] :> With[{v = FunctionOfExponential[u, x]}, Dist[v/D[v, x]
, Subst[Int[FunctionOfExponentialFunction[u, x]/x, x], x, v], x]] /; Functi
onOfExponentialQ[u, x] &&  !MatchQ[u, (w_)*((a_.)*(v_)^(n_))^(m_) /; FreeQ[
{a, m, n}, x] && IntegerQ[m*n]] &&  !MatchQ[u, E^((c_.)*((a_.) + (b_.)*x))*
(F_)[v_] /; FreeQ[{a, b, c}, x] && InverseFunctionQ[F[x]]]
```

Rule 2531

```
Int[Log[1 + (e_.)*((F_)^((c_.)*((a_.) + (b_.)*(x_))))^(n_.)]*((f_.) + (g_.)
*(x_))^(m_.), x_Symbol] :> -Simp[((f + g*x)^m*PolyLog[2, -(e*(F^(c*(a + b*x
)))^n)])/(b*c*n*Log[F]), x] + Dist[(g*m)/(b*c*n*Log[F]), Int[(f + g*x)^(m -
 1)*PolyLog[2, -(e*(F^(c*(a + b*x)))^n)], x], x] /; FreeQ[{F, a, b, c, e, f
, g, n}, x] && GtQ[m, 0]
```

Rule 6266

```
Int[ArcCoth[(c_.) + Cot[(a_.) + (b_.)*(x_)]*(d_.)]*((e_.) + (f_.)*(x_))^(m_
.), x_Symbol] :> Simp[((e + f*x)^(m + 1)*ArcCoth[c + d*Cot[a + b*x]])/(f*(m
```

```
 + 1)), x] + Dist[(I*b)/(f*(m + 1)), Int[(e + f*x)^(m + 1)/(c - I*d - c*E^(
2*I*a + 2*I*b*x)), x], x] /; FreeQ[{a, b, c, d, e, f}, x] && IGtQ[m, 0] &&
EqQ[(c - I*d)^2, 1]
```

Rule 6589

```
Int[PolyLog[n_, (c_.)*((a_.) + (b_.)*(x_))^(p_.)]/((d_.) + (e_.)*(x_)), x_S
ymbol] :> Simp[PolyLog[n + 1, c*(a + b*x)^p]/(e*p), x] /; FreeQ[{a, b, c, d
, e, n, p}, x] && EqQ[b*d, a*e]
```

Rubi steps

$$\int x\coth^{-1}(1+id+d\cot(a+bx))\,dx = \frac{1}{2}x^2\coth^{-1}(1+id+d\cot(a+bx))+\frac{1}{2}(ib)\int\frac{x^2}{1+(-1-id)e^{2ia+2ibx}}\,dx$$

$$= \frac{1}{6}ibx^3+\frac{1}{2}x^2\coth^{-1}(1+id+d\cot(a+bx))+\frac{1}{2}(b(i-d))\int\frac{e^{2ia-}}{1+(-1-}$$

$$= \frac{1}{6}ibx^3+\frac{1}{2}x^2\coth^{-1}(1+id+d\cot(a+bx))-\frac{1}{4}x^2\log\left(1-(1+id)e^{2ia}\right.$$

$$= \frac{1}{6}ibx^3+\frac{1}{2}x^2\coth^{-1}(1+id+d\cot(a+bx))-\frac{1}{4}x^2\log\left(1-(1+id)e^{2ia}\right.$$

$$= \frac{1}{6}ibx^3+\frac{1}{2}x^2\coth^{-1}(1+id+d\cot(a+bx))-\frac{1}{4}x^2\log\left(1-(1+id)e^{2ia}\right.$$

$$= \frac{1}{6}ibx^3+\frac{1}{2}x^2\coth^{-1}(1+id+d\cot(a+bx))-\frac{1}{4}x^2\log\left(1-(1+id)e^{2ia}\right.$$

**Mathematica [A]** time = 0.12, size = 119, normalized size = 0.90

$$\frac{1}{2}x^2\coth^{-1}(d\cot(a+bx)+id+1)-\frac{2b^2x^2\log\left(1+\frac{ie^{-2i(a+bx)}}{d-i}\right)+2ibx\text{Li}_2\left(-\frac{ie^{-2i(a+bx)}}{d-i}\right)+\text{Li}_3\left(-\frac{ie^{-2i(a+bx)}}{d-i}\right)}{8b^2}$$

Antiderivative was successfully verified.

```
[In] Integrate[x*ArcCoth[1 + I*d + d*Cot[a + b*x]],x]
```

```
[Out] (x^2*ArcCoth[1 + I*d + d*Cot[a + b*x]])/2 - (2*b^2*x^2*Log[1 + I/((-I + d)*
E^((2*I)*(a + b*x)))] + (2*I)*b*x*PolyLog[2, (-I)/((-I + d)*E^((2*I)*(a + b
*x)))] + PolyLog[3, (-I)/((-I + d)*E^((2*I)*(a + b*x)))])/(8*b^2)
```

**fricas [C]** time = 0.73, size = 156, normalized size = 1.18

$$\frac{4i\,b^3x^3+6\,b^2x^2\log\left(\frac{\left((d-i)e^{(2i\,bx+2i\,a)}+i\right)e^{(-2i\,bx-2i\,a)}}{d}\right)+4i\,a^3+6i\,bx\text{Li}_2\left(-(-i\,d-1)e^{(2i\,bx+2i\,a)}\right)-6\,a^2\log\left(\frac{(d-i)e^{(2i\,bx+2i\,a}}{d-i}\right.}{24\,b^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*arccoth(1+I*d+d*cot(b*x+a)),x, algorithm="fricas")
```

```
[Out] 1/24*(4*I*b^3*x^3 + 6*b^2*x^2*log(((d - I)*e^(2*I*b*x + 2*I*a) + I)*e^(-2*I
*b*x - 2*I*a)/d) + 4*I*a^3 + 6*I*b*x*dilog(-(-I*d - 1)*e^(2*I*b*x + 2*I*a))
 - 6*a^2*log(((d - I)*e^(2*I*b*x + 2*I*a) + I)/(d - I)) - 6*(b^2*x^2 - a^2)
*log((-I*d - 1)*e^(2*I*b*x + 2*I*a) + 1) - 3*polylog(3, (I*d + 1)*e^(2*I*b*
x + 2*I*a)))/b^2
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int x \operatorname{arcoth}(d \cot(bx+a) + i d + 1) \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*arccoth(1+I*d+d*cot(b*x+a)),x, algorithm="giac")
```

```
[Out] integrate(x*arccoth(d*cot(b*x + a) + I*d + 1), x)
```

**maple [C]** time = 5.27, size = 2351, normalized size = 17.81

Expression too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x*arccoth(1+I*d+d*cot(b*x+a)),x)
```

```
[Out] 1/2*I/b^2*a*d/(I-d)*dilog(1-I*exp(I*(b*x+a))*(I*(I-d))^(1/2))+1/2*I/b^2*a*d
/(I-d)*dilog(1+I*exp(I*(b*x+a))*(I*(I-d))^(1/2))-1/4*I/b*d/(I-d)*polylog(2,
-I*(I-d)*exp(2*I*(b*x+a)))*x-1/4*I/b^2*d/(I-d)*polylog(2,-I*(I-d)*exp(2*I*(
b*x+a)))*a-1/2*I/b/(I-d)*ln(1+I*(I-d)*exp(2*I*(b*x+a)))*x*a+1/8*I*x^2*Pi*cs
gn((exp(2*I*(b*x+a))*d-I*exp(2*I*(b*x+a))+I)/(exp(2*I*(b*x+a))-1))^3-1/8*I*
x^2*Pi*csgn((exp(2*I*(b*x+a))*d-I*exp(2*I*(b*x+a))+I)/(exp(2*I*(b*x+a))-1))
^2+1/6*I*b*x^3+1/8*I*x^2*Pi*csgn(I*exp(2*I*(b*x+a)))*csgn(I/(exp(2*I*(b*x+a
))-1))*csgn(I*exp(2*I*(b*x+a))/(exp(2*I*(b*x+a))-1))+1/8*I*x^2*Pi*csgn(I*d)
*csgn(I*exp(2*I*(b*x+a))/(exp(2*I*(b*x+a))-1))*csgn(I*d/(exp(2*I*(b*x+a))-1
)*exp(2*I*(b*x+a)))+1/8*I*x^2*Pi*csgn(I*exp(2*I*(b*x+a)))^3+1/4/b^2*d/(I-d)
*ln(1+I*(I-d)*exp(2*I*(b*x+a)))*a^2-1/4*x^2*ln(d)-1/2/b^2*a^2*d/(I-d)*ln(1-
I*exp(I*(b*x+a))*(I*(I-d))^(1/2))-1/2/b^2*a^2*d/(I-d)*ln(1+I*exp(I*(b*x+a))
*(I*(I-d))^(1/2))-1/4/b/(I-d)*polylog(2,-I*(I-d)*exp(2*I*(b*x+a)))*x-1/4/b^
2/(I-d)*polylog(2,-I*(I-d)*exp(2*I*(b*x+a)))*a+1/4*d/(I-d)*ln(1+I*(I-d)*exp
(2*I*(b*x+a)))*x^2+1/2/b^2*a/(I-d)*dilog(1-I*exp(I*(b*x+a))*(I*(I-d))^(1/2)
)-1/8*I*x^2*Pi*csgn(I*(exp(2*I*(b*x+a))*d-I*exp(2*I*(b*x+a))+I)/(exp(2*I*(b
*x+a))-1))^3-1/8*I/b^2/(I-d)*polylog(3,-I*(I-d)*exp(2*I*(b*x+a)))-1/4*I/(I-
d)*ln(1+I*(I-d)*exp(2*I*(b*x+a)))*x^2-1/8*I*x^2*Pi*csgn(I/(exp(2*I*(b*x+a))
-1))*csgn(I*(exp(2*I*(b*x+a))*d-I*exp(2*I*(b*x+a))+I))*csgn(I*(exp(2*I*(b*x
+a))*d-I*exp(2*I*(b*x+a))+I)/(exp(2*I*(b*x+a))-1))-1/8*I*x^2*Pi*csgn(d/(exp
(2*I*(b*x+a))-1)*exp(2*I*(b*x+a)))^3+1/8*I*x^2*Pi*csgn(d/(exp(2*I*(b*x+a))-
1)*exp(2*I*(b*x+a)))^2-1/2*x^2*ln(exp(I*(b*x+a)))+1/8*I*x^2*Pi*csgn(I*d/(ex
p(2*I*(b*x+a))-1)*exp(2*I*(b*x+a)))*csgn(d/(exp(2*I*(b*x+a))-1)*exp(2*I*(b*
x+a)))+1/8*I*x^2*Pi*csgn(I*d/(exp(2*I*(b*x+a))-1)*exp(2*I*(b*x+a)))^3-1/8*I
*x^2*Pi*csgn(I*d)*csgn(I*d/(exp(2*I*(b*x+a))-1)*exp(2*I*(b*x+a)))^2+1/4*x^2
*ln(exp(2*I*(b*x+a))*d-I*exp(2*I*(b*x+a))+I)+1/8*I*x^2*Pi*csgn(I*(exp(2*I*(
b*x+a))*d-I*exp(2*I*(b*x+a))+I))*csgn(I*(exp(2*I*(b*x+a))*d-I*exp(2*I*(b*x+
a))+I)/(exp(2*I*(b*x+a))-1))^2+1/2/b^2*a/(I-d)*dilog(1+I*exp(I*(b*x+a))*(I*
(I-d))^(1/2))+1/8/b^2*d/(I-d)*polylog(3,-I*(I-d)*exp(2*I*(b*x+a)))+1/8*I*x^
2*Pi*csgn(I*exp(2*I*(b*x+a))/(exp(2*I*(b*x+a))-1))^3+1/4/b^2*a^2*d/(I-d)*ln
(I*exp(2*I*(b*x+a))-exp(2*I*(b*x+a))*d-I)-1/8*I*x^2*Pi*csgn(I*exp(2*I*(b*x+
a)))*csgn(I*exp(2*I*(b*x+a))/(exp(2*I*(b*x+a))-1))^2-1/8*I*x^2*Pi*csgn(I/(e
xp(2*I*(b*x+a))-1))*csgn(I*exp(2*I*(b*x+a))/(exp(2*I*(b*x+a))-1))^2-1/8*I*x
^2*Pi*csgn(I*d/(exp(2*I*(b*x+a))-1)*exp(2*I*(b*x+a)))*csgn(d/(exp(2*I*(b*x+
a))-1)*exp(2*I*(b*x+a)))^2-1/8*I*x^2*Pi*csgn(I*exp(2*I*(b*x+a))/(exp(2*I*(b
*x+a))-1))*csgn(I*d/(exp(2*I*(b*x+a))-1)*exp(2*I*(b*x+a)))^2+1/8*I*x^2*Pi*c
sgn(I/(exp(2*I*(b*x+a))-1))*csgn(I*(exp(2*I*(b*x+a))*d-I*exp(2*I*(b*x+a))+I
)/(exp(2*I*(b*x+a))-1))^2-1/2/b*a*d/(I-d)*ln(1-I*exp(I*(b*x+a))*(I*(I-d))^(
1/2))*x-1/2/b*a*d/(I-d)*ln(1+I*exp(I*(b*x+a))*(I*(I-d))^(1/2))*x+1/2/b*d/(I
-d)*ln(1+I*(I-d)*exp(2*I*(b*x+a)))*x*a+1/8*I*x^2*Pi*csgn(I*exp(I*(b*x+a)))^
2*csgn(I*exp(2*I*(b*x+a)))-1/4*I*x^2*Pi*csgn(I*exp(I*(b*x+a)))*csgn(I*exp(2
*I*(b*x+a)))^2+1/8*I*x^2*Pi*csgn(I*(exp(2*I*(b*x+a))*d-I*exp(2*I*(b*x+a))+I
```

```
)/(exp(2*I*(b*x+a))-1))*csgn((exp(2*I*(b*x+a))*d-I*exp(2*I*(b*x+a))+I)/(exp
(2*I*(b*x+a))-1))^2-1/4*I/b^2*a^2/(I-d)*ln(I*exp(2*I*(b*x+a))-exp(2*I*(b*x+
a))*d-I)-1/4*I/b^2/(I-d)*ln(1+I*(I-d)*exp(2*I*(b*x+a)))*a^2+1/2*I/b^2*a^2/(
I-d)*ln(1-I*exp(I*(b*x+a))*(I*(I-d))^(1/2))+1/2*I/b^2*a^2/(I-d)*ln(1+I*exp(
I*(b*x+a))*(I*(I-d))^(1/2))-1/8*I*x^2*Pi*csgn(I*(exp(2*I*(b*x+a))*d-I*exp(2
*I*(b*x+a))+I)/(exp(2*I*(b*x+a))-1))*csgn((exp(2*I*(b*x+a))*d-I*exp(2*I*(b*
x+a))+I)/(exp(2*I*(b*x+a))-1))+1/2*I/b*a/(I-d)*ln(1+I*exp(I*(b*x+a))*(I*(I-
d))^(1/2))*x+1/2*I/b*a/(I-d)*ln(1-I*exp(I*(b*x+a))*(I*(I-d))^(1/2))*x
```

**maxima [B]** time = 0.37, size = 248, normalized size = 1.88

$$\frac{\frac{12\left(\left(bx+a\right)^2-2\left(bx+a\right)a\right)\operatorname{arcoth}\left(d\cot\left(bx+a\right)+id+1\right)}{b}-\frac{-4i\left(bx+a\right)^3+12i\left(bx+a\right)^2a-6ibx\operatorname{Li}_2\left(\left(id+1\right)e^{\left(2ibx+2ia\right)}\right)+\left(-6i\left(bx+a\right)^2+12i\left(bx+a\right)a\right)\arctan(\cdots}{\cdots}}{\cdots}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*arccoth(1+I*d+d*cot(b*x+a)),x, algorithm="maxima")
```

```
[Out] 1/24*(12*((b*x + a)^2 - 2*(b*x + a)*a)*arccoth(d*cot(b*x + a) + I*d + 1)/b
- (-4*I*(b*x + a)^3 + 12*I*(b*x + a)^2*a - 6*I*b*x*dilog((I*d + 1)*e^(2*I*b
*x + 2*I*a)) + (-6*I*(b*x + a)^2 + 12*I*(b*x + a)*a)*arctan2(d*cos(2*b*x +
2*a) + sin(2*b*x + 2*a), d*sin(2*b*x + 2*a) - cos(2*b*x + 2*a) + 1) + 3*((b
*x + a)^2 - 2*(b*x + a)*a)*log((d^2 + 1)*cos(2*b*x + 2*a)^2 + (d^2 + 1)*sin
(2*b*x + 2*a)^2 + 2*d*sin(2*b*x + 2*a) - 2*cos(2*b*x + 2*a) + 1) + 3*polylo
g(3, (I*d + 1)*e^(2*I*b*x + 2*I*a)))/b)/b
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.01

$$\int x\operatorname{acoth}\left(d\cot\left(a+b\,x\right)+1+d\,1\mathrm{i}\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x*acoth(d*1i + d*cot(a + b*x) + 1),x)
```

```
[Out] int(x*acoth(d*1i + d*cot(a + b*x) + 1), x)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int x\operatorname{acoth}\left(d\cot\left(a+bx\right)+id+1\right)dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*acoth(1+I*d+d*cot(b*x+a)),x)
```

```
[Out] Integral(x*acoth(d*cot(a + b*x) + I*d + 1), x)
```

# 3.259 $\int \coth^{-1}(1+id+d\cot(a+bx))\,dx$

**Optimal**. Leaf size=93

$$\frac{i\text{Li}_2\left((id+1)e^{2ia+2ibx}\right)}{4b}-\frac{1}{2}x\log\left(1-(1+id)e^{2ia+2ibx}\right)+x\coth^{-1}(d\cot(a+bx)+id+1)+\frac{1}{2}ibx^2$$

```
[Out] 1/2*I*b*x^2+x*arccoth(1+I*d+d*cot(b*x+a))-1/2*x*ln(1-(1+I*d)*exp(2*I*a+2*I*
b*x))+1/4*I*polylog(2,(1+I*d)*exp(2*I*a+2*I*b*x))/b
```

**Rubi [A]** time = 0.16, antiderivative size = 93, normalized size of antiderivative = 1.00, number of steps used = 5, number of rules used = 5, integrand size = 16, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.312, Rules used = {6258, 2184, 2190, 2279, 2391}

$$\frac{i\text{PolyLog}\left(2,(1+id)e^{2ia+2ibx}\right)}{4b}-\frac{1}{2}x\log\left(1-(1+id)e^{2ia+2ibx}\right)+x\coth^{-1}(d\cot(a+bx)+id+1)+\frac{1}{2}ibx^2$$

Antiderivative was successfully verified.

```
[In] Int[ArcCoth[1 + I*d + d*Cot[a + b*x]],x]
```

```
[Out] (I/2)*b*x^2 + x*ArcCoth[1 + I*d + d*Cot[a + b*x]] - (x*Log[1 - (1 + I*d)*E^
((2*I)*a + (2*I)*b*x)])/2 + ((I/4)*PolyLog[2, (1 + I*d)*E^((2*I)*a + (2*I)*
b*x)])/b
```

Rule 2184

```
Int[((c_.) + (d_.)*(x_))^(m_.)/((a_) + (b_.)*((F_)^((g_.)*((e_.) + (f_.)*(x
_))))^(n_.)), x_Symbol] :> Simp[(c + d*x)^(m + 1)/(a*d*(m + 1)), x] - Dist[
b/a, Int[((c + d*x)^m*(F^(g*(e + f*x)))^n)/(a + b*(F^(g*(e + f*x)))^n), x],
 x] /; FreeQ[{F, a, b, c, d, e, f, g, n}, x] && IGtQ[m, 0]
```

Rule 2190

```
Int[(((F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m_.))/
((a_) + (b_.)*((F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)), x_Symbol] :> Simp
[((c + d*x)^m*Log[1 + (b*(F^(g*(e + f*x)))^n)/a])/(b*f*g*n*Log[F]), x] - Di
st[(d*m)/(b*f*g*n*Log[F]), Int[(c + d*x)^(m - 1)*Log[1 + (b*(F^(g*(e + f*x)
))^n)/a], x], x] /; FreeQ[{F, a, b, c, d, e, f, g, n}, x] && IGtQ[m, 0]
```

Rule 2279

```
Int[Log[(a_) + (b_.)*((F_)^((e_.)*((c_.) + (d_.)*(x_))))^(n_.)], x_Symbol]
:> Dist[1/(d*e*n*Log[F]), Subst[Int[Log[a + b*x]/x, x], x, (F^(e*(c + d*x))
)^n], x] /; FreeQ[{F, a, b, c, d, e, n}, x] && GtQ[a, 0]
```

Rule 2391

```
Int[Log[(c_.)*((d_) + (e_.)*(x_)^(n_.))]/(x_), x_Symbol] :> -Simp[PolyLog[2
, -(c*e*x^n)]/n, x] /; FreeQ[{c, d, e, n}, x] && EqQ[c*d, 1]
```

Rule 6258

```
Int[ArcCoth[(c_.) + Cot[(a_.) + (b_.)*(x_)]*(d_.)], x_Symbol] :> Simp[x*Arc
Coth[c + d*Cot[a + b*x]], x] + Dist[I*b, Int[x/(c - I*d - c*E^(2*I*a + 2*I*
b*x)), x], x] /; FreeQ[{a, b, c, d}, x] && EqQ[(c - I*d)^2, 1]
```

Rubi steps

$$\int \coth^{-1}(1+id+d\cot(a+bx))\,dx = x\coth^{-1}(1+id+d\cot(a+bx)) + (ib)\int \frac{x}{1+(-1-id)e^{2ia+2ibx}}\,dx$$
$$= \frac{1}{2}ibx^2 + x\coth^{-1}(1+id+d\cot(a+bx)) + (b(i-d))\int \frac{e^{2ia+2ibx}x}{1+(-1-id)e^{2i}}$$
$$= \frac{1}{2}ibx^2 + x\coth^{-1}(1+id+d\cot(a+bx)) - \frac{1}{2}x\log\left(1-(1+id)e^{2ia+2ibx}\right)$$
$$= \frac{1}{2}ibx^2 + x\coth^{-1}(1+id+d\cot(a+bx)) - \frac{1}{2}x\log\left(1-(1+id)e^{2ia+2ibx}\right)$$
$$= \frac{1}{2}ibx^2 + x\coth^{-1}(1+id+d\cot(a+bx)) - \frac{1}{2}x\log\left(1-(1+id)e^{2ia+2ibx}\right)$$

**Mathematica [B]** time = 3.79, size = 709, normalized size = 7.62

$$\frac{x\csc^2(a+bx)(\cos(bx)-i\sin(bx))(\cos(bx)+i\sin(bx)}{(\cot(a+bx)+i)(d\cot(a+bx)+id+2)\left(\frac{(d-2i)\cos(a+bx)(\log(1-i\tan(bx))-\log(1+i\tan(bx)))}{d\cos(a+bx)+(2+id)\sin(a+bx)}+\frac{d\sin(a+bx)(\log(1-i\tan(bx))-\log(}{(d-2i)\sin(a+bx)-id\cos(a}\right.}$$

Warning: Unable to verify antiderivative.

```
[In] Integrate[ArcCoth[1 + I*d + d*Cot[a + b*x]],x]
```

```
[Out] x*ArcCoth[1 + I*d + d*Cot[a + b*x]] + (x*Csc[a + b*x]^2*(2*b*x*Log[2*Cos[b*
x]*(Cos[b*x] - I*Sin[b*x])] + I*Log[(Sec[b*x]*(Cos[a] - I*Sin[a])*(d*Cos[a
+ b*x] + (2 + I*d)*Sin[a + b*x]))/(2*(-I + d))]*Log[1 - I*Tan[b*x]] - I*Log
[(Sec[b*x]*((-I)*Cos[a] + Sin[a])*(d*Cos[a + b*x] + (2 + I*d)*Sin[a + b*x])
)/2]*Log[1 + I*Tan[b*x]] + I*PolyLog[2, -Cos[2*b*x] + I*Sin[2*b*x]] - I*Pol
yLog[2, (Sec[b*x]*((2 + I*d)*Cos[a] - d*Sin[a])*(Cos[a + b*x] + I*Sin[a + b
*x]))/2] + I*PolyLog[2, ((Cos[a] - I*Sin[a])*((-2 - I*d)*Cos[a] + d*Sin[a])
*(I + Tan[b*x]))/(2*(-I + d))])*(Cos[b*x] - I*Sin[b*x])*(Cos[b*x] + I*Sin[b
*x]))/((I + Cot[a + b*x])*(2 + I*d + d*Cot[a + b*x])*((2*I)*b*x + Log[1 + (
Sec[b*x]*((-2 - I*d)*Cos[a] + d*Sin[a])*(Cos[a + b*x] + I*Sin[a + b*x]))/2]
 - Log[(Sec[b*x]*((-I)*Cos[a] + Sin[a])*(d*Cos[a + b*x] + (2 + I*d)*Sin[a +
 b*x]))/2] + ((-2*I + d)*Cos[a + b*x]*(Log[1 - I*Tan[b*x]] - Log[1 + I*Tan[
b*x]]))/(d*Cos[a + b*x] + (2 + I*d)*Sin[a + b*x]) + (d*(Log[1 - I*Tan[b*x]]
 - Log[1 + I*Tan[b*x]])*Sin[a + b*x])/((-I)*d*Cos[a + b*x] + (-2*I + d)*Sin
[a + b*x]) + 2*b*x*Tan[b*x] - I*Log[1 + (Sec[b*x]*((-2 - I*d)*Cos[a] + d*Si
n[a])*(Cos[a + b*x] + I*Sin[a + b*x]))/2]*Tan[b*x] + I*Log[(Sec[b*x]*((-I)*
Cos[a] + Sin[a])*(d*Cos[a + b*x] + (2 + I*d)*Sin[a + b*x]))/2]*Tan[b*x] - I
*Log[1 - I*Tan[b*x]]*Tan[b*x] + I*Log[1 + I*Tan[b*x]]*Tan[b*x]))
```

**fricas [A]** time = 0.52, size = 121, normalized size = 1.30

$$\frac{2i\,b^2x^2 + 2\,bx\log\left(\frac{\left((d-i)e^{(2i\,bx+2i\,a)}+i\right)e^{(-2i\,bx-2i\,a)}}{d}\right) - 2i\,a^2 - 2\,(bx+a)\log\left((-i\,d-1)e^{(2i\,bx+2i\,a)}+1\right) + 2\,a\log\left(\frac{(d-i)e^{(2i}}{a}\right.}{4\,b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(1+I*d+d*cot(b*x+a)),x, algorithm="fricas")
```

```
[Out] 1/4*(2*I*b^2*x^2 + 2*b*x*log(((d - I)*e^(2*I*b*x + 2*I*a) + I)*e^(-2*I*b*x
- 2*I*a)/d) - 2*I*a^2 - 2*(b*x + a)*log((-I*d - 1)*e^(2*I*b*x + 2*I*a) + 1)
 + 2*a*log(((d - I)*e^(2*I*b*x + 2*I*a) + I)/(d - I)) + I*dilog(-(-I*d - 1)
*e^(2*I*b*x + 2*I*a)))/b
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \operatorname{arcoth}(d\cot(bx+a)+i\,d+1)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(1+I*d+d*cot(b*x+a)),x, algorithm="giac")
```

```
[Out] integrate(arccoth(d*cot(b*x + a) + I*d + 1), x)
```

**maple [B]** time = 0.76, size = 299, normalized size = 3.22

$$-\frac{i\operatorname{arccoth}(1+id+d\cot(bx+a))\ln(id+d\cot(bx+a))}{2b}+\frac{i\operatorname{arccoth}(1+id+d\cot(bx+a))\ln(id-d\cot(bx+a$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(arccoth(1+I*d+d*cot(b*x+a)),x)
```

```
[Out] -1/2*I/b*arccoth(1+I*d+d*cot(b*x+a))*ln(I*d+d*cot(b*x+a))+1/2*I/b*arccoth(1
+I*d+d*cot(b*x+a))*ln(I*d-d*cot(b*x+a))-1/8*I/b*ln(I*d+d*cot(b*x+a))^2+1/4*
I/b*dilog(1+1/2*I*d+1/2*d*cot(b*x+a))+1/4*I/b*ln(I*d+d*cot(b*x+a))*ln(1+1/2
*I*d+1/2*d*cot(b*x+a))-1/4*I/b*dilog((-2-I*d-d*cot(b*x+a))/(-2*I*d-2))-1/4*
I/b*ln(I*d-d*cot(b*x+a))*ln((-2-I*d-d*cot(b*x+a))/(-2*I*d-2))+1/4*I/b*dilog
(1/2*I*(-I*d-d*cot(b*x+a))/d)+1/4*I/b*ln(I*d-d*cot(b*x+a))*ln(1/2*I*(-I*d-d
*cot(b*x+a))/d)
```

**maxima [B]** time = 0.45, size = 286, normalized size = 3.08

$$-\frac{4(bx+a)d\left(\frac{\log((id+2)\tan(bx+a)+d)}{d}-\frac{\log(i\tan(bx+a)+1)}{d}\right)+d\left(-\frac{2i\left(\log((id+2)\tan(bx+a)+d)\log\left(\frac{(d-2i)\tan(bx+a)-id}{2id+2}+1\right)+\mathrm{Li}_2\left(-\frac{(d-2i)\tan(b}{2id+}\right.\right.}{d}\right.}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(1+I*d+d*cot(b*x+a)),x, algorithm="maxima")
```

```
[Out] -1/8*(4*(b*x + a)*d*(log((I*d + 2)*tan(b*x + a) + d)/d - log(I*tan(b*x + a)
 + 1)/d) + d*(-2*I*(log((I*d + 2)*tan(b*x + a) + d)*log(((d - 2*I)*tan(b*x
+ a) - I*d)/(2*I*d + 2) + 1) + dilog(-((d - 2*I)*tan(b*x + a) - I*d)/(2*I*d
 + 2)))/d - 2*I*(log(1/2*(d - 2*I)*tan(b*x + a) - 1/2*I*d)*log(I*tan(b*x +
a) + 1) + dilog(-1/2*(d - 2*I)*tan(b*x + a) + 1/2*I*d + 1))/d + (2*I*log((I
*d + 2)*tan(b*x + a) + d)*log(I*tan(b*x + a) + 1) - I*log(I*tan(b*x + a) +
1)^2)/d + 2*I*(log(I*tan(b*x + a) + 1)*log(-1/2*I*tan(b*x + a) + 1/2) + dil
og(1/2*I*tan(b*x + a) + 1/2))/d) - 8*(b*x + a)*arccoth(I*d + d/tan(b*x + a)
 + 1))/b
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.01

$$\int \operatorname{acoth}(d\cot(a+b\,x)+1+d\,1\mathrm{i})\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(d*1i + d*cot(a + b*x) + 1),x)
```

```
[Out] int(acoth(d*1i + d*cot(a + b*x) + 1), x)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \operatorname{acoth}(d\cot(a+bx)+id+1)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(1+I*d+d*cot(b*x+a)),x)
```

```
[Out] Integral(acoth(d*cot(a + b*x) + I*d + 1), x)
```

## 3.260 $\int \frac{\coth^{-1}(1+id+d\cot(a+bx))}{x}\,dx$

**Optimal**. Leaf size=23

$$\text{Int}\left(\frac{\coth^{-1}(d\cot(a+bx)+id+1)}{x},x\right)$$

[Out] CannotIntegrate(arccoth(1+I*d+d*cot(b*x+a))/x,x)

**Rubi** [A] time = 0.09, antiderivative size = 0, normalized size of antiderivative = 0.00, number of steps used = 0, number of rules used = 0, integrand size = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int \frac{\coth^{-1}(1+id+d\cot(a+bx))}{x}\,dx$$

Verification is Not applicable to the result.

[In] Int[ArcCoth[1 + I*d + d*Cot[a + b*x]]/x,x]

[Out] Defer[Int][ArcCoth[1 + I*d + d*Cot[a + b*x]]/x, x]

Rubi steps

$$\int \frac{\coth^{-1}(1+id+d\cot(a+bx))}{x}\,dx=\int \frac{\coth^{-1}(1+id+d\cot(a+bx))}{x}\,dx$$

**Mathematica** [A] time = 0.78, size = 0, normalized size = 0.00

$$\int \frac{\coth^{-1}(1+id+d\cot(a+bx))}{x}\,dx$$

Verification is Not applicable to the result.

[In] Integrate[ArcCoth[1 + I*d + d*Cot[a + b*x]]/x,x]

[Out] Integrate[ArcCoth[1 + I*d + d*Cot[a + b*x]]/x, x]

**fricas** [A] time = 0.64, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{\log\left(\frac{\left((d-i)e^{(2i\,bx+2i\,a)}+i\right)e^{(-2i\,bx-2i\,a)}}{d}\right)}{2\,x},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

[In] integrate(arccoth(1+I*d+d*cot(b*x+a))/x,x, algorithm="fricas")

[Out] integral(1/2*log(((d - I)*e^(2*I*b*x + 2*I*a) + I)*e^(-2*I*b*x - 2*I*a)/d)/x, x)

**giac** [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{arcoth}(d\cot(bx+a)+i\,d+1)}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

[In] integrate(arccoth(1+I*d+d*cot(b*x+a))/x,x, algorithm="giac")

```
[Out] integrate(arccoth(d*cot(b*x + a) + I*d + 1)/x, x)
```

**maple** [A] time = 2.06, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{arccoth}\left(1+id+d\cot\left(bx+a\right)\right)}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(arccoth(1+I*d+d*cot(b*x+a))/x,x)
```

```
[Out] int(arccoth(1+I*d+d*cot(b*x+a))/x,x)
```

**maxima** [A] time = 0.00, size = 0, normalized size = 0.00

$$-i\,bx+\frac{1}{4}\left(-i\,\pi-4i\,a-2\,\log(d)\right)\log(x)+\frac{1}{2}i\int\frac{\arctan\left(d\cos\left(2\,bx+2\,a\right)+\sin\left(2\,bx+2\,a\right),-d\sin\left(2\,bx+2\,a\right)\right.}{x}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(1+I*d+d*cot(b*x+a))/x,x, algorithm="maxima")
```

```
[Out] -I*b*x + 1/4*(-I*pi - 4*I*a - 2*log(d))*log(x) + 1/2*I*integrate(arctan2(d*
cos(2*b*x + 2*a) + sin(2*b*x + 2*a), -d*sin(2*b*x + 2*a) + cos(2*b*x + 2*a)
 - 1)/x, x) + 1/4*integrate(log((d^2 + 1)*cos(2*b*x + 2*a)^2 + (d^2 + 1)*si
n(2*b*x + 2*a)^2 + 2*d*sin(2*b*x + 2*a) - 2*cos(2*b*x + 2*a) + 1)/x, x)
```

**mupad** [A] time = 0.00, size = -1, normalized size = -0.04

$$\int \frac{\operatorname{acoth}\left(d\cot\left(a+b\,x\right)+1+d\,1\mathrm{i}\right)}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(d*1i + d*cot(a + b*x) + 1)/x,x)
```

```
[Out] int(acoth(d*1i + d*cot(a + b*x) + 1)/x, x)
```

**sympy** [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{acoth}\left(d\cot\left(a+bx\right)+id+1\right)}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(1+I*d+d*cot(b*x+a))/x,x)
```

```
[Out] Integral(acoth(d*cot(a + b*x) + I*d + 1)/x, x)
```

## 3.261 $\int x^2 \coth^{-1}(1 - id - d\cot(a + bx))\,dx$

**Optimal**. Leaf size=169

$$-\frac{i\text{Li}_4\left((1-id)e^{2ia+2ibx}\right)}{8b^3}-\frac{x\text{Li}_3\left((1-id)e^{2ia+2ibx}\right)}{4b^2}+\frac{ix^2\text{Li}_2\left((1-id)e^{2ia+2ibx}\right)}{4b}-\frac{1}{6}x^3\log\left(1-(1-id)e^{2ia+2ibx}\right)+\frac{1}{3}x^3\text{cot}$$

```
[Out] 1/12*I*b*x^4+1/3*x^3*arccoth(1-I*d-d*cot(b*x+a))-1/6*x^3*ln(1-(1-I*d)*exp(2
*I*a+2*I*b*x))+1/4*I*x^2*polylog(2,(1-I*d)*exp(2*I*a+2*I*b*x))/b-1/4*x*poly
log(3,(1-I*d)*exp(2*I*a+2*I*b*x))/b^2-1/8*I*polylog(4,(1-I*d)*exp(2*I*a+2*I
*b*x))/b^3
```

**Rubi [A]** time = 0.29, antiderivative size = 169, normalized size of antiderivative = 1.00, number of steps used = 7, number of rules used = 7, integrand size = 21, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.333, Rules used = {6266, 2184, 2190, 2531, 6609, 2282, 6589}

$$-\frac{x\text{PolyLog}\left(3,(1-id)e^{2ia+2ibx}\right)}{4b^2}-\frac{i\text{PolyLog}\left(4,(1-id)e^{2ia+2ibx}\right)}{8b^3}+\frac{ix^2\text{PolyLog}\left(2,(1-id)e^{2ia+2ibx}\right)}{4b}-\frac{1}{6}x^3\log\left(1-(\right.$$

Antiderivative was successfully verified.

```
[In] Int[x^2*ArcCoth[1 - I*d - d*Cot[a + b*x]],x]
```

```
[Out] (I/12)*b*x^4 + (x^3*ArcCoth[1 - I*d - d*Cot[a + b*x]])/3 - (x^3*Log[1 - (1
- I*d)*E^((2*I)*a + (2*I)*b*x)])/6 + ((I/4)*x^2*PolyLog[2, (1 - I*d)*E^((2*
I)*a + (2*I)*b*x)])/b - (x*PolyLog[3, (1 - I*d)*E^((2*I)*a + (2*I)*b*x)])/(
4*b^2) - ((I/8)*PolyLog[4, (1 - I*d)*E^((2*I)*a + (2*I)*b*x)])/b^3
```

Rule 2184

```
Int[((c_.) + (d_.)*(x_))^(m_.)/((a_) + (b_.)*((F_)^((g_.)*((e_.) + (f_.)*(x
_))))^(n_.)), x_Symbol] :> Simp[(c + d*x)^(m + 1)/(a*d*(m + 1)), x] - Dist[
b/a, Int[((c + d*x)^m*(F^(g*(e + f*x)))^n)/(a + b*(F^(g*(e + f*x)))^n), x],
 x] /; FreeQ[{F, a, b, c, d, e, f, g, n}, x] && IGtQ[m, 0]
```

Rule 2190

```
Int[(((F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m_.))/
((a_) + (b_.)*((F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)), x_Symbol] :> Simp
[((c + d*x)^m*Log[1 + (b*(F^(g*(e + f*x)))^n)/a])/(b*f*g*n*Log[F]), x] - Di
st[(d*m)/(b*f*g*n*Log[F]), Int[(c + d*x)^(m - 1)*Log[1 + (b*(F^(g*(e + f*x)
))^n)/a], x], x] /; FreeQ[{F, a, b, c, d, e, f, g, n}, x] && IGtQ[m, 0]
```

Rule 2282

```
Int[u_, x_Symbol] :> With[{v = FunctionOfExponential[u, x]}, Dist[v/D[v, x]
, Subst[Int[FunctionOfExponentialFunction[u, x]/x, x], x, v], x]] /; Functi
onOfExponentialQ[u, x] && !MatchQ[u, (w_)*((a_.)*(v_)^(n_))^(m_) /; FreeQ[
{a, m, n}, x] && IntegerQ[m*n]] && !MatchQ[u, E^((c_.)*((a_.) + (b_.)*x))*
(F_)[v_] /; FreeQ[{a, b, c}, x] && InverseFunctionQ[F[x]]]
```

Rule 2531

```
Int[Log[1 + (e_.)*((F_)^((c_.)*((a_.) + (b_.)*(x_))))^(n_.)]*((f_.) + (g_.)
*(x_))^(m_.), x_Symbol] :> -Simp[((f + g*x)^m*PolyLog[2, -(e*(F^(c*(a + b*x
)))^n)])/(b*c*n*Log[F]), x] + Dist[(g*m)/(b*c*n*Log[F]), Int[(f + g*x)^(m -
 1)*PolyLog[2, -(e*(F^(c*(a + b*x)))^n)], x], x] /; FreeQ[{F, a, b, c, e, f
, g, n}, x] && GtQ[m, 0]
```

Rule 6266

```
Int[ArcCoth[(c_.) + Cot[(a_.) + (b_.)*(x_)]*(d_.)]*((e_.) + (f_.)*(x_))^(m_
.), x_Symbol] :> Simp[((e + f*x)^(m + 1)*ArcCoth[c + d*Cot[a + b*x]])/(f*(m
 + 1)), x] + Dist[(I*b)/(f*(m + 1)), Int[(e + f*x)^(m + 1)/(c - I*d - c*E^(
2*I*a + 2*I*b*x)), x], x] /; FreeQ[{a, b, c, d, e, f}, x] && IGtQ[m, 0] &&
EqQ[(c - I*d)^2, 1]
```

Rule 6589

```
Int[PolyLog[n_, (c_.)*((a_.) + (b_.)*(x_))^(p_.)]/((d_.) + (e_.)*(x_)), x_S
ymbol] :> Simp[PolyLog[n + 1, c*(a + b*x)^p]/(e*p), x] /; FreeQ[{a, b, c, d
, e, n, p}, x] && EqQ[b*d, a*e]
```

Rule 6609

```
Int[((e_.) + (f_.)*(x_))^(m_.)*PolyLog[n_, (d_.)*((F_)^((c_.)*((a_.) + (b_.
)*(x_))))^(p_.)], x_Symbol] :> Simp[((e + f*x)^m*PolyLog[n + 1, d*(F^(c*(a
+ b*x)))^p])/(b*c*p*Log[F]), x] - Dist[(f*m)/(b*c*p*Log[F]), Int[(e + f*x)^
(m - 1)*PolyLog[n + 1, d*(F^(c*(a + b*x)))^p], x], x] /; FreeQ[{F, a, b, c,
 d, e, f, n, p}, x] && GtQ[m, 0]
```

Rubi steps

$$\int x^2 \coth^{-1}(1-id-d\cot(a+bx))\,dx = \frac{1}{3}x^3\coth^{-1}(1-id-d\cot(a+bx))+\frac{1}{3}(ib)\int\frac{x^3}{1+(-1+id)e^{2ia+2ibx}}\,d$$

$$= \frac{1}{12}ibx^4+\frac{1}{3}x^3\coth^{-1}(1-id-d\cot(a+bx))+\frac{1}{3}(b(i+d))\int\frac{e^{2}}{1+(-1}$$

$$= \frac{1}{12}ibx^4+\frac{1}{3}x^3\coth^{-1}(1-id-d\cot(a+bx))-\frac{1}{6}x^3\log\left(1-(1-id)e^{2}\right.$$

$$= \frac{1}{12}ibx^4+\frac{1}{3}x^3\coth^{-1}(1-id-d\cot(a+bx))-\frac{1}{6}x^3\log\left(1-(1-id)e^{2}\right.$$

$$= \frac{1}{12}ibx^4+\frac{1}{3}x^3\coth^{-1}(1-id-d\cot(a+bx))-\frac{1}{6}x^3\log\left(1-(1-id)e^{2}\right.$$

$$= \frac{1}{12}ibx^4+\frac{1}{3}x^3\coth^{-1}(1-id-d\cot(a+bx))-\frac{1}{6}x^3\log\left(1-(1-id)e^{2}\right.$$

$$= \frac{1}{12}ibx^4+\frac{1}{3}x^3\coth^{-1}(1-id-d\cot(a+bx))-\frac{1}{6}x^3\log\left(1-(1-id)e^{2}\right.$$

**Mathematica [A]** time = 0.21, size = 155, normalized size = 0.92

$$\frac{1}{3}x^3\coth^{-1}(d(-\cot(a+bx))-id+1)-\frac{4b^3x^3\log\left(1+\frac{e^{-2i(a+bx)}}{-1+id}\right)+6ib^2x^2\mathrm{Li}_2\left(\frac{ie^{-2i(a+bx)}}{d+i}\right)+6bx\mathrm{Li}_3\left(\frac{ie^{-2i(a+bx)}}{d+i}\right)-3i\mathrm{Li}_4}{24b^3}$$

Antiderivative was successfully verified.

```
[In] Integrate[x^2*ArcCoth[1 - I*d - d*Cot[a + b*x]],x]
```

```
[Out] (x^3*ArcCoth[1 - I*d - d*Cot[a + b*x]])/3 - (4*b^3*x^3*Log[1 + 1/((-1 + I*d
)*E^((2*I)*(a + b*x)))] + (6*I)*b^2*x^2*PolyLog[2, I/((I + d)*E^((2*I)*(a +
 b*x)))] + 6*b*x*PolyLog[3, I/((I + d)*E^((2*I)*(a + b*x)))] - (3*I)*PolyLo
g[4, I/((I + d)*E^((2*I)*(a + b*x)))])/(24*b^3)
```

**fricas [C]** time = 0.68, size = 179, normalized size = 1.06

$$\frac{2i\,b^4x^4-4\,b^3x^3\log\left(\frac{de^{(2i\,bx+2i\,a)}}{(d+i)e^{(2i\,bx+2i\,a)}-i}\right)+6i\,b^2x^2\mathrm{Li}_2\left(-(i\,d-1)e^{(2i\,bx+2i\,a)}\right)-2i\,a^4+4\,a^3\log\left(\frac{(d+i)e^{(2i\,bx+2i\,a)}-i}{d+i}\right)-6\,b}{2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*arccoth(1-I*d-d*cot(b*x+a)),x, algorithm="fricas")
```

```
[Out] 1/24*(2*I*b^4*x^4 - 4*b^3*x^3*log(d*e^(2*I*b*x + 2*I*a)/((d + I)*e^(2*I*b*x
 + 2*I*a) - I)) + 6*I*b^2*x^2*dilog(-(I*d - 1)*e^(2*I*b*x + 2*I*a)) - 2*I*a
^4 + 4*a^3*log(((d + I)*e^(2*I*b*x + 2*I*a) - I)/(d + I)) - 6*b*x*polylog(3
, (-I*d + 1)*e^(2*I*b*x + 2*I*a)) - 4*(b^3*x^3 + a^3)*log((I*d - 1)*e^(2*I*
b*x + 2*I*a) + 1) - 3*I*polylog(4, (-I*d + 1)*e^(2*I*b*x + 2*I*a)))/b^3
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int x^2 \operatorname{arcoth}\left(-d\cot\left(bx+a\right)-i\,d+1\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*arccoth(1-I*d-d*cot(b*x+a)),x, algorithm="giac")
```

```
[Out] integrate(x^2*arccoth(-d*cot(b*x + a) - I*d + 1), x)
```

**maple [C]** time = 5.97, size = 2339, normalized size = 13.84

Expression too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^2*arccoth(1-I*d-d*cot(b*x+a)),x)
```

```
[Out] 1/2/b^2*d/(I+d)*ln(1+I*(I+d)*exp(2*I*(b*x+a)))*x*a^2-1/2/b^2*a^2*d/(I+d)*ln
(1+I*exp(I*(b*x+a))*(I*(I+d))^(1/2))*x-1/2/b^2*a^2*d/(I+d)*ln(1-I*exp(I*(b*
x+a))*(I*(I+d))^(1/2))*x-1/12*I*x^3*Pi*csgn(I/(exp(2*I*(b*x+a))-1))*csgn(I*
(I*exp(2*I*(b*x+a))+exp(2*I*(b*x+a))*d-I))*csgn(I*(I*exp(2*I*(b*x+a))+exp(2
*I*(b*x+a))*d-I)/(exp(2*I*(b*x+a))-1))+1/12*I*x^3*Pi*csgn((I*exp(2*I*(b*x+a
))+exp(2*I*(b*x+a))*d-I)/(exp(2*I*(b*x+a))-1))^2+1/4/b^3/(I+d)*polylog(2,-I
*(I+d)*exp(2*I*(b*x+a)))*a^2-1/2/b^3*a^2/(I+d)*dilog(1+I*exp(I*(b*x+a))*(I*
(I+d))^(1/2))-1/2/b^3*a^2/(I+d)*dilog(1-I*exp(I*(b*x+a))*(I*(I+d))^(1/2))-1
/6*d/(I+d)*ln(1+I*(I+d)*exp(2*I*(b*x+a)))*x^3+1/6/b^3*a^3*d/(I+d)*ln(I*exp(
2*I*(b*x+a))+exp(2*I*(b*x+a))*d-I)-1/12*I*x^3*Pi*csgn(d/(exp(2*I*(b*x+a))-1
)*exp(2*I*(b*x+a)))^2-1/3*x^3*ln(exp(I*(b*x+a)))+1/12*I*b*x^4-1/12*I*x^3*Pi
*csgn((I*exp(2*I*(b*x+a))+exp(2*I*(b*x+a))*d-I)/(exp(2*I*(b*x+a))-1))^3-1/6
*I/(I+d)*ln(1+I*(I+d)*exp(2*I*(b*x+a)))*x^3+1/12*I*x^3*Pi*csgn(I*exp(2*I*(b
*x+a)))^3-1/6*x^3*ln(d)+1/12*I*x^3*Pi*csgn(I*exp(I*(b*x+a)))^2*csgn(I*exp(2
*I*(b*x+a)))-1/2*I/b^3*a^3/(I+d)*ln(1+I*exp(I*(b*x+a))*(I*(I+d))^(1/2))-1/6
*I*x^3*Pi*csgn(I*exp(I*(b*x+a)))*csgn(I*exp(2*I*(b*x+a)))^2-1/12*I*x^3*Pi*c
sgn(I*(I*exp(2*I*(b*x+a))+exp(2*I*(b*x+a))*d-I)/(exp(2*I*(b*x+a))-1))*csgn(
(I*exp(2*I*(b*x+a))+exp(2*I*(b*x+a))*d-I)/(exp(2*I*(b*x+a))-1))+1/12*I*x^3*
Pi*csgn(I*d/(exp(2*I*(b*x+a))-1)*exp(2*I*(b*x+a)))^3+1/12*I*x^3*Pi*csgn(d/(
exp(2*I*(b*x+a))-1)*exp(2*I*(b*x+a)))^3+1/8/b^3/(I+d)*polylog(4,-I*(I+d)*ex
p(2*I*(b*x+a)))-1/12*I*x^3*Pi*csgn(I*d)*csgn(I*d/(exp(2*I*(b*x+a))-1)*exp(2
*I*(b*x+a)))^2+1/6*x^3*ln(I*exp(2*I*(b*x+a))+exp(2*I*(b*x+a))*d-I)+1/12*I*x
^3*Pi*csgn(I*exp(2*I*(b*x+a))/(exp(2*I*(b*x+a))-1))^3-1/12*I*x^3*Pi*csgn(I*
(I*exp(2*I*(b*x+a))+exp(2*I*(b*x+a))*d-I)/(exp(2*I*(b*x+a))-1))^3-1/4*I/b^2
/(I+d)*polylog(3,-I*(I+d)*exp(2*I*(b*x+a)))*x+1/6*I/b^3*a^3/(I+d)*ln(I*exp(
2*I*(b*x+a))+exp(2*I*(b*x+a))*d-I)+1/12*I*x^3*Pi*csgn(I*exp(2*I*(b*x+a)))*c
sgn(I/(exp(2*I*(b*x+a))-1))*csgn(I*exp(2*I*(b*x+a))/(exp(2*I*(b*x+a))-1))+1
/12*I*x^3*Pi*csgn(I*d)*csgn(I*exp(2*I*(b*x+a))/(exp(2*I*(b*x+a))-1))*csgn(I
*d/(exp(2*I*(b*x+a))-1)*exp(2*I*(b*x+a)))-1/2*I/b^2*a^2/(I+d)*ln(1+I*exp(I*
(b*x+a))*(I*(I+d))^(1/2))*x-1/2*I/b^2*a^2/(I+d)*ln(1-I*exp(I*(b*x+a))*(I*(I
+d))^(1/2))*x+1/2*I/b^2/(I+d)*ln(1+I*(I+d)*exp(2*I*(b*x+a)))*x*a^2+1/4*I/b*
d/(I+d)*polylog(2,-I*(I+d)*exp(2*I*(b*x+a)))*x^2-1/4*I/b^3*d/(I+d)*polylog(
2,-I*(I+d)*exp(2*I*(b*x+a)))*a^2+1/2*I/b^3*a^2*d/(I+d)*dilog(1+I*exp(I*(b*x
```

```
+a))*(I*(I+d))^(1/2))-1/2*I/b^3*a^3/(I+d)*ln(1-I*exp(I*(b*x+a))*(I*(I+d))^(
1/2))-1/8*I/b^3*d/(I+d)*polylog(4,-I*(I+d)*exp(2*I*(b*x+a)))+1/2*I/b^3*a^2*
d/(I+d)*dilog(1-I*exp(I*(b*x+a))*(I*(I+d))^(1/2))-1/12*I*x^3*Pi*csgn(I*d/(e
xp(2*I*(b*x+a))-1)*exp(2*I*(b*x+a)))*csgn(d/(exp(2*I*(b*x+a))-1)*exp(2*I*(b
*x+a)))^2-1/2/b^3*a^3*d/(I+d)*ln(1+I*exp(I*(b*x+a))*(I*(I+d))^(1/2))-1/2/b^
3*a^3*d/(I+d)*ln(1-I*exp(I*(b*x+a))*(I*(I+d))^(1/2))+1/3/b^3*d/(I+d)*ln(1+I
*(I+d)*exp(2*I*(b*x+a)))*a^3+1/12*I*x^3*Pi*csgn(I*d/(exp(2*I*(b*x+a))-1)*ex
p(2*I*(b*x+a)))*csgn(d/(exp(2*I*(b*x+a))-1)*exp(2*I*(b*x+a)))-1/12*I*x^3*Pi
*csgn(I*exp(2*I*(b*x+a)))*csgn(I*exp(2*I*(b*x+a))/(exp(2*I*(b*x+a))-1))^2-1
/12*I*x^3*Pi*csgn(I/(exp(2*I*(b*x+a))-1))*csgn(I*exp(2*I*(b*x+a))/(exp(2*I*
(b*x+a))-1))^2-1/12*I*x^3*Pi*csgn(I*exp(2*I*(b*x+a))/(exp(2*I*(b*x+a))-1))*
csgn(I*d/(exp(2*I*(b*x+a))-1)*exp(2*I*(b*x+a)))^2+1/12*I*x^3*Pi*csgn(I*(I*e
xp(2*I*(b*x+a))+exp(2*I*(b*x+a))*d-I)/(exp(2*I*(b*x+a))-1))*csgn((I*exp(2*I
*(b*x+a))+exp(2*I*(b*x+a))*d-I)/(exp(2*I*(b*x+a))-1))^2+1/12*I*x^3*Pi*csgn(
I*(I*exp(2*I*(b*x+a))+exp(2*I*(b*x+a))*d-I))*csgn(I*(I*exp(2*I*(b*x+a))+exp
(2*I*(b*x+a))*d-I)/(exp(2*I*(b*x+a))-1))^2-1/4/b^2*d/(I+d)*polylog(3,-I*(I+
d)*exp(2*I*(b*x+a)))*x+1/3*I/b^3/(I+d)*ln(1+I*(I+d)*exp(2*I*(b*x+a)))*a^3+1
/12*I*x^3*Pi*csgn(I/(exp(2*I*(b*x+a))-1))*csgn(I*(I*exp(2*I*(b*x+a))+exp(2*
I*(b*x+a))*d-I)/(exp(2*I*(b*x+a))-1))^2-1/4/b/(I+d)*polylog(2,-I*(I+d)*exp(
2*I*(b*x+a)))*x^2
```

**maxima [B]** time = 0.41, size = 343, normalized size = 2.03

$$-\frac{\frac{12\left((bx+a)^3-3(bx+a)^2a+3(bx+a)a^2\right)\operatorname{arcoth}(d\cot(bx+a)+id-1)}{b^2}+\frac{-3i(bx+a)^4+12i(bx+a)^3a-18i(bx+a)^2a^2+\left(-8i(bx+a)^3+18i(bx+a)^2a-18i(b\ldots}{\ldots}}{\ldots}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*arccoth(1-I*d-d*cot(b*x+a)),x, algorithm="maxima")
```

```
[Out] -1/36*(12*((b*x + a)^3 - 3*(b*x + a)^2*a + 3*(b*x + a)*a^2)*arccoth(d*cot(b
*x + a) + I*d - 1)/b^2 + (-3*I*(b*x + a)^4 + 12*I*(b*x + a)^3*a - 18*I*(b*x
 + a)^2*a^2 + (-8*I*(b*x + a)^3 + 18*I*(b*x + a)^2*a - 18*I*(b*x + a)*a^2)*
arctan2(-d*cos(2*b*x + 2*a) + sin(2*b*x + 2*a), -d*sin(2*b*x + 2*a) - cos(2
*b*x + 2*a) + 1) + (-12*I*(b*x + a)^2 + 18*I*(b*x + a)*a - 9*I*a^2)*dilog((
-I*d + 1)*e^(2*I*b*x + 2*I*a)) + (4*(b*x + a)^3 - 9*(b*x + a)^2*a + 9*(b*x
+ a)*a^2)*log((d^2 + 1)*cos(2*b*x + 2*a)^2 + (d^2 + 1)*sin(2*b*x + 2*a)^2 -
 2*d*sin(2*b*x + 2*a) - 2*cos(2*b*x + 2*a) + 1) + 3*(4*b*x + a)*polylog(3,
(-I*d + 1)*e^(2*I*b*x + 2*I*a)) + 6*I*polylog(4, (-I*d + 1)*e^(2*I*b*x + 2*
I*a)))/b^2)/b
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.01

$$\int -x^2\,\mathrm{acoth}\left(d\cot\left(a+b\,x\right)-1+d\,1\mathrm{i}\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(-x^2*acoth(d*1i + d*cot(a + b*x) - 1),x)
```

```
[Out] int(-x^2*acoth(d*1i + d*cot(a + b*x) - 1), x)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int x^2\operatorname{acoth}\left(-d\cot\left(a+bx\right)-id+1\right)dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**2*acoth(1-I*d-d*cot(b*x+a)),x)
```

```
[Out] Integral(x**2*acoth(-d*cot(a + b*x) - I*d + 1), x)
```

## 3.262 $\int x \coth^{-1}(1 - id - d\cot(a + bx))\,dx$

**Optimal**. Leaf size=133

$$-\frac{\text{Li}_3\left((1-id)e^{2ia+2ibx}\right)}{8b^2}+\frac{ix\text{Li}_2\left((1-id)e^{2ia+2ibx}\right)}{4b}-\frac{1}{4}x^2\log\left(1-(1-id)e^{2ia+2ibx}\right)+\frac{1}{2}x^2\coth^{-1}(d(-\cot(a+bx))-id+1$$

```
[Out] 1/6*I*b*x^3+1/2*x^2*arccoth(1-I*d-d*cot(b*x+a))-1/4*x^2*ln(1-(1-I*d)*exp(2*
I*a+2*I*b*x))+1/4*I*x*polylog(2,(1-I*d)*exp(2*I*a+2*I*b*x))/b-1/8*polylog(3
,(1-I*d)*exp(2*I*a+2*I*b*x))/b^2
```

**Rubi [A]** time = 0.25, antiderivative size = 133, normalized size of antiderivative = 1.00, number of steps used = 6, number of rules used = 6, integrand size = 19, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.316, Rules used = {6266, 2184, 2190, 2531, 2282, 6589}

$$-\frac{\text{PolyLog}\left(3,(1-id)e^{2ia+2ibx}\right)}{8b^2}+\frac{ix\text{PolyLog}\left(2,(1-id)e^{2ia+2ibx}\right)}{4b}-\frac{1}{4}x^2\log\left(1-(1-id)e^{2ia+2ibx}\right)+\frac{1}{2}x^2\coth^{-1}(d(-c$$

Antiderivative was successfully verified.

```
[In] Int[x*ArcCoth[1 - I*d - d*Cot[a + b*x]],x]
```

```
[Out] (I/6)*b*x^3 + (x^2*ArcCoth[1 - I*d - d*Cot[a + b*x]])/2 - (x^2*Log[1 - (1 -
 I*d)*E^((2*I)*a + (2*I)*b*x)])/4 + ((I/4)*x*PolyLog[2, (1 - I*d)*E^((2*I)*
a + (2*I)*b*x)])/b - PolyLog[3, (1 - I*d)*E^((2*I)*a + (2*I)*b*x)]/(8*b^2)
```

Rule 2184

```
Int[((c_.) + (d_.)*(x_))^(m_.)/((a_) + (b_.)*((F_)^((g_.)*((e_.) + (f_.)*(x
_))))^(n_.)), x_Symbol] :> Simp[(c + d*x)^(m + 1)/(a*d*(m + 1)), x] - Dist[
b/a, Int[((c + d*x)^m*(F^(g*(e + f*x)))^n)/(a + b*(F^(g*(e + f*x)))^n), x],
 x] /; FreeQ[{F, a, b, c, d, e, f, g, n}, x] && IGtQ[m, 0]
```

Rule 2190

```
Int[(((F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m_.))/
((a_) + (b_.)*((F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)), x_Symbol] :> Simp
[((c + d*x)^m*Log[1 + (b*(F^(g*(e + f*x)))^n)/a])/(b*f*g*n*Log[F]), x] - Di
st[(d*m)/(b*f*g*n*Log[F]), Int[(c + d*x)^(m - 1)*Log[1 + (b*(F^(g*(e + f*x)
))^n)/a], x], x] /; FreeQ[{F, a, b, c, d, e, f, g, n}, x] && IGtQ[m, 0]
```

Rule 2282

```
Int[u_, x_Symbol] :> With[{v = FunctionOfExponential[u, x]}, Dist[v/D[v, x]
, Subst[Int[FunctionOfExponentialFunction[u, x]/x, x], x, v], x]] /; Functi
onOfExponentialQ[u, x] &&  !MatchQ[u, (w_)*((a_.)*(v_)^(n_))^(m_) /; FreeQ[
{a, m, n}, x] && IntegerQ[m*n]] &&  !MatchQ[u, E^((c_.)*((a_.) + (b_.)*x))*
(F_)[v_] /; FreeQ[{a, b, c}, x] && InverseFunctionQ[F[x]]]
```

Rule 2531

```
Int[Log[1 + (e_.)*((F_)^((c_.)*((a_.) + (b_.)*(x_))))^(n_.)]*((f_.) + (g_.)
*(x_))^(m_.), x_Symbol] :> -Simp[((f + g*x)^m*PolyLog[2, -(e*(F^(c*(a + b*x
)))^n)])/(b*c*n*Log[F]), x] + Dist[(g*m)/(b*c*n*Log[F]), Int[(f + g*x)^(m -
 1)*PolyLog[2, -(e*(F^(c*(a + b*x)))^n)], x], x] /; FreeQ[{F, a, b, c, e, f
, g, n}, x] && GtQ[m, 0]
```

Rule 6266

```
Int[ArcCoth[(c_.) + Cot[(a_.) + (b_.)*(x_)]*(d_.)]*((e_.) + (f_.)*(x_))^(m_
.), x_Symbol] :> Simp[((e + f*x)^(m + 1)*ArcCoth[c + d*Cot[a + b*x]])/(f*(m
```

```
 + 1)), x] + Dist[(I*b)/(f*(m + 1)), Int[(e + f*x)^(m + 1)/(c - I*d - c*E^(
2*I*a + 2*I*b*x)), x], x] /; FreeQ[{a, b, c, d, e, f}, x] && IGtQ[m, 0] &&
EqQ[(c - I*d)^2, 1]
```

Rule 6589

```
Int[PolyLog[n_, (c_.)*((a_.) + (b_.)*(x_))^(p_.)]/((d_.) + (e_.)*(x_)), x_S
ymbol] :> Simp[PolyLog[n + 1, c*(a + b*x)^p]/(e*p), x] /; FreeQ[{a, b, c, d
, e, n, p}, x] && EqQ[b*d, a*e]
```

Rubi steps

$$\int x\coth^{-1}(1-id-d\cot(a+bx))\,dx = \frac{1}{2}x^2\coth^{-1}(1-id-d\cot(a+bx))+\frac{1}{2}(ib)\int\frac{x^2}{1+(-1+id)e^{2ia+2ibx}}\,dx$$
$$=\frac{1}{6}ibx^3+\frac{1}{2}x^2\coth^{-1}(1-id-d\cot(a+bx))+\frac{1}{2}(b(i+d))\int\frac{e^{2ia+}}{1+(-1+}$$
$$=\frac{1}{6}ibx^3+\frac{1}{2}x^2\coth^{-1}(1-id-d\cot(a+bx))-\frac{1}{4}x^2\log\left(1-(1-id)e^{2ia-}\right.$$
$$=\frac{1}{6}ibx^3+\frac{1}{2}x^2\coth^{-1}(1-id-d\cot(a+bx))-\frac{1}{4}x^2\log\left(1-(1-id)e^{2ia-}\right.$$
$$=\frac{1}{6}ibx^3+\frac{1}{2}x^2\coth^{-1}(1-id-d\cot(a+bx))-\frac{1}{4}x^2\log\left(1-(1-id)e^{2ia-}\right.$$
$$=\frac{1}{6}ibx^3+\frac{1}{2}x^2\coth^{-1}(1-id-d\cot(a+bx))-\frac{1}{4}x^2\log\left(1-(1-id)e^{2ia-}\right.$$

**Mathematica [A]** time = 0.11, size = 119, normalized size = 0.89

$$\frac{1}{2}x^2\coth^{-1}(d(-\cot(a+bx))-id+1)-\frac{2b^2x^2\log\left(1+\frac{e^{-2i(a+bx)}}{-1+id}\right)+2ibx\text{Li}_2\left(\frac{ie^{-2i(a+bx)}}{d+i}\right)+\text{Li}_3\left(\frac{ie^{-2i(a+bx)}}{d+i}\right)}{8b^2}$$

Antiderivative was successfully verified.

```
[In] Integrate[x*ArcCoth[1 - I*d - d*Cot[a + b*x]],x]
```

```
[Out] (x^2*ArcCoth[1 - I*d - d*Cot[a + b*x]])/2 - (2*b^2*x^2*Log[1 + 1/((-1 + I*d
)*E^((2*I)*(a + b*x)))] + (2*I)*b*x*PolyLog[2, I/((I + d)*E^((2*I)*(a + b*x
)))] + PolyLog[3, I/((I + d)*E^((2*I)*(a + b*x)))])/(8*b^2)
```

**fricas [C]** time = 0.63, size = 156, normalized size = 1.17

$$\frac{4i\,b^3x^3-6\,b^2x^2\log\left(\frac{de^{(2i\,bx+2i\,a)}}{(d+i)e^{(2i\,bx+2i\,a)}-i}\right)+4i\,a^3+6i\,bx\text{Li}_2\left(-(i\,d-1)e^{(2i\,bx+2i\,a)}\right)-6\,a^2\log\left(\frac{(d+i)e^{(2i\,bx+2i\,a)}-i}{d+i}\right)-6\,(b^2}{24\,b^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*arccoth(1-I*d-d*cot(b*x+a)),x, algorithm="fricas")
```

```
[Out] 1/24*(4*I*b^3*x^3 - 6*b^2*x^2*log(d*e^(2*I*b*x + 2*I*a)/((d + I)*e^(2*I*b*x
 + 2*I*a) - I)) + 4*I*a^3 + 6*I*b*x*dilog(-(I*d - 1)*e^(2*I*b*x + 2*I*a)) -
 6*a^2*log(((d + I)*e^(2*I*b*x + 2*I*a) - I)/(d + I)) - 6*(b^2*x^2 - a^2)*l
og((I*d - 1)*e^(2*I*b*x + 2*I*a) + 1) - 3*polylog(3, (-I*d + 1)*e^(2*I*b*x
+ 2*I*a)))/b^2
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int x\,\text{arcoth}\left(-d\cot\left(bx+a\right)-i\,d+1\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

[In] integrate(x*arccoth(1-I*d-d*cot(b*x+a)),x, algorithm="giac")

[Out] integrate(x*arccoth(-d*cot(b*x + a) - I*d + 1), x)

**maple [C]** time = 5.51, size = 2249, normalized size = 16.91

Expression too large to display

Verification of antiderivative is not currently implemented for this CAS.

[In] int(x*arccoth(1-I*d-d*cot(b*x+a)),x)

[Out] -1/4/b^2/(I+d)*polylog(2,-I*(I+d)*exp(2*I*(b*x+a)))*a-1/4*d/(I+d)*ln(1+I*(I+d)*exp(2*I*(b*x+a)))*x^2-1/8/b^2*d/(I+d)*polylog(3,-I*(I+d)*exp(2*I*(b*x+a)))+1/8*I*x^2*Pi*csgn((I*exp(2*I*(b*x+a))+exp(2*I*(b*x+a))*d-I)/(exp(2*I*(b*x+a))-1))^2+1/4*I/b^2*d/(I+d)*polylog(2,-I*(I+d)*exp(2*I*(b*x+a)))*a+1/2*I/b*a/(I+d)*ln(1+I*exp(I*(b*x+a))*(I*(I+d))^(1/2))*x+1/2*I/b*a/(I+d)*ln(1-I*exp(I*(b*x+a))*(I*(I+d))^(1/2))*x-1/4*I/b^2/(I+d)*ln(1+I*(I+d)*exp(2*I*(b*x+a)))*a^2+1/2*I/b^2*a^2/(I+d)*ln(1+I*exp(I*(b*x+a))*(I*(I+d))^(1/2))+1/6*I*b*x^3+1/8*I*x^2*Pi*csgn(I*exp(2*I*(b*x+a)))*csgn(I/(exp(2*I*(b*x+a))-1))*csgn(I*exp(2*I*(b*x+a))/(exp(2*I*(b*x+a))-1))+1/8*I*x^2*Pi*csgn(I*d)*csgn(I*exp(2*I*(b*x+a))/(exp(2*I*(b*x+a))-1))*csgn(I*d/(exp(2*I*(b*x+a))-1)*exp(2*I*(b*x+a)))+1/8*I*x^2*Pi*csgn(I*exp(2*I*(b*x+a)))^3-1/8*I/b^2/(I+d)*polylog(3,-I*(I+d)*exp(2*I*(b*x+a)))-1/4*I/(I+d)*ln(1+I*(I+d)*exp(2*I*(b*x+a)))*x^2-1/4*x^2*ln(d)+1/8*I*x^2*Pi*csgn(d/(exp(2*I*(b*x+a))-1)*exp(2*I*(b*x+a)))^3-1/8*I*x^2*Pi*csgn(d/(exp(2*I*(b*x+a))-1)*exp(2*I*(b*x+a)))^2-1/2*x^2*ln(exp(I*(b*x+a)))+1/8*I*x^2*Pi*csgn(I*d/(exp(2*I*(b*x+a))-1)*exp(2*I*(b*x+a)))*csgn(d/(exp(2*I*(b*x+a))-1)*exp(2*I*(b*x+a)))+1/8*I*x^2*Pi*csgn(I*d/(exp(2*I*(b*x+a))-1)*exp(2*I*(b*x+a)))^3-1/8*I*x^2*Pi*csgn((I*exp(2*I*(b*x+a))+exp(2*I*(b*x+a))*d-I)/(exp(2*I*(b*x+a))-1))^3+1/2/b^2*a/(I+d)*dilog(1+I*exp(I*(b*x+a))*(I*(I+d))^(1/2))+1/2/b^2*a/(I+d)*dilog(1-I*exp(I*(b*x+a))*(I*(I+d))^(1/2))-1/4/b/(I+d)*polylog(2,-I*(I+d)*exp(2*I*(b*x+a)))*x-1/8*I*x^2*Pi*csgn(I*d)*csgn(I*d/(exp(2*I*(b*x+a))-1)*exp(2*I*(b*x+a)))^2-1/8*I*x^2*Pi*csgn(I*(I*exp(2*I*(b*x+a))+exp(2*I*(b*x+a))*d-I)/(exp(2*I*(b*x+a))-1))^3-1/8*I*x^2*Pi*csgn(I*(I*exp(2*I*(b*x+a))+exp(2*I*(b*x+a))*d-I)/(exp(2*I*(b*x+a))-1))*csgn((I*exp(2*I*(b*x+a))+exp(2*I*(b*x+a))*d-I)/(exp(2*I*(b*x+a))-1))+1/8*I*x^2*Pi*csgn(I*exp(2*I*(b*x+a))/(exp(2*I*(b*x+a))-1))^3+1/8*I*x^2*Pi*csgn(I*(I*exp(2*I*(b*x+a))+exp(2*I*(b*x+a))*d-I))*csgn(I*(I*exp(2*I*(b*x+a))+exp(2*I*(b*x+a))*d-I)/(exp(2*I*(b*x+a))-1))^2-1/8*I*x^2*Pi*csgn(I*exp(2*I*(b*x+a)))*csgn(I*exp(2*I*(b*x+a))/(exp(2*I*(b*x+a))-1))^2-1/8*I*x^2*Pi*csgn(I/(exp(2*I*(b*x+a))-1))*csgn(I*exp(2*I*(b*x+a))/(exp(2*I*(b*x+a))-1))^2-1/8*I*x^2*Pi*csgn(I*d/(exp(2*I*(b*x+a))-1)*exp(2*I*(b*x+a)))*csgn(d/(exp(2*I*(b*x+a))-1)*exp(2*I*(b*x+a)))^2-1/8*I*x^2*Pi*csgn(I*exp(2*I*(b*x+a))/(exp(2*I*(b*x+a))-1))*csgn(I*d/(exp(2*I*(b*x+a))-1)*exp(2*I*(b*x+a)))^2+1/4*x^2*ln(I*exp(2*I*(b*x+a))+exp(2*I*(b*x+a))*d-I)+1/8*I*x^2*Pi*csgn(I*exp(I*(b*x+a)))^2*csgn(I*exp(2*I*(b*x+a)))-1/4*I*x^2*Pi*csgn(I*exp(I*(b*x+a)))*csgn(I*exp(2*I*(b*x+a)))^2-1/2*I/b^2*a*d/(I+d)*dilog(1+I*exp(I*(b*x+a))*(I*(I+d))^(1/2))-1/2*I/b^2*a*d/(I+d)*dilog(1-I*exp(I*(b*x+a))*(I*(I+d))^(1/2))-1/2*I/b/(I+d)*ln(1+I*(I+d)*exp(2*I*(b*x+a)))*x*a+1/2/b*a*d/(I+d)*ln(1-I*exp(I*(b*x+a))*(I*(I+d))^(1/2))*x-1/2/b*d/(I+d)*ln(1+I*(I+d)*exp(2*I*(b*x+a)))*x*a+1/2/b*a*d/(I+d)*ln(1+I*exp(I*(b*x+a))*(I*(I+d))^(1/2))*x-1/8*I*x^2*Pi*csgn(I/(exp(2*I*(b*x+a))-1))*csgn(I*(I*exp(2*I*(b*x+a))+exp(2*I*(b*x+a))*d-I))*csgn(I*(I*exp(2*I*(b*x+a))+exp(2*I*(b*x+a))*d-I)/(exp(2*I*(b*x+a))-1))+1/2/b^2*a^2*d/(I+d)*ln(1+I*exp(I*(b*x+a))*(I*(I+d))^(1/2))+1/8*I*x^2*Pi*csgn(I*(I*exp(2*I*(b*x+a))+exp(2*I*(b*x+a))*d-I)/(exp(2*I*(b*x+a))-1))*csgn((I*exp(2*I*(b*x+a))+exp(2*I*(b*x+a))*d-I)/(exp(2*I*(b*x+a))-1))^2+1/8*I*x^2*Pi*csgn(I/(exp(2*I*(b*x+a))-1))*csgn(I*(I*exp(2*I*(b*x+a))+exp(2*I*(b*x+a))*d-I)/(exp(2*I*(b*x+a))-1))^2+1/2*I/b^2*a^2/(I+d)*ln(1-I*exp(I*(b*x+a))*(I*(I+d))^(1/2))-1/4*I/b^2*a^2/(I+d)*ln(I*exp(2*I*(b*x+a))+exp(2*I*(b*x+a))*d-I)+1/2/b^2*

```
a^2*d/(I+d)*ln(1-I*exp(I*(b*x+a))*(I*(I+d))^(1/2))-1/4/b^2*a^2*d/(I+d)*ln(I
*exp(2*I*(b*x+a))+exp(2*I*(b*x+a))*d-I)-1/4/b^2*d/(I+d)*ln(1+I*(I+d)*exp(2*
I*(b*x+a)))*a^2+1/4*I/b*d/(I+d)*polylog(2,-I*(I+d)*exp(2*I*(b*x+a)))*x
```

**maxima [B]** time = 0.38, size = 249, normalized size = 1.87

$$-\frac{\frac{12\left((bx+a)^2-2\,(bx+a)a\right)\operatorname{arcoth}(d\cot(bx+a)+i\,d-1)}{b}+\frac{-4i\,(bx+a)^3+12i\,(bx+a)^2a-6i\,bx\mathrm{Li}_2\left((-i\,d+1)e^{(2i\,bx+2i\,a)}\right)+\left(-6i\,(bx+a)^2+12i\,(bx+a)a\right)\operatorname{arcta}}{}}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*arccoth(1-I*d-d*cot(b*x+a)),x, algorithm="maxima")
```

```
[Out] -1/24*(12*((b*x + a)^2 - 2*(b*x + a)*a)*arccoth(d*cot(b*x + a) + I*d - 1)/b
 + (-4*I*(b*x + a)^3 + 12*I*(b*x + a)^2*a - 6*I*b*x*dilog((-I*d + 1)*e^(2*I
*b*x + 2*I*a)) + (-6*I*(b*x + a)^2 + 12*I*(b*x + a)*a)*arctan2(-d*cos(2*b*x
 + 2*a) + sin(2*b*x + 2*a), -d*sin(2*b*x + 2*a) - cos(2*b*x + 2*a) + 1) + 3
*((b*x + a)^2 - 2*(b*x + a)*a)*log((d^2 + 1)*cos(2*b*x + 2*a)^2 + (d^2 + 1)
*sin(2*b*x + 2*a)^2 - 2*d*sin(2*b*x + 2*a) - 2*cos(2*b*x + 2*a) + 1) + 3*po
lylog(3, (-I*d + 1)*e^(2*I*b*x + 2*I*a)))/b)/b
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.01

$$\int -x\,\mathrm{acoth}\left(d\cot\left(a+b\,x\right)-1+d\,1\mathrm{i}\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(-x*acoth(d*1i + d*cot(a + b*x) - 1),x)
```

```
[Out] int(-x*acoth(d*1i + d*cot(a + b*x) - 1), x)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int x\,\mathrm{acoth}\left(-d\cot\left(a+bx\right)-id+1\right)dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*acoth(1-I*d-d*cot(b*x+a)),x)
```

```
[Out] Integral(x*acoth(-d*cot(a + b*x) - I*d + 1), x)
```

## 3.263 $\int \coth^{-1}(1 - id - d\cot(a + bx))\,dx$

**Optimal**. Leaf size=94

$$\frac{i\text{Li}_2\left((1-id)e^{2ia+2ibx}\right)}{4b}-\frac{1}{2}x\log\left(1-(1-id)e^{2ia+2ibx}\right)+x\coth^{-1}(d(-\cot(a+bx))-id+1)+\frac{1}{2}ibx^2$$

```
[Out] 1/2*I*b*x^2+x*arccoth(1-I*d-d*cot(b*x+a))-1/2*x*ln(1-(1-I*d)*exp(2*I*a+2*I*
b*x))+1/4*I*polylog(2,(1-I*d)*exp(2*I*a+2*I*b*x))/b
```

**Rubi [A]** time = 0.15, antiderivative size = 94, normalized size of antiderivative = 1.00, number of steps used = 5, number of rules used = 5, integrand size = 17, $\frac{\text{number of rules}}{\text{integrand size}} = 0.294$, Rules used = {6258, 2184, 2190, 2279, 2391}

$$\frac{i\text{PolyLog}\left(2,(1-id)e^{2ia+2ibx}\right)}{4b}-\frac{1}{2}x\log\left(1-(1-id)e^{2ia+2ibx}\right)+x\coth^{-1}(d(-\cot(a+bx))-id+1)+\frac{1}{2}ibx^2$$

Antiderivative was successfully verified.

```
[In] Int[ArcCoth[1 - I*d - d*Cot[a + b*x]],x]
```

```
[Out] (I/2)*b*x^2 + x*ArcCoth[1 - I*d - d*Cot[a + b*x]] - (x*Log[1 - (1 - I*d)*E^
((2*I)*a + (2*I)*b*x)])/2 + ((I/4)*PolyLog[2, (1 - I*d)*E^((2*I)*a + (2*I)*
b*x)])/b
```

Rule 2184

```
Int[((c_.) + (d_.)*(x_))^(m_.)/((a_) + (b_.)*((F_)^((g_.)*((e_.) + (f_.)*(x
_))))^(n_.)), x_Symbol] :> Simp[(c + d*x)^(m + 1)/(a*d*(m + 1)), x] - Dist[
b/a, Int[((c + d*x)^m*(F^(g*(e + f*x)))^n)/(a + b*(F^(g*(e + f*x)))^n), x],
 x] /; FreeQ[{F, a, b, c, d, e, f, g, n}, x] && IGtQ[m, 0]
```

Rule 2190

```
Int[(((F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m_.))/
((a_) + (b_.)*((F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)), x_Symbol] :> Simp
[((c + d*x)^m*Log[1 + (b*(F^(g*(e + f*x)))^n)/a])/(b*f*g*n*Log[F]), x] - Di
st[(d*m)/(b*f*g*n*Log[F]), Int[(c + d*x)^(m - 1)*Log[1 + (b*(F^(g*(e + f*x)
))^n)/a], x], x] /; FreeQ[{F, a, b, c, d, e, f, g, n}, x] && IGtQ[m, 0]
```

Rule 2279

```
Int[Log[(a_) + (b_.)*((F_)^((e_.)*((c_.) + (d_.)*(x_))))^(n_.)], x_Symbol]
:> Dist[1/(d*e*n*Log[F]), Subst[Int[Log[a + b*x]/x, x], x, (F^(e*(c + d*x))
)^n], x] /; FreeQ[{F, a, b, c, d, e, n}, x] && GtQ[a, 0]
```

Rule 2391

```
Int[Log[(c_.)*((d_) + (e_.)*(x_)^(n_.))]/(x_), x_Symbol] :> -Simp[PolyLog[2
, -(c*e*x^n)]/n, x] /; FreeQ[{c, d, e, n}, x] && EqQ[c*d, 1]
```

Rule 6258

```
Int[ArcCoth[(c_.) + Cot[(a_.) + (b_.)*(x_)]*(d_.)], x_Symbol] :> Simp[x*Arc
Coth[c + d*Cot[a + b*x]], x] + Dist[I*b, Int[x/(c - I*d - c*E^(2*I*a + 2*I*
b*x)), x], x] /; FreeQ[{a, b, c, d}, x] && EqQ[(c - I*d)^2, 1]
```

Rubi steps

$$\int \coth^{-1}(1-id-d\cot(a+bx))\,dx = x\coth^{-1}(1-id-d\cot(a+bx)) + (ib)\int \frac{x}{1+(-1+id)e^{2ia+2ibx}}\,dx$$
$$= \frac{1}{2}ibx^2 + x\coth^{-1}(1-id-d\cot(a+bx)) + (b(i+d))\int \frac{e^{2ia+2ibx}x}{1+(-1+id)e^{2i}}$$
$$= \frac{1}{2}ibx^2 + x\coth^{-1}(1-id-d\cot(a+bx)) - \frac{1}{2}x\log\left(1-(1-id)e^{2ia+2ibx}\right)$$
$$= \frac{1}{2}ibx^2 + x\coth^{-1}(1-id-d\cot(a+bx)) - \frac{1}{2}x\log\left(1-(1-id)e^{2ia+2ibx}\right)$$
$$= \frac{1}{2}ibx^2 + x\coth^{-1}(1-id-d\cot(a+bx)) - \frac{1}{2}x\log\left(1-(1-id)e^{2ia+2ibx}\right)$$

**Mathematica [B]** time = 2.94, size = 605, normalized size = 6.44

$$\frac{x\csc^2(a+bx)(\cos(bx)-i\sin(bx))(\cos(bx)+i\sin(bx))\left(i\mathrm{Li}_2\left(\frac{(\cos(a)-i\sin(a))((2-id)\cos(a)+d\sin(a))(\tan(bx)+i)}{2(d+i)}\right)-i\mathrm{Li}_2\left(\right.\right.}{(\cot(a+bx)+i)(d\cot(a+bx)+id-2)\left(\frac{\sec^2(bx)\log\left(\frac{i\sec(}{}\right.}{}\right.}$$

Warning: Unable to verify antiderivative.

```
[In] Integrate[ArcCoth[1 - I*d - d*Cot[a + b*x]],x]
```

```
[Out] x*ArcCoth[1 - I*d - d*Cot[a + b*x]] + (x*Csc[a + b*x]^2*(2*b*x*Log[2*Cos[b*
x]*(Cos[b*x] - I*Sin[b*x])] + I*Log[(Sec[b*x]*(Cos[a] - I*Sin[a])*(d*Cos[a
+ b*x] + I*(2*I + d)*Sin[a + b*x]))/(2*(I + d))]*Log[1 - I*Tan[b*x]] - I*Lo
g[(I*Sec[b*x]*(d*Cos[a + b*x] + I*(2*I + d)*Sin[a + b*x]))/(2*Cos[a] - (2*I
)*Sin[a])]*Log[1 + I*Tan[b*x]] + I*PolyLog[2, -Cos[2*b*x] + I*Sin[2*b*x]] -
 I*PolyLog[2, (Sec[b*x]*((2 - I*d)*Cos[a] + d*Sin[a])*(Cos[a + b*x] + I*Sin
[a + b*x]))/2] + I*PolyLog[2, ((Cos[a] - I*Sin[a])*((2 - I*d)*Cos[a] + d*Si
n[a])*(I + Tan[b*x]))/(2*(I + d))])*(Cos[b*x] - I*Sin[b*x])*(Cos[b*x] + I*S
in[b*x]))/((I + Cot[a + b*x])*(-2 + I*d + d*Cot[a + b*x])*(-((Log[1 - I*Tan
[b*x]]*Sec[b*x]*((2*I + d)*Cos[a] + I*d*Sin[a]))/(d*Cos[a + b*x] + I*(2*I +
 d)*Sin[a + b*x])) + (Log[1 + I*Tan[b*x]]*Sec[b*x]*((2*I + d)*Cos[a] + I*d*
Sin[a]))/(d*Cos[a + b*x] + I*(2*I + d)*Sin[a + b*x]) + (Log[(I*Sec[b*x]*(d*
Cos[a + b*x] + I*(2*I + d)*Sin[a + b*x]))/(2*Cos[a] - (2*I)*Sin[a])]*Sec[b*
x]^2)/(1 + I*Tan[b*x]) - 2*b*x*(I + Tan[b*x]) + I*Log[1 - (Sec[b*x]*((2 - I
*d)*Cos[a] + d*Sin[a])*(Cos[a + b*x] + I*Sin[a + b*x]))/2]*(I + Tan[b*x])))
```

**fricas [A]** time = 0.71, size = 121, normalized size = 1.29

$$\frac{2i\,b^2x^2 - 2\,bx\log\left(\frac{de^{(2i\,bx+2i\,a)}}{(d+i)e^{(2i\,bx+2i\,a)}-i}\right) - 2i\,a^2 - 2\,(bx+a)\log\left((i\,d-1)e^{(2i\,bx+2i\,a)}+1\right) + 2\,a\log\left(\frac{(d+i)e^{(2i\,bx+2i\,a)}-i}{d+i}\right) + i}{4\,b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(1-I*d-d*cot(b*x+a)),x, algorithm="fricas")
```

```
[Out] 1/4*(2*I*b^2*x^2 - 2*b*x*log(d*e^(2*I*b*x + 2*I*a)/((d + I)*e^(2*I*b*x + 2*
I*a) - I)) - 2*I*a^2 - 2*(b*x + a)*log((I*d - 1)*e^(2*I*b*x + 2*I*a) + 1) +
 2*a*log(((d + I)*e^(2*I*b*x + 2*I*a) - I)/(d + I)) + I*dilog(-(I*d - 1)*e^
(2*I*b*x + 2*I*a)))/b
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \operatorname{arcoth}\left(-d\cot\left(bx+a\right)-i\,d+1\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(1-I*d-d*cot(b*x+a)),x, algorithm="giac")
```

```
[Out] integrate(arccoth(-d*cot(b*x + a) - I*d + 1), x)
```

**maple [B]** time = 0.70, size = 304, normalized size = 3.23

$$\frac{i\operatorname{arccoth}(1-id-d\cot(bx+a))\ln(id-d\cot(bx+a))}{2b}-\frac{i\operatorname{arccoth}(1-id-d\cot(bx+a))\ln(-id-d\cot(bx+a)}{2b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(arccoth(1-I*d-d*cot(b*x+a)),x)
```

```
[Out] 1/2*I/b*arccoth(1-I*d-d*cot(b*x+a))*ln(I*d-d*cot(b*x+a))-1/2*I/b*arccoth(1-
I*d-d*cot(b*x+a))*ln(-I*d-d*cot(b*x+a))-1/8*I/b*ln(-I*d-d*cot(b*x+a))^2+1/4
*I/b*dilog(1-1/2*I*d-1/2*d*cot(b*x+a))+1/4*I/b*ln(-I*d-d*cot(b*x+a))*ln(1-1
/2*I*d-1/2*d*cot(b*x+a))-1/4*I/b*dilog((2-I*d-d*cot(b*x+a))/(-2*I*d+2))-1/4
*I/b*ln(I*d-d*cot(b*x+a))*ln((2-I*d-d*cot(b*x+a))/(-2*I*d+2))+1/4*I/b*dilog
(1/2*I*(-I*d-d*cot(b*x+a))/d)+1/4*I/b*ln(I*d-d*cot(b*x+a))*ln(1/2*I*(-I*d-d
*cot(b*x+a))/d)
```

**maxima [B]** time = 0.45, size = 288, normalized size = 3.06

$$-\frac{4(bx+a)d\left(\frac{\log((id-2)\tan(bx+a)+d)}{d}-\frac{\log(i\tan(bx+a)+1)}{d}\right)-d\left(\frac{2i\left(\log((id-2)\tan(bx+a)+d)\log\left(\frac{(d+2i)\tan(bx+a)-id}{2id-2}+1\right)+\mathrm{Li}_2\left(-\frac{(d+2i)\tan(bx+}{2id-2}\right.\right.}{d}\right.}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(1-I*d-d*cot(b*x+a)),x, algorithm="maxima")
```

```
[Out] -1/8*(4*(b*x + a)*d*(log((I*d - 2)*tan(b*x + a) + d)/d - log(I*tan(b*x + a)
 + 1)/d) - d*(2*I*(log((I*d - 2)*tan(b*x + a) + d)*log(((d + 2*I)*tan(b*x +
 a) - I*d)/(2*I*d - 2) + 1) + dilog(-((d + 2*I)*tan(b*x + a) - I*d)/(2*I*d
- 2)))/d + 2*I*(log(-1/2*(d + 2*I)*tan(b*x + a) + 1/2*I*d)*log(I*tan(b*x +
a) + 1) + dilog(1/2*(d + 2*I)*tan(b*x + a) - 1/2*I*d + 1))/d - (2*I*log((I*
d - 2)*tan(b*x + a) + d)*log(I*tan(b*x + a) + 1) - I*log(I*tan(b*x + a) + 1
)^2)/d - 2*I*(log(I*tan(b*x + a) + 1)*log(-1/2*I*tan(b*x + a) + 1/2) + dilo
g(1/2*I*tan(b*x + a) + 1/2))/d) + 8*(b*x + a)*arccoth(I*d + d/tan(b*x + a)
- 1))/b
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.01

$$\int -\operatorname{acoth}\left(d\cot(a+b\,x)-1+d\,1\mathrm{i}\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(-acoth(d*1i + d*cot(a + b*x) - 1),x)
```

```
[Out] int(-acoth(d*1i + d*cot(a + b*x) - 1), x)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \operatorname{acoth}(-d\cot(a+bx)-id+1)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(1-I*d-d*cot(b*x+a)),x)
```

```
[Out] Integral(acoth(-d*cot(a + b*x) - I*d + 1), x)
```

## 3.264 $\int \frac{\coth^{-1}(1-id-d\cot(a+bx))}{x}\,dx$

**Optimal**. Leaf size=24

$$\operatorname{Int}\left(\frac{\coth^{-1}(d(-\cot(a+bx))-id+1)}{x},x\right)$$

[Out] CannotIntegrate(arccoth(1-I*d-d*cot(b*x+a))/x,x)

**Rubi [A]** time = 0.08, antiderivative size = 0, normalized size of antiderivative = 0.00, number of steps used = 0, number of rules used = 0, integrand size = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int \frac{\coth^{-1}(1-id-d\cot(a+bx))}{x}\,dx$$

Verification is Not applicable to the result.

[In] Int[ArcCoth[1 - I*d - d*Cot[a + b*x]]/x,x]

[Out] Defer[Int][ArcCoth[1 - I*d - d*Cot[a + b*x]]/x, x]

Rubi steps

$$\int \frac{\coth^{-1}(1-id-d\cot(a+bx))}{x}\,dx = \int \frac{\coth^{-1}(1-id-d\cot(a+bx))}{x}\,dx$$

**Mathematica [A]** time = 0.83, size = 0, normalized size = 0.00

$$\int \frac{\coth^{-1}(1-id-d\cot(a+bx))}{x}\,dx$$

Verification is Not applicable to the result.

[In] Integrate[ArcCoth[1 - I*d - d*Cot[a + b*x]]/x,x]

[Out] Integrate[ArcCoth[1 - I*d - d*Cot[a + b*x]]/x, x]

**fricas [A]** time = 0.60, size = 0, normalized size = 0.00

$$\operatorname{integral}\left(-\frac{\log\left(\frac{de^{(2i\,bx+2i\,a)}}{(d+i)e^{(2i\,bx+2i\,a)}-i}\right)}{2\,x},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

[In] integrate(arccoth(1-I*d-d*cot(b*x+a))/x,x, algorithm="fricas")

[Out] integral(-1/2*log(d*e^(2*I*b*x + 2*I*a)/((d + I)*e^(2*I*b*x + 2*I*a) - I))/x, x)

**giac [A]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{arcoth}\left(-d\cot\left(bx+a\right)-i\,d+1\right)}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

[In] integrate(arccoth(1-I*d-d*cot(b*x+a))/x,x, algorithm="giac")

```
[Out] integrate(arccoth(-d*cot(b*x + a) - I*d + 1)/x, x)
```

**maple** [A] time = 2.07, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{arccoth}(1 - id - d\cot(bx + a))}{x}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(arccoth(1-I*d-d*cot(b*x+a))/x,x)
```

```
[Out] int(arccoth(1-I*d-d*cot(b*x+a))/x,x)
```

**maxima** [A] time = 0.00, size = 0, normalized size = 0.00

$$-i\,bx+\frac{1}{4}\left(-i\,\pi-4i\,a-2\,\log(d)\right)\log(x)-\frac{1}{2}i\int\frac{\arctan\left(-d\cos\left(2\,bx+2\,a\right)+\sin\left(2\,bx+2\,a\right),-d\sin\left(2\,bx+2\,a\right)-\right.}{x}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(1-I*d-d*cot(b*x+a))/x,x, algorithm="maxima")
```

```
[Out] -I*b*x + 1/4*(-I*pi - 4*I*a - 2*log(d))*log(x) - 1/2*I*integrate(arctan2(-d
*cos(2*b*x + 2*a) + sin(2*b*x + 2*a), -d*sin(2*b*x + 2*a) - cos(2*b*x + 2*a
) + 1)/x, x) + 1/4*integrate(log((d^2 + 1)*cos(2*b*x + 2*a)^2 + (d^2 + 1)*s
in(2*b*x + 2*a)^2 - 2*d*sin(2*b*x + 2*a) - 2*cos(2*b*x + 2*a) + 1)/x, x)
```

**mupad** [A] time = 0.00, size = -1, normalized size = -0.04

$$\int -\frac{\operatorname{acoth}\left(d\cot\left(a+b\,x\right)-1+d\,1\mathrm{i}\right)}{x}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(-acoth(d*1i + d*cot(a + b*x) - 1)/x,x)
```

```
[Out] int(-acoth(d*1i + d*cot(a + b*x) - 1)/x, x)
```

**sympy** [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{acoth}\left(-d\cot\left(a + bx\right) - id + 1\right)}{x}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(1-I*d-d*cot(b*x+a))/x,x)
```

```
[Out] Integral(acoth(-d*cot(a + b*x) - I*d + 1)/x, x)
```

# 3.265 $\int \frac{\left(a+b\coth^{-1}(cx^n)\right)\left(d+e\log\left(fx^m\right)\right)}{x}\,dx$

**Optimal**. Leaf size=160

$$ad\log(x)+\frac{ae\log^2\left(fx^m\right)}{2m}+\frac{bd\text{Li}_2\left(-\frac{x^{-n}}{c}\right)}{2n}-\frac{bd\text{Li}_2\left(\frac{x^{-n}}{c}\right)}{2n}+\frac{be\text{Li}_2\left(-\frac{x^{-n}}{c}\right)\log\left(fx^m\right)}{2n}-\frac{be\text{Li}_2\left(\frac{x^{-n}}{c}\right)\log\left(fx^m\right)}{2n}+\frac{bemL$$

```
[Out] a*d*ln(x)+1/2*a*e*ln(f*x^m)^2/m+1/2*b*d*polylog(2,-1/c/(x^n))/n+1/2*b*e*ln(
f*x^m)*polylog(2,-1/c/(x^n))/n-1/2*b*d*polylog(2,1/c/(x^n))/n-1/2*b*e*ln(f*
x^m)*polylog(2,1/c/(x^n))/n+1/2*b*e*m*polylog(3,-1/c/(x^n))/n^2-1/2*b*e*m*p
olylog(3,1/c/(x^n))/n^2
```

**Rubi** [A] time = 0.57, antiderivative size = 160, normalized size of antiderivative = 1.00, number of steps used = 11, number of rules used = 8, integrand size = 24, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.333, Rules used = {2301, 6742, 6096, 5913, 6072, 6070, 2374, 6589}

$$\frac{bd\text{PolyLog}\left(2,-\frac{x^{-n}}{c}\right)}{2n}-\frac{bd\text{PolyLog}\left(2,\frac{x^{-n}}{c}\right)}{2n}+\frac{be\log\left(fx^m\right)\text{PolyLog}\left(2,-\frac{x^{-n}}{c}\right)}{2n}-\frac{be\log\left(fx^m\right)\text{PolyLog}\left(2,\frac{x^{-n}}{c}\right)}{2n}-$$

Antiderivative was successfully verified.

```
[In] Int[((a + b*ArcCoth[c*x^n])*(d + e*Log[f*x^m]))/x,x]
```

```
[Out] a*d*Log[x] + (a*e*Log[f*x^m]^2)/(2*m) + (b*d*PolyLog[2, -(1/(c*x^n))])/(2*n
) + (b*e*Log[f*x^m]*PolyLog[2, -(1/(c*x^n))])/(2*n) - (b*d*PolyLog[2, 1/(c*
x^n)])/(2*n) - (b*e*Log[f*x^m]*PolyLog[2, 1/(c*x^n)])/(2*n) + (b*e*m*PolyLo
g[3, -(1/(c*x^n))])/(2*n^2) - (b*e*m*PolyLog[3, 1/(c*x^n)])/(2*n^2)
```

Rule 2301

```
Int[((a_.) + Log[(c_.)*(x_)^(n_.)]*(b_.))/(x_), x_Symbol] :> Simp[(a + b*Lo
g[c*x^n])^2/(2*b*n), x] /; FreeQ[{a, b, c, n}, x]
```

Rule 2374

```
Int[(Log[(d_.)*((e_) + (f_.)*(x_)^(m_.))]*((a_.) + Log[(c_.)*(x_)^(n_.)]*(b
_.))^(p_.))/(x_), x_Symbol] :> -Simp[(PolyLog[2, -(d*f*x^m)]*(a + b*Log[c*x
^n])^p)/m, x] + Dist[(b*n*p)/m, Int[(PolyLog[2, -(d*f*x^m)]*(a + b*Log[c*x^
n])^(p - 1))/x, x], x] /; FreeQ[{a, b, c, d, e, f, m, n}, x] && IGtQ[p, 0]
&& EqQ[d*e, 1]
```

Rule 5913

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))/(x_), x_Symbol] :> Simp[a*Log[x], x
] + (Simp[(b*PolyLog[2, -(c*x)^(-1)])/2, x] - Simp[(b*PolyLog[2, 1/(c*x)])/
2, x]) /; FreeQ[{a, b, c}, x]
```

Rule 6070

```
Int[(ArcCoth[(c_.)*(x_)^(n_.)]*Log[(d_.)*(x_)^(m_.)])/(x_), x_Symbol] :> Di
st[1/2, Int[(Log[d*x^m]*Log[1 + 1/(c*x^n)])/x, x], x] - Dist[1/2, Int[(Log[
d*x^m]*Log[1 - 1/(c*x^n)])/x, x], x] /; FreeQ[{c, d, m, n}, x]
```

Rule 6072

```
Int[(Log[(d_.)*(x_)^(m_.)]*(ArcCoth[(c_.)*(x_)^(n_.)]*(b_.) + (a_)))/(x_),
x_Symbol] :> Dist[a, Int[Log[d*x^m]/x, x], x] + Dist[b, Int[(Log[d*x^m]*Arc
Coth[c*x^n])/x, x], x] /; FreeQ[{a, b, c, d, m, n}, x]
```

Rule 6096

```
Int[((a_.) + ArcCoth[(c_.)*(x_)^(n_)]*(b_.))^(p_.)/(x_), x_Symbol] :> Dist[
1/n, Subst[Int[(a + b*ArcCoth[c*x])^p/x, x], x, x^n], x] /; FreeQ[{a, b, c,
 n}, x] && IGtQ[p, 0]
```

Rule 6589

```
Int[PolyLog[n_, (c_.)*((a_.) + (b_.)*(x_))^(p_.)]/((d_.) + (e_.)*(x_)), x_S
ymbol] :> Simp[PolyLog[n + 1, c*(a + b*x)^p]/(e*p), x] /; FreeQ[{a, b, c, d
, e, n, p}, x] && EqQ[b*d, a*e]
```

Rule 6742

```
Int[u_, x_Symbol] :> With[{v = ExpandIntegrand[u, x]}, Int[v, x] /; SumQ[v]
]
```

Rubi steps

$$\int \frac{\left(a+b\coth^{-1}(cx^n)\right)\left(d+e\log\left(fx^m\right)\right)}{x}\,dx = \int \left(\frac{d\left(a+b\coth^{-1}(cx^n)\right)}{x}+\frac{e\left(a+b\coth^{-1}(cx^n)\right)\log\left(fx^m\right)}{x}\right)dx$$

$$= d\int \frac{a+b\coth^{-1}(cx^n)}{x}\,dx + e\int \frac{\left(a+b\coth^{-1}(cx^n)\right)\log\left(fx^m\right)}{x}\,dx$$

$$= (ae)\int \frac{\log\left(fx^m\right)}{x}\,dx + (be)\int \frac{\coth^{-1}(cx^n)\log\left(fx^m\right)}{x}\,dx + \frac{d\,\mathrm{Sub}}{}$$

$$= ad\log(x) + \frac{ae\log^2\left(fx^m\right)}{2m} + \frac{bd\mathrm{Li}_2\left(-\frac{x^{-n}}{c}\right)}{2n} - \frac{bd\mathrm{Li}_2\left(\frac{x^{-n}}{c}\right)}{2n} - \frac{1}{2}(be)$$

$$= ad\log(x) + \frac{ae\log^2\left(fx^m\right)}{2m} + \frac{bd\mathrm{Li}_2\left(-\frac{x^{-n}}{c}\right)}{2n} + \frac{be\log\left(fx^m\right)\mathrm{Li}_2\left(-\frac{x}{}\right.}{2n}$$

$$= ad\log(x) + \frac{ae\log^2\left(fx^m\right)}{2m} + \frac{bd\mathrm{Li}_2\left(-\frac{x^{-n}}{c}\right)}{2n} + \frac{be\log\left(fx^m\right)\mathrm{Li}_2\left(-\frac{x}{}\right.}{2n}$$

**Mathematica [C]** time = 0.30, size = 131, normalized size = 0.82

$$\frac{bcx^n\left(d+e\log\left(fx^m\right)\right){}_3F_2\left(\frac{1}{2},\frac{1}{2},1;\frac{3}{2},\frac{3}{2};c^2x^{2n}\right)}{n} - \frac{bcemx^n{}_4F_3\left(\frac{1}{2},\frac{1}{2},\frac{1}{2},1;\frac{3}{2},\frac{3}{2},\frac{3}{2};c^2x^{2n}\right)}{n^2} - \frac{1}{2}\log(x)\left(em\log(x)-2\left(d\right.\right.$$

Antiderivative was successfully verified.

```
[In] Integrate[((a + b*ArcCoth[c*x^n])*(d + e*Log[f*x^m]))/x,x]
```

```
[Out] -((b*c*e*m*x^n*HypergeometricPFQ[{1/2, 1/2, 1/2, 1}, {3/2, 3/2, 3/2}, c^2*x
^(2*n)])/n^2) + (b*c*x^n*HypergeometricPFQ[{1/2, 1/2, 1}, {3/2, 3/2}, c^2*x
^(2*n)]*(d + e*Log[f*x^m]))/n - ((a + b*ArcCoth[c*x^n] - b*ArcTanh[c*x^n])*
Log[x]*(e*m*Log[x] - 2*(d + e*Log[f*x^m])))/2
```

**fricas [C]** time = 0.60, size = 326, normalized size = 2.04

$$\frac{2\,aemn^2\log(x)^2 - 2\,bem\mathrm{polylog}\left(3, c\cosh\left(n\log(x)\right)+c\sinh\left(n\log(x)\right)\right) + 2\,bem\mathrm{polylog}\left(3, -c\cosh\left(n\log(x)\right)\right.}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccoth(c*x^n))*(d+e*log(f*x^m))/x,x, algorithm="fricas")
```

```
[Out] 1/4*(2*a*e*m*n^2*log(x)^2 - 2*b*e*m*polylog(3, c*cosh(n*log(x)) + c*sinh(n*
log(x))) + 2*b*e*m*polylog(3, -c*cosh(n*log(x)) - c*sinh(n*log(x))) + 2*(b*
e*m*n*log(x) + b*e*n*log(f) + b*d*n)*dilog(c*cosh(n*log(x)) + c*sinh(n*log(
x))) - 2*(b*e*m*n*log(x) + b*e*n*log(f) + b*d*n)*dilog(-c*cosh(n*log(x)) -
c*sinh(n*log(x))) - (b*e*m*n^2*log(x)^2 + 2*(b*e*n^2*log(f) + b*d*n^2)*log(
x))*log(c*cosh(n*log(x)) + c*sinh(n*log(x)) + 1) + (b*e*m*n^2*log(x)^2 + 2*
(b*e*n^2*log(f) + b*d*n^2)*log(x))*log(-c*cosh(n*log(x)) - c*sinh(n*log(x))
 + 1) + 4*(a*e*n^2*log(f) + a*d*n^2)*log(x) + (b*e*m*n^2*log(x)^2 + 2*(b*e*
n^2*log(f) + b*d*n^2)*log(x))*log((c*cosh(n*log(x)) + c*sinh(n*log(x)) + 1)
/(c*cosh(n*log(x)) + c*sinh(n*log(x)) - 1)))/n^2
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{(b\operatorname{arcoth}(cx^n) + a)\left(e\log\left(fx^m\right) + d\right)}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccoth(c*x^n))*(d+e*log(f*x^m))/x,x, algorithm="giac")
```

```
[Out] integrate((b*arccoth(c*x^n) + a)*(e*log(f*x^m) + d)/x, x)
```

**maple [C]** time = 0.54, size = 920, normalized size = 5.75

result too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a+b*arccoth(c*x^n))*(d+e*ln(f*x^m))/x,x)
```

```
[Out] 1/4*I/n*Pi*ln(c*x^n-1)*ln(c*x^n)*b*e*csgn(I*f*x^m)^3-1/4*I/n*Pi*dilog(c*x^n
)*b*e*csgn(I*f)*csgn(I*f*x^m)^2+1/2*I/n*ln(x^n)*Pi*a*e*csgn(I*x^m)*csgn(I*f
*x^m)^2-1/4*I/n*Pi*dilog(c*x^n)*b*e*csgn(I*x^m)*csgn(I*f*x^m)^2+1/n*ln(x^n)
*a*d+1/2*e*a/m*ln(x^m)^2-1/2/n*dilog(c*x^n)*b*d-1/2/n*dilog(c*x^n+1)*b*d+1/
4*I/n*Pi*ln(c*x^n-1)*ln(c*x^n)*b*e*csgn(I*f)*csgn(I*x^m)*csgn(I*f*x^m)-1/2*
I/n*ln(x^n)*Pi*a*e*csgn(I*f)*csgn(I*x^m)*csgn(I*f*x^m)+1/4*I/n*dilog(c*x^n+
1)*Pi*b*e*csgn(I*f)*csgn(I*x^m)*csgn(I*f*x^m)+1/4*I/n*dilog(c*x^n+1)*Pi*b*e
*csgn(I*f*x^m)^3-1/2*I/n*ln(x^n)*Pi*a*e*csgn(I*f*x^m)^3-1/2/n*ln(c*x^n-1)*l
n(c*x^n)*b*d+1/4*e*b*ln(c*x^n-1)*ln(x)^2*m-1/2*e*b*ln(c*x^n-1)*ln(x^m)*ln(x
)-1/4*e*b*m*ln(x)^2*ln(1-c*x^n)-1/4*I/n*Pi*ln(c*x^n-1)*ln(c*x^n)*b*e*csgn(I
*f)*csgn(I*f*x^m)^2+1/4*I/n*Pi*dilog(c*x^n)*b*e*csgn(I*f)*csgn(I*x^m)*csgn(
I*f*x^m)-1/4*I/n*dilog(c*x^n+1)*Pi*b*e*csgn(I*f)*csgn(I*f*x^m)^2+1/2*I/n*ln
(x^n)*Pi*a*e*csgn(I*f)*csgn(I*f*x^m)^2-1/4*I/n*dilog(c*x^n+1)*Pi*b*e*csgn(I
*x^m)*csgn(I*f*x^m)^2+1/2*b*e*m*polylog(3,-c*x^n)/n^2-1/2*b*e*m*polylog(3,c
*x^n)/n^2-1/4*I/n*Pi*ln(c*x^n-1)*ln(c*x^n)*b*e*csgn(I*x^m)*csgn(I*f*x^m)^2-
1/2*e*b/n*m*ln(x)*polylog(2,-c*x^n)+1/2*e*b/n*dilog(c*x^n+1)*m*ln(x)+1/2*e*
b/n*m*ln(x)*polylog(2,c*x^n)-1/2*e*b/n*ln(1-c*x^n)*ln(c*x^n)*ln(x^m)+1/2*e*
b/n*dilog(c*x^n)*m*ln(x)+1/2*e*b/n*ln(1-c*x^n)*ln(c*x^n)*m*ln(x)+1/4*I/n*Pi
*dilog(c*x^n)*b*e*csgn(I*f*x^m)^3-1/2/n*ln(f)*ln(c*x^n-1)*ln(c*x^n)*b*e-1/2
*e*b/n*dilog(c*x^n+1)*ln(x^m)+1/2*e*b*ln(x^m)*ln(1-c*x^n)*ln(x)-1/2*e*b/n*d
ilog(c*x^n)*ln(x^m)+1/n*ln(x^n)*ln(f)*a*e-1/2/n*dilog(c*x^n+1)*ln(f)*b*e-1/
2/n*ln(f)*dilog(c*x^n)*b*e
```

**maxima [F]** time = 0.00, size = 0, normalized size = 0.00

$$\frac{ae\log\left(fx^m\right)^2}{2\,m}+ad\log(x)-\frac{1}{4}\left(bem\log(x)^2-2\,be\log(x)\log\left(x^m\right)-2\left(e\log(f)+d\right)b\log(x)\right)\log\left(cx^n+1\right)+\frac{1}{4}\left(b\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccoth(c*x^n))*(d+e*log(f*x^m))/x,x, algorithm="maxima")
```

```
[Out] 1/2*a*e*log(f*x^m)^2/m + a*d*log(x) - 1/4*(b*e*m*log(x)^2 - 2*b*e*log(x)*lo
g(x^m) - 2*(e*log(f) + d)*b*log(x))*log(c*x^n + 1) + 1/4*(b*e*m*log(x)^2 -
2*b*e*log(x)*log(x^m) - 2*(e*log(f) + d)*b*log(x))*log(c*x^n - 1) + integra
te(1/2*(2*b*c*e*n*x^n*log(x)*log(x^m) - (b*c*e*m*n*log(x)^2 - 2*(e*n*log(f)
 + d*n)*b*c*log(x))*x^n)/(c^2*x*x^(2*n) - x), x)
```

**mupad** [**F**] time = 0.00, size = -1, normalized size = -0.01

$$\int \frac{(a+b\,\mathrm{acoth}\,(c\,x^n))\,\left(d+e\,\ln\left(f\,x^m\right)\right)}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(((a + b*acoth(c*x^n))*(d + e*log(f*x^m)))/x,x)
```

```
[Out] int(((a + b*acoth(c*x^n))*(d + e*log(f*x^m)))/x, x)
```

**sympy** [**F(-1)**] time = 0.00, size = 0, normalized size = 0.00

Timed out

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*acoth(c*x**n))*(d+e*ln(f*x**m))/x,x)
```

```
[Out] Timed out
```

# 3.266 $\int x^5 \left(a+b\coth^{-1}(cx)\right)\left(d+e\log\left(1-c^2x^2\right)\right)dx$

**Optimal**. Leaf size=297

$$-\frac{ex^2\left(a+b\coth^{-1}(cx)\right)}{6c^4}+\frac{1}{6}x^6\left(a+b\coth^{-1}(cx)\right)\left(e\log\left(1-c^2x^2\right)+d\right)-\frac{ex^4\left(a+b\coth^{-1}(cx)\right)}{12c^2}-\frac{e\log\left(1-c^2x^2\right.}{}$$

```
[Out] 1/36*b*(6*d-11*e)*x/c^5-23/45*b*e*x/c^5+1/108*b*(6*d-5*e)*x^3/c^3-8/135*b*e
*x^3/c^3+1/90*b*(3*d-e)*x^5/c-1/75*b*e*x^5/c-1/6*e*x^2*(a+b*arccoth(c*x))/c
^4-1/12*e*x^4*(a+b*arccoth(c*x))/c^2-1/18*e*x^6*(a+b*arccoth(c*x))-1/36*b*(
6*d-11*e)*arctanh(c*x)/c^6+23/45*b*e*arctanh(c*x)/c^6+1/6*b*e*x*ln(-c^2*x^2
+1)/c^5+1/18*b*e*x^3*ln(-c^2*x^2+1)/c^3+1/30*b*e*x^5*ln(-c^2*x^2+1)/c-1/6*e
*(a+b*arccoth(c*x))*ln(-c^2*x^2+1)/c^6+1/6*x^6*(a+b*arccoth(c*x))*(d+e*ln(-
c^2*x^2+1))
```

**Rubi [A]** time = 0.39, antiderivative size = 297, normalized size of antiderivative = 1.00, number of steps used = 23, number of rules used = 11, integrand size = 27, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.407, Rules used = {2454, 2395, 43, 6084, 321, 207, 302, 2528, 2448, 206, 2455}

$$\frac{1}{6}x^6\left(a+b\coth^{-1}(cx)\right)\left(e\log\left(1-c^2x^2\right)+d\right)-\frac{ex^4\left(a+b\coth^{-1}(cx)\right)}{12c^2}-\frac{ex^2\left(a+b\coth^{-1}(cx)\right)}{6c^4}-\frac{e\log\left(1-c^2x^2\right)}{}$$

Antiderivative was successfully verified.

```
[In] Int[x^5*(a + b*ArcCoth[c*x])*(d + e*Log[1 - c^2*x^2]),x]
```

```
[Out] (b*(3*d - e)*x)/(18*c^5) - (137*b*e*x)/(180*c^5) + (b*(3*d - e)*x^3)/(54*c^
3) - (47*b*e*x^3)/(540*c^3) + (b*(3*d - e)*x^5)/(90*c) - (b*e*x^5)/(75*c) -
 (e*x^2*(a + b*ArcCoth[c*x]))/(6*c^4) - (e*x^4*(a + b*ArcCoth[c*x]))/(12*c^
2) - (e*x^6*(a + b*ArcCoth[c*x]))/18 - (b*(3*d - e)*ArcTanh[c*x])/(18*c^6)
+ (137*b*e*ArcTanh[c*x])/(180*c^6) + (b*e*x*Log[1 - c^2*x^2])/(6*c^5) + (b*
e*x^3*Log[1 - c^2*x^2])/(18*c^3) + (b*e*x^5*Log[1 - c^2*x^2])/(30*c) - (e*(
a + b*ArcCoth[c*x])*Log[1 - c^2*x^2])/(6*c^6) + (x^6*(a + b*ArcCoth[c*x])*(
d + e*Log[1 - c^2*x^2]))/6
```

Rule 43

```
Int[((a_.) + (b_.)*(x_))^(m_.)*((c_.) + (d_.)*(x_))^(n_.), x_Symbol] :> Int
[ExpandIntegrand[(a + b*x)^m*(c + d*x)^n, x], x] /; FreeQ[{a, b, c, d, n},
x] && NeQ[b*c - a*d, 0] && IGtQ[m, 0] && ( !IntegerQ[n] || (EqQ[c, 0] && Le
Q[7*m + 4*n + 4, 0]) || LtQ[9*m + 5*(n + 1), 0] || GtQ[m + n + 2, 0])
```

Rule 206

```
Int[((a_) + (b_.)*(x_)^2)^(-1), x_Symbol] :> Simp[(1*ArcTanh[(Rt[-b, 2]*x)/
Rt[a, 2]])/(Rt[a, 2]*Rt[-b, 2]), x] /; FreeQ[{a, b}, x] && NegQ[a/b] && (Gt
Q[a, 0] || LtQ[b, 0])
```

Rule 207

```
Int[((a_) + (b_.)*(x_)^2)^(-1), x_Symbol] :> -Simp[ArcTanh[(Rt[b, 2]*x)/Rt[
-a, 2]]/(Rt[-a, 2]*Rt[b, 2]), x] /; FreeQ[{a, b}, x] && NegQ[a/b] && (LtQ[a
, 0] || GtQ[b, 0])
```

Rule 302

```
Int[(x_)^(m_)/((a_) + (b_.)*(x_)^(n_)), x_Symbol] :> Int[PolynomialDivide[x
^m, a + b*x^n, x], x] /; FreeQ[{a, b}, x] && IGtQ[m, 0] && IGtQ[n, 0] && Gt
Q[m, 2*n - 1]
```

Rule 321

```
Int[((c_.)*(x_))^(m_)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Simp[(c^(
n - 1)*(c*x)^(m - n + 1)*(a + b*x^n)^(p + 1))/(b*(m + n*p + 1)), x] - Dist[
(a*c^n*(m - n + 1))/(b*(m + n*p + 1)), Int[(c*x)^(m - n)*(a + b*x^n)^p, x],
 x] /; FreeQ[{a, b, c, p}, x] && IGtQ[n, 0] && GtQ[m, n - 1] && NeQ[m + n*p
 + 1, 0] && IntBinomialQ[a, b, c, n, m, p, x]
```

Rule 2395

```
Int[((a_.) + Log[(c_.)*((d_) + (e_.)*(x_))^(n_.)]*(b_.))*((f_.) + (g_.)*(x_
))^(q_.), x_Symbol] :> Simp[((f + g*x)^(q + 1)*(a + b*Log[c*(d + e*x)^n]))/
(g*(q + 1)), x] - Dist[(b*e*n)/(g*(q + 1)), Int[(f + g*x)^(q + 1)/(d + e*x)
, x], x] /; FreeQ[{a, b, c, d, e, f, g, n, q}, x] && NeQ[e*f - d*g, 0] && N
eQ[q, -1]
```

Rule 2448

```
Int[Log[(c_.)*((d_) + (e_.)*(x_)^(n_))^(p_.)], x_Symbol] :> Simp[x*Log[c*(d
 + e*x^n)^p], x] - Dist[e*n*p, Int[x^n/(d + e*x^n), x], x] /; FreeQ[{c, d,
e, n, p}, x]
```

Rule 2454

```
Int[((a_.) + Log[(c_.)*((d_) + (e_.)*(x_)^(n_))^(p_.)]*(b_.))^(q_.)*(x_)^(m
_.), x_Symbol] :> Dist[1/n, Subst[Int[x^(Simplify[(m + 1)/n] - 1)*(a + b*Lo
g[c*(d + e*x)^p])^q, x], x, x^n], x] /; FreeQ[{a, b, c, d, e, m, n, p, q},
x] && IntegerQ[Simplify[(m + 1)/n]] && (GtQ[(m + 1)/n, 0] || IGtQ[q, 0]) &&
  !(EqQ[q, 1] && ILtQ[n, 0] && IGtQ[m, 0])
```

Rule 2455

```
Int[((a_.) + Log[(c_.)*((d_) + (e_.)*(x_)^(n_))^(p_.)]*(b_.))*((f_.)*(x_))^
(m_.), x_Symbol] :> Simp[((f*x)^(m + 1)*(a + b*Log[c*(d + e*x^n)^p]))/(f*(m
 + 1)), x] - Dist[(b*e*n*p)/(f*(m + 1)), Int[(x^(n - 1)*(f*x)^(m + 1))/(d +
 e*x^n), x], x] /; FreeQ[{a, b, c, d, e, f, m, n, p}, x] && NeQ[m, -1]
```

Rule 2528

```
Int[((a_.) + Log[(c_.)*(RFx_)^(p_.)]*(b_.))^(n_.)*(RGx_), x_Symbol] :> With
[{u = ExpandIntegrand[(a + b*Log[c*RFx^p])^n, RGx, x]}, Int[u, x] /; SumQ[u
]] /; FreeQ[{a, b, c, p}, x] && RationalFunctionQ[RFx, x] && RationalFuncti
onQ[RGx, x] && IGtQ[n, 0]
```

Rule 6084

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))*((d_.) + Log[(f_.) + (g_.)*(x_)^2]*
(e_.))*(x_)^(m_.), x_Symbol] :> With[{u = IntHide[x^m*(d + e*Log[f + g*x^2]
), x]}, Dist[a + b*ArcCoth[c*x], u, x] - Dist[b*c, Int[ExpandIntegrand[u/(1
 - c^2*x^2), x], x], x]] /; FreeQ[{a, b, c, d, e, f, g}, x] && IGtQ[(m + 1)
/2, 0]
```

Rubi steps

$$\int x^5 \left(a+b\coth^{-1}(cx)\right)\left(d+e\log\left(1-c^2x^2\right)\right)\,dx = -\frac{ex^2\left(a+b\coth^{-1}(cx)\right)}{6c^4} - \frac{ex^4\left(a+b\coth^{-1}(cx)\right)}{12c^2} - \frac{1}{18}ex^6$$

$$= -\frac{ex^2\left(a+b\coth^{-1}(cx)\right)}{6c^4} - \frac{ex^4\left(a+b\coth^{-1}(cx)\right)}{12c^2} - \frac{1}{18}ex^6$$

$$= -\frac{bex}{6c^5} - \frac{ex^2\left(a+b\coth^{-1}(cx)\right)}{6c^4} - \frac{ex^4\left(a+b\coth^{-1}(cx)\right)}{12c^2} -$$

$$= \frac{b(3d-e)x}{18c^5} - \frac{bex}{4c^5} + \frac{b(3d-e)x^3}{54c^3} - \frac{bex^3}{36c^3} + \frac{b(3d-e)x^5}{90c} -$$

$$= \frac{b(3d-e)x}{18c^5} - \frac{bex}{4c^5} + \frac{b(3d-e)x^3}{54c^3} - \frac{bex^3}{36c^3} + \frac{b(3d-e)x^5}{90c} -$$

$$= \frac{b(3d-e)x}{18c^5} - \frac{7bex}{12c^5} + \frac{b(3d-e)x^3}{54c^3} - \frac{bex^3}{36c^3} + \frac{b(3d-e)x^5}{90c} -$$

$$= \frac{b(3d-e)x}{18c^5} - \frac{137bex}{180c^5} + \frac{b(3d-e)x^3}{54c^3} - \frac{47bex^3}{540c^3} + \frac{b(3d-e)x}{90c}$$

$$= \frac{b(3d-e)x}{18c^5} - \frac{137bex}{180c^5} + \frac{b(3d-e)x^3}{54c^3} - \frac{47bex^3}{540c^3} + \frac{b(3d-e)x}{90c}$$

**Mathematica [A]** time = 0.17, size = 236, normalized size = 0.79

$$\frac{20e\log\left(1-c^2x^2\right)\left(15ac^6x^6+15b\left(c^6x^6-1\right)\coth^{-1}(cx)+bcx\left(3c^4x^4+5c^2x^2+15\right)\right)+15\log(1-cx)(-20ae+}{}$$

Antiderivative was successfully verified.

```
[In] Integrate[x^5*(a + b*ArcCoth[c*x])*(d + e*Log[1 - c^2*x^2]),x]
```

```
[Out] (30*b*c*(10*d - 49*e)*x - 300*a*c^2*e*x^2 + 10*b*c^3*(10*d - 19*e)*x^3 - 15
0*a*c^4*e*x^4 + 4*b*c^5*(15*d - 11*e)*x^5 + 100*a*c^6*(3*d - e)*x^6 - 50*b*
c^2*x^2*(-6*c^4*d*x^4 + e*(6 + 3*c^2*x^2 + 2*c^4*x^4))*ArcCoth[c*x] + 15*(1
0*b*d - 20*a*e - 49*b*e)*Log[1 - c*x] - 15*(10*b*d + 20*a*e - 49*b*e)*Log[1
 + c*x] + 20*e*(15*a*c^6*x^6 + b*c*x*(15 + 5*c^2*x^2 + 3*c^4*x^4) + 15*b*(-
1 + c^6*x^6)*ArcCoth[c*x])*Log[1 - c^2*x^2])/(1800*c^6)
```

**fricas [A]** time = 0.67, size = 246, normalized size = 0.83

$$-\frac{150\,ac^4ex^4-100\left(3\,ac^6d-ac^6e\right)x^6+300\,ac^2ex^2-4\left(15\,bc^5d-11\,bc^5e\right)x^5-10\left(10\,bc^3d-19\,bc^3e\right)x^3-30\,(10}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^5*(a+b*arccoth(c*x))*(d+e*log(-c^2*x^2+1)),x, algorithm="fricas
")
```

```
[Out] -1/1800*(150*a*c^4*e*x^4 - 100*(3*a*c^6*d - a*c^6*e)*x^6 + 300*a*c^2*e*x^2
- 4*(15*b*c^5*d - 11*b*c^5*e)*x^5 - 10*(10*b*c^3*d - 19*b*c^3*e)*x^3 - 30*(
10*b*c*d - 49*b*c*e)*x - 20*(15*a*c^6*e*x^6 + 3*b*c^5*e*x^5 + 5*b*c^3*e*x^3
 + 15*b*c*e*x - 15*a*e)*log(-c^2*x^2 + 1) + 5*(15*b*c^4*e*x^4 - 10*(3*b*c^6
*d - b*c^6*e)*x^6 + 30*b*c^2*e*x^2 + 30*b*d - 147*b*e - 30*(b*c^6*e*x^6 - b
*e)*log(-c^2*x^2 + 1))*log((c*x + 1)/(c*x - 1)))/c^6
```

**giac [F(-2)]** time = 0.00, size = 0, normalized size = 0.00

Exception raised: TypeError

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^5*(a+b*arccoth(c*x))*(d+e*log(-c^2*x^2+1)),x, algorithm="giac")
```

```
[Out] Exception raised: TypeError >> An error occurred running a Giac command:INP
UT:sage2:=int(sage0,x):;OUTPUT:sym2poly/r2sym(const gen & e,const index_m &
 i,const vecteur & l) Error: Bad Argument Value
```

**maple [C]** time = 16.95, size = 4034, normalized size = 13.58

output too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^5*(a+b*arccoth(c*x))*(d+e*ln(-c^2*x^2+1)),x)
```

```
[Out] -49/60*b*e*x/c^5-19/180*b*e*x^3/c^3-11/450*b*e*x^5/c-23/90/c^6*b*d+1/12*I*b
*arccoth(c*x)*Pi*csgn(I*((c*x+1)/(c*x-1)-1)^2)^3*x^6*e+1/12*I*b*arccoth(c*x
)*Pi*csgn(I*(c*x+1)/(c*x-1)/((c*x+1)/(c*x-1)-1)^2)^3*x^6*e+1/60*I/c*b*Pi*cs
gn(I*(c*x+1)/(c*x-1)/((c*x+1)/(c*x-1)-1)^2)^3*x^5*e+1/36*I/c^3*b*Pi*csgn(I*
(c*x+1)/(c*x-1)/((c*x+1)/(c*x-1)-1)^2)^3*x^3*e+1/12*I/c^5*b*Pi*csgn(I*(c*x+
1)/(c*x-1)/((c*x+1)/(c*x-1)-1)^2)^3*x*e+1/60*I/c*b*Pi*csgn(I*((c*x+1)/(c*x-
1)-1)^2)^3*x^5*e+1/36*I/c^3*b*Pi*csgn(I*((c*x+1)/(c*x-1)-1)^2)^3*x^3*e+1/12
*I/c^5*b*Pi*csgn(I*((c*x+1)/(c*x-1)-1)^2)^3*x*e-1/12*I*b*arccoth(c*x)*Pi*cs
gn(I/((c*x-1)/(c*x+1))^(1/2))^2*csgn(I*(c*x+1)/(c*x-1))*x^6*e+1/12*I*b*arcc
oth(c*x)*Pi*csgn(I*(c*x+1)/(c*x-1)/((c*x+1)/(c*x-1)-1)^2)^2*csgn(I/((c*x+1)
/(c*x-1)-1)^2)*x^6*e+1/12*I*b*arccoth(c*x)*Pi*csgn(I*((c*x+1)/(c*x-1)-1))^2
*csgn(I*((c*x+1)/(c*x-1)-1)^2)*x^6*e+1/6*I*b*arccoth(c*x)*Pi*csgn(I/((c*x-1
)/(c*x+1))^(1/2))*csgn(I*(c*x+1)/(c*x-1))^2*x^6*e-1/6*I*b*arccoth(c*x)*Pi*c
sgn(I*((c*x+1)/(c*x-1)-1))*csgn(I*((c*x+1)/(c*x-1)-1)^2)^2*x^6*e+1/12*I*b*a
rccoth(c*x)*Pi*csgn(I*(c*x+1)/(c*x-1))*csgn(I*(c*x+1)/(c*x-1)/((c*x+1)/(c*x
-1)-1)^2)^2*x^6*e-1/6*I/c^6*b*arccoth(c*x)*Pi*e*csgn(I/((c*x-1)/(c*x+1))^(1
/2))*csgn(I*(c*x+1)/(c*x-1))^2+1/6*I/c^6*b*arccoth(c*x)*Pi*e*csgn(I*((c*x+1
)/(c*x-1)-1))*csgn(I*((c*x+1)/(c*x-1)-1)^2)^2-1/12*I/c^6*b*arccoth(c*x)*e*P
i*csgn(I*(c*x+1)/(c*x-1))*csgn(I*(c*x+1)/(c*x-1)/((c*x+1)/(c*x-1)-1)^2)^2+1
/12*I/c^6*b*arccoth(c*x)*e*Pi*csgn(I/((c*x-1)/(c*x+1))^(1/2))^2*csgn(I*(c*x
+1)/(c*x-1))+23/180*I/c^6*b*e*Pi*csgn(I*(c*x+1)/(c*x-1))*csgn(I/((c*x+1)/(c
*x-1)-1)^2)*csgn(I*(c*x+1)/(c*x-1)/((c*x+1)/(c*x-1)-1)^2)-1/60*I/c*b*Pi*csg
n(I/((c*x-1)/(c*x+1))^(1/2))^2*csgn(I*(c*x+1)/(c*x-1))*x^5*e-1/36*I/c^3*b*P
i*csgn(I/((c*x-1)/(c*x+1))^(1/2))^2*csgn(I*(c*x+1)/(c*x-1))*x^3*e-1/12*I/c^
5*b*Pi*csgn(I/((c*x-1)/(c*x+1))^(1/2))^2*csgn(I*(c*x+1)/(c*x-1))*x*e+1/60*I
/c*b*Pi*csgn(I*(c*x+1)/(c*x-1))*csgn(I*(c*x+1)/(c*x-1)/((c*x+1)/(c*x-1)-1)^
2)^2*x^5*e+1/36*I/c^3*b*Pi*csgn(I*(c*x+1)/(c*x-1))*csgn(I*(c*x+1)/(c*x-1)/(
(c*x+1)/(c*x-1)-1)^2)^2*x^3*e+1/12*I/c^5*b*Pi*csgn(I*(c*x+1)/(c*x-1))*csgn(
I*(c*x+1)/(c*x-1)/((c*x+1)/(c*x-1)-1)^2)^2*x*e+1/60*I/c*b*Pi*csgn(I*(c*x+1)
/(c*x-1)/((c*x+1)/(c*x-1)-1)^2)^2*csgn(I/((c*x+1)/(c*x-1)-1)^2)*x^5*e+1/36*
I/c^3*b*Pi*csgn(I*(c*x+1)/(c*x-1)/((c*x+1)/(c*x-1)-1)^2)^2*csgn(I/((c*x+1)/
(c*x-1)-1)^2)*x^3*e+1/12*I/c^5*b*Pi*csgn(I*(c*x+1)/(c*x-1)/((c*x+1)/(c*x-1)
-1)^2)^2*csgn(I/((c*x+1)/(c*x-1)-1)^2)*x*e-1/30*I/c*b*Pi*csgn(I*((c*x+1)/(c
*x-1)-1))*csgn(I*((c*x+1)/(c*x-1)-1)^2)^2*x^5*e-1/18*I/c^3*b*Pi*csgn(I*((c*
x+1)/(c*x-1)-1))*csgn(I*((c*x+1)/(c*x-1)-1)^2)^2*x^3*e-1/6*I/c^5*b*Pi*csgn(
I*((c*x+1)/(c*x-1)-1))*csgn(I*((c*x+1)/(c*x-1)-1)^2)^2*x*e+1/30*I/c*b*Pi*cs
gn(I/((c*x-1)/(c*x+1))^(1/2))*csgn(I*(c*x+1)/(c*x-1))^2*x^5*e+1/18*I/c^3*b*
Pi*csgn(I/((c*x-1)/(c*x+1))^(1/2))*csgn(I*(c*x+1)/(c*x-1))^2*x^3*e+1/6*I/c^
5*b*Pi*csgn(I/((c*x-1)/(c*x+1))^(1/2))*csgn(I*(c*x+1)/(c*x-1))^2*x*e+1/60*I
/c*b*Pi*csgn(I*((c*x+1)/(c*x-1)-1))^2*csgn(I*((c*x+1)/(c*x-1)-1)^2)*x^5*e+1
/36*I/c^3*b*Pi*csgn(I*((c*x+1)/(c*x-1)-1))^2*csgn(I*((c*x+1)/(c*x-1)-1)^2)*
```

```
x^3*e+1/12*I/c^5*b*Pi*csgn(I*((c*x+1)/(c*x-1)-1))^2*csgn(I*((c*x+1)/(c*x-1)
-1)^2)*x*e-1/12*I/c^6*b*arccoth(c*x)*e*Pi*csgn(I/((c*x+1)/(c*x-1)-1)^2)*csg
n(I*(c*x+1)/(c*x-1)/((c*x+1)/(c*x-1)-1)^2)^2-1/12*I/c^6*b*arccoth(c*x)*e*Pi
*csgn(I*((c*x+1)/(c*x-1)-1))^2*csgn(I*((c*x+1)/(c*x-1)-1)^2)-1/60*I/c*b*Pi*
csgn(I*(c*x+1)/(c*x-1))*csgn(I*(c*x+1)/(c*x-1)/((c*x+1)/(c*x-1)-1)^2)*csgn(
I/((c*x+1)/(c*x-1)-1)^2)*x^5*e-1/12*I/c^5*b*Pi*csgn(I*(c*x+1)/(c*x-1))*csgn
(I*(c*x+1)/(c*x-1)/((c*x+1)/(c*x-1)-1)^2)*csgn(I/((c*x+1)/(c*x-1)-1)^2)*x*e
-1/36*I/c^3*b*Pi*csgn(I*(c*x+1)/(c*x-1))*csgn(I*(c*x+1)/(c*x-1)/((c*x+1)/(c
*x-1)-1)^2)*csgn(I/((c*x+1)/(c*x-1)-1)^2)*x^3*e+1/12*I/c^6*b*arccoth(c*x)*P
i*e*csgn(I*(c*x+1)/(c*x-1))*csgn(I/((c*x+1)/(c*x-1)-1)^2)*csgn(I*(c*x+1)/(c
*x-1)/((c*x+1)/(c*x-1)-1)^2)-1/12*I*b*arccoth(c*x)*Pi*csgn(I*(c*x+1)/(c*x-1
))*csgn(I*(c*x+1)/(c*x-1)/((c*x+1)/(c*x-1)-1)^2)*csgn(I/((c*x+1)/(c*x-1)-1)
^2)*x^6*e-1/12*a*e/c^2*x^4-1/6*a*e/c^4*x^2+1/6*a*e*x^6*ln(-c^2*x^2+1)-1/6*a
*e/c^6*ln(c^2*x^2-1)+1/18/c^3*b*x^3*d+1/6/c^5*b*x*d+1/30/c*b*x^5*d+1/6*b*ar
ccoth(c*x)*x^6*d-1/18*b*arccoth(c*x)*x^6*e+239/180/c^6*b*arccoth(c*x)*e-1/6
/c^6*b*arccoth(c*x)*d-23/90*I/c^6*b*e*Pi-1/6*I*b*arccoth(c*x)*Pi*csgn(I*(c*
x+1)/(c*x-1)/((c*x+1)/(c*x-1)-1)^2)^2*x^6*e-1/12*I*b*arccoth(c*x)*Pi*csgn(I
*(c*x+1)/(c*x-1))^3*x^6*e-1/60*I/c*b*Pi*csgn(I*(c*x+1)/(c*x-1))^3*x^5*e-1/1
2*I/c^5*b*Pi*csgn(I*(c*x+1)/(c*x-1))^3*x*e-1/30*I/c*b*Pi*csgn(I*(c*x+1)/(c*
x-1)/((c*x+1)/(c*x-1)-1)^2)^2*x^5*e-1/18*I/c^3*b*Pi*csgn(I*(c*x+1)/(c*x-1)/
((c*x+1)/(c*x-1)-1)^2)^2*x^3*e-1/6*I/c^5*b*Pi*csgn(I*(c*x+1)/(c*x-1)/((c*x+
1)/(c*x-1)-1)^2)^2*x*e-23/180*I/c^6*b*e*Pi*csgn(I*((c*x+1)/(c*x-1)-1))^2*cs
gn(I*((c*x+1)/(c*x-1)-1)^2)-1/12*I/c^6*b*arccoth(c*x)*e*Pi*csgn(I*((c*x+1)/
(c*x-1)-1)^2)^3-1/12*I/c^6*b*arccoth(c*x)*e*Pi*csgn(I*(c*x+1)/(c*x-1)/((c*x
+1)/(c*x-1)-1)^2)^3+1/6*I/c^6*b*arccoth(c*x)*e*Pi*csgn(I*(c*x+1)/(c*x-1)/((
c*x+1)/(c*x-1)-1)^2)^2+23/180*I/c^6*b*e*Pi*csgn(I/((c*x-1)/(c*x+1))^(1/2))^
2*csgn(I*(c*x+1)/(c*x-1))-23/180*I/c^6*b*e*Pi*csgn(I*(c*x+1)/(c*x-1))*csgn(
I*(c*x+1)/(c*x-1)/((c*x+1)/(c*x-1)-1)^2)^2+1/12*I/c^6*b*arccoth(c*x)*Pi*e*c
sgn(I*(c*x+1)/(c*x-1))^3+71/75*e/c^6*b-1/18*a*e*x^6+1/6*x^6*a*d+23/90*I/c^6
*b*e*Pi*csgn(I*((c*x+1)/(c*x-1)-1))*csgn(I*((c*x+1)/(c*x-1)-1)^2)^2-23/90*I
/c^6*b*e*Pi*csgn(I/((c*x-1)/(c*x+1))^(1/2))*csgn(I*(c*x+1)/(c*x-1))^2-1/90/
c^6*b*e*(15*arccoth(c*x)*x^5*c^5+15*arccoth(c*x)*x^4*c^4+3*c^4*x^4+15*arcco
th(c*x)*x^3*c^3+3*c^3*x^3+15*arccoth(c*x)*x^2*c^2+8*c^2*x^2+15*arccoth(c*x)
*x*c+8*c*x+15*arccoth(c*x)+23)*(c*x-1)*ln((c*x-1)/(c*x+1))-1/6*I/c^6*b*arcc
oth(c*x)*Pi*e+23/180*I/c^6*b*e*Pi*csgn(I*(c*x+1)/(c*x-1))^3+23/90*I/c^6*b*e
*Pi*csgn(I*(c*x+1)/(c*x-1)/((c*x+1)/(c*x-1)-1)^2)^2-23/180*I/c^6*b*e*Pi*csg
n(I*((c*x+1)/(c*x-1)-1)^2)^3-23/180*I/c^6*b*e*Pi*csgn(I*(c*x+1)/(c*x-1)/((c
*x+1)/(c*x-1)-1)^2)^3+1/30*I/c*b*Pi*x^5*e+1/18*I/c^3*b*Pi*x^3*e+1/6*I/c^5*b
*Pi*x*e+1/6*I*b*arccoth(c*x)*Pi*x^6*e-23/45/c^6*b*e*ln(2)+1/3/c^6*b*arccoth
(c*x)*e*ln((c*x+1)/(c*x-1)-1)-1/3/c^6*b*arccoth(c*x)*ln(2)*e-1/15/c*b*ln((c
*x+1)/(c*x-1)-1)*x^5*e-1/9/c^3*b*ln((c*x+1)/(c*x-1)-1)*x^3*e-1/3/c^5*b*ln((
c*x+1)/(c*x-1)-1)*x*e+1/15/c*b*ln(2)*x^5*e+1/9/c^3*b*ln(2)*x^3*e+1/3/c^5*b*
ln(2)*x*e-1/12/c^2*b*arccoth(c*x)*x^4*e-1/6/c^4*b*arccoth(c*x)*x^2*e-1/3*b*
arccoth(c*x)*ln((c*x+1)/(c*x-1)-1)*x^6*e+1/3*b*arccoth(c*x)*ln(2)*x^6*e-1/3
6*I/c^3*b*Pi*csgn(I*(c*x+1)/(c*x-1))^3*x^3*e-23/180*I/c^6*b*e*Pi*csgn(I/((c
*x+1)/(c*x-1)-1)^2)*csgn(I*(c*x+1)/(c*x-1)/((c*x+1)/(c*x-1)-1)^2)^2
```

**maxima [C]** time = 0.35, size = 328, normalized size = 1.10

$$\frac{1}{6}\,adx^6+\frac{1}{36}\left(6\,x^6\log\left(-c^2x^2+1\right)-c^2\left(\frac{2\,c^4x^6+3\,c^2x^4+6\,x^2}{c^6}+\frac{6\,\log\left(c^2x^2-1\right)}{c^8}\right)\right)be\,\mathrm{arcoth}\left(cx\right)+\frac{1}{180}\left(30\,x^6\,\mathrm{a}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^5*(a+b*arccoth(c*x))*(d+e*log(-c^2*x^2+1)),x, algorithm="maxima
")

[Out] 1/6*a*d*x^6 + 1/36*(6*x^6*log(-c^2*x^2 + 1) - c^2*((2*c^4*x^6 + 3*c^2*x^4 +
 6*x^2)/c^6 + 6*log(c^2*x^2 - 1)/c^8))*b*e*arccoth(c*x) + 1/180*(30*x^6*arc
coth(c*x) + c*(2*(3*c^4*x^5 + 5*c^2*x^3 + 15*x)/c^6 - 15*log(c*x + 1)/c^7 +
```

```
 15*log(c*x - 1)/c^7))*b*d + 1/36*(6*x^6*log(-c^2*x^2 + 1) - c^2*((2*c^4*x^
6 + 3*c^2*x^4 + 6*x^2)/c^6 + 6*log(c^2*x^2 - 1)/c^8))*a*e + 1/1800*((60*I*p
i*c^5 - 44*c^5)*x^5 + (100*I*pi*c^3 - 190*c^3)*x^3 + (300*I*pi*c - 1470*c)*
x - 5*(30*I*pi - 12*c^5*x^5 - 20*c^3*x^3 - 60*c*x - 147)*log(c*x + 1) - 5*(
-30*I*pi - 12*c^5*x^5 - 20*c^3*x^3 - 60*c*x + 147)*log(c*x - 1))*b*e/c^6
```

**mupad [B]** time = 2.29, size = 510, normalized size = 1.72

$$\ln\left(1-c^2\,x^2\right)\,\left(\frac{a\,e\,x^6}{6}+\frac{b\,e\,x}{6\,c^5}+\frac{b\,e\,x^5}{30\,c}+\frac{b\,e\,x^3}{18\,c^3}\right)-\ln\left(\frac{1}{c\,x}+1\right)\,\left(\ln\left(1-c^2\,x^2\right)\,\left(\frac{b\,e}{12\,c^6}-\frac{b\,e\,x^6}{12}\right)-\frac{b\,d\,x^6}{12}+\frac{b\,e\,x^6}{36}+\frac{b}{2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^5*(a + b*acoth(c*x))*(d + e*log(1 - c^2*x^2)),x)
```

```
[Out] log(1 - c^2*x^2)*((a*e*x^6)/6 + (b*e*x)/(6*c^5) + (b*e*x^5)/(30*c) + (b*e*x
^3)/(18*c^3)) - log(1/(c*x) + 1)*(log(1 - c^2*x^2)*((b*e)/(12*c^6) - (b*e*x
^6)/12) - (b*d*x^6)/12 + (b*e*x^6)/36 + (b*e*x^4)/(24*c^2) + (b*e*x^2)/(12*
c^4)) + log(1 - 1/(c*x))*(((b*d*x^7)/6 - (b*c^2*d*x^9)/6)/(2*(x + c*x^2)*(c
*x - 1)) + ((b*e*x^7)/36 + (b*e*x^5)/(12*c^2) - (b*e*x^3)/(6*c^4) + (b*c^2*
e*x^9)/18)/(2*(x + c*x^2)*(c*x - 1)) + (log(1 - c^2*x^2)*((b*e*x^7)/6 - (b*
c^2*e*x^9)/6))/(2*(x + c*x^2)*(c*x - 1)) - (b*e*log(1 - c^2*x^2)*(x - c^2*x
^3))/(12*c^6*(x + c*x^2)*(c*x - 1))) + x^4*((a*(3*d - e))/(12*c^2) - (a*d)/
(4*c^2)) + x^3*((b*(15*d - 11*e))/(270*c^3) - (7*b*e)/(108*c^3)) + x*(((b*(
15*d - 11*e))/(90*c^3) - (7*b*e)/(36*c^3))/c^2 - (b*e)/(2*c^5)) + (a*x^6*(3
*d - e))/18 + (x^2*((a*(3*d - e))/(3*c^2) - (a*d)/c^2))/(2*c^2) - (log(c*x
- 1)*(20*a*e - 10*b*d + 49*b*e))/(120*c^6) - (log(c*x + 1)*(20*a*e + 10*b*d
 - 49*b*e))/(120*c^6) + (b*x^5*(15*d - 11*e))/(450*c)
```

**sympy [A]** time = 23.40, size = 362, normalized size = 1.22

$$\begin{cases} \frac{adx^6}{6}+\frac{aex^6\log\left(-c^2x^2+1\right)}{6}-\frac{aex^6}{18}-\frac{aex^4}{12c^2}-\frac{aex^2}{6c^4}-\frac{ae\log\left(-c^2x^2+1\right)}{6c^6}+\frac{bdx^6\operatorname{acoth}(cx)}{6}+\frac{bex^6\log\left(-c^2x^2+1\right)\operatorname{acoth}(cx)}{6}-\frac{bex^6\operatorname{acoth}(cx)}{18} \\ \frac{dx^6\left(a+\frac{i\pi b}{2}\right)}{6} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**5*(a+b*acoth(c*x))*(d+e*ln(-c**2*x**2+1)),x)
```

```
[Out] Piecewise((a*d*x**6/6 + a*e*x**6*log(-c**2*x**2 + 1)/6 - a*e*x**6/18 - a*e*
x**4/(12*c**2) - a*e*x**2/(6*c**4) - a*e*log(-c**2*x**2 + 1)/(6*c**6) + b*d
*x**6*acoth(c*x)/6 + b*e*x**6*log(-c**2*x**2 + 1)*acoth(c*x)/6 - b*e*x**6*a
coth(c*x)/18 + b*d*x**5/(30*c) + b*e*x**5*log(-c**2*x**2 + 1)/(30*c) - 11*b
*e*x**5/(450*c) - b*e*x**4*acoth(c*x)/(12*c**2) + b*d*x**3/(18*c**3) + b*e*
x**3*log(-c**2*x**2 + 1)/(18*c**3) - 19*b*e*x**3/(180*c**3) - b*e*x**2*acot
h(c*x)/(6*c**4) + b*d*x/(6*c**5) + b*e*x*log(-c**2*x**2 + 1)/(6*c**5) - 49*
b*e*x/(60*c**5) - b*d*acoth(c*x)/(6*c**6) - b*e*log(-c**2*x**2 + 1)*acoth(c
*x)/(6*c**6) + 49*b*e*acoth(c*x)/(60*c**6), Ne(c, 0)), (d*x**6*(a + I*pi*b/
2)/6, True))
```

# 3.267 $\int x^3 \left(a+b\coth^{-1}(cx)\right)\left(d+e\log\left(1-c^2x^2\right)\right)\,dx$

**Optimal**. Leaf size=225

$$\frac{1}{4}x^4\left(a+b\coth^{-1}(cx)\right)\left(e\log\left(1-c^2x^2\right)+d\right)-\frac{ex^2\left(a+b\coth^{-1}(cx)\right)}{4c^2}-\frac{e\log\left(1-c^2x^2\right)\left(a+b\coth^{-1}(cx)\right)}{4c^4}-\frac{1}{8}ex$$

```
[Out] 1/8*b*(2*d-3*e)*x/c^3-2/3*b*e*x/c^3+1/24*b*(2*d-e)*x^3/c-1/18*b*e*x^3/c-1/4
*e*x^2*(a+b*arccoth(c*x))/c^2-1/8*e*x^4*(a+b*arccoth(c*x))-1/8*b*(2*d-3*e)*
arctanh(c*x)/c^4+2/3*b*e*arctanh(c*x)/c^4+1/4*b*e*x*ln(-c^2*x^2+1)/c^3+1/12
*b*e*x^3*ln(-c^2*x^2+1)/c-1/4*e*(a+b*arccoth(c*x))*ln(-c^2*x^2+1)/c^4+1/4*x
^4*(a+b*arccoth(c*x))*(d+e*ln(-c^2*x^2+1))
```

**Rubi [A]** time = 0.26, antiderivative size = 225, normalized size of antiderivative = 1.00, number of steps used = 14, number of rules used = 11, integrand size = 27, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.407, Rules used = {2454, 2395, 43, 6084, 459, 321, 206, 2471, 2448, 2455, 302}

$$\frac{1}{4}x^4\left(a+b\coth^{-1}(cx)\right)\left(e\log\left(1-c^2x^2\right)+d\right)-\frac{ex^2\left(a+b\coth^{-1}(cx)\right)}{4c^2}-\frac{e\log\left(1-c^2x^2\right)\left(a+b\coth^{-1}(cx)\right)}{4c^4}-\frac{1}{8}ex$$

Antiderivative was successfully verified.

```
[In] Int[x^3*(a + b*ArcCoth[c*x])*(d + e*Log[1 - c^2*x^2]),x]
```

```
[Out] (b*(2*d - 3*e)*x)/(8*c^3) - (2*b*e*x)/(3*c^3) + (b*(2*d - e)*x^3)/(24*c) -
(b*e*x^3)/(18*c) - (e*x^2*(a + b*ArcCoth[c*x]))/(4*c^2) - (e*x^4*(a + b*Arc
Coth[c*x]))/8 - (b*(2*d - 3*e)*ArcTanh[c*x])/(8*c^4) + (2*b*e*ArcTanh[c*x])
/(3*c^4) + (b*e*x*Log[1 - c^2*x^2])/(4*c^3) + (b*e*x^3*Log[1 - c^2*x^2])/(1
2*c) - (e*(a + b*ArcCoth[c*x])*Log[1 - c^2*x^2])/(4*c^4) + (x^4*(a + b*ArcC
oth[c*x])*(d + e*Log[1 - c^2*x^2]))/4
```

Rule 43

```
Int[((a_.) + (b_.)*(x_))^(m_.)*((c_.) + (d_.)*(x_))^(n_.), x_Symbol] :> Int
[ExpandIntegrand[(a + b*x)^m*(c + d*x)^n, x], x] /; FreeQ[{a, b, c, d, n},
x] && NeQ[b*c - a*d, 0] && IGtQ[m, 0] && ( !IntegerQ[n] || (EqQ[c, 0] && Le
Q[7*m + 4*n + 4, 0]) || LtQ[9*m + 5*(n + 1), 0] || GtQ[m + n + 2, 0])
```

Rule 206

```
Int[((a_) + (b_.)*(x_)^2)^(-1), x_Symbol] :> Simp[(1*ArcTanh[(Rt[-b, 2]*x)/
Rt[a, 2]])/(Rt[a, 2]*Rt[-b, 2]), x] /; FreeQ[{a, b}, x] && NegQ[a/b] && (Gt
Q[a, 0] || LtQ[b, 0])
```

Rule 302

```
Int[(x_)^(m_)/((a_) + (b_.)*(x_)^(n_)), x_Symbol] :> Int[PolynomialDivide[x
^m, a + b*x^n, x], x] /; FreeQ[{a, b}, x] && IGtQ[m, 0] && IGtQ[n, 0] && Gt
Q[m, 2*n - 1]
```

Rule 321

```
Int[((c_.)*(x_))^(m_)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Simp[(c^(
n - 1)*(c*x)^(m - n + 1)*(a + b*x^n)^(p + 1))/(b*(m + n*p + 1)), x] - Dist[
(a*c^n*(m - n + 1))/(b*(m + n*p + 1)), Int[(c*x)^(m - n)*(a + b*x^n)^p, x],
 x] /; FreeQ[{a, b, c, p}, x] && IGtQ[n, 0] && GtQ[m, n - 1] && NeQ[m + n*p
 + 1, 0] && IntBinomialQ[a, b, c, n, m, p, x]
```

Rule 459

```
Int[((e_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_.)*((c_) + (d_.)*(x_)^(n
_)), x_Symbol] :> Simp[(d*(e*x)^(m + 1)*(a + b*x^n)^(p + 1))/(b*e*(m + n*(p
 + 1) + 1)), x] - Dist[(a*d*(m + 1) - b*c*(m + n*(p + 1) + 1))/(b*(m + n*(p
 + 1) + 1)), Int[(e*x)^m*(a + b*x^n)^p, x], x] /; FreeQ[{a, b, c, d, e, m,
n, p}, x] && NeQ[b*c - a*d, 0] && NeQ[m + n*(p + 1) + 1, 0]
```

Rule 2395

```
Int[((a_.) + Log[(c_.)*((d_) + (e_.)*(x_))^(n_.)]*(b_.))*((f_.) + (g_.)*(x_
))^(q_.), x_Symbol] :> Simp[((f + g*x)^(q + 1)*(a + b*Log[c*(d + e*x)^n]))/
(g*(q + 1)), x] - Dist[(b*e*n)/(g*(q + 1)), Int[(f + g*x)^(q + 1)/(d + e*x)
, x], x] /; FreeQ[{a, b, c, d, e, f, g, n, q}, x] && NeQ[e*f - d*g, 0] && N
eQ[q, -1]
```

Rule 2448

```
Int[Log[(c_.)*((d_) + (e_.)*(x_)^(n_))^(p_.)], x_Symbol] :> Simp[x*Log[c*(d
 + e*x^n)^p], x] - Dist[e*n*p, Int[x^n/(d + e*x^n), x], x] /; FreeQ[{c, d,
e, n, p}, x]
```

Rule 2454

```
Int[((a_.) + Log[(c_.)*((d_) + (e_.)*(x_)^(n_))^(p_.)]*(b_.))^(q_.)*(x_)^(m
_.), x_Symbol] :> Dist[1/n, Subst[Int[x^(Simplify[(m + 1)/n] - 1)*(a + b*Lo
g[c*(d + e*x)^p])^q, x], x, x^n], x] /; FreeQ[{a, b, c, d, e, m, n, p, q},
x] && IntegerQ[Simplify[(m + 1)/n]] && (GtQ[(m + 1)/n, 0] || IGtQ[q, 0]) &&
  !(EqQ[q, 1] && ILtQ[n, 0] && IGtQ[m, 0])
```

Rule 2455

```
Int[((a_.) + Log[(c_.)*((d_) + (e_.)*(x_)^(n_))^(p_.)]*(b_.))*((f_.)*(x_))^
(m_.), x_Symbol] :> Simp[((f*x)^(m + 1)*(a + b*Log[c*(d + e*x^n)^p]))/(f*(m
 + 1)), x] - Dist[(b*e*n*p)/(f*(m + 1)), Int[(x^(n - 1)*(f*x)^(m + 1))/(d +
 e*x^n), x], x] /; FreeQ[{a, b, c, d, e, f, m, n, p}, x] && NeQ[m, -1]
```

Rule 2471

```
Int[((a_.) + Log[(c_.)*((d_) + (e_.)*(x_)^(n_))^(p_.)]*(b_.))^(q_.)*((f_) +
 (g_.)*(x_)^(s_))^(r_.), x_Symbol] :> With[{t = ExpandIntegrand[(a + b*Log[
c*(d + e*x^n)^p])^q, (f + g*x^s)^r, x]}, Int[t, x] /; SumQ[t]] /; FreeQ[{a,
 b, c, d, e, f, g, n, p, q, r, s}, x] && IntegerQ[n] && IGtQ[q, 0] && Integ
erQ[r] && IntegerQ[s] && (EqQ[q, 1] || (GtQ[r, 0] && GtQ[s, 1]) || (LtQ[s,
0] && LtQ[r, 0]))
```

Rule 6084

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))*((d_.) + Log[(f_.) + (g_.)*(x_)^2]*
(e_.))*(x_)^(m_.), x_Symbol] :> With[{u = IntHide[x^m*(d + e*Log[f + g*x^2]
), x]}, Dist[a + b*ArcCoth[c*x], u, x] - Dist[b*c, Int[ExpandIntegrand[u/(1
 - c^2*x^2), x], x], x]] /; FreeQ[{a, b, c, d, e, f, g}, x] && IGtQ[(m + 1)
/2, 0]
```

Rubi steps

$$\int x^3 \left(a+b\coth^{-1}(cx)\right)\left(d+e\log\left(1-c^2x^2\right)\right)dx = -\frac{ex^2\left(a+b\coth^{-1}(cx)\right)}{4c^2} - \frac{1}{8}ex^4\left(a+b\coth^{-1}(cx)\right) - \frac{e\left(a\right.}{}$$

$$= -\frac{ex^2\left(a+b\coth^{-1}(cx)\right)}{4c^2} - \frac{1}{8}ex^4\left(a+b\coth^{-1}(cx)\right) - \frac{e\left(a\right.}{}$$

$$= \frac{b(2d-e)x^3}{24c} - \frac{ex^2\left(a+b\coth^{-1}(cx)\right)}{4c^2} - \frac{1}{8}ex^4\left(a+b\coth^{-1}\right.$$

$$= \frac{b(2d-3e)x}{8c^3} + \frac{b(2d-e)x^3}{24c} - \frac{ex^2\left(a+b\coth^{-1}(cx)\right)}{4c^2} - \frac{1}{8}ex$$

$$= \frac{b(2d-3e)x}{8c^3} + \frac{b(2d-e)x^3}{24c} - \frac{ex^2\left(a+b\coth^{-1}(cx)\right)}{4c^2} - \frac{1}{8}ex$$

$$= \frac{b(2d-3e)x}{8c^3} - \frac{bex}{2c^3} + \frac{b(2d-e)x^3}{24c} - \frac{ex^2\left(a+b\coth^{-1}(cx)\right)}{4c^2}$$

$$= \frac{b(2d-3e)x}{8c^3} - \frac{2bex}{3c^3} + \frac{b(2d-e)x^3}{24c} - \frac{bex^3}{18c} - \frac{ex^2\left(a+b\coth\right.}{4c^2}$$

$$= \frac{b(2d-3e)x}{8c^3} - \frac{2bex}{3c^3} + \frac{b(2d-e)x^3}{24c} - \frac{bex^3}{18c} - \frac{ex^2\left(a+b\coth\right.}{4c^2}$$

**Mathematica [A]** time = 0.15, size = 192, normalized size = 0.85

$$\frac{12e\log\left(1-c^2x^2\right)\left(3ac^4x^4+3b\left(c^4x^4-1\right)\coth^{-1}(cx)+bcx\left(c^2x^2+3\right)\right)+3\log(1-cx)(-12ae+6bd-25be)-}{}$$

Antiderivative was successfully verified.

```
[In] Integrate[x^3*(a + b*ArcCoth[c*x])*(d + e*Log[1 - c^2*x^2]),x]
```

```
[Out] (6*b*c*(6*d - 25*e)*x - 36*a*c^2*e*x^2 + 2*b*c^3*(6*d - 7*e)*x^3 + 18*a*c^4
*(2*d - e)*x^4 - 18*b*c^2*x^2*(-2*c^2*d*x^2 + e*(2 + c^2*x^2))*ArcCoth[c*x]
 + 3*(6*b*d - 12*a*e - 25*b*e)*Log[1 - c*x] - 3*(6*b*d + 12*a*e - 25*b*e)*L
og[1 + c*x] + 12*e*(3*a*c^4*x^4 + b*c*x*(3 + c^2*x^2) + 3*b*(-1 + c^4*x^4)*
ArcCoth[c*x])*Log[1 - c^2*x^2])/(144*c^4)
```

**fricas [A]** time = 0.52, size = 195, normalized size = 0.87

$$-\frac{36\,ac^2ex^2-18\left(2\,ac^4d-ac^4e\right)x^4-2\left(6\,bc^3d-7\,bc^3e\right)x^3-6\,(6\,bcd-25\,bce)x-12\left(3\,ac^4ex^4+bc^3ex^3+3\,bcex\right.}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^3*(a+b*arccoth(c*x))*(d+e*log(-c^2*x^2+1)),x, algorithm="fricas
")
```

```
[Out] -1/144*(36*a*c^2*e*x^2 - 18*(2*a*c^4*d - a*c^4*e)*x^4 - 2*(6*b*c^3*d - 7*b*
c^3*e)*x^3 - 6*(6*b*c*d - 25*b*c*e)*x - 12*(3*a*c^4*e*x^4 + b*c^3*e*x^3 + 3
*b*c*e*x - 3*a*e)*log(-c^2*x^2 + 1) + 3*(6*b*c^2*e*x^2 - 3*(2*b*c^4*d - b*c
^4*e)*x^4 + 6*b*d - 25*b*e - 6*(b*c^4*e*x^4 - b*e)*log(-c^2*x^2 + 1))*log((
c*x + 1)/(c*x - 1)))/c^4
```

**giac [F(-2)]** time = 0.00, size = 0, normalized size = 0.00

Exception raised: TypeError

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^3*(a+b*arccoth(c*x))*(d+e*log(-c^2*x^2+1)),x, algorithm="giac")
```

```
[Out] Exception raised: TypeError >> An error occurred running a Giac command:INP
UT:sage2:=int(sage0,x):;OUTPUT:sym2poly/r2sym(const gen & e,const index_m &
 i,const vecteur & l) Error: Bad Argument Value
```

**maple [C]** time = 12.63, size = 3320, normalized size = 14.76

output too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^3*(a+b*arccoth(c*x))*(d+e*ln(-c^2*x^2+1)),x)
```

```
[Out] -25/24*b*e*x/c^3-7/72*b*e*x^3/c+1/4*b*d*x/c^3+1/12*b*d*x^3/c+1/4*I*b*arccot
h(c*x)*csgn(I*(c*x+1)/(c*x-1))^2*csgn(I/((c*x-1)/(c*x+1))^(1/2))*Pi*x^4*e-1
/8*I*b*arccoth(c*x)*csgn(I*(c*x+1)/(c*x-1))*csgn(I/((c*x-1)/(c*x+1))^(1/2))
^2*Pi*x^4*e+1/8*I/c^3*b*csgn(I/((c*x+1)/(c*x-1)-1)^2)*csgn(I*(c*x+1)/(c*x-1
)/((c*x+1)/(c*x-1)-1)^2)^2*Pi*x*e-2/3/c^4*b*e*ln(2)-1/24*I/c*b*csgn(I/((c*x
+1)/(c*x-1)-1)^2)*csgn(I*(c*x+1)/(c*x-1)/((c*x+1)/(c*x-1)-1)^2)*csgn(I*(c*x
+1)/(c*x-1))*Pi*x^3*e-1/8*I/c^3*b*csgn(I/((c*x+1)/(c*x-1)-1)^2)*csgn(I*(c*x
+1)/(c*x-1)/((c*x+1)/(c*x-1)-1)^2)*csgn(I*(c*x+1)/(c*x-1))*Pi*x*e+1/8*I/c^4
*b*arccoth(c*x)*Pi*e*csgn(I*(c*x+1)/(c*x-1))*csgn(I/((c*x+1)/(c*x-1)-1)^2)*
csgn(I*(c*x+1)/(c*x-1)/((c*x+1)/(c*x-1)-1)^2)-1/8*I*b*arccoth(c*x)*csgn(I/(
(c*x+1)/(c*x-1)-1)^2)*csgn(I*(c*x+1)/(c*x-1)/((c*x+1)/(c*x-1)-1)^2)*csgn(I*
(c*x+1)/(c*x-1))*Pi*x^4*e+1/8*I/c^3*b*csgn(I*(c*x+1)/(c*x-1)/((c*x+1)/(c*x-
1)-1)^2)^2*csgn(I*(c*x+1)/(c*x-1))*Pi*x*e+1/8*I/c^3*b*csgn(I*((c*x+1)/(c*x-
1)-1))^2*csgn(I*((c*x+1)/(c*x-1)-1)^2)*Pi*x*e-1/4*I/c^3*b*csgn(I*((c*x+1)/(
c*x-1)-1))*csgn(I*((c*x+1)/(c*x-1)-1)^2)^2*Pi*x*e+1/4*I/c^3*b*csgn(I*(c*x+1
)/(c*x-1))^2*csgn(I/((c*x-1)/(c*x+1))^(1/2))*Pi*x*e-1/8*I/c^3*b*csgn(I*(c*x
+1)/(c*x-1))*csgn(I/((c*x-1)/(c*x+1))^(1/2))^2*Pi*x*e-1/8*I/c^4*b*arccoth(c
*x)*Pi*e*csgn(I/((c*x+1)/(c*x-1)-1)^2)*csgn(I*(c*x+1)/(c*x-1)/((c*x+1)/(c*x
-1)-1)^2)^2-1/8*I/c^4*b*arccoth(c*x)*Pi*e*csgn(I*(c*x+1)/(c*x-1))*csgn(I*(c
*x+1)/(c*x-1)/((c*x+1)/(c*x-1)-1)^2)^2-1/8*I/c^4*b*arccoth(c*x)*e*Pi*csgn(I
*((c*x+1)/(c*x-1)-1))^2*csgn(I*((c*x+1)/(c*x-1)-1)^2)+1/4*I/c^4*b*arccoth(c
*x)*e*Pi*csgn(I*((c*x+1)/(c*x-1)-1))*csgn(I*((c*x+1)/(c*x-1)-1)^2)^2-1/4*I/
c^4*b*arccoth(c*x)*Pi*e*csgn(I/((c*x-1)/(c*x+1))^(1/2))*csgn(I*(c*x+1)/(c*x
-1))^2+1/8*I/c^4*b*arccoth(c*x)*Pi*e*csgn(I/((c*x-1)/(c*x+1))^(1/2))^2*csgn
(I*(c*x+1)/(c*x-1))+1/6*I/c^4*b*e*Pi*csgn(I*(c*x+1)/(c*x-1))*csgn(I/((c*x+1
)/(c*x-1)-1)^2)*csgn(I*(c*x+1)/(c*x-1)/((c*x+1)/(c*x-1)-1)^2)+1/8*I*b*arcco
th(c*x)*csgn(I/((c*x+1)/(c*x-1)-1)^2)*csgn(I*(c*x+1)/(c*x-1)/((c*x+1)/(c*x-
1)-1)^2)^2*Pi*x^4*e+1/8*I*b*arccoth(c*x)*csgn(I*(c*x+1)/(c*x-1)/((c*x+1)/(c
*x-1)-1)^2)^2*csgn(I*(c*x+1)/(c*x-1))*Pi*x^4*e+1/8*I*b*arccoth(c*x)*csgn(I*
((c*x+1)/(c*x-1)-1))^2*csgn(I*((c*x+1)/(c*x-1)-1)^2)*Pi*x^4*e-1/4*I*b*arcco
th(c*x)*csgn(I*((c*x+1)/(c*x-1)-1))*csgn(I*((c*x+1)/(c*x-1)-1)^2)^2*Pi*x^4*
e+1/24*I/c*b*csgn(I/((c*x+1)/(c*x-1)-1)^2)*csgn(I*(c*x+1)/(c*x-1)/((c*x+1)/
(c*x-1)-1)^2)^2*Pi*x^3*e+1/24*I/c*b*csgn(I*(c*x+1)/(c*x-1)/((c*x+1)/(c*x-1)
-1)^2)^2*csgn(I*(c*x+1)/(c*x-1))*Pi*x^3*e+1/24*I/c*b*csgn(I*((c*x+1)/(c*x-1
)-1))^2*csgn(I*((c*x+1)/(c*x-1)-1)^2)*Pi*x^3*e-1/12*I/c*b*csgn(I*((c*x+1)/(
c*x-1)-1))*csgn(I*((c*x+1)/(c*x-1)-1)^2)^2*Pi*x^3*e+1/12*I/c*b*csgn(I*(c*x+
1)/(c*x-1))^2*csgn(I/((c*x-1)/(c*x+1))^(1/2))*Pi*x^3*e-1/24*I/c*b*csgn(I*(c
*x+1)/(c*x-1))*csgn(I/((c*x-1)/(c*x+1))^(1/2))^2*Pi*x^3*e+41/36*e/c^4*b-1/3
/c^4*b*d+1/6*I/c^4*b*e*Pi*csgn(I/((c*x-1)/(c*x+1))^(1/2))^2*csgn(I*(c*x+1)/
(c*x-1))+1/12*I/c*b*Pi*x^3*e-1/6*I/c^4*b*e*Pi*csgn(I*(c*x+1)/(c*x-1)/((c*x+
1)/(c*x-1)-1)^2)^3-1/6*I/c^4*b*e*Pi*csgn(I*((c*x+1)/(c*x-1)-1)^2)^3+1/6*I/c
^4*b*e*Pi*csgn(I*(c*x+1)/(c*x-1))^3+1/3*I/c^4*b*e*Pi*csgn(I*(c*x+1)/(c*x-1)
/((c*x+1)/(c*x-1)-1)^2)^2+1/4*I/c^3*b*Pi*x*e-1/4*I/c^4*b*Pi*e*arccoth(c*x)+
1/4*I*b*arccoth(c*x)*Pi*x^4*e-1/12/c^4*b*e*(3*arccoth(c*x)*x^3*c^3+3*arccot
h(c*x)*x^2*c^2+c^2*x^2+3*arccoth(c*x)*x*c+c*x+3*arccoth(c*x)+4)*(c*x-1)*ln(
(c*x-1)/(c*x+1))+1/8*I*b*arccoth(c*x)*csgn(I*(c*x+1)/(c*x-1)/((c*x+1)/(c*x-
1)-1)^2)^3*Pi*x^4*e+1/8*I*b*arccoth(c*x)*csgn(I*((c*x+1)/(c*x-1)-1)^2)^3*Pi
```

```
*x^4*e-1/8*I*b*arccoth(c*x)*csgn(I*(c*x+1)/(c*x-1))^3*Pi*x^4*e-1/4*I*b*arcc
oth(c*x)*csgn(I*(c*x+1)/(c*x-1)/((c*x+1)/(c*x-1)-1)^2)^2*Pi*x^4*e+1/24*I/c*
b*csgn(I*(c*x+1)/(c*x-1)/((c*x+1)/(c*x-1)-1)^2)^3*Pi*x^3*e+1/24*I/c*b*csgn(
I*((c*x+1)/(c*x-1)-1)^2)^3*Pi*x^3*e-1/24*I/c*b*csgn(I*(c*x+1)/(c*x-1))^3*Pi
*x^3*e-1/12*I/c*b*csgn(I*(c*x+1)/(c*x-1)/((c*x+1)/(c*x-1)-1)^2)^2*Pi*x^3*e+
1/8*I/c^3*b*csgn(I*(c*x+1)/(c*x-1)/((c*x+1)/(c*x-1)-1)^2)^3*Pi*x*e+1/8*I/c^
3*b*csgn(I*((c*x+1)/(c*x-1)-1)^2)^3*Pi*x*e-1/8*I/c^3*b*csgn(I*(c*x+1)/(c*x-
1))^3*Pi*x*e-1/8*I/c^4*b*arccoth(c*x)*e*Pi*csgn(I*(c*x+1)/(c*x-1)/((c*x+1)/
(c*x-1)-1)^2)^3-1/8*I/c^4*b*arccoth(c*x)*e*Pi*csgn(I*((c*x+1)/(c*x-1)-1)^2)
^3+1/8*I/c^4*b*arccoth(c*x)*e*Pi*csgn(I*(c*x+1)/(c*x-1))^3-1/4*I/c^3*b*csgn
(I*(c*x+1)/(c*x-1)/((c*x+1)/(c*x-1)-1)^2)^2*Pi*x*e+1/4*I/c^4*b*arccoth(c*x)
*e*Pi*csgn(I*(c*x+1)/(c*x-1)/((c*x+1)/(c*x-1)-1)^2)^2-1/6*I/c^4*b*e*Pi*csgn
(I/((c*x+1)/(c*x-1)-1)^2)*csgn(I*(c*x+1)/(c*x-1)/((c*x+1)/(c*x-1)-1)^2)^2-1
/6*I/c^4*b*e*Pi*csgn(I*(c*x+1)/(c*x-1))*csgn(I*(c*x+1)/(c*x-1)/((c*x+1)/(c*
x-1)-1)^2)^2-1/6*I/c^4*b*e*Pi*csgn(I*((c*x+1)/(c*x-1)-1))^2*csgn(I*((c*x+1)
/(c*x-1)-1)^2)+1/3*I/c^4*b*e*Pi*csgn(I*((c*x+1)/(c*x-1)-1))*csgn(I*((c*x+1)
/(c*x-1)-1)^2)^2-1/3*I/c^4*b*e*Pi*csgn(I/((c*x-1)/(c*x+1))^(1/2))*csgn(I*(c
*x+1)/(c*x-1))^2-1/3*I/c^4*b*e*Pi-1/2*b*arccoth(c*x)*ln((c*x+1)/(c*x-1)-1)*
x^4*e+1/2*b*arccoth(c*x)*ln(2)*x^4*e-1/6/c*b*ln((c*x+1)/(c*x-1)-1)*x^3*e+1/
6/c*b*ln(2)*x^3*e-1/4/c^2*b*arccoth(c*x)*x^2*e-1/2/c^3*b*ln((c*x+1)/(c*x-1)
-1)*x*e+1/2/c^3*b*ln(2)*x*e+1/2/c^4*b*arccoth(c*x)*e*ln((c*x+1)/(c*x-1)-1)-
1/2/c^4*b*arccoth(c*x)*ln(2)*e+1/4*x^4*a*d-1/8*a*e*x^4-1/4*a*e/c^2*x^2+1/4*
a*e*x^4*ln(-c^2*x^2+1)-1/4*a*e/c^4*ln(c^2*x^2-1)-1/4/c^4*b*arccoth(c*x)*d+4
1/24/c^4*b*arccoth(c*x)*e+1/4*b*arccoth(c*x)*x^4*d-1/8*b*arccoth(c*x)*x^4*e
```

**maxima [C]** time = 0.35, size = 269, normalized size = 1.20

$$\frac{1}{4}adx^4+\frac{1}{8}\left(2x^4\log\left(-c^2x^2+1\right)-c^2\left(\frac{c^2x^4+2x^2}{c^4}+\frac{2\log\left(c^2x^2-1\right)}{c^6}\right)\right)be\,\mathrm{arcoth}\,(cx)+\frac{1}{24}\left(6x^4\,\mathrm{arcoth}\,(cx)+c\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^3*(a+b*arccoth(c*x))*(d+e*log(-c^2*x^2+1)),x, algorithm="maxima
")
```

```
[Out] 1/4*a*d*x^4 + 1/8*(2*x^4*log(-c^2*x^2 + 1) - c^2*((c^2*x^4 + 2*x^2)/c^4 + 2
*log(c^2*x^2 - 1)/c^6))*b*e*arccoth(c*x) + 1/24*(6*x^4*arccoth(c*x) + c*(2*
(c^2*x^3 + 3*x)/c^4 - 3*log(c*x + 1)/c^5 + 3*log(c*x - 1)/c^5))*b*d + 1/8*(
2*x^4*log(-c^2*x^2 + 1) - c^2*((c^2*x^4 + 2*x^2)/c^4 + 2*log(c^2*x^2 - 1)/c
^6))*a*e + 1/144*((12*I*pi*c^3 - 14*c^3)*x^3 + (36*I*pi*c - 150*c)*x - 3*(6
*I*pi - 4*c^3*x^3 - 12*c*x - 25)*log(c*x + 1) - 3*(-6*I*pi - 4*c^3*x^3 - 12
*c*x + 25)*log(c*x - 1))*b*e/c^4
```

**mupad [B]** time = 2.28, size = 414, normalized size = 1.84

$$\ln\left(1-\frac{1}{c\,x}\right)\left(\frac{\frac{b\,e\,x^5}{8}-\frac{b\,e\,x^3}{4\,c^2}+\frac{b\,c^2\,e\,x^7}{8}}{2\,\left(c\,x^2+x\right)\,\left(c\,x-1\right)}+\frac{\frac{b\,d\,x^5}{4}-\frac{b\,c^2\,d\,x^7}{4}}{2\,\left(c\,x^2+x\right)\,\left(c\,x-1\right)}+\frac{\ln\left(1-c^2\,x^2\right)\,\left(\frac{b\,e\,x^5}{4}-\frac{b\,c^2\,e\,x^7}{4}\right)}{2\,\left(c\,x^2+x\right)\,\left(c\,x-1\right)}-\frac{b\,e\,\ln\left(1-c^2\,x^2\right)}{8\,c^4\,\left(c\,x^2+x\right.}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^3*(a + b*acoth(c*x))*(d + e*log(1 - c^2*x^2)),x)
```

```
[Out] log(1 - 1/(c*x))*(((b*e*x^5)/8 - (b*e*x^3)/(4*c^2) + (b*c^2*e*x^7)/8)/(2*(x
 + c*x^2)*(c*x - 1)) + ((b*d*x^5)/4 - (b*c^2*d*x^7)/4)/(2*(x + c*x^2)*(c*x
- 1)) + (log(1 - c^2*x^2)*((b*e*x^5)/4 - (b*c^2*e*x^7)/4))/(2*(x + c*x^2)*(
c*x - 1)) - (b*e*log(1 - c^2*x^2)*(x - c^2*x^3))/(8*c^4*(x + c*x^2)*(c*x -
1))) + x*((b*(6*d - 7*e))/(24*c^3) - (3*b*e)/(4*c^3)) + log(1 - c^2*x^2)*((
a*e*x^4)/4 + (b*e*x)/(4*c^3) + (b*e*x^3)/(12*c)) - log(1/(c*x) + 1)*(log(1
- c^2*x^2)*((b*e)/(8*c^4) - (b*e*x^4)/8) - (b*d*x^4)/8 + (b*e*x^4)/16 + (b*
```

e*x^2)/(8*c^2)) + x^2*((a*(2*d - e))/(4*c^2) - (a*d)/(2*c^2)) + (a*x^4*(2*d - e))/8 - (log(c*x - 1)*(12*a*e - 6*b*d + 25*b*e))/(48*c^4) - (log(c*x + 1)*(12*a*e + 6*b*d - 25*b*e))/(48*c^4) + (b*x^3*(6*d - 7*e))/(72*c)

**sympy** [A] time = 9.88, size = 286, normalized size = 1.27

$$\begin{cases} \frac{adx^4}{4} + \frac{aex^4\log\left(-c^2x^2+1\right)}{4} - \frac{aex^4}{8} - \frac{aex^2}{4c^2} - \frac{ae\log\left(-c^2x^2+1\right)}{4c^4} + \frac{bdx^4\operatorname{acoth}(cx)}{4} + \frac{bex^4\log\left(-c^2x^2+1\right)\operatorname{acoth}(cx)}{4} - \frac{bex^4\operatorname{acoth}(cx)}{8} + \frac{bdx^3}{12c} \\ \frac{dx^4\left(a+\frac{i\pi b}{2}\right)}{4} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**3*(a+b*acoth(c*x))*(d+e*ln(-c**2*x**2+1)),x)
```

```
[Out] Piecewise((a*d*x**4/4 + a*e*x**4*log(-c**2*x**2 + 1)/4 - a*e*x**4/8 - a*e*x
**2/(4*c**2) - a*e*log(-c**2*x**2 + 1)/(4*c**4) + b*d*x**4*acoth(c*x)/4 + b
*e*x**4*log(-c**2*x**2 + 1)*acoth(c*x)/4 - b*e*x**4*acoth(c*x)/8 + b*d*x**3
/(12*c) + b*e*x**3*log(-c**2*x**2 + 1)/(12*c) - 7*b*e*x**3/(72*c) - b*e*x**
2*acoth(c*x)/(4*c**2) + b*d*x/(4*c**3) + b*e*x*log(-c**2*x**2 + 1)/(4*c**3)
 - 25*b*e*x/(24*c**3) - b*d*acoth(c*x)/(4*c**4) - b*e*log(-c**2*x**2 + 1)*a
coth(c*x)/(4*c**4) + 25*b*e*acoth(c*x)/(24*c**4), Ne(c, 0)), (d*x**4*(a + I
*pi*b/2)/4, True))
```

# 3.268 $\int x \left(a+b \coth^{-1}(cx)\right) \left(d+e \log \left(1-c^2 x^2\right)\right) dx$

**Optimal**. Leaf size=140

$$-\frac{e \left(1-c^2x^2\right) \log \left(1-c^2x^2\right) \left(a+b \coth^{-1}(cx)\right)}{2c^2}+\frac{1}{2}dx^2 \left(a+b \coth^{-1}(cx)\right)-\frac{1}{2}ex^2 \left(a+b \coth^{-1}(cx)\right)-\frac{b(d-e) \tan}{2c^2}$$

```
[Out] 1/2*b*(d-e)*x/c-b*e*x/c+1/2*d*x^2*(a+b*arccoth(c*x))-1/2*e*x^2*(a+b*arccoth
(c*x))-1/2*b*(d-e)*arctanh(c*x)/c^2+b*e*arctanh(c*x)/c^2+1/2*b*e*x*ln(-c^2*
x^2+1)/c-1/2*e*(-c^2*x^2+1)*(a+b*arccoth(c*x))*ln(-c^2*x^2+1)/c^2
```

**Rubi [A]** time = 0.12, antiderivative size = 140, normalized size of antiderivative = 1.00, number of steps used = 7, number of rules used = 8, integrand size = 25, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.320, Rules used = {2454, 2389, 2295, 6084, 321, 207, 2448, 206}

$$-\frac{e \left(1-c^2x^2\right) \log \left(1-c^2x^2\right) \left(a+b \coth^{-1}(cx)\right)}{2c^2}+\frac{1}{2}dx^2 \left(a+b \coth^{-1}(cx)\right)-\frac{1}{2}ex^2 \left(a+b \coth^{-1}(cx)\right)-\frac{b(d-e) \tan}{2c^2}$$

Antiderivative was successfully verified.

```
[In] Int[x*(a + b*ArcCoth[c*x])*(d + e*Log[1 - c^2*x^2]),x]
```

```
[Out] (b*(d - e)*x)/(2*c) - (b*e*x)/c + (d*x^2*(a + b*ArcCoth[c*x]))/2 - (e*x^2*(
a + b*ArcCoth[c*x]))/2 - (b*(d - e)*ArcTanh[c*x])/(2*c^2) + (b*e*ArcTanh[c*
x])/c^2 + (b*e*x*Log[1 - c^2*x^2])/(2*c) - (e*(1 - c^2*x^2)*(a + b*ArcCoth[
c*x])*Log[1 - c^2*x^2])/(2*c^2)
```

Rule 206

```
Int[((a_) + (b_.)*(x_)^2)^(-1), x_Symbol] :> Simp[(1*ArcTanh[(Rt[-b, 2]*x)/
Rt[a, 2]])/(Rt[a, 2]*Rt[-b, 2]), x] /; FreeQ[{a, b}, x] && NegQ[a/b] && (Gt
Q[a, 0] || LtQ[b, 0])
```

Rule 207

```
Int[((a_) + (b_.)*(x_)^2)^(-1), x_Symbol] :> -Simp[ArcTanh[(Rt[b, 2]*x)/Rt[
-a, 2]]/(Rt[-a, 2]*Rt[b, 2]), x] /; FreeQ[{a, b}, x] && NegQ[a/b] && (LtQ[a
, 0] || GtQ[b, 0])
```

Rule 321

```
Int[((c_.)*(x_))^(m_)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Simp[(c^(
n - 1)*(c*x)^(m - n + 1)*(a + b*x^n)^(p + 1))/(b*(m + n*p + 1)), x] - Dist[
(a*c^n*(m - n + 1))/(b*(m + n*p + 1)), Int[(c*x)^(m - n)*(a + b*x^n)^p, x],
 x] /; FreeQ[{a, b, c, p}, x] && IGtQ[n, 0] && GtQ[m, n - 1] && NeQ[m + n*p
 + 1, 0] && IntBinomialQ[a, b, c, n, m, p, x]
```

Rule 2295

```
Int[Log[(c_.)*(x_)^(n_.)], x_Symbol] :> Simp[x*Log[c*x^n], x] - Simp[n*x, x
] /; FreeQ[{c, n}, x]
```

Rule 2389

```
Int[((a_.) + Log[(c_.)*((d_) + (e_.)*(x_))^(n_.)]*(b_.))^(p_.), x_Symbol] :
> Dist[1/e, Subst[Int[(a + b*Log[c*x^n])^p, x], x, d + e*x], x] /; FreeQ[{a
, b, c, d, e, n, p}, x]
```

Rule 2448

```
Int[Log[(c_.)*((d_) + (e_.)*(x_)^(n_))^(p_.)], x_Symbol] :> Simp[x*Log[c*(d
 + e*x^n)^p], x] - Dist[e*n*p, Int[x^n/(d + e*x^n), x], x] /; FreeQ[{c, d,
e, n, p}, x]
```

Rule 2454

```
Int[((a_.) + Log[(c_.)*((d_) + (e_.)*(x_)^(n_))^(p_.)]*(b_.))^(q_.)*(x_)^(m
_.), x_Symbol] :> Dist[1/n, Subst[Int[x^(Simplify[(m + 1)/n] - 1)*(a + b*Lo
g[c*(d + e*x)^p])^q, x], x, x^n], x] /; FreeQ[{a, b, c, d, e, m, n, p, q},
x] && IntegerQ[Simplify[(m + 1)/n]] && (GtQ[(m + 1)/n, 0] || IGtQ[q, 0]) &&
  !(EqQ[q, 1] && ILtQ[n, 0] && IGtQ[m, 0])
```

Rule 6084

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))*((d_.) + Log[(f_.) + (g_.)*(x_)^2]*
(e_.))*(x_)^(m_.), x_Symbol] :> With[{u = IntHide[x^m*(d + e*Log[f + g*x^2]
), x]}, Dist[a + b*ArcCoth[c*x], u, x] - Dist[b*c, Int[ExpandIntegrand[u/(1
 - c^2*x^2), x], x], x]] /; FreeQ[{a, b, c, d, e, f, g}, x] && IGtQ[(m + 1)
/2, 0]
```

Rubi steps

$$\begin{aligned}\int x\left(a+b\coth^{-1}(cx)\right)\left(d+e\log\left(1-c^2x^2\right)\right)dx &= \frac{1}{2}dx^2\left(a+b\coth^{-1}(cx)\right)-\frac{1}{2}ex^2\left(a+b\coth^{-1}(cx)\right)-\frac{e\left(1-c^2\right.}{}\\ &= \frac{1}{2}dx^2\left(a+b\coth^{-1}(cx)\right)-\frac{1}{2}ex^2\left(a+b\coth^{-1}(cx)\right)-\frac{e\left(1-c^2\right.}{}\\ &= \frac{b(d-e)x}{2c}+\frac{1}{2}dx^2\left(a+b\coth^{-1}(cx)\right)-\frac{1}{2}ex^2\left(a+b\coth^{-1}(cx)\right.\\ &= \frac{b(d-e)x}{2c}-\frac{bex}{c}+\frac{1}{2}dx^2\left(a+b\coth^{-1}(cx)\right)-\frac{1}{2}ex^2\left(a+b\coth\right.\\ &= \frac{b(d-e)x}{2c}-\frac{bex}{c}+\frac{1}{2}dx^2\left(a+b\coth^{-1}(cx)\right)-\frac{1}{2}ex^2\left(a+b\coth\right.\end{aligned}$$

**Mathematica [A]** time = 0.11, size = 129, normalized size = 0.92

$$\frac{2e\log\left(1-c^2x^2\right)\left(cx(acx+b)+b\left(c^2x^2-1\right)\coth^{-1}(cx)\right)+\log(1-cx)(b(d-3e)-2ae)-\log(cx+1)(2ae+b(d-}{4c^2}$$

Antiderivative was successfully verified.

```
[In] Integrate[x*(a + b*ArcCoth[c*x])*(d + e*Log[1 - c^2*x^2]),x]
```

```
[Out] (2*b*c*(d - 3*e)*x + 2*a*c^2*(d - e)*x^2 + 2*b*c^2*(d - e)*x^2*ArcCoth[c*x]
 + (b*(d - 3*e) - 2*a*e)*Log[1 - c*x] - (b*(d - 3*e) + 2*a*e)*Log[1 + c*x]
+ 2*e*(c*x*(b + a*c*x) + b*(-1 + c^2*x^2)*ArcCoth[c*x])*Log[1 - c^2*x^2])/(
4*c^2)
```

**fricas [A]** time = 0.58, size = 138, normalized size = 0.99

$$\frac{2\left(ac^2d-ac^2e\right)x^2+2\left(bcd-3\,bce\right)x+2\left(ac^2ex^2+bcex-ae\right)\log\left(-c^2x^2+1\right)+\left(\left(bc^2d-bc^2e\right)x^2-bd+3\,be+\left(bc\right.\right.}{4\,c^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*(a+b*arccoth(c*x))*(d+e*log(-c^2*x^2+1)),x, algorithm="fricas")
```

```
[Out] 1/4*(2*(a*c^2*d - a*c^2*e)*x^2 + 2*(b*c*d - 3*b*c*e)*x + 2*(a*c^2*e*x^2 + b
*c*e*x - a*e)*log(-c^2*x^2 + 1) + ((b*c^2*d - b*c^2*e)*x^2 - b*d + 3*b*e +
(b*c^2*e*x^2 - b*e)*log(-c^2*x^2 + 1))*log((c*x + 1)/(c*x - 1)))/c^2
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int (b \operatorname{arcoth}(cx) + a)\left(e \log\left(-c^2x^2 + 1\right) + d\right)x\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*(a+b*arccoth(c*x))*(d+e*log(-c^2*x^2+1)),x, algorithm="giac")
```

```
[Out] integrate((b*arccoth(c*x) + a)*(e*log(-c^2*x^2 + 1) + d)*x, x)
```

**maple [C]** time = 3.36, size = 2616, normalized size = 18.69

Expression too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x*(a+b*arccoth(c*x))*(d+e*ln(-c^2*x^2+1)),x)
```

```
[Out] -1/c^2*b*e*ln(2)-1/2/c^2*b*d+1/2*a*x^2*d-1/2*a*e*x^2+1/2*a*e/c^2+3/2*e/c^2*
b-1/2/c^2*b*arccoth(c*x)*d+5/2/c^2*b*arccoth(c*x)*e+1/2*a*e*ln(-c^2*x^2+1)*
x^2-1/2*a*e/c^2*ln(-c^2*x^2+1)+1/2*b*arccoth(c*x)*x^2*d-1/2*b*arccoth(c*x)*
x^2*e+1/2*b*d*x/c-3/2*b*e*x/c-1/4*I/c^2*b*arccoth(c*x)*e*Pi*csgn(I*((c*x+1)
/(c*x-1)-1)^2)^3-1/2*I/c*b*csgn(I*(c*x+1)/(c*x-1)/((c*x+1)/(c*x-1)-1)^2)^2*
Pi*x*e+1/2*I/c^2*b*arccoth(c*x)*e*Pi*csgn(I*(c*x+1)/(c*x-1)/((c*x+1)/(c*x-1
)-1)^2)^2+1/4*I/c^2*b*Pi*e*csgn(I/((c*x-1)/(c*x+1))^(1/2))^2*csgn(I*(c*x+1)
/(c*x-1))-1/2*I/c^2*b*Pi*e*csgn(I/((c*x-1)/(c*x+1))^(1/2))*csgn(I*(c*x+1)/(
c*x-1))^2-1/4*I/c^2*b*e*Pi*csgn(I*(c*x+1)/(c*x-1))*csgn(I*(c*x+1)/(c*x-1)/(
(c*x+1)/(c*x-1)-1)^2)^2-1/4*I/c^2*b*e*Pi*csgn(I/((c*x+1)/(c*x-1)-1)^2)*csgn
(I*(c*x+1)/(c*x-1)/((c*x+1)/(c*x-1)-1)^2)^2+1/2*I/c^2*b*e*Pi*csgn(I*((c*x+1
)/(c*x-1)-1))*csgn(I*((c*x+1)/(c*x-1)-1)^2)^2-1/4*I/c^2*b*e*Pi*csgn(I*((c*x
+1)/(c*x-1)-1))^2*csgn(I*((c*x+1)/(c*x-1)-1)^2)+1/4*I/c^2*b*arccoth(c*x)*e*
Pi*csgn(I*(c*x+1)/(c*x-1))*csgn(I/((c*x+1)/(c*x-1)-1)^2)*csgn(I*(c*x+1)/(c*
x-1)/((c*x+1)/(c*x-1)-1)^2)-1/4*I*b*arccoth(c*x)*csgn(I*(c*x+1)/(c*x-1))*cs
gn(I*(c*x+1)/(c*x-1)/((c*x+1)/(c*x-1)-1)^2)*csgn(I/((c*x+1)/(c*x-1)-1)^2)*P
i*x^2*e-1/4*I/c*b*csgn(I*(c*x+1)/(c*x-1))*csgn(I*(c*x+1)/(c*x-1)/((c*x+1)/(
c*x-1)-1)^2)*csgn(I/((c*x+1)/(c*x-1)-1)^2)*Pi*x*e-1/c*b*ln((c*x+1)/(c*x-1)-
1)*x*e+1/c*b*ln(2)*x*e+1/c^2*b*arccoth(c*x)*e*ln((c*x+1)/(c*x-1)-1)-1/c^2*b
*arccoth(c*x)*e*ln(2)-b*arccoth(c*x)*ln((c*x+1)/(c*x-1)-1)*x^2*e+b*arccoth(
c*x)*ln(2)*x^2*e+1/4*I/c^2*b*Pi*e*csgn(I*(c*x+1)/(c*x-1))^3-1/4*I/c^2*b*e*P
i*csgn(I*(c*x+1)/(c*x-1)/((c*x+1)/(c*x-1)-1)^2)^3-1/4*I/c^2*b*e*Pi*csgn(I*(
(c*x+1)/(c*x-1)-1)^2)^3+1/2*I/c^2*b*e*Pi*csgn(I*(c*x+1)/(c*x-1)/((c*x+1)/(c
*x-1)-1)^2)^2+1/2*I/c*b*Pi*x*e-1/2*I/c^2*b*Pi*e*arccoth(c*x)+1/2*I*b*arccot
h(c*x)*Pi*x^2*e-1/2/c^2*b*e*(arccoth(c*x)*x*c+arccoth(c*x)+1)*(c*x-1)*ln((c
*x-1)/(c*x+1))+1/2*I/c*b*csgn(I/((c*x-1)/(c*x+1))^(1/2))*csgn(I*(c*x+1)/(c*
x-1))^2*Pi*x*e+1/4*I/c*b*csgn(I*(c*x+1)/(c*x-1))*csgn(I*(c*x+1)/(c*x-1)/((c
*x+1)/(c*x-1)-1)^2)^2*Pi*x*e+1/4*I/c*b*csgn(I*(c*x+1)/(c*x-1)/((c*x+1)/(c*x
-1)-1)^2)^2*csgn(I/((c*x+1)/(c*x-1)-1)^2)*Pi*x*e-1/2*I/c*b*csgn(I*((c*x+1)/
(c*x-1)-1)^2)^2*csgn(I*((c*x+1)/(c*x-1)-1))*Pi*x*e+1/4*I/c*b*csgn(I*((c*x+1
)/(c*x-1)-1)^2)*csgn(I*((c*x+1)/(c*x-1)-1))^2*Pi*x*e+1/4*I/c^2*b*arccoth(c*
x)*e*Pi*csgn(I/((c*x-1)/(c*x+1))^(1/2))^2*csgn(I*(c*x+1)/(c*x-1))-1/2*I/c^2
*b*arccoth(c*x)*e*Pi*csgn(I/((c*x-1)/(c*x+1))^(1/2))*csgn(I*(c*x+1)/(c*x-1)
)^2-1/4*I/c^2*b*arccoth(c*x)*e*Pi*csgn(I*(c*x+1)/(c*x-1))*csgn(I*(c*x+1)/(c
*x-1)/((c*x+1)/(c*x-1)-1)^2)^2-1/4*I/c^2*b*arccoth(c*x)*e*Pi*csgn(I/((c*x+1
)/(c*x-1)-1)^2)*csgn(I*(c*x+1)/(c*x-1)/((c*x+1)/(c*x-1)-1)^2)^2+1/2*I/c^2*b
*arccoth(c*x)*e*Pi*csgn(I*((c*x+1)/(c*x-1)-1))*csgn(I*((c*x+1)/(c*x-1)-1)^2
```

```
)^2-1/4*I/c^2*b*arccoth(c*x)*e*Pi*csgn(I*((c*x+1)/(c*x-1)-1))^2*csgn(I*((c*
x+1)/(c*x-1)-1)^2)+1/4*I/c^2*b*e*Pi*csgn(I*(c*x+1)/(c*x-1))*csgn(I/((c*x+1)
/(c*x-1)-1)^2)*csgn(I*(c*x+1)/(c*x-1)/((c*x+1)/(c*x-1)-1)^2)+1/2*I*b*arccot
h(c*x)*csgn(I/((c*x-1)/(c*x+1))^(1/2))*csgn(I*(c*x+1)/(c*x-1))^2*Pi*x^2*e+1
/4*I*b*arccoth(c*x)*csgn(I*(c*x+1)/(c*x-1))*csgn(I*(c*x+1)/(c*x-1)/((c*x+1)
/(c*x-1)-1)^2)^2*Pi*x^2*e-1/4*I*b*arccoth(c*x)*csgn(I/((c*x-1)/(c*x+1))^(1/
2))^2*csgn(I*(c*x+1)/(c*x-1))*Pi*x^2*e+1/4*I*b*arccoth(c*x)*csgn(I*(c*x+1)/
(c*x-1)/((c*x+1)/(c*x-1)-1)^2)^2*csgn(I/((c*x+1)/(c*x-1)-1)^2)*Pi*x^2*e-1/2
*I*b*arccoth(c*x)*csgn(I*((c*x+1)/(c*x-1)-1)^2)^2*csgn(I*((c*x+1)/(c*x-1)-1
))*Pi*x^2*e+1/4*I*b*arccoth(c*x)*csgn(I*((c*x+1)/(c*x-1)-1)^2)*csgn(I*((c*x
+1)/(c*x-1)-1))^2*Pi*x^2*e-1/4*I/c*b*csgn(I/((c*x-1)/(c*x+1))^(1/2))^2*csgn
(I*(c*x+1)/(c*x-1))*Pi*x*e-1/2*I/c^2*b*Pi*e-1/4*I*b*arccoth(c*x)*csgn(I*(c*
x+1)/(c*x-1))^3*Pi*x^2*e+1/4*I*b*arccoth(c*x)*csgn(I*(c*x+1)/(c*x-1)/((c*x+
1)/(c*x-1)-1)^2)^3*Pi*x^2*e+1/4*I*b*arccoth(c*x)*csgn(I*((c*x+1)/(c*x-1)-1)
^2)^3*Pi*x^2*e-1/2*I*b*arccoth(c*x)*csgn(I*(c*x+1)/(c*x-1)/((c*x+1)/(c*x-1)
-1)^2)^2*Pi*x^2*e-1/4*I/c*b*csgn(I*(c*x+1)/(c*x-1))^3*Pi*x*e+1/4*I/c*b*csgn
(I*(c*x+1)/(c*x-1)/((c*x+1)/(c*x-1)-1)^2)^3*Pi*x*e+1/4*I/c*b*csgn(I*((c*x+1
)/(c*x-1)-1)^2)^3*Pi*x*e+1/4*I/c^2*b*arccoth(c*x)*e*Pi*csgn(I*(c*x+1)/(c*x-
1))^3-1/4*I/c^2*b*arccoth(c*x)*e*Pi*csgn(I*(c*x+1)/(c*x-1)/((c*x+1)/(c*x-1)
-1)^2)^3
```

**maxima** [A] time = 0.34, size = 171, normalized size = 1.22

$$\frac{1}{2}adx^2+\frac{1}{4}\left(2x^2\operatorname{arcoth}(cx)+c\left(\frac{2x}{c^2}-\frac{\log(cx+1)}{c^3}+\frac{\log(cx-1)}{c^3}\right)\right)bd-\frac{\left(c^2x^2-\left(c^2x^2-1\right)\log\left(-c^2x^2+1\right)-1\right)be}{2c^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*(a+b*arccoth(c*x))*(d+e*log(-c^2*x^2+1)),x, algorithm="maxima")
```

```
[Out] 1/2*a*d*x^2 + 1/4*(2*x^2*arccoth(c*x) + c*(2*x/c^2 - log(c*x + 1)/c^3 + log
(c*x - 1)/c^3))*b*d - 1/2*(c^2*x^2 - (c^2*x^2 - 1)*log(-c^2*x^2 + 1) - 1)*b
*e*arccoth(c*x)/c^2 - 1/2*(c^2*x^2 - (c^2*x^2 - 1)*log(-c^2*x^2 + 1) - 1)*a
*e/c^2 - 1/2*(3*c*x - (c*x + 1)*log(c*x + 1) - (c*x - 1)*log(-c*x + 1))*b*e
/c^2
```

**mupad** [B] time = 2.05, size = 329, normalized size = 2.35

$$\ln\left(1-\frac{1}{cx}\right)\left(\frac{\frac{bdx^3}{2}-\frac{bc^2dx^5}{2}}{2\left(cx^2+x\right)(cx-1)}-\frac{\frac{bex^3}{2}-\frac{bc^2ex^5}{2}}{2\left(cx^2+x\right)(cx-1)}+\frac{\ln\left(1-c^2x^2\right)\left(\frac{bex^3}{2}-\frac{bc^2ex^5}{2}\right)}{2\left(cx^2+x\right)(cx-1)}-\frac{be\ln\left(1-c^2x^2\right)(x}{4c^2\left(cx^2+x\right)(c}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x*(a + b*acoth(c*x))*(d + e*log(1 - c^2*x^2)),x)
```

```
[Out] log(1 - 1/(c*x))*(((b*d*x^3)/2 - (b*c^2*d*x^5)/2)/(2*(x + c*x^2)*(c*x - 1))
 - ((b*e*x^3)/2 - (b*c^2*e*x^5)/2)/(2*(x + c*x^2)*(c*x - 1)) + (log(1 - c^2
*x^2)*((b*e*x^3)/2 - (b*c^2*e*x^5)/2))/(2*(x + c*x^2)*(c*x - 1)) - (b*e*log
(1 - c^2*x^2)*(x - c^2*x^3))/(4*c^2*(x + c*x^2)*(c*x - 1))) + log(1 - c^2*x
^2)*((a*e*x^2)/2 + (b*e*x)/(2*c)) - log(1/(c*x) + 1)*(log(1 - c^2*x^2)*((b*
e)/(4*c^2) - (b*e*x^2)/4) - (b*d*x^2)/4 + (b*e*x^2)/4) + (a*x^2*(d - e))/2
- (log(c*x + 1)*(2*a*e + b*d - 3*b*e))/(4*c^2) - (log(c*x - 1)*(2*a*e - b*d
 + 3*b*e))/(4*c^2) + (b*x*(d - 3*e))/(2*c)
```

**sympy** [A] time = 3.93, size = 209, normalized size = 1.49

$$\begin{cases}\frac{adx^2}{2}+\frac{aex^2\log\left(-c^2x^2+1\right)}{2}-\frac{aex^2}{2}-\frac{ae\log\left(-c^2x^2+1\right)}{2c^2}+\frac{bdx^2\operatorname{acoth}(cx)}{2}+\frac{bex^2\log\left(-c^2x^2+1\right)\operatorname{acoth}(cx)}{2}-\frac{bex^2\operatorname{acoth}(cx)}{2}+\frac{bdx}{2c}+\frac{bex\log\dots}{} \\ \frac{dx^2\left(a+\frac{i\pi b}{2}\right)}{2}\end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*(a+b*acoth(c*x))*(d+e*ln(-c**2*x**2+1)),x)
```

```
[Out] Piecewise((a*d*x**2/2 + a*e*x**2*log(-c**2*x**2 + 1)/2 - a*e*x**2/2 - a*e*l
og(-c**2*x**2 + 1)/(2*c**2) + b*d*x**2*acoth(c*x)/2 + b*e*x**2*log(-c**2*x*
*2 + 1)*acoth(c*x)/2 - b*e*x**2*acoth(c*x)/2 + b*d*x/(2*c) + b*e*x*log(-c**
2*x**2 + 1)/(2*c) - 3*b*e*x/(2*c) - b*d*acoth(c*x)/(2*c**2) - b*e*log(-c**2
*x**2 + 1)*acoth(c*x)/(2*c**2) + 3*b*e*acoth(c*x)/(2*c**2), Ne(c, 0)), (d*x
**2*(a + I*pi*b/2)/2, True))
```

# 3.269 $\int \frac{\left(a+b\coth^{-1}(cx)\right)\left(d+e\log\left(1-c^2x^2\right)\right)}{x}\,dx$

**Optimal**. Leaf size=381

$$-\frac{1}{2}ae\text{Li}_2\left(c^2x^2\right)+ad\log(x)+\frac{1}{2}be\text{Li}_2\left(-\frac{1}{cx}\right)\log\left(-c^2x^2\right)-\frac{1}{2}be\text{Li}_2\left(-\frac{1}{cx}\right)\left(\log\left(-c^2x^2\right)-\log\left(1-c^2x^2\right)+\log\left(1-\frac{1}{cx}\right)\right.$$

```
[Out] -1/2*b*e*ln(1+1/c/x)^2*ln(-1/c/x)+1/2*b*e*ln(1-1/c/x)^2*ln(1/c/x)+a*d*ln(x)
-b*e*ln((c+1/x)/c)*polylog(2,(c+1/x)/c)+b*e*ln(1-1/c/x)*polylog(2,1-1/c/x)+
1/2*b*d*polylog(2,-1/c/x)+1/2*b*e*ln(-c^2*x^2)*polylog(2,-1/c/x)-1/2*b*e*(l
n(1-1/c/x)+ln(1+1/c/x)+ln(-c^2*x^2)-ln(-c^2*x^2+1))*polylog(2,-1/c/x)-1/2*b
*d*polylog(2,1/c/x)-1/2*b*e*ln(-c^2*x^2)*polylog(2,1/c/x)+1/2*b*e*(ln(1-1/c
/x)+ln(1+1/c/x)+ln(-c^2*x^2)-ln(-c^2*x^2+1))*polylog(2,1/c/x)-1/2*a*e*polyl
og(2,c^2*x^2)+b*e*polylog(3,(c+1/x)/c)-b*e*polylog(3,1-1/c/x)+b*e*polylog(3
,-1/c/x)-b*e*polylog(3,1/c/x)
```

**Rubi [A]** time = 0.44, antiderivative size = 381, normalized size of antiderivative = 1.00, number of steps used = 21, number of rules used = 11, integrand size = 27, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.407, Rules used = {6080, 5913, 6078, 2391, 6076, 2454, 2396, 2433, 2374, 6589, 6070}

$$-\frac{1}{2}ae\text{PolyLog}\left(2,c^2x^2\right)+\frac{1}{2}be\log\left(-c^2x^2\right)\text{PolyLog}\left(2,-\frac{1}{cx}\right)-\frac{1}{2}be\left(\log\left(-c^2x^2\right)-\log\left(1-c^2x^2\right)+\log\left(1-\frac{1}{cx}\right)+\right.$$

Antiderivative was successfully verified.

```
[In] Int[((a + b*ArcCoth[c*x])*(d + e*Log[1 - c^2*x^2]))/x,x]
```

```
[Out] -(b*e*Log[1 + 1/(c*x)]^2*Log[-(1/(c*x))])/2 + (b*e*Log[1 - 1/(c*x)]^2*Log[1
/(c*x)])/2 + a*d*Log[x] - b*e*Log[(c + x^(-1))/c]*PolyLog[2, (c + x^(-1))/c
] + b*e*Log[1 - 1/(c*x)]*PolyLog[2, 1 - 1/(c*x)] + (b*d*PolyLog[2, -(1/(c*x
))])/2 + (b*e*Log[-(c^2*x^2)]*PolyLog[2, -(1/(c*x))])/2 - (b*e*(Log[1 - 1/(
c*x)] + Log[1 + 1/(c*x)] + Log[-(c^2*x^2)] - Log[1 - c^2*x^2])*PolyLog[2, -
(1/(c*x))])/2 - (b*d*PolyLog[2, 1/(c*x)])/2 - (b*e*Log[-(c^2*x^2)]*PolyLog[
2, 1/(c*x)])/2 + (b*e*(Log[1 - 1/(c*x)] + Log[1 + 1/(c*x)] + Log[-(c^2*x^2)
] - Log[1 - c^2*x^2])*PolyLog[2, 1/(c*x)])/2 - (a*e*PolyLog[2, c^2*x^2])/2
+ b*e*PolyLog[3, (c + x^(-1))/c] - b*e*PolyLog[3, 1 - 1/(c*x)] + b*e*PolyLo
g[3, -(1/(c*x))] - b*e*PolyLog[3, 1/(c*x)]
```

Rule 2374

```
Int[(Log[(d_.)*((e_) + (f_.)*(x_)^(m_.))]*((a_.) + Log[(c_.)*(x_)^(n_.)]*(b
_.))^(p_.))/(x_), x_Symbol] :> -Simp[(PolyLog[2, -(d*f*x^m)]*(a + b*Log[c*x
^n])^p)/m, x] + Dist[(b*n*p)/m, Int[(PolyLog[2, -(d*f*x^m)]*(a + b*Log[c*x^
n])^(p - 1))/x, x], x] /; FreeQ[{a, b, c, d, e, f, m, n}, x] && IGtQ[p, 0]
&& EqQ[d*e, 1]
```

Rule 2391

```
Int[Log[(c_.)*((d_) + (e_.)*(x_)^(n_.))]/(x_), x_Symbol] :> -Simp[PolyLog[2
, -(c*e*x^n)]/n, x] /; FreeQ[{c, d, e, n}, x] && EqQ[c*d, 1]
```

Rule 2396

```
Int[((a_.) + Log[(c_.)*((d_) + (e_.)*(x_))^(n_.)]*(b_.))^(p_)/((f_.) + (g_.
)*(x_)), x_Symbol] :> Simp[(Log[(e*(f + g*x))/(e*f - d*g)]*(a + b*Log[c*(d
+ e*x)^n])^p)/g, x] - Dist[(b*e*n*p)/g, Int[(Log[(e*(f + g*x))/(e*f - d*g)]
*(a + b*Log[c*(d + e*x)^n])^(p - 1))/(d + e*x), x], x] /; FreeQ[{a, b, c, d
```

```
, e, f, g, n, p}, x] && NeQ[e*f - d*g, 0] && IGtQ[p, 1]
```

Rule 2433

```
Int[((a_.) + Log[(c_.)*((d_) + (e_.)*(x_))^(n_.)]*(b_.))^(p_.)*((f_.) + Log
[(h_.)*((i_.) + (j_.)*(x_))^(m_.)]*(g_.))*((k_.) + (l_.)*(x_))^(r_.), x_Sym
bol] :> Dist[1/e, Subst[Int[((k*x)/d)^r*(a + b*Log[c*x^n])^p*(f + g*Log[h*(
(e*i - d*j)/e + (j*x)/e)^m]), x], x, d + e*x], x] /; FreeQ[{a, b, c, d, e,
f, g, h, i, j, k, l, n, p, r}, x] && EqQ[e*k - d*l, 0]
```

Rule 2454

```
Int[((a_.) + Log[(c_.)*((d_) + (e_.)*(x_)^(n_))^(p_.)]*(b_.))^(q_.)*(x_)^(m
_.), x_Symbol] :> Dist[1/n, Subst[Int[x^(Simplify[(m + 1)/n] - 1)*(a + b*Lo
g[c*(d + e*x)^p])^q, x], x, x^n], x] /; FreeQ[{a, b, c, d, e, m, n, p, q},
x] && IntegerQ[Simplify[(m + 1)/n]] && (GtQ[(m + 1)/n, 0] || IGtQ[q, 0]) &&
  !(EqQ[q, 1] && ILtQ[n, 0] && IGtQ[m, 0])
```

Rule 5913

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))/(x_), x_Symbol] :> Simp[a*Log[x], x
] + (Simp[(b*PolyLog[2, -(c*x)^(-1)])/2, x] - Simp[(b*PolyLog[2, 1/(c*x)])/
2, x]) /; FreeQ[{a, b, c}, x]
```

Rule 6070

```
Int[(ArcCoth[(c_.)*(x_)^(n_.)]*Log[(d_.)*(x_)^(m_.)])/(x_), x_Symbol] :> Di
st[1/2, Int[(Log[d*x^m]*Log[1 + 1/(c*x^n)])/x, x], x] - Dist[1/2, Int[(Log[
d*x^m]*Log[1 - 1/(c*x^n)])/x, x], x] /; FreeQ[{c, d, m, n}, x]
```

Rule 6076

```
Int[(ArcCoth[(c_.)*(x_)]*Log[(f_.) + (g_.)*(x_)^2])/(x_), x_Symbol] :> Dist
[Log[f + g*x^2] - Log[-(c^2*x^2)] - Log[1 - 1/(c*x)] - Log[1 + 1/(c*x)], In
t[ArcCoth[c*x]/x, x], x] + (-Dist[1/2, Int[Log[1 - 1/(c*x)]^2/x, x], x] + D
ist[1/2, Int[Log[1 + 1/(c*x)]^2/x, x], x] + Int[(Log[-(c^2*x^2)]*ArcCoth[c*
x])/x, x]) /; FreeQ[{c, f, g}, x] && EqQ[c^2*f + g, 0]
```

Rule 6078

```
Int[(Log[(f_.) + (g_.)*(x_)^2]*(ArcCoth[(c_.)*(x_)]*(b_.) + (a_)))/(x_), x_
Symbol] :> Dist[a, Int[Log[f + g*x^2]/x, x], x] + Dist[b, Int[(Log[f + g*x^
2]*ArcCoth[c*x])/x, x], x] /; FreeQ[{a, b, c, f, g}, x]
```

Rule 6080

```
Int[(((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))*(Log[(f_.) + (g_.)*(x_)^2]*(e_.) +
 (d_)))/(x_), x_Symbol] :> Dist[d, Int[(a + b*ArcCoth[c*x])/x, x], x] + Dis
t[e, Int[(Log[f + g*x^2]*(a + b*ArcCoth[c*x]))/x, x], x] /; FreeQ[{a, b, c,
 d, e, f, g}, x]
```

Rule 6589

```
Int[PolyLog[n_, (c_.)*((a_.) + (b_.)*(x_))^(p_.)]/((d_.) + (e_.)*(x_)), x_S
ymbol] :> Simp[PolyLog[n + 1, c*(a + b*x)^p]/(e*p), x] /; FreeQ[{a, b, c, d
, e, n, p}, x] && EqQ[b*d, a*e]
```

Rubi steps

$$\int \frac{\left(a+b\coth^{-1}(cx)\right)\left(d+e\log\left(1-c^2x^2\right)\right)}{x}\,dx = d\int \frac{a+b\coth^{-1}(cx)}{x}\,dx + e\int \frac{\left(a+b\coth^{-1}(cx)\right)\log\left(1-c^2x^2\right.}{x}$$

$$= ad\log(x) + \frac{1}{2}bd\text{Li}_2\left(-\frac{1}{cx}\right) - \frac{1}{2}bd\text{Li}_2\left(\frac{1}{cx}\right) + (ae)\int \frac{\log\left(1-c^2x\right.}{x}$$

$$= ad\log(x) + \frac{1}{2}bd\text{Li}_2\left(-\frac{1}{cx}\right) - \frac{1}{2}bd\text{Li}_2\left(\frac{1}{cx}\right) - \frac{1}{2}ae\text{Li}_2\left(c^2x^2\right) - \frac{1}{2}($$

$$= ad\log(x) + \frac{1}{2}bd\text{Li}_2\left(-\frac{1}{cx}\right) - \frac{1}{2}be\left(\log\left(1-\frac{1}{cx}\right) + \log\left(1+\frac{1}{cx}\right)\right.$$

$$= -\frac{1}{2}be\log^2\left(1+\frac{1}{cx}\right)\log\left(-\frac{1}{cx}\right) + \frac{1}{2}be\log^2\left(1-\frac{1}{cx}\right)\log\left(\frac{1}{cx}\right) + $$

$$= -\frac{1}{2}be\log^2\left(1+\frac{1}{cx}\right)\log\left(-\frac{1}{cx}\right) + \frac{1}{2}be\log^2\left(1-\frac{1}{cx}\right)\log\left(\frac{1}{cx}\right) + $$

$$= -\frac{1}{2}be\log^2\left(1+\frac{1}{cx}\right)\log\left(-\frac{1}{cx}\right) + \frac{1}{2}be\log^2\left(1-\frac{1}{cx}\right)\log\left(\frac{1}{cx}\right) + $$

$$= -\frac{1}{2}be\log^2\left(1+\frac{1}{cx}\right)\log\left(-\frac{1}{cx}\right) + \frac{1}{2}be\log^2\left(1-\frac{1}{cx}\right)\log\left(\frac{1}{cx}\right) + $$

**Mathematica [F]** time = 0.22, size = 0, normalized size = 0.00

$$\int \frac{\left(a+b\coth^{-1}(cx)\right)\left(d+e\log\left(1-c^2x^2\right)\right)}{x}\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[((a + b*ArcCoth[c*x])*(d + e*Log[1 - c^2*x^2]))/x,x]
[Out] Integrate[((a + b*ArcCoth[c*x])*(d + e*Log[1 - c^2*x^2]))/x, x]
```

**fricas [F]** time = 0.50, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{bd\,\text{arcoth}(cx) + ad + (be\,\text{arcoth}(cx) + ae)\log\left(-c^2x^2+1\right)}{x}, x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccoth(c*x))*(d+e*log(-c^2*x^2+1))/x,x, algorithm="fricas")
[Out] integral((b*d*arccoth(c*x) + a*d + (b*e*arccoth(c*x) + a*e)*log(-c^2*x^2 +
1))/x, x)
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{(b\,\text{arcoth}(cx) + a)\left(e\log\left(-c^2x^2+1\right) + d\right)}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccoth(c*x))*(d+e*log(-c^2*x^2+1))/x,x, algorithm="giac")
[Out] integrate((b*arccoth(c*x) + a)*(e*log(-c^2*x^2 + 1) + d)/x, x)
```

**maple [C]** time = 4.56, size = 864, normalized size = 2.27

result too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a+b*arccoth(c*x))*(d+e*ln(-c^2*x^2+1))/x,x)
```

```
[Out] b*e*polylog(3,-c*x+1)-b*e*polylog(3,c*x+1)-(-1/2*I*Pi*b*e*csgn(I*(c*x-1)*(c
*x+1))^2-1/4*I*Pi*b*e*csgn(I*(c*x-1))*csgn(I*(c*x+1))*csgn(I*(c*x-1)*(c*x+1
))+1/4*I*Pi*b*e*csgn(I*(c*x-1))*csgn(I*(c*x-1)*(c*x+1))^2+1/4*I*Pi*b*e*csgn
(I*(c*x+1))*csgn(I*(c*x-1)*(c*x+1))^2+1/4*I*Pi*b*e*csgn(I*(c*x-1)*(c*x+1))^
3+1/2*I*e*Pi*b+a*e+1/2*b*d)*dilog(c*x+1)-1/2*I*ln(c*x-1)*Pi*ln(c*x)*b*e+ln(
c*x)*ln(c*x-1)*a*e-1/2*ln(c*x)*ln(c*x-1)*b*d-1/2*ln(c*x)*ln(c*x-1)^2*b*e-po
lylog(2,-c*x+1)*ln(c*x-1)*b*e+1/2*b*e*ln(-c*x)*ln(c*x+1)^2+b*e*ln(c*x+1)*po
lylog(2,c*x+1)-1/4*I*ln(c*x)*ln(c*x-1)*Pi*b*e*csgn(I*(c*x+1))*csgn(I*(c*x-1
)*(c*x+1))^2+1/4*I*dilog(c*x)*Pi*b*e*csgn(I*(c*x-1))*csgn(I*(c*x+1))*csgn(I
*(c*x-1)*(c*x+1))-1/2*I*ln(c*x)*Pi*a*e*csgn(I*(c*x-1))*csgn(I*(c*x+1))*csgn
(I*(c*x-1)*(c*x+1))-1/4*I*ln(c*x)*ln(c*x-1)*Pi*b*e*csgn(I*(c*x-1))*csgn(I*(
c*x-1)*(c*x+1))^2+dilog(c*x)*a*e-1/2*dilog(c*x)*b*d+ln(c*x)*a*d-1/4*I*dilog
(c*x)*Pi*b*e*csgn(I*(c*x-1)*(c*x+1))^3+1/4*I*ln(c*x)*ln(c*x-1)*Pi*b*e*csgn(
I*(c*x-1))*csgn(I*(c*x+1))*csgn(I*(c*x-1)*(c*x+1))+I*ln(c*x)*Pi*a*e-1/4*I*l
n(c*x)*ln(c*x-1)*Pi*b*e*csgn(I*(c*x-1)*(c*x+1))^3+1/2*I*ln(c*x)*ln(c*x-1)*P
i*b*e*csgn(I*(c*x-1)*(c*x+1))^2-1/2*I*Pi*dilog(c*x)*b*e-1/4*I*dilog(c*x)*Pi
*b*e*csgn(I*(c*x-1))*csgn(I*(c*x-1)*(c*x+1))^2-1/4*I*dilog(c*x)*Pi*b*e*csgn
(I*(c*x+1))*csgn(I*(c*x-1)*(c*x+1))^2+1/2*I*ln(c*x)*Pi*a*e*csgn(I*(c*x-1))*
csgn(I*(c*x-1)*(c*x+1))^2+1/2*I*ln(c*x)*Pi*a*e*csgn(I*(c*x+1))*csgn(I*(c*x-
1)*(c*x+1))^2+1/2*I*ln(c*x)*Pi*a*e*csgn(I*(c*x-1)*(c*x+1))^3+1/2*I*dilog(c*
x)*Pi*b*e*csgn(I*(c*x-1)*(c*x+1))^2-I*ln(c*x)*Pi*a*e*csgn(I*(c*x-1)*(c*x+1)
)^2
```

**maxima [C]** time = 0.54, size = 167, normalized size = 0.44

$$i\pi ae\log(x) - \frac{1}{2}\left(\log(cx-1)^2\log(cx) + 2\,\mathrm{Li}_2(-cx+1)\log(cx-1) - 2\,\mathrm{Li}_3(-cx+1)\right)be + \frac{1}{2}\left(\log(cx+1)^2\log(-\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccoth(c*x))*(d+e*log(-c^2*x^2+1))/x,x, algorithm="maxima")
```

```
[Out] I*pi*a*e*log(x) - 1/2*(log(c*x - 1)^2*log(c*x) + 2*dilog(-c*x + 1)*log(c*x
- 1) - 2*polylog(3, -c*x + 1))*b*e + 1/2*(log(c*x + 1)^2*log(-c*x) + 2*dilo
g(c*x + 1)*log(c*x + 1) - 2*polylog(3, c*x + 1))*b*e + a*d*log(x) - 1/2*(I*
pi*b*e + b*d - 2*a*e)*(log(c*x - 1)*log(c*x) + dilog(-c*x + 1)) - 1/2*(-I*p
i*b*e - b*d - 2*a*e)*(log(c*x + 1)*log(-c*x) + dilog(c*x + 1))
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.00

$$\int \frac{(a+b\,\mathrm{acoth}(c\,x))\,\left(d+e\,\ln\left(1-c^2\,x^2\right)\right)}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(((a + b*acoth(c*x))*(d + e*log(1 - c^2*x^2)))/x,x)
```

```
[Out] int(((a + b*acoth(c*x))*(d + e*log(1 - c^2*x^2)))/x, x)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{(a+b\,\mathrm{acoth}(cx))\left(d+e\log\left(-c^2x^2+1\right)\right)}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*acoth(c*x))*(d+e*ln(-c**2*x**2+1))/x,x)
[Out] Integral((a + b*acoth(c*x))*(d + e*log(-c**2*x**2 + 1))/x, x)
```

# 3.270 $\int \frac{(a+b\coth^{-1}(cx))(d+e\log(1-c^2x^2))}{x^3}\,dx$

**Optimal**. Leaf size=247

$$-\frac{(a+b\coth^{-1}(cx))\left(e\log\left(1-c^2x^2\right)+d\right)}{2x^2}+\frac{1}{2}c^2e(a+b)\log(1-cx)+\frac{1}{2}c^2e(a-b)\log(cx+1)-ac^2e\log(x)-\frac{bc\left(e\log\right.}{}$$

```
[Out] -1/2*b*c^2*e*arccoth(c*x)^2-1/2*b*c^2*e*arctanh(c*x)^2-a*c^2*e*ln(x)+b*c^2*
e*arctanh(c*x)*ln(2/(-c*x+1))+1/2*(a+b)*c^2*e*ln(-c*x+1)+1/2*(a-b)*c^2*e*ln
(c*x+1)-1/2*b*c*(d+e*ln(-c^2*x^2+1))/x-1/2*(a+b*arccoth(c*x))*(d+e*ln(-c^2*
x^2+1))/x^2+1/2*b*c^2*arctanh(c*x)*(d+e*ln(-c^2*x^2+1))-b*c^2*e*arccoth(c*x
)*ln(2-2/(c*x+1))+1/2*b*c^2*e*polylog(2,1-2/(-c*x+1))+1/2*b*c^2*e*polylog(2
,-1+2/(c*x+1))
```

**Rubi [A]** time = 0.49, antiderivative size = 247, normalized size of antiderivative = 1.00, number of steps used = 13, number of rules used = 13, integrand size = 27, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.482, Rules used = {5917, 325, 206, 6086, 6725, 801, 5989, 5933, 2447, 5984, 5918, 2402, 2315}

$$\frac{1}{2}bc^2e\text{PolyLog}\left(2,1-\frac{2}{1-cx}\right)+\frac{1}{2}bc^2e\text{PolyLog}\left(2,\frac{2}{cx+1}-1\right)-\frac{(a+b\coth^{-1}(cx))\left(e\log\left(1-c^2x^2\right)+d\right)}{2x^2}+\frac{1}{2}c^2\cdots$$

Antiderivative was successfully verified.

```
[In] Int[((a + b*ArcCoth[c*x])*(d + e*Log[1 - c^2*x^2]))/x^3,x]
```

```
[Out] -(b*c^2*e*ArcCoth[c*x]^2)/2 - (b*c^2*e*ArcTanh[c*x]^2)/2 - a*c^2*e*Log[x] +
 b*c^2*e*ArcTanh[c*x]*Log[2/(1 - c*x)] + ((a + b)*c^2*e*Log[1 - c*x])/2 + (
(a - b)*c^2*e*Log[1 + c*x])/2 - (b*c*(d + e*Log[1 - c^2*x^2]))/(2*x) - ((a
+ b*ArcCoth[c*x])*(d + e*Log[1 - c^2*x^2]))/(2*x^2) + (b*c^2*ArcTanh[c*x]*(
d + e*Log[1 - c^2*x^2]))/2 - b*c^2*e*ArcCoth[c*x]*Log[2 - 2/(1 + c*x)] + (b
*c^2*e*PolyLog[2, 1 - 2/(1 - c*x)])/2 + (b*c^2*e*PolyLog[2, -1 + 2/(1 + c*x
)])/2
```

Rule 206

```
Int[((a_) + (b_.)*(x_)^2)^(-1), x_Symbol] :> Simp[(1*ArcTanh[(Rt[-b, 2]*x)/
Rt[a, 2]])/(Rt[a, 2]*Rt[-b, 2]), x] /; FreeQ[{a, b}, x] && NegQ[a/b] && (Gt
Q[a, 0] || LtQ[b, 0])
```

Rule 325

```
Int[((c_.)*(x_))^(m_)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Simp[((c*
x)^(m + 1)*(a + b*x^n)^(p + 1))/(a*c*(m + 1)), x] - Dist[(b*(m + n*(p + 1)
+ 1))/(a*c^n*(m + 1)), Int[(c*x)^(m + n)*(a + b*x^n)^p, x], x] /; FreeQ[{a,
 b, c, p}, x] && IGtQ[n, 0] && LtQ[m, -1] && IntBinomialQ[a, b, c, n, m, p,
 x]
```

Rule 801

```
Int[(((d_.) + (e_.)*(x_))^(m_)*((f_.) + (g_.)*(x_)))/((a_) + (c_.)*(x_)^2),
 x_Symbol] :> Int[ExpandIntegrand[((d + e*x)^m*(f + g*x))/(a + c*x^2), x],
x] /; FreeQ[{a, c, d, e, f, g}, x] && NeQ[c*d^2 + a*e^2, 0] && IntegerQ[m]
```

Rule 2315

```
Int[Log[(c_.)*(x_)]/((d_) + (e_.)*(x_)), x_Symbol] :> -Simp[PolyLog[2, 1 -
c*x]/e, x] /; FreeQ[{c, d, e}, x] && EqQ[e + c*d, 0]
```

Rule 2402

```
Int[Log[(c_.)/((d_) + (e_.)*(x_))]/((f_) + (g_.)*(x_)^2), x_Symbol] :> -Dis
t[e/g, Subst[Int[Log[2*d*x]/(1 - 2*d*x), x], x, 1/(d + e*x)], x] /; FreeQ[{
c, d, e, f, g}, x] && EqQ[c, 2*d] && EqQ[e^2*f + d^2*g, 0]
```

Rule 2447

```
Int[Log[u_]*(Pq_)^(m_.), x_Symbol] :> With[{C = FullSimplify[(Pq^m*(1 - u))
/D[u, x]]}, Simp[C*PolyLog[2, 1 - u], x] /; FreeQ[C, x]] /; IntegerQ[m] &&
PolyQ[Pq, x] && RationalFunctionQ[u, x] && LeQ[RationalFunctionExponents[u,
 x][[2]], Expon[Pq, x]]
```

Rule 5917

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)*((d_.)*(x_))^(m_.), x_Symbol]
 :> Simp[((d*x)^(m + 1)*(a + b*ArcCoth[c*x])^p)/(d*(m + 1)), x] - Dist[(b*c
*p)/(d*(m + 1)), Int[((d*x)^(m + 1)*(a + b*ArcCoth[c*x])^(p - 1))/(1 - c^2*
x^2), x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[p, 0] && (EqQ[p, 1] || In
tegerQ[m]) && NeQ[m, -1]
```

Rule 5918

```
Int[((a_.) + ArcTanh[(c_.)*(x_)]*(b_.))^(p_.)/((d_) + (e_.)*(x_)), x_Symbol
] :> -Simp[((a + b*ArcTanh[c*x])^p*Log[2/(1 + (e*x)/d)])/e, x] + Dist[(b*c*
p)/e, Int[((a + b*ArcTanh[c*x])^(p - 1)*Log[2/(1 + (e*x)/d)])/(1 - c^2*x^2)
, x], x] /; FreeQ[{a, b, c, d, e}, x] && IGtQ[p, 0] && EqQ[c^2*d^2 - e^2, 0
]
```

Rule 5933

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)/((x_)*((d_) + (e_.)*(x_))), x
_Symbol] :> Simp[((a + b*ArcCoth[c*x])^p*Log[2 - 2/(1 + (e*x)/d)])/d, x] -
Dist[(b*c*p)/d, Int[((a + b*ArcCoth[c*x])^(p - 1)*Log[2 - 2/(1 + (e*x)/d)])
/(1 - c^2*x^2), x], x] /; FreeQ[{a, b, c, d, e}, x] && IGtQ[p, 0] && EqQ[c^
2*d^2 - e^2, 0]
```

Rule 5984

```
Int[(((a_.) + ArcTanh[(c_.)*(x_)]*(b_.))^(p_.)*(x_))/((d_) + (e_.)*(x_)^2),
 x_Symbol] :> Simp[(a + b*ArcTanh[c*x])^(p + 1)/(b*e*(p + 1)), x] + Dist[1/
(c*d), Int[(a + b*ArcTanh[c*x])^p/(1 - c*x), x], x] /; FreeQ[{a, b, c, d, e
}, x] && EqQ[c^2*d + e, 0] && IGtQ[p, 0]
```

Rule 5989

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)/((x_)*((d_) + (e_.)*(x_)^2)),
 x_Symbol] :> Simp[(a + b*ArcCoth[c*x])^(p + 1)/(b*d*(p + 1)), x] + Dist[1/
d, Int[(a + b*ArcCoth[c*x])^p/(x*(1 + c*x)), x], x] /; FreeQ[{a, b, c, d, e
}, x] && EqQ[c^2*d + e, 0] && GtQ[p, 0]
```

Rule 6086

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))*((d_.) + Log[(f_.) + (g_.)*(x_)^2]*
(e_.))*(x_)^(m_.), x_Symbol] :> With[{u = IntHide[x^m*(a + b*ArcCoth[c*x]),
 x]}, Dist[d + e*Log[f + g*x^2], u, x] - Dist[2*e*g, Int[ExpandIntegrand[(x
*u)/(f + g*x^2), x], x], x]] /; FreeQ[{a, b, c, d, e, f, g}, x] && IntegerQ
[m] && NeQ[m, -1]
```

Rule 6725

```
Int[(u_)/((a_) + (b_.)*(x_)^(n_)), x_Symbol] :> With[{v = RationalFunctionE
xpand[u/(a + b*x^n), x]}, Int[v, x] /; SumQ[v]] /; FreeQ[{a, b}, x] && IGtQ
[n, 0]
```

Rubi steps

$$\int \frac{\left(a+b\coth^{-1}(cx)\right)\left(d+e\log\left(1-c^2x^2\right)\right)}{x^3}\,dx = -\frac{bc\left(d+e\log\left(1-c^2x^2\right)\right)}{2x}-\frac{\left(a+b\coth^{-1}(cx)\right)\left(d+e\log\left(1\right.\right.}{2x^2}$$

$$= -\frac{bc\left(d+e\log\left(1-c^2x^2\right)\right)}{2x}-\frac{\left(a+b\coth^{-1}(cx)\right)\left(d+e\log\left(1\right.\right.}{2x^2}$$

$$= -\frac{1}{2}bc^2e\tanh^{-1}(cx)^2-\frac{bc\left(d+e\log\left(1-c^2x^2\right)\right)}{2x}-\frac{\left(a+b\,\mathrm{cot}\right.}{}$$

$$= -\frac{1}{2}bc^2e\tanh^{-1}(cx)^2+bc^2e\tanh^{-1}(cx)\log\left(\frac{2}{1-cx}\right)-\frac{bc\left(d+\right.}{}$$

$$= -\frac{1}{2}bc^2e\coth^{-1}(cx)^2-\frac{1}{2}bc^2e\tanh^{-1}(cx)^2+bc^2e\tanh^{-1}(cx)\,\mathrm{l}$$

$$= -\frac{1}{2}bc^2e\coth^{-1}(cx)^2-\frac{1}{2}bc^2e\tanh^{-1}(cx)^2-ac^2e\log(x)+bc^2$$

$$= -\frac{1}{2}bc^2e\coth^{-1}(cx)^2-\frac{1}{2}bc^2e\tanh^{-1}(cx)^2-ac^2e\log(x)+bc^2$$

**Mathematica [A]** time = 0.16, size = 161, normalized size = 0.65

$$\frac{1}{2}\left(-\frac{e\log\left(1-c^2x^2\right)\left(a+\left(b-bc^2x^2\right)\coth^{-1}(cx)+bcx\right)}{x^2}+c^2e(a+b)\log(1-cx)+c^2e(a-b)\log(cx+1)-2ac\right.$$

Warning: Unable to verify antiderivative.

```
[In] Integrate[((a + b*ArcCoth[c*x])*(d + e*Log[1 - c^2*x^2]))/x^3,x]
```

```
[Out] (-((a*d)/x^2) - 2*a*c^2*e*Log[x] + (a + b)*c^2*e*Log[1 - c*x] + (a - b)*c^2
*e*Log[1 + c*x] - (b*d*(2*ArcCoth[c*x] + c*x*(2 + c*x*Log[1 - c*x] - c*x*Lo
g[1 + c*x])))/(2*x^2) - (e*(a + b*c*x + (b - b*c^2*x^2)*ArcCoth[c*x])*Log[1
 - c^2*x^2])/x^2 - b*c^2*e*(PolyLog[2, -(1/(c*x))] - PolyLog[2, 1/(c*x)]))/
2
```

**fricas [F]** time = 0.87, size = 0, normalized size = 0.00

$$\mathrm{integral}\left(\frac{bd\,\mathrm{arcoth}\,(cx)+ad+(be\,\mathrm{arcoth}\,(cx)+ae)\log\left(-c^2x^2+1\right)}{x^3},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccoth(c*x))*(d+e*log(-c^2*x^2+1))/x^3,x, algorithm="fricas
")
```

```
[Out] integral((b*d*arccoth(c*x) + a*d + (b*e*arccoth(c*x) + a*e)*log(-c^2*x^2 +
1))/x^3, x)
```

**giac** [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{(b \operatorname{arcoth}(cx) + a)\left(e \log\left(-c^2x^2 + 1\right) + d\right)}{x^3}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccoth(c*x))*(d+e*log(-c^2*x^2+1))/x^3,x, algorithm="giac")
```

```
[Out] integrate((b*arccoth(c*x) + a)*(e*log(-c^2*x^2 + 1) + d)/x^3, x)
```

**maple** [F] time = 11.44, size = 0, normalized size = 0.00

$$\int \frac{(a + b \operatorname{arccoth}(cx))\left(d + e \ln\left(-c^2x^2 + 1\right)\right)}{x^3}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a+b*arccoth(c*x))*(d+e*ln(-c^2*x^2+1))/x^3,x)
```

```
[Out] int((a+b*arccoth(c*x))*(d+e*ln(-c^2*x^2+1))/x^3,x)
```

**maxima** [F] time = 0.00, size = 0, normalized size = 0.00

$$\frac{1}{4}\left(\left(c \log(cx + 1) - c \log(cx - 1) - \frac{2}{x}\right)c - \frac{2 \operatorname{arcoth}(cx)}{x^2}\right)bd + \frac{1}{2}\left(c^2\left(\log\left(c^2x^2 - 1\right) - \log\left(x^2\right)\right) - \frac{\log\left(-c^2x^2 + 1\right)}{x^2}\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccoth(c*x))*(d+e*log(-c^2*x^2+1))/x^3,x, algorithm="maxima
")
```

```
[Out] 1/4*((c*log(c*x + 1) - c*log(c*x - 1) - 2/x)*c - 2*arccoth(c*x)/x^2)*b*d +
1/2*(c^2*(log(c^2*x^2 - 1) - log(x^2)) - log(-c^2*x^2 + 1)/x^2)*a*e - 1/4*b
*e*(log(c*x + 1)^2/x^2 - 2*integrate(-((c*x + 1)*log(c*x - 1)^2 - (I*pi + (
I*pi*c + c)*x)*log(c*x + 1) - (-I*pi - I*pi*c*x)*log(c*x - 1))/(c*x^4 + x^3
), x)) - 1/2*a*d/x^2
```

**mupad** [F] time = 0.00, size = -1, normalized size = -0.00

$$\int \frac{(a + b \operatorname{acoth}(c\, x))\,\left(d + e\, \ln\left(1 - c^2\, x^2\right)\right)}{x^3}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(((a + b*acoth(c*x))*(d + e*log(1 - c^2*x^2)))/x^3,x)
```

```
[Out] int(((a + b*acoth(c*x))*(d + e*log(1 - c^2*x^2)))/x^3, x)
```

**sympy** [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{(a + b \operatorname{acoth}(cx))\left(d + e \log\left(-c^2x^2 + 1\right)\right)}{x^3}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*acoth(c*x))*(d+e*ln(-c**2*x**2+1))/x**3,x)
```

```
[Out] Integral((a + b*acoth(c*x))*(d + e*log(-c**2*x**2 + 1))/x**3, x)
```

# 3.271 $\int \frac{\left(a+b\coth^{-1}(cx)\right)\left(d+e\log\left(1-c^2x^2\right)\right)}{x^5}\,dx$

**Optimal**. Leaf size=339

$$\frac{1}{12}c^4e(3a+4b)\log(1-cx)+\frac{1}{12}c^4e(3a-4b)\log(cx+1)-\frac{\left(a+b\coth^{-1}(cx)\right)\left(e\log\left(1-c^2x^2\right)+d\right)}{4x^4}-\frac{1}{2}ac^4e\log(x)+\frac{a}{4}$$

```
[Out] 1/4*a*c^2*e/x^2+5/12*b*c^3*e/x+1/4*b*c^2*e*arccoth(c*x)/x^2-1/4*b*c^4*e*arc
coth(c*x)^2-1/4*b*c^4*e*arctanh(c*x)-1/4*b*c^4*e*arctanh(c*x)^2-1/2*a*c^4*e
*ln(x)+1/2*b*c^4*e*arctanh(c*x)*ln(2/(-c*x+1))+1/12*(3*a+4*b)*c^4*e*ln(-c*x
+1)+1/12*(3*a-4*b)*c^4*e*ln(c*x+1)-1/12*b*c*(d+e*ln(-c^2*x^2+1))/x^3-1/4*b*
c^3*(d+e*ln(-c^2*x^2+1))/x-1/4*(a+b*arccoth(c*x))*(d+e*ln(-c^2*x^2+1))/x^4+
1/4*b*c^4*arctanh(c*x)*(d+e*ln(-c^2*x^2+1))-1/2*b*c^4*e*arccoth(c*x)*ln(2-2
/(c*x+1))+1/4*b*c^4*e*polylog(2,1-2/(-c*x+1))+1/4*b*c^4*e*polylog(2,-1+2/(c
*x+1))
```

**Rubi** [A] time = 0.72, antiderivative size = 339, normalized size of antiderivative = 1.00, number of steps used = 17, number of rules used = 14, integrand size = 27, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.518, Rules used = {5917, 325, 206, 6086, 6725, 1802, 5983, 5989, 5933, 2447, 5984, 5918, 2402, 2315}

$$\frac{1}{4}bc^4e\text{PolyLog}\left(2,1-\frac{2}{1-cx}\right)+\frac{1}{4}bc^4e\text{PolyLog}\left(2,\frac{2}{cx+1}-1\right)-\frac{\left(a+b\coth^{-1}(cx)\right)\left(e\log\left(1-c^2x^2\right)+d\right)}{4x^4}+\frac{1}{12}c$$

Antiderivative was successfully verified.

```
[In] Int[((a + b*ArcCoth[c*x])*(d + e*Log[1 - c^2*x^2]))/x^5,x]
```

```
[Out] (a*c^2*e)/(4*x^2) + (5*b*c^3*e)/(12*x) + (b*c^2*e*ArcCoth[c*x])/(4*x^2) - (
b*c^4*e*ArcCoth[c*x]^2)/4 - (b*c^4*e*ArcTanh[c*x])/4 - (b*c^4*e*ArcTanh[c*x
]^2)/4 - (a*c^4*e*Log[x])/2 + (b*c^4*e*ArcTanh[c*x]*Log[2/(1 - c*x)])/2 + (
(3*a + 4*b)*c^4*e*Log[1 - c*x])/12 + ((3*a - 4*b)*c^4*e*Log[1 + c*x])/12 -
(b*c*(d + e*Log[1 - c^2*x^2]))/(12*x^3) - (b*c^3*(d + e*Log[1 - c^2*x^2]))/
(4*x) - ((a + b*ArcCoth[c*x])*(d + e*Log[1 - c^2*x^2]))/(4*x^4) + (b*c^4*Ar
cTanh[c*x]*(d + e*Log[1 - c^2*x^2]))/4 - (b*c^4*e*ArcCoth[c*x]*Log[2 - 2/(1
 + c*x)])/2 + (b*c^4*e*PolyLog[2, 1 - 2/(1 - c*x)])/4 + (b*c^4*e*PolyLog[2,
 -1 + 2/(1 + c*x)])/4
```

Rule 206

```
Int[((a_) + (b_.)*(x_)^2)^(-1), x_Symbol] :> Simp[(1*ArcTanh[(Rt[-b, 2]*x)/
Rt[a, 2]])/(Rt[a, 2]*Rt[-b, 2]), x] /; FreeQ[{a, b}, x] && NegQ[a/b] && (Gt
Q[a, 0] || LtQ[b, 0])
```

Rule 325

```
Int[((c_.)*(x_))^(m_)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Simp[((c*
x)^(m + 1)*(a + b*x^n)^(p + 1))/(a*c*(m + 1)), x] - Dist[(b*(m + n*(p + 1)
+ 1))/(a*c^n*(m + 1)), Int[(c*x)^(m + n)*(a + b*x^n)^p, x], x] /; FreeQ[{a,
 b, c, p}, x] && IGtQ[n, 0] && LtQ[m, -1] && IntBinomialQ[a, b, c, n, m, p,
 x]
```

Rule 1802

```
Int[(Pq_)*((c_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^2)^(p_.), x_Symbol] :> Int[
ExpandIntegrand[(c*x)^m*Pq*(a + b*x^2)^p, x], x] /; FreeQ[{a, b, c, m}, x]
&& PolyQ[Pq, x] && IGtQ[p, -2]
```

Rule 2315

```
Int[Log[(c_.)*(x_)]/((d_) + (e_.)*(x_)), x_Symbol] :> -Simp[PolyLog[2, 1 -
c*x]/e, x] /; FreeQ[{c, d, e}, x] && EqQ[e + c*d, 0]
```

Rule 2402

```
Int[Log[(c_.)/((d_) + (e_.)*(x_))]/((f_) + (g_.)*(x_)^2), x_Symbol] :> -Dis
t[e/g, Subst[Int[Log[2*d*x]/(1 - 2*d*x), x], x, 1/(d + e*x)], x] /; FreeQ[{
c, d, e, f, g}, x] && EqQ[c, 2*d] && EqQ[e^2*f + d^2*g, 0]
```

Rule 2447

```
Int[Log[u_]*(Pq_)^(m_.), x_Symbol] :> With[{C = FullSimplify[(Pq^m*(1 - u))
/D[u, x]]}, Simp[C*PolyLog[2, 1 - u], x] /; FreeQ[C, x]] /; IntegerQ[m] &&
PolyQ[Pq, x] && RationalFunctionQ[u, x] && LeQ[RationalFunctionExponents[u,
 x][[2]], Expon[Pq, x]]
```

Rule 5917

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)*((d_.)*(x_))^(m_.), x_Symbol]
 :> Simp[((d*x)^(m + 1)*(a + b*ArcCoth[c*x])^p)/(d*(m + 1)), x] - Dist[(b*c
*p)/(d*(m + 1)), Int[((d*x)^(m + 1)*(a + b*ArcCoth[c*x])^(p - 1))/(1 - c^2*
x^2), x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[p, 0] && (EqQ[p, 1] || In
tegerQ[m]) && NeQ[m, -1]
```

Rule 5918

```
Int[((a_.) + ArcTanh[(c_.)*(x_)]*(b_.))^(p_.)/((d_) + (e_.)*(x_)), x_Symbol
] :> -Simp[((a + b*ArcTanh[c*x])^p*Log[2/(1 + (e*x)/d)])/e, x] + Dist[(b*c*
p)/e, Int[((a + b*ArcTanh[c*x])^(p - 1)*Log[2/(1 + (e*x)/d)])/(1 - c^2*x^2)
, x], x] /; FreeQ[{a, b, c, d, e}, x] && IGtQ[p, 0] && EqQ[c^2*d^2 - e^2, 0
]
```

Rule 5933

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)/((x_)*((d_) + (e_.)*(x_))), x
_Symbol] :> Simp[((a + b*ArcCoth[c*x])^p*Log[2 - 2/(1 + (e*x)/d)])/d, x] -
Dist[(b*c*p)/d, Int[((a + b*ArcCoth[c*x])^(p - 1)*Log[2 - 2/(1 + (e*x)/d)])
/(1 - c^2*x^2), x], x] /; FreeQ[{a, b, c, d, e}, x] && IGtQ[p, 0] && EqQ[c^
2*d^2 - e^2, 0]
```

Rule 5983

```
Int[(((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)*((f_.)*(x_))^(m_))/((d_) + (
e_.)*(x_)^2), x_Symbol] :> Dist[1/d, Int[(f*x)^m*(a + b*ArcCoth[c*x])^p, x]
, x] - Dist[e/(d*f^2), Int[((f*x)^(m + 2)*(a + b*ArcCoth[c*x])^p)/(d + e*x^
2), x], x] /; FreeQ[{a, b, c, d, e, f}, x] && GtQ[p, 0] && LtQ[m, -1]
```

Rule 5984

```
Int[(((a_.) + ArcTanh[(c_.)*(x_)]*(b_.))^(p_.)*(x_))/((d_) + (e_.)*(x_)^2),
 x_Symbol] :> Simp[(a + b*ArcTanh[c*x])^(p + 1)/(b*e*(p + 1)), x] + Dist[1/
(c*d), Int[(a + b*ArcTanh[c*x])^p/(1 - c*x), x], x] /; FreeQ[{a, b, c, d, e
}, x] && EqQ[c^2*d + e, 0] && IGtQ[p, 0]
```

Rule 5989

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)/((x_)*((d_) + (e_.)*(x_)^2)),
 x_Symbol] :> Simp[(a + b*ArcCoth[c*x])^(p + 1)/(b*d*(p + 1)), x] + Dist[1/
d, Int[(a + b*ArcCoth[c*x])^p/(x*(1 + c*x)), x], x] /; FreeQ[{a, b, c, d, e
```

```
}, x] && EqQ[c^2*d + e, 0] && GtQ[p, 0]
```

Rule 6086

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))*((d_.) + Log[(f_.) + (g_.)*(x_)^2]*
(e_.))*(x_)^(m_.), x_Symbol] :> With[{u = IntHide[x^m*(a + b*ArcCoth[c*x]),
 x]}, Dist[d + e*Log[f + g*x^2], u, x] - Dist[2*e*g, Int[ExpandIntegrand[(x
*u)/(f + g*x^2), x], x], x]] /; FreeQ[{a, b, c, d, e, f, g}, x] && IntegerQ
[m] && NeQ[m, -1]
```

Rule 6725

```
Int[(u_)/((a_) + (b_.)*(x_)^(n_)), x_Symbol] :> With[{v = RationalFunctionE
xpand[u/(a + b*x^n), x]}, Int[v, x] /; SumQ[v]] /; FreeQ[{a, b}, x] && IGtQ
[n, 0]
```

Rubi steps

$$\int \frac{\left(a+b\coth^{-1}(cx)\right)\left(d+e\log\left(1-c^2x^2\right)\right)}{x^5}\,dx = -\frac{bc\left(d+e\log\left(1-c^2x^2\right)\right)}{12x^3}-\frac{bc^3\left(d+e\log\left(1-c^2x^2\right)\right)}{4x}-\frac{(a+$$

$$= -\frac{bc\left(d+e\log\left(1-c^2x^2\right)\right)}{12x^3}-\frac{bc^3\left(d+e\log\left(1-c^2x^2\right)\right)}{4x}-\frac{(a+$$

$$= -\frac{1}{4}bc^4e\tanh^{-1}(cx)^2-\frac{bc\left(d+e\log\left(1-c^2x^2\right)\right)}{12x^3}-\frac{bc^3\left(d+e\,\mathrm{l}\right.}{}$$

$$= -\frac{1}{4}bc^4e\tanh^{-1}(cx)^2+\frac{1}{2}bc^4e\tanh^{-1}(cx)\log\left(\frac{2}{1-cx}\right)-\frac{bc\left(d\right.}{}$$

$$= -\frac{1}{4}bc^4e\tanh^{-1}(cx)^2+\frac{1}{2}bc^4e\tanh^{-1}(cx)\log\left(\frac{2}{1-cx}\right)-\frac{bc\left(d\right.}{}$$

$$= \frac{ac^2e}{4x^2}+\frac{bc^3e}{6x}+\frac{bc^2e\coth^{-1}(cx)}{4x^2}-\frac{1}{4}bc^4e\coth^{-1}(cx)^2-\frac{1}{4}bc^4e$$

$$= \frac{ac^2e}{4x^2}+\frac{5bc^3e}{12x}+\frac{bc^2e\coth^{-1}(cx)}{4x^2}-\frac{1}{4}bc^4e\coth^{-1}(cx)^2-\frac{1}{4}bc^4$$

$$= \frac{ac^2e}{4x^2}+\frac{5bc^3e}{12x}+\frac{bc^2e\coth^{-1}(cx)}{4x^2}-\frac{1}{4}bc^4e\coth^{-1}(cx)^2-\frac{1}{4}bc^4$$

**Mathematica [A]** time = 0.15, size = 307, normalized size = 0.91

$$\frac{1}{12}\log(1-cx)\left(3ac^4e+4bc^4e\right)+\frac{1}{12}\log(cx+1)\left(3ac^4e-4bc^4e\right)+\frac{e\log\left(1-c^2x^2\right)\left(-3a+3bc^4x^4\coth^{-1}(cx)-3bc\right.}{12x^4}$$

Warning: Unable to verify antiderivative.

```
[In] Integrate[((a + b*ArcCoth[c*x])*(d + e*Log[1 - c^2*x^2]))/x^5,x]
```

```
[Out] -1/4*(a*d)/x^4 + (a*c^2*e)/(4*x^2) + (b*c^3*e)/(6*x) - (a*c^4*e*Log[x])/2 +
 ((3*a*c^4*e + 4*b*c^4*e)*Log[1 - c*x])/12 - (b*c^4*e*(-1/2*ArcCoth[c*x]/(c
^2*x^2) + (-(1/(c*x)) - Log[1 - c*x]/2 + Log[1 + c*x]/2)/2))/2 + b*c^4*d*(-
1/4*ArcCoth[c*x]/(c^4*x^4) + (-1/3*1/(c^3*x^3) - 1/(c*x) - Log[1 - c*x]/2 +
 Log[1 + c*x]/2)/4) + ((3*a*c^4*e - 4*b*c^4*e)*Log[1 + c*x])/12 + (e*(-3*a
```

```
- b*c*x - 3*b*c^3*x^3 - 3*b*ArcCoth[c*x] + 3*b*c^4*x^4*ArcCoth[c*x])*Log[1
- c^2*x^2])/(12*x^4) - (b*c^4*e*(PolyLog[2, -(1/(c*x))] - PolyLog[2, 1/(c*x
)]))/4
```

**fricas [F]** time = 0.51, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{bd\,\text{arcoth}\,(cx)+ad+(be\,\text{arcoth}\,(cx)+ae)\log\left(-c^2x^2+1\right)}{x^5},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccoth(c*x))*(d+e*log(-c^2*x^2+1))/x^5,x, algorithm="fricas
")
```

```
[Out] integral((b*d*arccoth(c*x) + a*d + (b*e*arccoth(c*x) + a*e)*log(-c^2*x^2 +
1))/x^5, x)
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int\frac{(b\,\text{arcoth}\,(cx)+a)\left(e\log\left(-c^2x^2+1\right)+d\right)}{x^5}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccoth(c*x))*(d+e*log(-c^2*x^2+1))/x^5,x, algorithm="giac")
```

```
[Out] integrate((b*arccoth(c*x) + a)*(e*log(-c^2*x^2 + 1) + d)/x^5, x)
```

**maple [F(-2)]** time = 180.00, size = 0, normalized size = 0.00

$$\int\frac{(a+b\,\text{arccoth}\,(cx))\left(d+e\ln\left(-c^2x^2+1\right)\right)}{x^5}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a+b*arccoth(c*x))*(d+e*ln(-c^2*x^2+1))/x^5,x)
```

```
[Out] int((a+b*arccoth(c*x))*(d+e*ln(-c^2*x^2+1))/x^5,x)
```

**maxima [F]** time = 0.00, size = 0, normalized size = 0.00

$$\frac{1}{24}\left(\left(3\,c^3\log\left(cx+1\right)-3\,c^3\log\left(cx-1\right)-\frac{2\left(3\,c^2x^2+1\right)}{x^3}\right)c-\frac{6\,\text{arcoth}\,(cx)}{x^4}\right)bd+\frac{1}{4}\left(\left(c^2\log\left(c^2x^2-1\right)-c^2\log\left(x^2\right.\right.\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccoth(c*x))*(d+e*log(-c^2*x^2+1))/x^5,x, algorithm="maxima
")
```

```
[Out] 1/24*((3*c^3*log(c*x + 1) - 3*c^3*log(c*x - 1) - 2*(3*c^2*x^2 + 1)/x^3)*c -
 6*arccoth(c*x)/x^4)*b*d + 1/4*((c^2*log(c^2*x^2 - 1) - c^2*log(x^2) + 1/x^
2)*c^2 - log(-c^2*x^2 + 1)/x^4)*a*e - 1/8*b*e*(log(c*x + 1)^2/x^4 - 4*integ
rate(-1/2*(2*(c*x + 1)*log(c*x - 1)^2 - (2*I*pi + (2*I*pi*c + c)*x)*log(c*x
 + 1) - (-2*I*pi - 2*I*pi*c*x)*log(c*x - 1))/(c*x^6 + x^5), x)) - 1/4*a*d/x
^4
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.00

$$\int\frac{(a+b\,\text{acoth}\,(c\,x))\,\left(d+e\,\ln\left(1-c^2\,x^2\right)\right)}{x^5}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(((a + b*acoth(c*x))*(d + e*log(1 - c^2*x^2)))/x^5,x)
```

```
[Out] int(((a + b*acoth(c*x))*(d + e*log(1 - c^2*x^2)))/x^5, x)
```

**sympy** **[F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{(a+b\operatorname{acoth}(cx))\left(d+e\log\left(-c^2x^2+1\right)\right)}{x^5}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*acoth(c*x))*(d+e*ln(-c**2*x**2+1))/x**5,x)
```

```
[Out] Integral((a + b*acoth(c*x))*(d + e*log(-c**2*x**2 + 1))/x**5, x)
```

# 3.272 $\int x^4 \left(a+b\coth^{-1}(cx)\right)\left(d+e\log\left(1-c^2x^2\right)\right)\,dx$

**Optimal**. Leaf size=315

$$-\frac{e(4a+3b)\log(1-cx)}{20c^5}+\frac{e(4a-3b)\log(cx+1)}{20c^5}+\frac{1}{5}x^5\left(a+b\coth^{-1}(cx)\right)\left(e\log\left(1-c^2x^2\right)+d\right)-\frac{2aex}{5c^4}-\frac{2aex^3}{15c^2}-\frac{2}{25}$$

```
[Out] -2/5*a*e*x/c^4-77/300*b*e*x^2/c^3-2/15*a*e*x^3/c^2-9/200*b*e*x^4/c-2/25*a*e
*x^5-2/5*b*e*x*arccoth(c*x)/c^4-2/15*b*e*x^3*arccoth(c*x)/c^2-2/25*b*e*x^5*
arccoth(c*x)+1/5*b*e*arccoth(c*x)^2/c^5-1/20*(4*a+3*b)*e*ln(-c*x+1)/c^5+1/2
0*(4*a-3*b)*e*ln(c*x+1)/c^5-23/75*b*e*ln(-c^2*x^2+1)/c^5-1/20*b*e*ln(-c^2*x
^2+1)^2/c^5+1/10*b*x^2*(d+e*ln(-c^2*x^2+1))/c^3+1/20*b*x^4*(d+e*ln(-c^2*x^2
+1))/c+1/5*x^5*(a+b*arccoth(c*x))*(d+e*ln(-c^2*x^2+1))+1/10*b*ln(-c^2*x^2+1
)*(d+e*ln(-c^2*x^2+1))/c^5
```

**Rubi [A]** time = 0.75, antiderivative size = 315, normalized size of antiderivative = 1.00, number of steps used = 26, number of rules used = 15, integrand size = 27, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.556, Rules used = {5917, 266, 43, 6086, 6725, 1802, 633, 31, 5981, 5911, 260, 5949, 2475, 2390, 2301}

$$\frac{1}{5}x^5\left(a+b\coth^{-1}(cx)\right)\left(e\log\left(1-c^2x^2\right)+d\right)-\frac{e(4a+3b)\log(1-cx)}{20c^5}+\frac{e(4a-3b)\log(cx+1)}{20c^5}-\frac{2aex^3}{15c^2}-\frac{2aex}{5c^4}-\frac{2}{25}ae$$

Antiderivative was successfully verified.

```
[In] Int[x^4*(a + b*ArcCoth[c*x])*(d + e*Log[1 - c^2*x^2]),x]
```

```
[Out] (-2*a*e*x)/(5*c^4) - (77*b*e*x^2)/(300*c^3) - (2*a*e*x^3)/(15*c^2) - (9*b*e
*x^4)/(200*c) - (2*a*e*x^5)/25 - (2*b*e*x*ArcCoth[c*x])/(5*c^4) - (2*b*e*x^
3*ArcCoth[c*x])/(15*c^2) - (2*b*e*x^5*ArcCoth[c*x])/25 + (b*e*ArcCoth[c*x]^
2)/(5*c^5) - ((4*a + 3*b)*e*Log[1 - c*x])/(20*c^5) + ((4*a - 3*b)*e*Log[1 +
 c*x])/(20*c^5) - (23*b*e*Log[1 - c^2*x^2])/(75*c^5) - (b*e*Log[1 - c^2*x^2
]^2)/(20*c^5) + (b*x^2*(d + e*Log[1 - c^2*x^2]))/(10*c^3) + (b*x^4*(d + e*L
og[1 - c^2*x^2]))/(20*c) + (x^5*(a + b*ArcCoth[c*x])*(d + e*Log[1 - c^2*x^2
]))/5 + (b*Log[1 - c^2*x^2]*(d + e*Log[1 - c^2*x^2]))/(10*c^5)
```

Rule 31

```
Int[((a_) + (b_.)*(x_))^(-1), x_Symbol] :> Simp[Log[RemoveContent[a + b*x,
x]]/b, x] /; FreeQ[{a, b}, x]
```

Rule 43

```
Int[((a_.) + (b_.)*(x_))^(m_.)*((c_.) + (d_.)*(x_))^(n_.), x_Symbol] :> Int
[ExpandIntegrand[(a + b*x)^m*(c + d*x)^n, x], x] /; FreeQ[{a, b, c, d, n},
x] && NeQ[b*c - a*d, 0] && IGtQ[m, 0] && ( !IntegerQ[n] || (EqQ[c, 0] && Le
Q[7*m + 4*n + 4, 0]) || LtQ[9*m + 5*(n + 1), 0] || GtQ[m + n + 2, 0])
```

Rule 260

```
Int[(x_)^(m_.)/((a_) + (b_.)*(x_)^(n_)), x_Symbol] :> Simp[Log[RemoveConten
t[a + b*x^n, x]]/(b*n), x] /; FreeQ[{a, b, m, n}, x] && EqQ[m, n - 1]
```

Rule 266

```
Int[(x_)^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Dist[1/n, Subst[
Int[x^(Simplify[(m + 1)/n] - 1)*(a + b*x)^p, x], x, x^n], x] /; FreeQ[{a, b
, m, n, p}, x] && IntegerQ[Simplify[(m + 1)/n]]
```

Rule 633

```
Int[((d_) + (e_.)*(x_))/((a_) + (c_.)*(x_)^2), x_Symbol] :> With[{q = Rt[-(
a*c), 2]}, Dist[e/2 + (c*d)/(2*q), Int[1/(-q + c*x), x], x] + Dist[e/2 - (c
*d)/(2*q), Int[1/(q + c*x), x], x]] /; FreeQ[{a, c, d, e}, x] && NiceSqrtQ[
-(a*c)]
```

Rule 1802

```
Int[(Pq_)*((c_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^2)^(p_.), x_Symbol] :> Int[
ExpandIntegrand[(c*x)^m*Pq*(a + b*x^2)^p, x], x] /; FreeQ[{a, b, c, m}, x]
&& PolyQ[Pq, x] && IGtQ[p, -2]
```

Rule 2301

```
Int[((a_.) + Log[(c_.)*(x_)^(n_.)]*(b_.))/(x_), x_Symbol] :> Simp[(a + b*Lo
g[c*x^n])^2/(2*b*n), x] /; FreeQ[{a, b, c, n}, x]
```

Rule 2390

```
Int[((a_.) + Log[(c_.)*((d_) + (e_.)*(x_))^(n_.)]*(b_.))^(p_.)*((f_) + (g_.
)*(x_))^(q_.), x_Symbol] :> Dist[1/e, Subst[Int[((f*x)/d)^q*(a + b*Log[c*x^
n])^p, x], x, d + e*x], x] /; FreeQ[{a, b, c, d, e, f, g, n, p, q}, x] && E
qQ[e*f - d*g, 0]
```

Rule 2475

```
Int[((a_.) + Log[(c_.)*((d_) + (e_.)*(x_)^(n_))^(p_.)]*(b_.))^(q_.)*(x_)^(m
_.)*((f_) + (g_.)*(x_)^(s_))^(r_.), x_Symbol] :> Dist[1/n, Subst[Int[x^(Sim
plify[(m + 1)/n] - 1)*(f + g*x^(s/n))^r*(a + b*Log[c*(d + e*x)^p])^q, x], x
, x^n], x] /; FreeQ[{a, b, c, d, e, f, g, m, n, p, q, r, s}, x] && IntegerQ
[r] && IntegerQ[s/n] && IntegerQ[Simplify[(m + 1)/n]] && (GtQ[(m + 1)/n, 0]
 || IGtQ[q, 0])
```

Rule 5911

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.), x_Symbol] :> Simp[x*(a + b*A
rcCoth[c*x])^p, x] - Dist[b*c*p, Int[(x*(a + b*ArcCoth[c*x])^(p - 1))/(1 -
c^2*x^2), x], x] /; FreeQ[{a, b, c}, x] && IGtQ[p, 0]
```

Rule 5917

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)*((d_.)*(x_))^(m_.), x_Symbol]
 :> Simp[((d*x)^(m + 1)*(a + b*ArcCoth[c*x])^p)/(d*(m + 1)), x] - Dist[(b*c
*p)/(d*(m + 1)), Int[((d*x)^(m + 1)*(a + b*ArcCoth[c*x])^(p - 1))/(1 - c^2*
x^2), x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[p, 0] && (EqQ[p, 1] || In
tegerQ[m]) && NeQ[m, -1]
```

Rule 5949

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)/((d_) + (e_.)*(x_)^2), x_Symb
ol] :> Simp[(a + b*ArcCoth[c*x])^(p + 1)/(b*c*d*(p + 1)), x] /; FreeQ[{a, b
, c, d, e, p}, x] && EqQ[c^2*d + e, 0] && NeQ[p, -1]
```

Rule 5981

```
Int[(((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)*((f_.)*(x_))^(m_))/((d_) + (
e_.)*(x_)^2), x_Symbol] :> Dist[f^2/e, Int[(f*x)^(m - 2)*(a + b*ArcCoth[c*x
])^p, x], x] - Dist[(d*f^2)/e, Int[((f*x)^(m - 2)*(a + b*ArcCoth[c*x])^p)/(
d + e*x^2), x], x] /; FreeQ[{a, b, c, d, e, f}, x] && GtQ[p, 0] && GtQ[m, 1
```

```
]
```

Rule 6086

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))*((d_.) + Log[(f_.) + (g_.)*(x_)^2]*
(e_.))*(x_)^(m_.), x_Symbol] :> With[{u = IntHide[x^m*(a + b*ArcCoth[c*x]),
 x]}, Dist[d + e*Log[f + g*x^2], u, x] - Dist[2*e*g, Int[ExpandIntegrand[(x
*u)/(f + g*x^2), x], x], x]] /; FreeQ[{a, b, c, d, e, f, g}, x] && IntegerQ
[m] && NeQ[m, -1]
```

Rule 6725

```
Int[(u_)/((a_) + (b_.)*(x_)^(n_)), x_Symbol] :> With[{v = RationalFunctionE
xpand[u/(a + b*x^n), x]}, Int[v, x] /; SumQ[v]] /; FreeQ[{a, b}, x] && IGtQ
[n, 0]
```

Rubi steps

$$\int x^4 \left(a+b\coth^{-1}(cx)\right)\left(d+e\log\left(1-c^2x^2\right)\right)dx = \frac{bx^2\left(d+e\log\left(1-c^2x^2\right)\right)}{10c^3} + \frac{bx^4\left(d+e\log\left(1-c^2x^2\right)\right)}{20c} + \frac{1}{5}x^5$$

$$= \frac{bx^2\left(d+e\log\left(1-c^2x^2\right)\right)}{10c^3} + \frac{bx^4\left(d+e\log\left(1-c^2x^2\right)\right)}{20c} + \frac{1}{5}x^5$$

$$= \frac{bx^2\left(d+e\log\left(1-c^2x^2\right)\right)}{10c^3} + \frac{bx^4\left(d+e\log\left(1-c^2x^2\right)\right)}{20c} + \frac{1}{5}x^5$$

$$= \frac{bx^2\left(d+e\log\left(1-c^2x^2\right)\right)}{10c^3} + \frac{bx^4\left(d+e\log\left(1-c^2x^2\right)\right)}{20c} + \frac{1}{5}x^5$$

$$= -\frac{be\log^2\left(1-c^2x^2\right)}{20c^5} + \frac{bx^2\left(d+e\log\left(1-c^2x^2\right)\right)}{10c^3} + \frac{bx^4\left(d+e\right.}{}$$

$$= -\frac{2aex}{5c^4} - \frac{3bex^2}{20c^3} - \frac{2aex^3}{15c^2} - \frac{bex^4}{40c} - \frac{2}{25}aex^5 - \frac{2}{25}bex^5\coth^{-1}(c$$

$$= -\frac{2aex}{5c^4} - \frac{3bex^2}{20c^3} - \frac{2aex^3}{15c^2} - \frac{bex^4}{40c} - \frac{2}{25}aex^5 - \frac{2bex^3\coth^{-1}(cx)}{15c^2}$$

$$= -\frac{2aex}{5c^4} - \frac{3bex^2}{20c^3} - \frac{2aex^3}{15c^2} - \frac{bex^4}{40c} - \frac{2}{25}aex^5 - \frac{2bex\coth^{-1}(cx)}{5c^4}$$

$$= -\frac{2aex}{5c^4} - \frac{19bex^2}{100c^3} - \frac{2aex^3}{15c^2} - \frac{9bex^4}{200c} - \frac{2}{25}aex^5 - \frac{2bex\coth^{-1}(c}{5c^4}$$

$$= -\frac{2aex}{5c^4} - \frac{77bex^2}{300c^3} - \frac{2aex^3}{15c^2} - \frac{9bex^4}{200c} - \frac{2}{25}aex^5 - \frac{2bex\coth^{-1}(c}{5c^4}$$

**Mathematica [A]** time = 0.16, size = 236, normalized size = 0.75

$$\frac{30c^2ex^2\log\left(1-c^2x^2\right)\left(4ac^3x^3+4bc^3x^3\coth^{-1}(cx)+b\left(c^2x^2+2\right)\right)+2\log(1-cx)(-60ae+30bd-137be)+2\log}{}$$

Antiderivative was successfully verified.

```
[In] Integrate[x^4*(a + b*ArcCoth[c*x])*(d + e*Log[1 - c^2*x^2]),x]
```

```
[Out] (-240*a*c*e*x + 2*b*c^2*(30*d - 77*e)*x^2 - 80*a*c^3*e*x^3 + 3*b*c^4*(10*d
- 9*e)*x^4 + 24*a*c^5*(5*d - 2*e)*x^5 - 8*b*c*x*(-15*c^4*d*x^4 + 2*e*(15 +
5*c^2*x^2 + 3*c^4*x^4))*ArcCoth[c*x] + 120*b*e*ArcCoth[c*x]^2 + 2*(30*b*d -
 60*a*e - 137*b*e)*Log[1 - c*x] + 2*(30*b*d + 60*a*e - 137*b*e)*Log[1 + c*x
] + 30*c^2*e*x^2*(4*a*c^3*x^3 + b*(2 + c^2*x^2) + 4*b*c^3*x^3*ArcCoth[c*x])
*Log[1 - c^2*x^2] + 30*b*e*Log[1 - c^2*x^2]^2)/(600*c^5)
```

**fricas [A]** time = 0.61, size = 249, normalized size = 0.79

$$-\frac{80\,ac^3ex^3 - 24\left(5\,ac^5d - 2\,ac^5e\right)x^5 - 3\left(10\,bc^4d - 9\,bc^4e\right)x^4 + 240\,acex - 30\,be\log\left(-c^2x^2+1\right)^2 - 30\,be\log\left(\frac{c}{c}\right.}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^4*(a+b*arccoth(c*x))*(d+e*log(-c^2*x^2+1)),x, algorithm="fricas
")
```

```
[Out] -1/600*(80*a*c^3*e*x^3 - 24*(5*a*c^5*d - 2*a*c^5*e)*x^5 - 3*(10*b*c^4*d - 9
*b*c^4*e)*x^4 + 240*a*c*e*x - 30*b*e*log(-c^2*x^2 + 1)^2 - 30*b*e*log((c*x
+ 1)/(c*x - 1))^2 - 2*(30*b*c^2*d - 77*b*c^2*e)*x^2 - 2*(60*a*c^5*e*x^5 + 1
5*b*c^4*e*x^4 + 30*b*c^2*e*x^2 + 30*b*d - 137*b*e)*log(-c^2*x^2 + 1) - 4*(1
5*b*c^5*e*x^5*log(-c^2*x^2 + 1) - 10*b*c^3*e*x^3 + 3*(5*b*c^5*d - 2*b*c^5*e
)*x^5 - 30*b*c*e*x + 30*a*e)*log((c*x + 1)/(c*x - 1)))/c^5
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \left(b\operatorname{arcoth}\left(cx\right) + a\right)\left(e\log\left(-c^2x^2+1\right) + d\right)x^4\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^4*(a+b*arccoth(c*x))*(d+e*log(-c^2*x^2+1)),x, algorithm="giac")
```

```
[Out] integrate((b*arccoth(c*x) + a)*(e*log(-c^2*x^2 + 1) + d)*x^4, x)
```

**maple [C]** time = 4.75, size = 4194, normalized size = 13.31

output too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^4*(a+b*arccoth(c*x))*(d+e*ln(-c^2*x^2+1)),x)
```

```
[Out] -2/5*b*arccoth(c*x)*ln((c*x+1)/(c*x-1)-1)*x^5*e+2/5*b*arccoth(c*x)*ln(2)*x^
5*e-1/10/c*b*ln((c*x+1)/(c*x-1)-1)*x^4*e-1/5/c^3*b*ln((c*x+1)/(c*x-1)-1)*x^
2*e-1/20/c^5*b*e*(4*arccoth(c*x)*x^5*c^5+c^4*x^4+2*c^2*x^2+4*arccoth(c*x)-4
*ln((c*x+1)/(c*x-1)-1)-3)*ln((c*x-1)/(c*x+1))-2/25*a*e*x^5-2/5*b*e*x*arccot
h(c*x)/c^4-2/15*b*e*x^3*arccoth(c*x)/c^2-2/25*b*e*x^5*arccoth(c*x)-2/5*a*e*
x/c^4-77/300*b*e*x^2/c^3-2/15*a*e*x^3/c^2-9/200*b*e*x^4/c+181/600*e/c^5*b+1
/10/c^3*b*x^2*d+1/20/c*b*x^4*d-1/5/c^5*b*d*ln((c*x+1)/(c*x-1)-1)+1/5/c^5*b*
ln((c*x+1)/(c*x-1)-1)^2*e+137/150/c^5*b*e*ln((c*x+1)/(c*x-1)-1)+1/5/c^5*b*a
rccoth(c*x)*d-46/75/c^5*b*arccoth(c*x)*e+1/5*b*arccoth(c*x)*x^5*d+1/5*a*e*x
^5*ln(-c^2*x^2+1)+1/5*a*e/c^5*ln(c*x+1)-1/5*a*e/c^5*ln(c*x-1)+3/40*I/c^5*b*
Pi*e*csgn(I*(c*x+1)/(c*x-1))*csgn(I/((c*x+1)/(c*x-1)-1)^2)*csgn(I*(c*x+1)/(
c*x-1)/((c*x+1)/(c*x-1)-1)^2)+1/10*I/c^5*b*arccoth(c*x)*Pi*e*csgn(I/((c*x+1
)/(c*x-1)-1)^2)*csgn(I*(c*x+1)/(c*x-1)/((c*x+1)/(c*x-1)-1)^2)^2+1/5*I/c^5*b
*arccoth(c*x)*Pi*e*csgn(I/((c*x-1)/(c*x+1))^(1/2))*csgn(I*(c*x+1)/(c*x-1))^
2-1/40*I/c*b*Pi*csgn(I/((c*x-1)/(c*x+1))^(1/2))^2*csgn(I*(c*x+1)/(c*x-1))*x
^4*e-1/20*I/c^3*b*Pi*csgn(I/((c*x-1)/(c*x+1))^(1/2))^2*csgn(I*(c*x+1)/(c*x-
1))*x^2*e+1/40*I/c*b*Pi*csgn(I*((c*x+1)/(c*x-1)-1)^2)*csgn(I*((c*x+1)/(c*x-
1)-1))^2*x^4*e+1/20*I/c^3*b*Pi*csgn(I*((c*x+1)/(c*x-1)-1)^2)*csgn(I*((c*x+1
)/(c*x-1)-1))^2*x^2*e-1/10*I/c^5*b*Pi*ln((c*x+1)/(c*x-1)-1)*e*csgn(I*(c*x+1
```

```
)/(c*x-1))*csgn(I*(c*x+1)/(c*x-1)/((c*x+1)/(c*x-1)-1)^2)^2+1/40*I/c*b*Pi*cs
gn(I*(c*x+1)/(c*x-1)/((c*x+1)/(c*x-1)-1)^2)^2*csgn(I/((c*x+1)/(c*x-1)-1)^2)
*x^4*e+1/20*I/c^3*b*Pi*csgn(I*(c*x+1)/(c*x-1)/((c*x+1)/(c*x-1)-1)^2)^2*csgn
(I/((c*x+1)/(c*x-1)-1)^2)*x^2*e+1/10*I/c^5*b*Pi*ln((c*x+1)/(c*x-1)-1)*e*csg
n(I/((c*x-1)/(c*x+1))^(1/2))^2*csgn(I*(c*x+1)/(c*x-1))+1/10*I/c^5*b*arccoth
(c*x)*Pi*e*csgn(I*(c*x+1)/(c*x-1))*csgn(I*(c*x+1)/(c*x-1)/((c*x+1)/(c*x-1)-
1)^2)^2-1/5*I/c^5*b*arccoth(c*x)*Pi*e*csgn(I*((c*x+1)/(c*x-1)-1))*csgn(I*((
c*x+1)/(c*x-1)-1)^2)^2+1/10*I/c^5*b*arccoth(c*x)*Pi*e*csgn(I*((c*x+1)/(c*x-
1)-1))^2*csgn(I*((c*x+1)/(c*x-1)-1)^2)-1/10*I/c^5*b*arccoth(c*x)*Pi*e*csgn(
I/((c*x-1)/(c*x+1))^(1/2))^2*csgn(I*(c*x+1)/(c*x-1))+1/5*I/c^5*b*Pi*ln((c*x
+1)/(c*x-1)-1)*e*csgn(I*((c*x+1)/(c*x-1)-1))*csgn(I*((c*x+1)/(c*x-1)-1)^2)^
2-1/10*I/c^5*b*Pi*ln((c*x+1)/(c*x-1)-1)*e*csgn(I/((c*x+1)/(c*x-1)-1)^2)*csg
n(I*(c*x+1)/(c*x-1)/((c*x+1)/(c*x-1)-1)^2)^2+1/20*I/c*b*Pi*csgn(I/((c*x-1)/
(c*x+1))^(1/2))*csgn(I*(c*x+1)/(c*x-1))^2*x^4*e+1/5*x^5*a*d-1/20*I/c^3*b*Pi
*csgn(I*(c*x+1)/(c*x-1))*csgn(I*(c*x+1)/(c*x-1)/((c*x+1)/(c*x-1)-1)^2)*csgn
(I/((c*x+1)/(c*x-1)-1)^2)*x^2*e+1/10*I/c^5*b*Pi*ln((c*x+1)/(c*x-1)-1)*e*csg
n(I*(c*x+1)/(c*x-1))*csgn(I/((c*x+1)/(c*x-1)-1)^2)*csgn(I*(c*x+1)/(c*x-1)/(
(c*x+1)/(c*x-1)-1)^2)-1/10*I*b*arccoth(c*x)*Pi*csgn(I*(c*x+1)/(c*x-1))*csgn
(I*(c*x+1)/(c*x-1)/((c*x+1)/(c*x-1)-1)^2)*csgn(I/((c*x+1)/(c*x-1)-1)^2)*x^5
*e-1/10*I/c^5*b*arccoth(c*x)*e*Pi*csgn(I*(c*x+1)/(c*x-1))*csgn(I/((c*x+1)/(
c*x-1)-1)^2)*csgn(I*(c*x+1)/(c*x-1)/((c*x+1)/(c*x-1)-1)^2)-1/40*I/c*b*Pi*cs
gn(I*(c*x+1)/(c*x-1))*csgn(I*(c*x+1)/(c*x-1)/((c*x+1)/(c*x-1)-1)^2)*csgn(I/
((c*x+1)/(c*x-1)-1)^2)*x^4*e-3/10/c^5*b*e*ln(2)-3/20/c^5*b*d+1/10*I/c^3*b*P
i*csgn(I/((c*x-1)/(c*x+1))^(1/2))*csgn(I*(c*x+1)/(c*x-1))^2*x^2*e+1/40*I/c*
b*Pi*csgn(I*(c*x+1)/(c*x-1))*csgn(I*(c*x+1)/(c*x-1)/((c*x+1)/(c*x-1)-1)^2)^
2*x^4*e+1/20*I/c^3*b*Pi*csgn(I*(c*x+1)/(c*x-1))*csgn(I*(c*x+1)/(c*x-1)/((c*
x+1)/(c*x-1)-1)^2)^2*x^2*e-1/20*I/c*b*Pi*csgn(I*((c*x+1)/(c*x-1)-1)^2)^2*cs
gn(I*((c*x+1)/(c*x-1)-1))*x^4*e-1/10*I/c^3*b*Pi*csgn(I*((c*x+1)/(c*x-1)-1)^
2)^2*csgn(I*((c*x+1)/(c*x-1)-1))*x^2*e-1/10*I/c^5*b*Pi*ln((c*x+1)/(c*x-1)-1
)*e*csgn(I*((c*x+1)/(c*x-1)-1))^2*csgn(I*((c*x+1)/(c*x-1)-1)^2)-1/5*I/c^5*b
*Pi*ln((c*x+1)/(c*x-1)-1)*e*csgn(I/((c*x-1)/(c*x+1))^(1/2))*csgn(I*(c*x+1)/
(c*x-1))^2+1/10*I*b*arccoth(c*x)*Pi*csgn(I*(c*x+1)/(c*x-1)/((c*x+1)/(c*x-1)
-1)^2)^2*csgn(I/((c*x+1)/(c*x-1)-1)^2)*x^5*e+1/5*I*b*arccoth(c*x)*Pi*csgn(I
/((c*x-1)/(c*x+1))^(1/2))*csgn(I*(c*x+1)/(c*x-1))^2*x^5*e+1/10*I*b*arccoth(
c*x)*Pi*csgn(I*((c*x+1)/(c*x-1)-1)^2)*csgn(I*((c*x+1)/(c*x-1)-1))^2*x^5*e-1
/10*I*b*arccoth(c*x)*Pi*csgn(I/((c*x-1)/(c*x+1))^(1/2))^2*csgn(I*(c*x+1)/(c
*x-1))*x^5*e+1/10*I*b*arccoth(c*x)*Pi*csgn(I*(c*x+1)/(c*x-1))*csgn(I*(c*x+1
)/(c*x-1)/((c*x+1)/(c*x-1)-1)^2)^2*x^5*e-1/5*I*b*arccoth(c*x)*Pi*csgn(I*((c
*x+1)/(c*x-1)-1)^2)^2*csgn(I*((c*x+1)/(c*x-1)-1))*x^5*e+1/10/c*b*ln(2)*x^4*
e+1/5/c^3*b*ln(2)*x^2*e-2/5/c^5*b*ln((c*x+1)/(c*x-1)-1)*ln(2)*e+2/5/c^5*b*a
rccoth(c*x)*ln(2)*e-3/20*I/c^5*b*Pi*e-1/5*I/c^5*b*Pi*ln((c*x+1)/(c*x-1)-1)*
e+1/20*I/c*b*Pi*x^4*e+1/10*I/c^3*b*Pi*x^2*e+3/40*I/c^5*b*e*Pi*csgn(I*(c*x+1
)/(c*x-1))^3-3/40*I/c^5*b*Pi*e*csgn(I*(c*x+1)/(c*x-1)/((c*x+1)/(c*x-1)-1)^2
)^3+3/20*I/c^5*b*Pi*e*csgn(I*(c*x+1)/(c*x-1)/((c*x+1)/(c*x-1)-1)^2)^2+1/5*I
/c^5*b*Pi*e*arccoth(c*x)-3/40*I/c^5*b*e*Pi*csgn(I*((c*x+1)/(c*x-1)-1)^2)^3+
1/5*I*b*arccoth(c*x)*Pi*x^5*e-3/40*I/c^5*b*e*Pi*csgn(I*((c*x+1)/(c*x-1)-1))
^2*csgn(I*((c*x+1)/(c*x-1)-1)^2)+1/10*I/c^5*b*arccoth(c*x)*Pi*e*csgn(I*((c*
x+1)/(c*x-1)-1)^2)^3-3/20*I/c^5*b*e*Pi*csgn(I/((c*x-1)/(c*x+1))^(1/2))*csgn
(I*(c*x+1)/(c*x-1))^2+1/5*I/c^5*b*Pi*ln((c*x+1)/(c*x-1)-1)*e*csgn(I*(c*x+1)
/(c*x-1)/((c*x+1)/(c*x-1)-1)^2)^2-1/10*I/c^5*b*Pi*ln((c*x+1)/(c*x-1)-1)*e*c
sgn(I*((c*x+1)/(c*x-1)-1)^2)^3-1/10*I/c^5*b*Pi*ln((c*x+1)/(c*x-1)-1)*e*csgn
(I*(c*x+1)/(c*x-1)/((c*x+1)/(c*x-1)-1)^2)^3+1/40*I/c*b*Pi*csgn(I*(c*x+1)/(c
*x-1)/((c*x+1)/(c*x-1)-1)^2)^3*x^4*e+1/20*I/c^3*b*Pi*csgn(I*(c*x+1)/(c*x-1)
/((c*x+1)/(c*x-1)-1)^2)^3*x^2*e-1/20*I/c*b*Pi*csgn(I*(c*x+1)/(c*x-1)/((c*x+
1)/(c*x-1)-1)^2)^2*x^4*e-1/10*I/c^3*b*Pi*csgn(I*(c*x+1)/(c*x-1)/((c*x+1)/(c
*x-1)-1)^2)^2*x^2*e+1/40*I/c*b*Pi*csgn(I*((c*x+1)/(c*x-1)-1)^2)^3*x^4*e+1/2
0*I/c^3*b*Pi*csgn(I*((c*x+1)/(c*x-1)-1)^2)^3*x^2*e-1/40*I/c*b*Pi*csgn(I*(c*
x+1)/(c*x-1))^3*x^4*e-1/20*I/c^3*b*Pi*csgn(I*(c*x+1)/(c*x-1))^3*x^2*e+1/10*
I*b*arccoth(c*x)*Pi*csgn(I*((c*x+1)/(c*x-1)-1)^2)^3*x^5*e-1/10*I*b*arccoth(
```

```
c*x)*Pi*csgn(I*(c*x+1)/(c*x-1))^3*x^5*e+1/10*I*b*arccoth(c*x)*Pi*csgn(I*(c*
x+1)/(c*x-1)/((c*x+1)/(c*x-1)-1)^2)^3*x^5*e-1/5*I*b*arccoth(c*x)*Pi*csgn(I*
(c*x+1)/(c*x-1)/((c*x+1)/(c*x-1)-1)^2)^2*x^5*e+1/10*I/c^5*b*Pi*ln((c*x+1)/(
c*x-1)-1)*e*csgn(I*(c*x+1)/(c*x-1))^3-3/40*I/c^5*b*e*Pi*csgn(I*(c*x+1)/(c*x
-1))*csgn(I*(c*x+1)/(c*x-1)/((c*x+1)/(c*x-1)-1)^2)^2+3/20*I/c^5*b*Pi*e*csgn
(I*((c*x+1)/(c*x-1)-1))*csgn(I*((c*x+1)/(c*x-1)-1)^2)^2-1/5*I/c^5*b*arccoth
(c*x)*Pi*e*csgn(I*(c*x+1)/(c*x-1)/((c*x+1)/(c*x-1)-1)^2)^2-3/40*I/c^5*b*Pi*
e*csgn(I/((c*x+1)/(c*x-1)-1)^2)*csgn(I*(c*x+1)/(c*x-1)/((c*x+1)/(c*x-1)-1)^
2)^2-1/10*I/c^5*b*arccoth(c*x)*Pi*e*csgn(I*(c*x+1)/(c*x-1))^3+1/10*I/c^5*b*
arccoth(c*x)*Pi*e*csgn(I*(c*x+1)/(c*x-1)/((c*x+1)/(c*x-1)-1)^2)^3+3/40*I/c^
5*b*e*Pi*csgn(I/((c*x-1)/(c*x+1))^(1/2))^2*csgn(I*(c*x+1)/(c*x-1))
```

**maxima [C]** time = 0.34, size = 314, normalized size = 1.00

$$\frac{1}{5}adx^5+\frac{1}{75}\left(15x^5\log\left(-c^2x^2+1\right)-c^2\left(\frac{2\left(3c^4x^5+5c^2x^3+15x\right)}{c^6}-\frac{15\log(cx+1)}{c^7}+\frac{15\log(cx-1)}{c^7}\right)\right)be\,\mathrm{arc}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^4*(a+b*arccoth(c*x))*(d+e*log(-c^2*x^2+1)),x, algorithm="maxima
")
```

```
[Out] 1/5*a*d*x^5 + 1/75*(15*x^5*log(-c^2*x^2 + 1) - c^2*(2*(3*c^4*x^5 + 5*c^2*x^
3 + 15*x)/c^6 - 15*log(c*x + 1)/c^7 + 15*log(c*x - 1)/c^7))*b*e*arccoth(c*x
) + 1/20*(4*x^5*arccoth(c*x) + c*((c^2*x^4 + 2*x^2)/c^4 + 2*log(c^2*x^2 - 1
)/c^6))*b*d + 1/75*(15*x^5*log(-c^2*x^2 + 1) - c^2*(2*(3*c^4*x^5 + 5*c^2*x^
3 + 15*x)/c^6 - 15*log(c*x + 1)/c^7 + 15*log(c*x - 1)/c^7))*a*e + 1/600*((3
0*I*pi*c^4 - 27*c^4)*x^4 + (60*I*pi*c^2 - 154*c^2)*x^2 + (60*I*pi + 30*c^4*
x^4 + 60*c^2*x^2 + 120*log(c*x - 1) - 274)*log(c*x + 1) - 2*(-30*I*pi - 15*
c^4*x^4 - 30*c^2*x^2 + 137)*log(c*x - 1))*b*e/c^5
```

**mupad [B]** time = 2.34, size = 497, normalized size = 1.58

$$\ln\left(\frac{1}{c\,x}+1\right)\left(\frac{b\,d\,x^5}{10}-\frac{\frac{2\,b\,e\,c^5\,x^5}{5}+\frac{2\,b\,e\,c^3\,x^3}{3}+2\,b\,e\,c\,x}{10\,c^5}+\frac{b\,e\,x^5\,\ln\left(1-c^2\,x^2\right)}{10}\right)+\ln\left(1-\frac{1}{c\,x}\right)\left(\frac{\frac{b\,d\,x^6}{5}-\frac{b\,c^2\,d\,x^8}{5}}{2\,\left(c\,x^2+x\right)\,\left(c\,x-1\right)}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^4*(a + b*acoth(c*x))*(d + e*log(1 - c^2*x^2)),x)
```

```
[Out] log(1/(c*x) + 1)*((b*d*x^5)/10 - (2*b*c*e*x + (2*b*c^3*e*x^3)/3 + (2*b*c^5*
e*x^5)/5)/(10*c^5) + (b*e*x^5*log(1 - c^2*x^2))/10) + log(1 - 1/(c*x))*(((b
*d*x^6)/5 - (b*c^2*d*x^8)/5)/(2*(x + c*x^2)*(c*x - 1)) + ((4*b*e*x^6)/75 +
(4*b*e*x^4)/(15*c^2) - (2*b*e*x^2)/(5*c^4) + (2*b*c^2*e*x^8)/25)/(2*(x + c*
x^2)*(c*x - 1)) + (log(1 - c^2*x^2)*((b*e*x^6)/5 - (b*c^2*e*x^8)/5))/(2*(x
+ c*x^2)*(c*x - 1)) - (b*e*log(1/(c*x) + 1))/(10*c^5)) + x^3*((a*(5*d - 2*e
))/(15*c^2) - (a*d)/(3*c^2)) + x^2*((b*(10*d - 9*e))/(100*c^3) - (b*e)/(6*c
^3)) + (x*((a*(5*d - 2*e))/(5*c^2) - (a*d)/c^2))/c^2 + (a*x^5*(5*d - 2*e))/
25 + c^2*log(1 - c^2*x^2)*((a*e*x^5)/(5*c^2) + (b*e*x^4)/(20*c^3) + (b*e*x^
2)/(10*c^5)) - (log(c*x - 1)*(60*a*e - 30*b*d + 137*b*e))/(300*c^5) + (log(
c*x + 1)*(60*a*e + 30*b*d - 137*b*e))/(300*c^5) + (b*e*log(1/(c*x) + 1)^2)/
(20*c^5) + (b*e*log(1 - 1/(c*x))^2)/(20*c^5) + (b*e*log(1 - c^2*x^2)^2)/(20
*c^5) + (b*x^4*(10*d - 9*e))/(200*c)
```

**sympy [A]** time = 15.30, size = 345, normalized size = 1.10

$$\begin{cases}\frac{adx^5}{5}+\frac{aex^5\log\left(-c^2x^2+1\right)}{5}-\frac{2aex^5}{25}-\frac{2aex^3}{15c^2}-\frac{2aex}{5c^4}+\frac{2ae\,\mathrm{acoth}\,(cx)}{5c^5}+\frac{bdx^5\,\mathrm{acoth}\,(cx)}{5}+\frac{bex^5\log\left(-c^2x^2+1\right)\mathrm{acoth}\,(cx)}{5}-\frac{2bex^5\,\mathrm{acoth}}{25}\\ \frac{dx^5\left(a+\frac{i\pi b}{2}\right)}{5}\end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**4*(a+b*acoth(c*x))*(d+e*ln(-c**2*x**2+1)),x)
```

```
[Out] Piecewise((a*d*x**5/5 + a*e*x**5*log(-c**2*x**2 + 1)/5 - 2*a*e*x**5/25 - 2*
a*e*x**3/(15*c**2) - 2*a*e*x/(5*c**4) + 2*a*e*acoth(c*x)/(5*c**5) + b*d*x**
5*acoth(c*x)/5 + b*e*x**5*log(-c**2*x**2 + 1)*acoth(c*x)/5 - 2*b*e*x**5*aco
th(c*x)/25 + b*d*x**4/(20*c) + b*e*x**4*log(-c**2*x**2 + 1)/(20*c) - 9*b*e*
x**4/(200*c) - 2*b*e*x**3*acoth(c*x)/(15*c**2) + b*d*x**2/(10*c**3) + b*e*x
**2*log(-c**2*x**2 + 1)/(10*c**3) - 77*b*e*x**2/(300*c**3) - 2*b*e*x*acoth(
c*x)/(5*c**4) + b*d*log(-c**2*x**2 + 1)/(10*c**5) + b*e*log(-c**2*x**2 + 1)
**2/(20*c**5) - 137*b*e*log(-c**2*x**2 + 1)/(300*c**5) + b*e*acoth(c*x)**2/
(5*c**5), Ne(c, 0)), (d*x**5*(a + I*pi*b/2)/5, True))
```

# 3.273 $\int x^2 \left(a+b\coth^{-1}(cx)\right)\left(d+e\log\left(1-c^2x^2\right)\right)\,dx$

**Optimal**. Leaf size=247

$$-\frac{e(2a+b)\log(1-cx)}{6c^3}+\frac{e(2a-b)\log(cx+1)}{6c^3}+\frac{1}{3}x^3\left(a+b\coth^{-1}(cx)\right)\left(e\log\left(1-c^2x^2\right)+d\right)-\frac{2aex}{3c^2}-\frac{2}{9}aex^3+\frac{be}{}$$

```
[Out] -2/3*a*e*x/c^2-5/18*b*e*x^2/c-2/9*a*e*x^3-2/3*b*e*x*arccoth(c*x)/c^2-2/9*b*
e*x^3*arccoth(c*x)+1/3*b*e*arccoth(c*x)^2/c^3-1/6*(2*a+b)*e*ln(-c*x+1)/c^3+
1/6*(2*a-b)*e*ln(c*x+1)/c^3-4/9*b*e*ln(-c^2*x^2+1)/c^3-1/12*b*e*ln(-c^2*x^2
+1)^2/c^3+1/6*b*x^2*(d+e*ln(-c^2*x^2+1))/c+1/3*x^3*(a+b*arccoth(c*x))*(d+e*
ln(-c^2*x^2+1))+1/6*b*ln(-c^2*x^2+1)*(d+e*ln(-c^2*x^2+1))/c^3
```

**Rubi [A]** time = 0.62, antiderivative size = 247, normalized size of antiderivative = 1.00, number of steps used = 21, number of rules used = 15, integrand size = 27, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.556, Rules used = {5917, 266, 43, 6086, 6725, 801, 633, 31, 5981, 5911, 260, 5949, 2475, 2390, 2301}

$$\frac{1}{3}x^3\left(a+b\coth^{-1}(cx)\right)\left(e\log\left(1-c^2x^2\right)+d\right)-\frac{e(2a+b)\log(1-cx)}{6c^3}+\frac{e(2a-b)\log(cx+1)}{6c^3}-\frac{2aex}{3c^2}-\frac{2}{9}aex^3+\frac{bx^2}{}$$

Antiderivative was successfully verified.

```
[In] Int[x^2*(a + b*ArcCoth[c*x])*(d + e*Log[1 - c^2*x^2]),x]
```

```
[Out] (-2*a*e*x)/(3*c^2) - (5*b*e*x^2)/(18*c) - (2*a*e*x^3)/9 - (2*b*e*x*ArcCoth[
c*x])/(3*c^2) - (2*b*e*x^3*ArcCoth[c*x])/9 + (b*e*ArcCoth[c*x]^2)/(3*c^3) -
 ((2*a + b)*e*Log[1 - c*x])/(6*c^3) + ((2*a - b)*e*Log[1 + c*x])/(6*c^3) -
(4*b*e*Log[1 - c^2*x^2])/(9*c^3) - (b*e*Log[1 - c^2*x^2]^2)/(12*c^3) + (b*x
^2*(d + e*Log[1 - c^2*x^2]))/(6*c) + (x^3*(a + b*ArcCoth[c*x])*(d + e*Log[1
 - c^2*x^2]))/3 + (b*Log[1 - c^2*x^2]*(d + e*Log[1 - c^2*x^2]))/(6*c^3)
```

Rule 31

```
Int[((a_) + (b_.)*(x_))^(-1), x_Symbol] :> Simp[Log[RemoveContent[a + b*x,
x]]/b, x] /; FreeQ[{a, b}, x]
```

Rule 43

```
Int[((a_.) + (b_.)*(x_))^(m_.)*((c_.) + (d_.)*(x_))^(n_.), x_Symbol] :> Int
[ExpandIntegrand[(a + b*x)^m*(c + d*x)^n, x], x] /; FreeQ[{a, b, c, d, n},
x] && NeQ[b*c - a*d, 0] && IGtQ[m, 0] && ( !IntegerQ[n] || (EqQ[c, 0] && Le
Q[7*m + 4*n + 4, 0]) || LtQ[9*m + 5*(n + 1), 0] || GtQ[m + n + 2, 0])
```

Rule 260

```
Int[(x_)^(m_.)/((a_) + (b_.)*(x_)^(n_)), x_Symbol] :> Simp[Log[RemoveConten
t[a + b*x^n, x]]/(b*n), x] /; FreeQ[{a, b, m, n}, x] && EqQ[m, n - 1]
```

Rule 266

```
Int[(x_)^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Dist[1/n, Subst[
Int[x^(Simplify[(m + 1)/n] - 1)*(a + b*x)^p, x], x, x^n], x] /; FreeQ[{a, b
, m, n, p}, x] && IntegerQ[Simplify[(m + 1)/n]]
```

Rule 633

```
Int[((d_) + (e_.)*(x_))/((a_) + (c_.)*(x_)^2), x_Symbol] :> With[{q = Rt[-(
a*c), 2]}, Dist[e/2 + (c*d)/(2*q), Int[1/(-q + c*x), x], x] + Dist[e/2 - (c
*d)/(2*q), Int[1/(q + c*x), x], x]] /; FreeQ[{a, c, d, e}, x] && NiceSqrtQ[
```

```
-(a*c)]
```

Rule 801

```
Int[(((d_.) + (e_.)*(x_))^(m_)*((f_.) + (g_.)*(x_)))/((a_) + (c_.)*(x_)^2),
 x_Symbol] :> Int[ExpandIntegrand[((d + e*x)^m*(f + g*x))/(a + c*x^2), x],
x] /; FreeQ[{a, c, d, e, f, g}, x] && NeQ[c*d^2 + a*e^2, 0] && IntegerQ[m]
```

Rule 2301

```
Int[((a_.) + Log[(c_.)*(x_)^(n_.)]*(b_.))/(x_), x_Symbol] :> Simp[(a + b*Lo
g[c*x^n])^2/(2*b*n), x] /; FreeQ[{a, b, c, n}, x]
```

Rule 2390

```
Int[((a_.) + Log[(c_.)*((d_) + (e_.)*(x_))^(n_.)]*(b_.))^(p_.)*((f_) + (g_.
)*(x_))^(q_.), x_Symbol] :> Dist[1/e, Subst[Int[((f*x)/d)^q*(a + b*Log[c*x^
n])^p, x], x, d + e*x], x] /; FreeQ[{a, b, c, d, e, f, g, n, p, q}, x] && E
qQ[e*f - d*g, 0]
```

Rule 2475

```
Int[((a_.) + Log[(c_.)*((d_) + (e_.)*(x_)^(n_))^(p_.)]*(b_.))^(q_.)*(x_)^(m
_.)*((f_) + (g_.)*(x_)^(s_))^(r_.), x_Symbol] :> Dist[1/n, Subst[Int[x^(Sim
plify[(m + 1)/n] - 1)*(f + g*x^(s/n))^r*(a + b*Log[c*(d + e*x)^p])^q, x], x
, x^n], x] /; FreeQ[{a, b, c, d, e, f, g, m, n, p, q, r, s}, x] && IntegerQ
[r] && IntegerQ[s/n] && IntegerQ[Simplify[(m + 1)/n]] && (GtQ[(m + 1)/n, 0]
 || IGtQ[q, 0])
```

Rule 5911

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.), x_Symbol] :> Simp[x*(a + b*A
rcCoth[c*x])^p, x] - Dist[b*c*p, Int[(x*(a + b*ArcCoth[c*x])^(p - 1))/(1 -
c^2*x^2), x], x] /; FreeQ[{a, b, c}, x] && IGtQ[p, 0]
```

Rule 5917

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)*((d_.)*(x_))^(m_.), x_Symbol]
 :> Simp[((d*x)^(m + 1)*(a + b*ArcCoth[c*x])^p)/(d*(m + 1)), x] - Dist[(b*c
*p)/(d*(m + 1)), Int[((d*x)^(m + 1)*(a + b*ArcCoth[c*x])^(p - 1))/(1 - c^2*
x^2), x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[p, 0] && (EqQ[p, 1] || In
tegerQ[m]) && NeQ[m, -1]
```

Rule 5949

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)/((d_) + (e_.)*(x_)^2), x_Symb
ol] :> Simp[(a + b*ArcCoth[c*x])^(p + 1)/(b*c*d*(p + 1)), x] /; FreeQ[{a, b
, c, d, e, p}, x] && EqQ[c^2*d + e, 0] && NeQ[p, -1]
```

Rule 5981

```
Int[(((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)*((f_.)*(x_))^(m_))/((d_) + (
e_.)*(x_)^2), x_Symbol] :> Dist[f^2/e, Int[(f*x)^(m - 2)*(a + b*ArcCoth[c*x
])^p, x], x] - Dist[(d*f^2)/e, Int[((f*x)^(m - 2)*(a + b*ArcCoth[c*x])^p)/(
d + e*x^2), x], x] /; FreeQ[{a, b, c, d, e, f}, x] && GtQ[p, 0] && GtQ[m, 1
]
```

Rule 6086

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))*((d_.) + Log[(f_.) + (g_.)*(x_)^2]*
(e_.))*(x_)^(m_.), x_Symbol] :> With[{u = IntHide[x^m*(a + b*ArcCoth[c*x]),
 x]}, Dist[d + e*Log[f + g*x^2], u, x] - Dist[2*e*g, Int[ExpandIntegrand[(x
*u)/(f + g*x^2), x], x], x]] /; FreeQ[{a, b, c, d, e, f, g}, x] && IntegerQ
[m] && NeQ[m, -1]
```

Rule 6725

```
Int[(u_)/((a_) + (b_.)*(x_)^(n_)), x_Symbol] :> With[{v = RationalFunctionE
xpand[u/(a + b*x^n), x]}, Int[v, x] /; SumQ[v]] /; FreeQ[{a, b}, x] && IGtQ
[n, 0]
```

Rubi steps

$$\int x^2 \left(a+b\coth^{-1}(cx)\right)\left(d+e\log\left(1-c^2x^2\right)\right)dx = \frac{bx^2\left(d+e\log\left(1-c^2x^2\right)\right)}{6c} + \frac{1}{3}x^3\left(a+b\coth^{-1}(cx)\right)\left(d+e\right.$$

$$= \frac{bx^2\left(d+e\log\left(1-c^2x^2\right)\right)}{6c} + \frac{1}{3}x^3\left(a+b\coth^{-1}(cx)\right)\left(d+e\right.$$

$$= \frac{bx^2\left(d+e\log\left(1-c^2x^2\right)\right)}{6c} + \frac{1}{3}x^3\left(a+b\coth^{-1}(cx)\right)\left(d+e\right.$$

$$= \frac{bx^2\left(d+e\log\left(1-c^2x^2\right)\right)}{6c} + \frac{1}{3}x^3\left(a+b\coth^{-1}(cx)\right)\left(d+e\right.$$

$$= -\frac{be\log^2\left(1-c^2x^2\right)}{12c^3} + \frac{bx^2\left(d+e\log\left(1-c^2x^2\right)\right)}{6c} + \frac{1}{3}x^3\left(a\right.$$

$$= -\frac{2aex}{3c^2} - \frac{bex^2}{6c} - \frac{2}{9}aex^3 - \frac{2}{9}bex^3\coth^{-1}(cx) - \frac{be\log^2\left(1-\right.}{12c^3}$$

$$= -\frac{2aex}{3c^2} - \frac{bex^2}{6c} - \frac{2}{9}aex^3 - \frac{2bex\coth^{-1}(cx)}{3c^2} - \frac{2}{9}bex^3\coth^{-1}$$

$$= -\frac{2aex}{3c^2} - \frac{bex^2}{6c} - \frac{2}{9}aex^3 - \frac{2bex\coth^{-1}(cx)}{3c^2} - \frac{2}{9}bex^3\coth^{-1}$$

$$= -\frac{2aex}{3c^2} - \frac{5bex^2}{18c} - \frac{2}{9}aex^3 - \frac{2bex\coth^{-1}(cx)}{3c^2} - \frac{2}{9}bex^3\coth^{-}$$

**Mathematica [A]** time = 0.13, size = 183, normalized size = 0.74

$$\frac{6c^2ex^2\log\left(1-c^2x^2\right)\left(2acx+2bcx\coth^{-1}(cx)+b\right)+2\log(1-cx)(-6ae+3bd-11be)+2\log(cx+1)(6ae+3}{}$$

Antiderivative was successfully verified.

```
[In] Integrate[x^2*(a + b*ArcCoth[c*x])*(d + e*Log[1 - c^2*x^2]),x]
```

```
[Out] (-24*a*c*e*x + 2*b*c^2*(3*d - 5*e)*x^2 + 4*a*c^3*(3*d - 2*e)*x^3 + 4*b*c*x*
(3*c^2*d*x^2 - 2*e*(3 + c^2*x^2))*ArcCoth[c*x] + 12*b*e*ArcCoth[c*x]^2 + 2*
(3*b*d - 6*a*e - 11*b*e)*Log[1 - c*x] + 2*(3*b*d + 6*a*e - 11*b*e)*Log[1 +
c*x] + 6*c^2*e*x^2*(b + 2*a*c*x + 2*b*c*x*ArcCoth[c*x])*Log[1 - c^2*x^2] +
3*b*e*Log[1 - c^2*x^2]^2)/(36*c^3)
```

**fricas** [A] time = 0.48, size = 198, normalized size = 0.80

$$-\frac{24\,acex - 4\left(3\,ac^3d - 2\,ac^3e\right)x^3 - 3\,be\log\left(-c^2x^2+1\right)^2 - 3\,be\log\left(\frac{cx+1}{cx-1}\right)^2 - 2\left(3\,bc^2d - 5\,bc^2e\right)x^2 - 2\left(6\,ac^3ex^3 + \right.}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*(a+b*arccoth(c*x))*(d+e*log(-c^2*x^2+1)),x, algorithm="fricas
")
```

```
[Out] -1/36*(24*a*c*e*x - 4*(3*a*c^3*d - 2*a*c^3*e)*x^3 - 3*b*e*log(-c^2*x^2 + 1)
^2 - 3*b*e*log((c*x + 1)/(c*x - 1))^2 - 2*(3*b*c^2*d - 5*b*c^2*e)*x^2 - 2*(
6*a*c^3*e*x^3 + 3*b*c^2*e*x^2 + 3*b*d - 11*b*e)*log(-c^2*x^2 + 1) - 2*(3*b*
c^3*e*x^3*log(-c^2*x^2 + 1) - 6*b*c*e*x + (3*b*c^3*d - 2*b*c^3*e)*x^3 + 6*a
*e)*log((c*x + 1)/(c*x - 1)))/c^3
```

**giac** [F] time = 0.00, size = 0, normalized size = 0.00

$$\int (b\,\mathrm{arcoth}\,(cx) + a)\left(e\log\left(-c^2x^2+1\right) + d\right)x^2\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*(a+b*arccoth(c*x))*(d+e*log(-c^2*x^2+1)),x, algorithm="giac")
```

```
[Out] integrate((b*arccoth(c*x) + a)*(e*log(-c^2*x^2 + 1) + d)*x^2, x)
```

**maple** [C] time = 3.72, size = 3514, normalized size = 14.23

output too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^2*(a+b*arccoth(c*x))*(d+e*ln(-c^2*x^2+1)),x)
```

```
[Out] -2/3*b*e*x*arccoth(c*x)/c^2-1/6/c^3*b*e*(2*arccoth(c*x)*x^3*c^3+c^2*x^2+2*a
rccoth(c*x)-2*ln((c*x+1)/(c*x-1)-1)-1)*ln((c*x-1)/(c*x+1))-1/3/c^3*b*e*ln(2
)-2/9*a*e*x^3-2/9*b*e*x^3*arccoth(c*x)-1/6/c^3*b*d-2/3*a*e*x/c^2-5/18*b*e*x
^2/c+1/6*b*d*x^2/c+5/18*e/c^3*b+1/3*a*e*x^3*ln(-c^2*x^2+1)+1/3*a*e/c^3*ln(c
*x+1)-1/3*a*e/c^3*ln(c*x-1)-1/6*I/c^3*b*e*Pi+1/3*x^3*a*d+1/6*I/c*b*Pi*x^2*e
+1/12*I/c^3*b*e*Pi*csgn(I*(c*x+1)/(c*x-1))^3-1/12*I/c^3*b*e*Pi*csgn(I*(c*x+
1)/(c*x-1)/((c*x+1)/(c*x-1)-1)^2)^3-1/12*I/c^3*b*Pi*e*csgn(I*((c*x+1)/(c*x-
1)-1)^2)^3+1/6*I/c^3*b*e*Pi*csgn(I*(c*x+1)/(c*x-1)/((c*x+1)/(c*x-1)-1)^2)^2
+1/3*I/c^3*b*Pi*arccoth(c*x)*e-1/3*I/c^3*b*Pi*ln((c*x+1)/(c*x-1)-1)*e+1/3*I
*b*arccoth(c*x)*Pi*x^3*e-1/6*I/c^3*b*Pi*ln((c*x+1)/(c*x-1)-1)*e*csgn(I*((c*
x+1)/(c*x-1)-1))^2*csgn(I*((c*x+1)/(c*x-1)-1)^2)+1/3*I/c^3*b*csgn(I*((c*x+1
)/(c*x-1)-1)^2)^2*csgn(I*((c*x+1)/(c*x-1)-1))*Pi*ln((c*x+1)/(c*x-1)-1)*e+1/
12*I/c^3*b*Pi*e*csgn(I*(c*x+1)/(c*x-1))*csgn(I/((c*x+1)/(c*x-1)-1)^2)*csgn(
I*(c*x+1)/(c*x-1)/((c*x+1)/(c*x-1)-1)^2)+1/3/c^3*b*ln((c*x+1)/(c*x-1)-1)^2*
e+1/3/c^3*b*arccoth(c*x)*d-8/9/c^3*b*arccoth(c*x)*e-1/3/c^3*b*d*ln((c*x+1)/
(c*x-1)-1)+11/9/c^3*b*e*ln((c*x+1)/(c*x-1)-1)+1/3*b*arccoth(c*x)*x^3*d-1/6*
I*b*arccoth(c*x)*Pi*csgn(I*(c*x+1)/(c*x-1))*csgn(I*(c*x+1)/(c*x-1)/((c*x+1)
/(c*x-1)-1)^2)*csgn(I/((c*x+1)/(c*x-1)-1)^2)*x^3*e-1/12*I/c*b*Pi*csgn(I*(c*
x+1)/(c*x-1))*csgn(I*(c*x+1)/(c*x-1)/((c*x+1)/(c*x-1)-1)^2)*csgn(I/((c*x+1)
/(c*x-1)-1)^2)*x^2*e-1/6*I/c^3*b*arccoth(c*x)*e*Pi*csgn(I*(c*x+1)/(c*x-1))*
csgn(I/((c*x+1)/(c*x-1)-1)^2)*csgn(I*(c*x+1)/(c*x-1)/((c*x+1)/(c*x-1)-1)^2)
+1/6*I/c^3*b*Pi*ln((c*x+1)/(c*x-1)-1)*e*csgn(I*(c*x+1)/(c*x-1))*csgn(I/((c*
x+1)/(c*x-1)-1)^2)*csgn(I*(c*x+1)/(c*x-1)/((c*x+1)/(c*x-1)-1)^2)-1/12*I/c*b
*Pi*csgn(I/((c*x-1)/(c*x+1))^(1/2))^2*csgn(I*(c*x+1)/(c*x-1))*x^2*e+1/6*I/c
*b*Pi*csgn(I/((c*x-1)/(c*x+1))^(1/2))*csgn(I*(c*x+1)/(c*x-1))^2*x^2*e-1/6*I
*b*arccoth(c*x)*Pi*csgn(I/((c*x-1)/(c*x+1))^(1/2))^2*csgn(I*(c*x+1)/(c*x-1)
```

```
)*x^3*e+1/3*I*b*arccoth(c*x)*Pi*csgn(I/((c*x-1)/(c*x+1))^(1/2))*csgn(I*(c*x
+1)/(c*x-1))^2*x^3*e+1/6*I*b*arccoth(c*x)*Pi*csgn(I*(c*x+1)/(c*x-1))*csgn(I
*(c*x+1)/(c*x-1)/((c*x+1)/(c*x-1)-1)^2)^2*x^3*e+1/6*I*b*arccoth(c*x)*Pi*csg
n(I*(c*x+1)/(c*x-1)/((c*x+1)/(c*x-1)-1)^2)^2*csgn(I/((c*x+1)/(c*x-1)-1)^2)*
x^3*e+1/6*I*b*arccoth(c*x)*Pi*csgn(I*((c*x+1)/(c*x-1)-1))^2*csgn(I*((c*x+1)
/(c*x-1)-1)^2)*x^3*e-1/3*I*b*arccoth(c*x)*Pi*csgn(I*((c*x+1)/(c*x-1)-1))*cs
gn(I*((c*x+1)/(c*x-1)-1)^2)^2*x^3*e+1/12*I/c*b*Pi*csgn(I*(c*x+1)/(c*x-1))*c
sgn(I*(c*x+1)/(c*x-1)/((c*x+1)/(c*x-1)-1)^2)^2*x^2*e+1/12*I/c*b*Pi*csgn(I*(
c*x+1)/(c*x-1)/((c*x+1)/(c*x-1)-1)^2)^2*csgn(I/((c*x+1)/(c*x-1)-1)^2)*x^2*e
+1/12*I/c*b*Pi*csgn(I*((c*x+1)/(c*x-1)-1))^2*csgn(I*((c*x+1)/(c*x-1)-1)^2)*
x^2*e-1/6*I/c*b*Pi*csgn(I*((c*x+1)/(c*x-1)-1))*csgn(I*((c*x+1)/(c*x-1)-1)^2
)^2*x^2*e-1/6*I/c^3*b*Pi*arccoth(c*x)*e*csgn(I/((c*x-1)/(c*x+1))^(1/2))^2*c
sgn(I*(c*x+1)/(c*x-1))+1/3*I/c^3*b*arccoth(c*x)*e*Pi*csgn(I/((c*x-1)/(c*x+1
))^(1/2))*csgn(I*(c*x+1)/(c*x-1))^2+1/6*I/c^3*b*arccoth(c*x)*e*Pi*csgn(I*(c
*x+1)/(c*x-1))*csgn(I*(c*x+1)/(c*x-1)/((c*x+1)/(c*x-1)-1)^2)^2+1/6*I/c^3*b*
arccoth(c*x)*e*Pi*csgn(I/((c*x+1)/(c*x-1)-1)^2)*csgn(I*(c*x+1)/(c*x-1)/((c*
x+1)/(c*x-1)-1)^2)^2+1/6*I/c^3*b*arccoth(c*x)*Pi*e*csgn(I*((c*x+1)/(c*x-1)-
1))^2*csgn(I*((c*x+1)/(c*x-1)-1)^2)-1/3*I/c^3*b*arccoth(c*x)*e*Pi*csgn(I*((
c*x+1)/(c*x-1)-1))*csgn(I*((c*x+1)/(c*x-1)-1)^2)^2+1/6*I/c^3*b*Pi*ln((c*x+1
)/(c*x-1)-1)*e*csgn(I/((c*x-1)/(c*x+1))^(1/2))^2*csgn(I*(c*x+1)/(c*x-1))-1/
3*I/c^3*b*Pi*ln((c*x+1)/(c*x-1)-1)*e*csgn(I/((c*x-1)/(c*x+1))^(1/2))*csgn(I
*(c*x+1)/(c*x-1))^2-1/6*I/c^3*b*Pi*ln((c*x+1)/(c*x-1)-1)*e*csgn(I*(c*x+1)/(
c*x-1))*csgn(I*(c*x+1)/(c*x-1)/((c*x+1)/(c*x-1)-1)^2)^2-1/6*I/c^3*b*csgn(I*
(c*x+1)/(c*x-1)/((c*x+1)/(c*x-1)-1)^2)^2*csgn(I/((c*x+1)/(c*x-1)-1)^2)*Pi*l
n((c*x+1)/(c*x-1)-1)*e-1/3/c*b*ln((c*x+1)/(c*x-1)-1)*x^2*e+2/3/c^3*b*arccot
h(c*x)*e*ln(2)-2/3/c^3*b*ln((c*x+1)/(c*x-1)-1)*ln(2)*e+2/3*b*arccoth(c*x)*l
n(2)*x^3*e-2/3*b*arccoth(c*x)*ln((c*x+1)/(c*x-1)-1)*x^3*e+1/3/c*b*ln(2)*x^2
*e+1/6*I*b*arccoth(c*x)*Pi*csgn(I*((c*x+1)/(c*x-1)-1)^2)^3*x^3*e-1/3*I*b*ar
ccoth(c*x)*Pi*csgn(I*(c*x+1)/(c*x-1)/((c*x+1)/(c*x-1)-1)^2)^2*x^3*e-1/12*I/
c*b*Pi*csgn(I*(c*x+1)/(c*x-1))^3*x^2*e+1/12*I/c*b*Pi*csgn(I*(c*x+1)/(c*x-1)
/((c*x+1)/(c*x-1)-1)^2)^3*x^2*e+1/6*I/c^3*b*arccoth(c*x)*e*Pi*csgn(I*((c*x+
1)/(c*x-1)-1)^2)^3+1/6*I/c^3*b*Pi*ln((c*x+1)/(c*x-1)-1)*e*csgn(I*(c*x+1)/(c
*x-1))^3-1/6*I/c^3*b*Pi*ln((c*x+1)/(c*x-1)-1)*e*csgn(I*(c*x+1)/(c*x-1)/((c*
x+1)/(c*x-1)-1)^2)^3-1/6*I/c^3*b*Pi*ln((c*x+1)/(c*x-1)-1)*e*csgn(I*((c*x+1)
/(c*x-1)-1)^2)^3-1/3*I/c^3*b*arccoth(c*x)*e*Pi*csgn(I*(c*x+1)/(c*x-1)/((c*x
+1)/(c*x-1)-1)^2)^2+1/3*I/c^3*b*Pi*ln((c*x+1)/(c*x-1)-1)*e*csgn(I*(c*x+1)/(
c*x-1)/((c*x+1)/(c*x-1)-1)^2)^2+1/12*I/c^3*b*csgn(I*(c*x+1)/(c*x-1))*csgn(I
/((c*x-1)/(c*x+1))^(1/2))^2*e*Pi-1/6*I/c^3*b*e*Pi*csgn(I/((c*x-1)/(c*x+1))^
(1/2))*csgn(I*(c*x+1)/(c*x-1))^2-1/12*I/c^3*b*e*Pi*csgn(I*(c*x+1)/(c*x-1))*
csgn(I*(c*x+1)/(c*x-1)/((c*x+1)/(c*x-1)-1)^2)^2-1/12*I/c^3*b*Pi*e*csgn(I/((
c*x+1)/(c*x-1)-1)^2)*csgn(I*(c*x+1)/(c*x-1)/((c*x+1)/(c*x-1)-1)^2)^2-1/12*I
/c^3*b*e*Pi*csgn(I*((c*x+1)/(c*x-1)-1))^2*csgn(I*((c*x+1)/(c*x-1)-1)^2)+1/6
*I/c^3*b*e*Pi*csgn(I*((c*x+1)/(c*x-1)-1))*csgn(I*((c*x+1)/(c*x-1)-1)^2)^2-1
/6*I*b*arccoth(c*x)*Pi*csgn(I*(c*x+1)/(c*x-1))^3*x^3*e+1/6*I*b*arccoth(c*x)
*Pi*csgn(I*(c*x+1)/(c*x-1)/((c*x+1)/(c*x-1)-1)^2)^3*x^3*e+1/12*I/c*b*Pi*csg
n(I*((c*x+1)/(c*x-1)-1)^2)^3*x^2*e-1/6*I/c*b*Pi*csgn(I*(c*x+1)/(c*x-1)/((c*
x+1)/(c*x-1)-1)^2)^2*x^2*e-1/6*I/c^3*b*arccoth(c*x)*e*Pi*csgn(I*(c*x+1)/(c*
x-1))^3+1/6*I/c^3*b*arccoth(c*x)*Pi*e*csgn(I*(c*x+1)/(c*x-1)/((c*x+1)/(c*x-
1)-1)^2)^3
```

**maxima [C]** time = 0.33, size = 252, normalized size = 1.02

$$\frac{1}{3}adx^3+\frac{1}{9}\left(3x^3\log\left(-c^2x^2+1\right)-c^2\left(\frac{2\left(c^2x^3+3x\right)}{c^4}-\frac{3\log\left(cx+1\right)}{c^5}+\frac{3\log\left(cx-1\right)}{c^5}\right)\right)be\operatorname{arcoth}\left(cx\right)+\frac{1}{6}\left(2x^3\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*(a+b*arccoth(c*x))*(d+e*log(-c^2*x^2+1)),x, algorithm="maxima
")
```

```
[Out] 1/3*a*d*x^3 + 1/9*(3*x^3*log(-c^2*x^2 + 1) - c^2*(2*(c^2*x^3 + 3*x)/c^4 - 3
*log(c*x + 1)/c^5 + 3*log(c*x - 1)/c^5))*b*e*arccoth(c*x) + 1/6*(2*x^3*arcc
oth(c*x) + c*(x^2/c^2 + log(c^2*x^2 - 1)/c^4))*b*d + 1/9*(3*x^3*log(-c^2*x^
2 + 1) - c^2*(2*(c^2*x^3 + 3*x)/c^4 - 3*log(c*x + 1)/c^5 + 3*log(c*x - 1)/c
^5))*a*e + 1/18*((3*I*pi*c^2 - 5*c^2)*x^2 + (3*I*pi + 3*c^2*x^2 + 6*log(c*x
 - 1) - 11)*log(c*x + 1) + (3*I*pi + 3*c^2*x^2 - 11)*log(c*x - 1))*b*e/c^3
```

**mupad [B]** time = 2.33, size = 414, normalized size = 1.68

$$\ln\left(\frac{1}{c\,x}+1\right)\left(\frac{b\,d\,x^3}{6}-\frac{\frac{2\,b\,e\,c^3\,x^3}{3}+2\,b\,e\,c\,x}{6\,c^3}+\frac{b\,e\,x^3\,\ln\left(1-c^2\,x^2\right)}{6}\right)+x\,\left(\frac{a\,\left(3\,d-2\,e\right)}{3\,c^2}-\frac{a\,d}{c^2}\right)+\ln\left(1-\frac{1}{c\,x}\right)\left(\frac{\frac{4\,b\,e\,x^4}{9}-2}{2\,\left(c\,x^2\right.}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^2*(a + b*acoth(c*x))*(d + e*log(1 - c^2*x^2)),x)
```

```
[Out] log(1/(c*x) + 1)*((b*d*x^3)/6 - (2*b*c*e*x + (2*b*c^3*e*x^3)/3)/(6*c^3) + (
b*e*x^3*log(1 - c^2*x^2))/6) + x*((a*(3*d - 2*e))/(3*c^2) - (a*d)/c^2) + lo
g(1 - 1/(c*x))*(((4*b*e*x^4)/9 - (2*b*e*x^2)/(3*c^2) + (2*b*c^2*e*x^6)/9)/(
2*(x + c*x^2)*(c*x - 1)) + ((b*d*x^4)/3 - (b*c^2*d*x^6)/3)/(2*(x + c*x^2)*(
c*x - 1)) + (log(1 - c^2*x^2)*((b*e*x^4)/3 - (b*c^2*e*x^6)/3))/(2*(x + c*x^
2)*(c*x - 1)) - (b*e*log(1/(c*x) + 1))/(6*c^3)) + (a*x^3*(3*d - 2*e))/9 + c
^2*log(1 - c^2*x^2)*((a*e*x^3)/(3*c^2) + (b*e*x^2)/(6*c^3)) - (log(c*x - 1)
*(6*a*e - 3*b*d + 11*b*e))/(18*c^3) + (log(c*x + 1)*(6*a*e + 3*b*d - 11*b*e
))/(18*c^3) + (b*e*log(1/(c*x) + 1)^2)/(12*c^3) + (b*e*log(1 - 1/(c*x))^2)/
(12*c^3) + (b*e*log(1 - c^2*x^2)^2)/(12*c^3) + (b*x^2*(3*d - 5*e))/(18*c)
```

**sympy [A]** time = 6.78, size = 265, normalized size = 1.07

$$\begin{cases} \frac{adx^3}{3}+\frac{aex^3\log\left(-c^2x^2+1\right)}{3}-\frac{2aex^3}{9}-\frac{2aex}{3c^2}+\frac{2ae\operatorname{acoth}(cx)}{3c^3}+\frac{bdx^3\operatorname{acoth}(cx)}{3}+\frac{bex^3\log\left(-c^2x^2+1\right)\operatorname{acoth}(cx)}{3}-\frac{2bex^3\operatorname{acoth}(cx)}{9}+\frac{bdx^2}{6c} \\ \frac{dx^3\left(a+\frac{i\pi b}{2}\right)}{3} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**2*(a+b*acoth(c*x))*(d+e*ln(-c**2*x**2+1)),x)
```

```
[Out] Piecewise((a*d*x**3/3 + a*e*x**3*log(-c**2*x**2 + 1)/3 - 2*a*e*x**3/9 - 2*a
*e*x/(3*c**2) + 2*a*e*acoth(c*x)/(3*c**3) + b*d*x**3*acoth(c*x)/3 + b*e*x**
3*log(-c**2*x**2 + 1)*acoth(c*x)/3 - 2*b*e*x**3*acoth(c*x)/9 + b*d*x**2/(6*
c) + b*e*x**2*log(-c**2*x**2 + 1)/(6*c) - 5*b*e*x**2/(18*c) - 2*b*e*x*acoth
(c*x)/(3*c**2) + b*d*log(-c**2*x**2 + 1)/(6*c**3) + b*e*log(-c**2*x**2 + 1)
**2/(12*c**3) - 11*b*e*log(-c**2*x**2 + 1)/(18*c**3) + b*e*acoth(c*x)**2/(3
*c**3), Ne(c, 0)), (d*x**3*(a + I*pi*b/2)/3, True))
```

# 3.274 $\int \left(a+b\coth^{-1}(cx)\right)\left(d+e\log\left(1-c^2x^2\right)\right)\,dx$

**Optimal**. Leaf size=104

$$x\left(a+b\coth^{-1}(cx)\right)\left(e\log\left(1-c^2x^2\right)+d\right)+\frac{e\left(a+b\coth^{-1}(cx)\right)^2}{bc}-2aex+\frac{b\left(e\log\left(1-c^2x^2\right)+d\right)^2}{4ce}-\frac{be\log\left(1-\right.}{c}$$

```
[Out] -2*a*e*x-2*b*e*x*arccoth(c*x)+e*(a+b*arccoth(c*x))^2/b/c-b*e*ln(-c^2*x^2+1)
/c+x*(a+b*arccoth(c*x))*(d+e*ln(-c^2*x^2+1))+1/4*b*(d+e*ln(-c^2*x^2+1))^2/c
/e
```

**Rubi [A]** time = 0.20, antiderivative size = 104, normalized size of antiderivative = 1.00, number of steps used = 9, number of rules used = 8, integrand size = 24, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.333, Rules used = {6074, 2475, 2390, 2301, 5981, 5911, 260, 5949}

$$x\left(a+b\coth^{-1}(cx)\right)\left(e\log\left(1-c^2x^2\right)+d\right)+\frac{e\left(a+b\coth^{-1}(cx)\right)^2}{bc}-2aex+\frac{b\left(e\log\left(1-c^2x^2\right)+d\right)^2}{4ce}-\frac{be\log\left(1-\right.}{c}$$

Antiderivative was successfully verified.

```
[In] Int[(a + b*ArcCoth[c*x])*(d + e*Log[1 - c^2*x^2]),x]
```

```
[Out] -2*a*e*x - 2*b*e*x*ArcCoth[c*x] + (e*(a + b*ArcCoth[c*x])^2)/(b*c) - (b*e*L
og[1 - c^2*x^2])/c + x*(a + b*ArcCoth[c*x])*(d + e*Log[1 - c^2*x^2]) + (b*(
d + e*Log[1 - c^2*x^2])^2)/(4*c*e)
```

Rule 260

```
Int[(x_)^(m_.)/((a_) + (b_.)*(x_)^(n_)), x_Symbol] :> Simp[Log[RemoveConten
t[a + b*x^n, x]]/(b*n), x] /; FreeQ[{a, b, m, n}, x] && EqQ[m, n - 1]
```

Rule 2301

```
Int[((a_.) + Log[(c_.)*(x_)^(n_.)]*(b_.))/(x_), x_Symbol] :> Simp[(a + b*Lo
g[c*x^n])^2/(2*b*n), x] /; FreeQ[{a, b, c, n}, x]
```

Rule 2390

```
Int[((a_.) + Log[(c_.)*((d_) + (e_.)*(x_))^(n_.)]*(b_.))^(p_.)*((f_) + (g_.
)*(x_))^(q_.), x_Symbol] :> Dist[1/e, Subst[Int[((f*x)/d)^q*(a + b*Log[c*x^
n])^p, x], x, d + e*x], x] /; FreeQ[{a, b, c, d, e, f, g, n, p, q}, x] && E
qQ[e*f - d*g, 0]
```

Rule 2475

```
Int[((a_.) + Log[(c_.)*((d_) + (e_.)*(x_)^(n_))^(p_.)]*(b_.))^(q_.)*(x_)^(m
_.)*((f_) + (g_.)*(x_)^(s_))^(r_.), x_Symbol] :> Dist[1/n, Subst[Int[x^(Sim
plify[(m + 1)/n] - 1)*(f + g*x^(s/n))^r*(a + b*Log[c*(d + e*x)^p])^q, x], x
, x^n], x] /; FreeQ[{a, b, c, d, e, f, g, m, n, p, q, r, s}, x] && IntegerQ
[r] && IntegerQ[s/n] && IntegerQ[Simplify[(m + 1)/n]] && (GtQ[(m + 1)/n, 0]
 || IGtQ[q, 0])
```

Rule 5911

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.), x_Symbol] :> Simp[x*(a + b*A
rcCoth[c*x])^p, x] - Dist[b*c*p, Int[(x*(a + b*ArcCoth[c*x])^(p - 1))/(1 -
c^2*x^2), x], x] /; FreeQ[{a, b, c}, x] && IGtQ[p, 0]
```

Rule 5949

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)/((d_) + (e_.)*(x_)^2), x_Symb
ol] :> Simp[(a + b*ArcCoth[c*x])^(p + 1)/(b*c*d*(p + 1)), x] /; FreeQ[{a, b
, c, d, e, p}, x] && EqQ[c^2*d + e, 0] && NeQ[p, -1]
```

Rule 5981

```
Int[(((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)*((f_.)*(x_))^(m_))/((d_) + (
e_.)*(x_)^2), x_Symbol] :> Dist[f^2/e, Int[(f*x)^(m - 2)*(a + b*ArcCoth[c*x
])^p, x], x] - Dist[(d*f^2)/e, Int[((f*x)^(m - 2)*(a + b*ArcCoth[c*x])^p)/(
d + e*x^2), x], x] /; FreeQ[{a, b, c, d, e, f}, x] && GtQ[p, 0] && GtQ[m, 1
]
```

Rule 6074

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))*((d_.) + Log[(f_.) + (g_.)*(x_)^2]*
(e_.)), x_Symbol] :> Simp[x*(d + e*Log[f + g*x^2])*(a + b*ArcCoth[c*x]), x]
 + (-Dist[b*c, Int[(x*(d + e*Log[f + g*x^2]))/(1 - c^2*x^2), x], x] - Dist[
2*e*g, Int[(x^2*(a + b*ArcCoth[c*x]))/(f + g*x^2), x], x]) /; FreeQ[{a, b,
c, d, e, f, g}, x]
```

Rubi steps

$$\int \left(a+b\coth^{-1}(cx)\right)\left(d+e\log\left(1-c^2x^2\right)\right)dx = x\left(a+b\coth^{-1}(cx)\right)\left(d+e\log\left(1-c^2x^2\right)\right)-(bc)\int\frac{x\left(d+e\log\right.}{1-c}$$

$$= x\left(a+b\coth^{-1}(cx)\right)\left(d+e\log\left(1-c^2x^2\right)\right)-\frac{1}{2}(bc)\,\text{Subst}\left(\int\frac{d}{}\right.$$

$$= -2aex+\frac{e\left(a+b\coth^{-1}(cx)\right)^2}{bc}+x\left(a+b\coth^{-1}(cx)\right)\left(d+e\log\right.$$

$$= -2aex-2bex\coth^{-1}(cx)+\frac{e\left(a+b\coth^{-1}(cx)\right)^2}{bc}+x\left(a+b\coth\right.$$

$$= -2aex-2bex\coth^{-1}(cx)+\frac{e\left(a+b\coth^{-1}(cx)\right)^2}{bc}-\frac{be\log\left(1-c\right.}{c}$$

**Mathematica [A]** time = 0.02, size = 144, normalized size = 1.38

$$aex\log\left(1-c^2x^2\right)+\frac{2ae\tanh^{-1}(cx)}{c}+adx-2aex+\frac{bd\log\left(1-c^2x^2\right)}{2c}+\frac{be\log^2\left(1-c^2x^2\right)}{4c}-\frac{be\log\left(1-c^2x^2\right)}{c}+bex\log\left(\right.$$

Antiderivative was successfully verified.

```
[In] Integrate[(a + b*ArcCoth[c*x])*(d + e*Log[1 - c^2*x^2]),x]
```

```
[Out] a*d*x - 2*a*e*x + b*d*x*ArcCoth[c*x] - 2*b*e*x*ArcCoth[c*x] + (b*e*ArcCoth[
c*x]^2)/c + (2*a*e*ArcTanh[c*x])/c + (b*d*Log[1 - c^2*x^2])/(2*c) - (b*e*Lo
g[1 - c^2*x^2])/c + a*e*x*Log[1 - c^2*x^2] + b*e*x*ArcCoth[c*x]*Log[1 - c^2
*x^2] + (b*e*Log[1 - c^2*x^2]^2)/(4*c)
```

**fricas [A]** time = 0.57, size = 130, normalized size = 1.25

$$\frac{be\log\left(-c^2x^2+1\right)^2+be\log\left(\frac{cx+1}{cx-1}\right)^2+4\,(acd-2\,ace)x+2\,(2\,acex+bd-2\,be)\log\left(-c^2x^2+1\right)+2\left(bcex\log\left(-c^2\right.\right.}{4\,c}$$

Verification of antiderivative is not currently implemented for this CAS.

[In] integrate((a+b*arccoth(c*x))*(d+e*log(-c^2*x^2+1)),x, algorithm="fricas")

[Out] 1/4*(b*e*log(-c^2*x^2 + 1)^2 + b*e*log((c*x + 1)/(c*x - 1))^2 + 4*(a*c*d - 2*a*c*e)*x + 2*(2*a*c*e*x + b*d - 2*b*e)*log(-c^2*x^2 + 1) + 2*(b*c*e*x*log(-c^2*x^2 + 1) + 2*a*e + (b*c*d - 2*b*c*e)*x)*log((c*x + 1)/(c*x - 1)))/c

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int (b \operatorname{arcoth}(cx) + a)\left(e \log\left(-c^2x^2 + 1\right) + d\right) dx$$

Verification of antiderivative is not currently implemented for this CAS.

[In] integrate((a+b*arccoth(c*x))*(d+e*log(-c^2*x^2+1)),x, algorithm="giac")

[Out] integrate((b*arccoth(c*x) + a)*(e*log(-c^2*x^2 + 1) + d), x)

**maple [C]** time = 1.80, size = 2210, normalized size = 21.25

result too large to display

Verification of antiderivative is not currently implemented for this CAS.

[In] int((a+b*arccoth(c*x))*(d+e*ln(-c^2*x^2+1)),x)

[Out] 2/c*b*arccoth(c*x)*e*ln(2)-2/c*b*ln((c*x+1)/(c*x-1)-1)*ln(2)*e+2*b*arccoth(c*x)*ln(2)*x*e-2*b*e*x*arccoth(c*x)+a*d*x-2*a*x*e+I/c*b*e*arccoth(c*x)*Pi-1/2*I/c*b*arccoth(c*x)*e*Pi*csgn(I*(c*x+1)/(c*x-1))^3-1/2*I/c*b*Pi*ln((c*x+1)/(c*x-1)-1)*e*csgn(I*(c*x+1)/(c*x-1)/((c*x+1)/(c*x-1)-1)^2)^3-1/2*I/c*b*Pi*ln((c*x+1)/(c*x-1)-1)*e*csgn(I*((c*x+1)/(c*x-1)-1)^2)^3+1/c*b*ln((c*x+1)/(c*x-1)-1)^2*e+1/c*b*arccoth(c*x)*d-2/c*b*arccoth(c*x)*e-1/c*b*d*ln((c*x+1)/(c*x-1)-1)+2/c*b*e*ln((c*x+1)/(c*x-1)-1)+b*arccoth(c*x)*x*d+a*e*x*ln(-c^2*x^2+1)+a*e/c*ln(c*x+1)-a*e/c*ln(c*x-1)-2*b*arccoth(c*x)*ln((c*x+1)/(c*x-1)-1)*x*e+I/c*b*csgn(I*(c*x+1)/(c*x-1))^2*csgn(I/((c*x-1)/(c*x+1))^(1/2))*e*arccoth(c*x)*Pi+I/c*b*Pi*ln((c*x+1)/(c*x-1)-1)*e*csgn(I*((c*x+1)/(c*x-1)-1))*csgn(I*((c*x+1)/(c*x-1)-1)^2)^2+I*b*arccoth(c*x)*csgn(I*(c*x+1)/(c*x-1))^2*csgn(I/((c*x-1)/(c*x+1))^(1/2))*Pi*x*e+1/2*I/c*b*arccoth(c*x)*e*Pi*csgn(I*(c*x+1)/(c*x-1))*csgn(I*(c*x+1)/(c*x-1)/((c*x+1)/(c*x-1)-1)^2)^2+1/2*I/c*b*arccoth(c*x)*e*Pi*csgn(I/((c*x+1)/(c*x-1)-1)^2)*csgn(I*(c*x+1)/(c*x-1)/((c*x+1)/(c*x-1)-1)^2)^2-I/c*b*arccoth(c*x)*e*Pi*csgn(I*((c*x+1)/(c*x-1)-1))*csgn(I*((c*x+1)/(c*x-1)-1)^2)^2+1/2*I/c*b*arccoth(c*x)*e*Pi*csgn(I*((c*x+1)/(c*x-1)-1))^2*csgn(I*((c*x+1)/(c*x-1)-1)^2)-1/2*I/c*b*csgn(I*(c*x+1)/(c*x-1))*csgn(I/((c*x-1)/(c*x+1))^(1/2))^2*e*arccoth(c*x)*Pi-1/2*I/c*b*Pi*ln((c*x+1)/(c*x-1)-1)*e*csgn(I*(c*x+1)/(c*x-1))*csgn(I*(c*x+1)/(c*x-1)/((c*x+1)/(c*x-1)-1)^2)^2-1/2*I/c*b*Pi*ln((c*x+1)/(c*x-1)-1)*e*csgn(I/((c*x+1)/(c*x-1)-1)^2)*csgn(I*(c*x+1)/(c*x-1)/((c*x+1)/(c*x-1)-1)^2)^2-1/2*I/c*b*Pi*ln((c*x+1)/(c*x-1)-1)*e*csgn(I*((c*x+1)/(c*x-1)-1))^2*csgn(I*((c*x+1)/(c*x-1)-1)^2)-I/c*b*Pi*ln((c*x+1)/(c*x-1)-1)*e*csgn(I/((c*x-1)/(c*x+1))^(1/2))*csgn(I*(c*x+1)/(c*x-1))^2+1/2*I/c*b*Pi*ln((c*x+1)/(c*x-1)-1)*e*csgn(I/((c*x-1)/(c*x+1))^(1/2))^2*csgn(I*(c*x+1)/(c*x-1))+1/2*I*b*arccoth(c*x)*csgn(I*(c*x+1)/(c*x-1)/((c*x+1)/(c*x-1)-1)^2)^2*csgn(I*(c*x+1)/(c*x-1))*Pi*x*e-I*b*arccoth(c*x)*csgn(I*((c*x+1)/(c*x-1)-1)^2)^2*csgn(I*((c*x+1)/(c*x-1)-1))*Pi*x*e-ln((c*x-1)/(c*x+1))*(arccoth(c*x)*x*c+arccoth(c*x)-ln((c*x+1)/(c*x-1)-1))*b*e/c-1/2*I*b*arccoth(c*x)*csgn(I*(c*x+1)/(c*x-1)/((c*x+1)/(c*x-1)-1)^2)*csgn(I*(c*x+1)/(c*x-1))*csgn(I/((c*x+1)/(c*x-1)-1)^2)*Pi*x*e-1/2*I/c*b*arccoth(c*x)*e*Pi*csgn(I*(c*x+1)/(c*x-1))*csgn(I/((c*x+1)/(c*x-1)-1)^2)*csgn(I*(c*x+1)/(c*x-1)/((c*x+1)/(c*x-1)-1)^2)+1/2*I/c*b*csgn(I*(c*x+1)/(c*x-1)/((c*x+1)/(c*x-1)-1)^2)*csgn(I/((c*x+1)/(c*x-1)-1)^2)*csgn(I*(c*x+1)/(c*x-1))*e*ln((c*x+1)/(c*x-1)-1)*Pi+I*b*arccoth(c*x)*Pi*x*e-I/c*b*e*ln((c*x+1)/(c*x-1)-1)*Pi+1/2*I*b*arccoth(c*x)*csgn(I*((c*x+1)/(c*x-1)-1)^2)*csgn(I*((c*x+1)/(c*x-1)-1))^2*Pi*x*e-1/2*I*b*arccoth(c*x)*csgn(I*(c*x+1)/(c*x-1))*csgn(I/((c*x-1)/(c*x+1))^(1/2))^2*Pi*x*e+1/2*I*b*arccoth(c*x)*csgn(I*(c*x+1)/(c*x-1)/((c*x+1)/

```
(c*x-1)-1)^2)^2*csgn(I/((c*x+1)/(c*x-1)-1)^2)*Pi*x*e+1/2*I/c*b*Pi*ln((c*x+1
)/(c*x-1)-1)*e*csgn(I*(c*x+1)/(c*x-1))^3-I/c*b*arccoth(c*x)*e*Pi*csgn(I*(c*
x+1)/(c*x-1)/((c*x+1)/(c*x-1)-1)^2)^2+I/c*b*Pi*ln((c*x+1)/(c*x-1)-1)*e*csgn
(I*(c*x+1)/(c*x-1)/((c*x+1)/(c*x-1)-1)^2)^2+1/2*I*b*arccoth(c*x)*csgn(I*(c*
x+1)/(c*x-1)/((c*x+1)/(c*x-1)-1)^2)^3*Pi*x*e+1/2*I*b*arccoth(c*x)*csgn(I*((
c*x+1)/(c*x-1)-1)^2)^3*Pi*x*e-1/2*I*b*arccoth(c*x)*csgn(I*(c*x+1)/(c*x-1))^
3*Pi*x*e-I*b*arccoth(c*x)*csgn(I*(c*x+1)/(c*x-1)/((c*x+1)/(c*x-1)-1)^2)^2*P
i*x*e+1/2*I/c*b*arccoth(c*x)*e*Pi*csgn(I*(c*x+1)/(c*x-1)/((c*x+1)/(c*x-1)-1
)^2)^3+1/2*I/c*b*arccoth(c*x)*e*Pi*csgn(I*((c*x+1)/(c*x-1)-1)^2)^3
```

**maxima [C]** time = 0.33, size = 178, normalized size = 1.71

$$-\left(c^{2}\left(\frac{2x}{c^{2}}-\frac{\log(cx+1)}{c^{3}}+\frac{\log(cx-1)}{c^{3}}\right)-x\log\left(-c^{2}x^{2}+1\right)\right)be\,\mathrm{arcoth}(cx)-\left(c^{2}\left(\frac{2x}{c^{2}}-\frac{\log(cx+1)}{c^{3}}+\frac{\log(cx-1)}{c^{3}}\right.\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccoth(c*x))*(d+e*log(-c^2*x^2+1)),x, algorithm="maxima")
```

```
[Out] -(c^2*(2*x/c^2 - log(c*x + 1)/c^3 + log(c*x - 1)/c^3) - x*log(-c^2*x^2 + 1)
)*b*e*arccoth(c*x) - (c^2*(2*x/c^2 - log(c*x + 1)/c^3 + log(c*x - 1)/c^3) -
 x*log(-c^2*x^2 + 1))*a*e + a*d*x + 1/2*(2*c*x*arccoth(c*x) + log(-c^2*x^2
+ 1))*b*d/c + 1/2*((I*pi + 2*log(c*x - 1) - 2)*log(c*x + 1) + (I*pi - 2)*lo
g(c*x - 1))*b*e/c
```

**mupad [B]** time = 2.09, size = 315, normalized size = 3.03

$$\ln\left(\frac{1}{c\,x}+1\right)\left(\frac{b\,d\,x}{2}-b\,e\,x+\frac{b\,e\,x\,\ln\left(1-c^{2}\,x^{2}\right)}{2}\right)+\ln\left(1-\frac{1}{c\,x}\right)\left(\frac{b\,d\,x^{2}-b\,c^{2}\,d\,x^{4}}{2\,\left(c\,x^{2}+x\right)\,\left(c\,x-1\right)}-\frac{2\,b\,e\,x^{2}-2\,b\,c^{2}\,e\,x^{4}}{2\,\left(c\,x^{2}+x\right)\,\left(c\,x-1\right)}+\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a + b*acoth(c*x))*(d + e*log(1 - c^2*x^2)),x)
```

```
[Out] log(1/(c*x) + 1)*((b*d*x)/2 - b*e*x + (b*e*x*log(1 - c^2*x^2))/2) + log(1 -
 1/(c*x))*((b*d*x^2 - b*c^2*d*x^4)/(2*(x + c*x^2)*(c*x - 1)) - (2*b*e*x^2 -
 2*b*c^2*e*x^4)/(2*(x + c*x^2)*(c*x - 1)) + (log(1 - c^2*x^2)*(b*e*x^2 - b*
c^2*e*x^4))/(2*(x + c*x^2)*(c*x - 1)) - (b*e*log(1/(c*x) + 1))/(2*c)) + a*x
*(d - 2*e) + (log(c*x + 1)*(2*a*e + b*d - 2*b*e))/(2*c) - (log(c*x - 1)*(2*
a*e - b*d + 2*b*e))/(2*c) + (b*e*log(1/(c*x) + 1)^2)/(4*c) + (b*e*log(1 - 1
/(c*x))^2)/(4*c) + (b*e*log(1 - c^2*x^2)^2)/(4*c) + a*e*x*log(1 - c^2*x^2)
```

**sympy [A]** time = 2.30, size = 155, normalized size = 1.49

$$\begin{cases} adx+aex\log\left(-c^{2}x^{2}+1\right)-2aex+\frac{2ae\,\mathrm{acoth}(cx)}{c}+bdx\,\mathrm{acoth}(cx)+bex\log\left(-c^{2}x^{2}+1\right)\mathrm{acoth}(cx)-2bex\,\mathrm{acoth}( \\ dx\left(a+\frac{i\pi b}{2}\right) \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*acoth(c*x))*(d+e*ln(-c**2*x**2+1)),x)
```

```
[Out] Piecewise((a*d*x + a*e*x*log(-c**2*x**2 + 1) - 2*a*e*x + 2*a*e*acoth(c*x)/c
 + b*d*x*acoth(c*x) + b*e*x*log(-c**2*x**2 + 1)*acoth(c*x) - 2*b*e*x*acoth(
c*x) + b*d*log(-c**2*x**2 + 1)/(2*c) + b*e*log(-c**2*x**2 + 1)**2/(4*c) - b
*e*log(-c**2*x**2 + 1)/c + b*e*acoth(c*x)**2/c, Ne(c, 0)), (d*x*(a + I*pi*b
/2), True))
```

# 3.275 $\int \frac{\left(a+b\coth^{-1}(cx)\right)\left(d+e\log\left(1-c^2x^2\right)\right)}{x^2}\,dx$

**Optimal**. Leaf size=105

$$-\frac{\left(a+b\coth^{-1}(cx)\right)\left(e\log\left(1-c^2x^2\right)+d\right)}{x}-\frac{ce\left(a+b\coth^{-1}(cx)\right)^2}{b}+\frac{1}{2}bc\log\left(1-\frac{1}{1-c^2x^2}\right)\left(e\log\left(1-c^2x^2\right)+\right.$$

```
[Out] -c*e*(a+b*arccoth(c*x))^2/b-(a+b*arccoth(c*x))*(d+e*ln(-c^2*x^2+1))/x+1/2*b
*c*(d+e*ln(-c^2*x^2+1))*ln(1-1/(-c^2*x^2+1))-1/2*b*c*e*polylog(2,1/(-c^2*x^
2+1))
```

**Rubi [A]** time = 0.27, antiderivative size = 94, normalized size of antiderivative = 0.90, number of steps used = 8, number of rules used = 8, integrand size = 27, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.296, Rules used = {6082, 2475, 2411, 2344, 2301, 2316, 2315, 5949}

$$-\frac{1}{2}bce\text{PolyLog}\left(2,c^2x^2\right)-\frac{\left(a+b\coth^{-1}(cx)\right)\left(e\log\left(1-c^2x^2\right)+d\right)}{x}-\frac{ce\left(a+b\coth^{-1}(cx)\right)^2}{b}-\frac{bc\left(e\log\left(1-c^2x^2\right.\right.}{4e}$$

Antiderivative was successfully verified.

```
[In] Int[((a + b*ArcCoth[c*x])*(d + e*Log[1 - c^2*x^2]))/x^2,x]
```

```
[Out] -((c*e*(a + b*ArcCoth[c*x])^2)/b) + b*c*d*Log[x] - ((a + b*ArcCoth[c*x])*(d
 + e*Log[1 - c^2*x^2]))/x - (b*c*(d + e*Log[1 - c^2*x^2])^2)/(4*e) - (b*c*e
*PolyLog[2, c^2*x^2])/2
```

Rule 2301

```
Int[((a_.) + Log[(c_.)*(x_)^(n_.)]*(b_.))/(x_), x_Symbol] :> Simp[(a + b*Lo
g[c*x^n])^2/(2*b*n), x] /; FreeQ[{a, b, c, n}, x]
```

Rule 2315

```
Int[Log[(c_.)*(x_)]/((d_) + (e_.)*(x_)), x_Symbol] :> -Simp[PolyLog[2, 1 -
c*x]/e, x] /; FreeQ[{c, d, e}, x] && EqQ[e + c*d, 0]
```

Rule 2316

```
Int[((a_.) + Log[(c_.)*(x_)]*(b_.))/((d_) + (e_.)*(x_)), x_Symbol] :> Simp[
((a + b*Log[-((c*d)/e)])*Log[d + e*x])/e, x] + Dist[b, Int[Log[-((e*x)/d)]/
(d + e*x), x], x] /; FreeQ[{a, b, c, d, e}, x] && GtQ[-((c*d)/e), 0]
```

Rule 2344

```
Int[((a_.) + Log[(c_.)*(x_)^(n_.)]*(b_.))^(p_.)/((x_)*((d_) + (e_.)*(x_))),
 x_Symbol] :> Dist[1/d, Int[(a + b*Log[c*x^n])^p/x, x], x] - Dist[e/d, Int[
(a + b*Log[c*x^n])^p/(d + e*x), x], x] /; FreeQ[{a, b, c, d, e, n}, x] && I
GtQ[p, 0]
```

Rule 2411

```
Int[((a_.) + Log[(c_.)*((d_) + (e_.)*(x_))^(n_.)]*(b_.))^(p_.)*((f_.) + (g_
.)*(x_))^(q_.)*((h_.) + (i_.)*(x_))^(r_.), x_Symbol] :> Dist[1/e, Subst[Int
[((g*x)/e)^q*((e*h - d*i)/e + (i*x)/e)^r*(a + b*Log[c*x^n])^p, x], x, d + e
*x], x] /; FreeQ[{a, b, c, d, e, f, g, h, i, n, p, q, r}, x] && EqQ[e*f - d
*g, 0] && (IGtQ[p, 0] || IGtQ[r, 0]) && IntegerQ[2*r]
```

Rule 2475

```
Int[((a_.) + Log[(c_.)*((d_) + (e_.)*(x_)^(n_))^(p_.)]*(b_.))^(q_.)*(x_)^(m
_.)*((f_) + (g_.)*(x_)^(s_))^(r_.), x_Symbol] :> Dist[1/n, Subst[Int[x^(Sim
plify[(m + 1)/n] - 1)*(f + g*x^(s/n))^r*(a + b*Log[c*(d + e*x)^p])^q, x], x
, x^n], x] /; FreeQ[{a, b, c, d, e, f, g, m, n, p, q, r, s}, x] && IntegerQ
[r] && IntegerQ[s/n] && IntegerQ[Simplify[(m + 1)/n]] && (GtQ[(m + 1)/n, 0]
 || IGtQ[q, 0])
```

Rule 5949

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)/((d_) + (e_.)*(x_)^2), x_Symb
ol] :> Simp[(a + b*ArcCoth[c*x])^(p + 1)/(b*c*d*(p + 1)), x] /; FreeQ[{a, b
, c, d, e, p}, x] && EqQ[c^2*d + e, 0] && NeQ[p, -1]
```

Rule 6082

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))*((d_.) + Log[(f_.) + (g_.)*(x_)^2]*
(e_.))*(x_)^(m_.), x_Symbol] :> Simp[(x^(m + 1)*(d + e*Log[f + g*x^2])*(a +
 b*ArcCoth[c*x]))/(m + 1), x] + (-Dist[(b*c)/(m + 1), Int[(x^(m + 1)*(d + e
*Log[f + g*x^2]))/(1 - c^2*x^2), x], x] - Dist[(2*e*g)/(m + 1), Int[(x^(m +
 2)*(a + b*ArcCoth[c*x]))/(f + g*x^2), x], x]) /; FreeQ[{a, b, c, d, e, f,
g}, x] && ILtQ[m/2, 0]
```

Rubi steps

$$\int \frac{\left(a+b\coth^{-1}(cx)\right)\left(d+e\log\left(1-c^2x^2\right)\right)}{x^2}\,dx = -\frac{\left(a+b\coth^{-1}(cx)\right)\left(d+e\log\left(1-c^2x^2\right)\right)}{x} + (bc)\int \frac{d+e\log\left(1\right.}{x\left(1-c\right.}$$

$$= -\frac{ce\left(a+b\coth^{-1}(cx)\right)^2}{b} - \frac{\left(a+b\coth^{-1}(cx)\right)\left(d+e\log\left(1-c^2x\right.\right.}{x}$$

$$= -\frac{ce\left(a+b\coth^{-1}(cx)\right)^2}{b} - \frac{\left(a+b\coth^{-1}(cx)\right)\left(d+e\log\left(1-c^2x\right.\right.}{x}$$

$$= -\frac{ce\left(a+b\coth^{-1}(cx)\right)^2}{b} - \frac{\left(a+b\coth^{-1}(cx)\right)\left(d+e\log\left(1-c^2x\right.\right.}{x}$$

$$= -\frac{ce\left(a+b\coth^{-1}(cx)\right)^2}{b} + bcd\log(x) - \frac{\left(a+b\coth^{-1}(cx)\right)\left(d+\right.}{x}$$

$$= -\frac{ce\left(a+b\coth^{-1}(cx)\right)^2}{b} + bcd\log(x) - \frac{\left(a+b\coth^{-1}(cx)\right)\left(d+\right.}{x}$$

**Mathematica [B]** time = 0.21, size = 332, normalized size = 3.16

$$-\frac{4ae\log\left(1-c^2x^2\right)+8acex\tanh^{-1}(cx)+4ad+2bcdx\log\left(1-c^2x^2\right)-4bcex\log(x)\log\left(1-c^2x^2\right)+2bcex\log\left(x\right.}{}$$

Antiderivative was successfully verified.

```
[In] Integrate[((a + b*ArcCoth[c*x])*(d + e*Log[1 - c^2*x^2]))/x^2,x]
```

```
[Out] -1/4*(4*a*d + 4*b*d*ArcCoth[c*x] + 4*b*c*e*x*ArcCoth[c*x]^2 + 8*a*c*e*x*Arc
Tanh[c*x] - 4*b*c*d*x*Log[x] - b*c*e*x*Log[-c^(-1) + x]^2 - b*c*e*x*Log[c^(
```

```
-1) + x]^2 - 2*b*c*e*x*Log[c^(-1) + x]*Log[(1 - c*x)/2] + 4*b*c*e*x*Log[x]*
Log[1 - c*x] - 2*b*c*e*x*Log[-c^(-1) + x]*Log[(1 + c*x)/2] + 4*b*c*e*x*Log[
x]*Log[1 + c*x] + 4*a*e*Log[1 - c^2*x^2] + 2*b*c*d*x*Log[1 - c^2*x^2] + 4*b
*e*ArcCoth[c*x]*Log[1 - c^2*x^2] - 4*b*c*e*x*Log[x]*Log[1 - c^2*x^2] + 2*b*
c*e*x*Log[-c^(-1) + x]*Log[1 - c^2*x^2] + 2*b*c*e*x*Log[c^(-1) + x]*Log[1 -
 c^2*x^2] + 4*b*c*e*x*PolyLog[2, -(c*x)] + 4*b*c*e*x*PolyLog[2, c*x] - 2*b*
c*e*x*PolyLog[2, 1/2 - (c*x)/2] - 2*b*c*e*x*PolyLog[2, (1 + c*x)/2])/x
```

**fricas [F]** time = 0.57, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{bd\,\text{arcoth}\,(cx) + ad + (be\,\text{arcoth}\,(cx) + ae)\log\left(-c^2x^2 + 1\right)}{x^2}, x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccoth(c*x))*(d+e*log(-c^2*x^2+1))/x^2,x, algorithm="fricas
")
```

```
[Out] integral((b*d*arccoth(c*x) + a*d + (b*e*arccoth(c*x) + a*e)*log(-c^2*x^2 +
1))/x^2, x)
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{(b\,\text{arcoth}\,(cx) + a)\left(e\log\left(-c^2x^2 + 1\right) + d\right)}{x^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccoth(c*x))*(d+e*log(-c^2*x^2+1))/x^2,x, algorithm="giac")
```

```
[Out] integrate((b*arccoth(c*x) + a)*(e*log(-c^2*x^2 + 1) + d)/x^2, x)
```

**maple [F]** time = 5.65, size = 0, normalized size = 0.00

$$\int \frac{(a + b\,\text{arccoth}\,(cx))\left(d + e\ln\left(-c^2x^2 + 1\right)\right)}{x^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a+b*arccoth(c*x))*(d+e*ln(-c^2*x^2+1))/x^2,x)
```

```
[Out] int((a+b*arccoth(c*x))*(d+e*ln(-c^2*x^2+1))/x^2,x)
```

**maxima [F]** time = 0.00, size = 0, normalized size = 0.00

$$-\frac{1}{2}\left(c\left(\log\left(c^2x^2 - 1\right) - \log\left(x^2\right)\right) + \frac{2\,\text{arcoth}\,(cx)}{x}\right)bd - \left(c^2\left(\frac{\log(cx + 1)}{c} - \frac{\log(cx - 1)}{c}\right) + \frac{\log\left(-c^2x^2 + 1\right)}{x}\right)ae -$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccoth(c*x))*(d+e*log(-c^2*x^2+1))/x^2,x, algorithm="maxima
")
```

```
[Out] -1/2*(c*(log(c^2*x^2 - 1) - log(x^2)) + 2*arccoth(c*x)/x)*b*d - (c^2*(log(c
*x + 1)/c - log(c*x - 1)/c) + log(-c^2*x^2 + 1)/x)*a*e - 1/2*b*e*(log(c*x +
 1)^2/x - integrate(-((c*x + 1)*log(c*x - 1)^2 - (I*pi + (I*pi*c + 2*c)*x)*
log(c*x + 1) - (-I*pi - I*pi*c*x)*log(c*x - 1))/(c*x^3 + x^2), x)) - a*d/x
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.01

$$\int \frac{(a + b\,\text{acoth}\,(c\,x))\,\left(d + e\,\ln\left(1 - c^2\,x^2\right)\right)}{x^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(((a + b*acoth(c*x))*(d + e*log(1 - c^2*x^2)))/x^2,x)
[Out] int(((a + b*acoth(c*x))*(d + e*log(1 - c^2*x^2)))/x^2, x)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{(a + b\,\mathrm{acoth}\,(cx))\left(d + e\log\left(-c^2x^2 + 1\right)\right)}{x^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*acoth(c*x))*(d+e*ln(-c**2*x**2+1))/x**2,x)
[Out] Integral((a + b*acoth(c*x))*(d + e*log(-c**2*x**2 + 1))/x**2, x)
```

# 3.276 $\int \frac{(a+b\coth^{-1}(cx))(d+e\log(1-c^2x^2))}{x^4}\,dx$

**Optimal**. Leaf size=197

$$-\frac{c^3e\left(a+b\coth^{-1}(cx)\right)^2}{3b}-\frac{\left(a+b\coth^{-1}(cx)\right)\left(e\log\left(1-c^2x^2\right)+d\right)}{3x^3}+\frac{2c^2e\left(a+b\coth^{-1}(cx)\right)}{3x}-bc^3e\log(x)-\frac{bc(}{}$$

```
[Out] 2/3*c^2*e*(a+b*arccoth(c*x))/x-1/3*c^3*e*(a+b*arccoth(c*x))^2/b-b*c^3*e*ln(
x)+1/3*b*c^3*e*ln(-c^2*x^2+1)-1/6*b*c*(-c^2*x^2+1)*(d+e*ln(-c^2*x^2+1))/x^2
-1/3*(a+b*arccoth(c*x))*(d+e*ln(-c^2*x^2+1))/x^3+1/6*b*c^3*(d+e*ln(-c^2*x^2
+1))*ln(1-1/(-c^2*x^2+1))-1/6*b*c^3*e*polylog(2,1/(-c^2*x^2+1))
```

**Rubi [A]** time = 0.46, antiderivative size = 191, normalized size of antiderivative = 0.97, number of steps used = 17, number of rules used = 16, integrand size = 27, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.593, Rules used = {6082, 2475, 2411, 2347, 2344, 2301, 2316, 2315, 2314, 31, 5983, 5917, 266, 36, 29, 5949}

$$-\frac{1}{6}bc^3e\text{PolyLog}\left(2,c^2x^2\right)-\frac{\left(a+b\coth^{-1}(cx)\right)\left(e\log\left(1-c^2x^2\right)+d\right)}{3x^3}-\frac{c^3e\left(a+b\coth^{-1}(cx)\right)^2}{3b}+\frac{2c^2e\left(a+b\coth\right.}{3x}$$

Antiderivative was successfully verified.

```
[In] Int[((a + b*ArcCoth[c*x])*(d + e*Log[1 - c^2*x^2]))/x^4,x]
```

```
[Out] (2*c^2*e*(a + b*ArcCoth[c*x]))/(3*x) - (c^3*e*(a + b*ArcCoth[c*x])^2)/(3*b)
 + (b*c^3*d*Log[x])/3 - b*c^3*e*Log[x] + (b*c^3*e*Log[1 - c^2*x^2])/3 - (b*
c*(1 - c^2*x^2)*(d + e*Log[1 - c^2*x^2]))/(6*x^2) - ((a + b*ArcCoth[c*x])*(
d + e*Log[1 - c^2*x^2]))/(3*x^3) - (b*c^3*(d + e*Log[1 - c^2*x^2])^2)/(12*e
) - (b*c^3*e*PolyLog[2, c^2*x^2])/6
```

Rule 29

```
Int[(x_)^(-1), x_Symbol] :> Simp[Log[x], x]
```

Rule 31

```
Int[((a_) + (b_.)*(x_))^(-1), x_Symbol] :> Simp[Log[RemoveContent[a + b*x,
x]]/b, x] /; FreeQ[{a, b}, x]
```

Rule 36

```
Int[1/(((a_.) + (b_.)*(x_))*((c_.) + (d_.)*(x_))), x_Symbol] :> Dist[b/(b*c
 - a*d), Int[1/(a + b*x), x], x] - Dist[d/(b*c - a*d), Int[1/(c + d*x), x],
 x] /; FreeQ[{a, b, c, d}, x] && NeQ[b*c - a*d, 0]
```

Rule 266

```
Int[(x_)^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Dist[1/n, Subst[
Int[x^(Simplify[(m + 1)/n] - 1)*(a + b*x)^p, x], x, x^n], x] /; FreeQ[{a, b
, m, n, p}, x] && IntegerQ[Simplify[(m + 1)/n]]
```

Rule 2301

```
Int[((a_.) + Log[(c_.)*(x_)^(n_.)]*(b_.))/(x_), x_Symbol] :> Simp[(a + b*Lo
g[c*x^n])^2/(2*b*n), x] /; FreeQ[{a, b, c, n}, x]
```

Rule 2314

```
Int[((a_.) + Log[(c_.)*(x_)^(n_.)]*(b_.))*((d_) + (e_.)*(x_)^(r_.))^(q_), x
_Symbol] :> Simp[(x*(d + e*x^r)^(q + 1)*(a + b*Log[c*x^n]))/d, x] - Dist[(b
*n)/d, Int[(d + e*x^r)^(q + 1), x], x] /; FreeQ[{a, b, c, d, e, n, q, r}, x
] && EqQ[r*(q + 1) + 1, 0]
```

Rule 2315

```
Int[Log[(c_.)*(x_)]/((d_) + (e_.)*(x_)), x_Symbol] :> -Simp[PolyLog[2, 1 -
c*x]/e, x] /; FreeQ[{c, d, e}, x] && EqQ[e + c*d, 0]
```

Rule 2316

```
Int[((a_.) + Log[(c_.)*(x_)]*(b_.))/((d_) + (e_.)*(x_)), x_Symbol] :> Simp[
((a + b*Log[-((c*d)/e)])*Log[d + e*x])/e, x] + Dist[b, Int[Log[-((e*x)/d)]/
(d + e*x), x], x] /; FreeQ[{a, b, c, d, e}, x] && GtQ[-((c*d)/e), 0]
```

Rule 2344

```
Int[((a_.) + Log[(c_.)*(x_)^(n_.)]*(b_.))^(p_.)/((x_)*((d_) + (e_.)*(x_))),
 x_Symbol] :> Dist[1/d, Int[(a + b*Log[c*x^n])^p/x, x], x] - Dist[e/d, Int[
(a + b*Log[c*x^n])^p/(d + e*x), x], x] /; FreeQ[{a, b, c, d, e, n}, x] && I
GtQ[p, 0]
```

Rule 2347

```
Int[(((a_.) + Log[(c_.)*(x_)^(n_.)]*(b_.))^(p_.)*((d_) + (e_.)*(x_))^(q_))/
(x_), x_Symbol] :> Dist[1/d, Int[((d + e*x)^(q + 1)*(a + b*Log[c*x^n])^p)/x
, x], x] - Dist[e/d, Int[(d + e*x)^q*(a + b*Log[c*x^n])^p, x], x] /; FreeQ[
{a, b, c, d, e, n}, x] && IGtQ[p, 0] && LtQ[q, -1] && IntegerQ[2*q]
```

Rule 2411

```
Int[((a_.) + Log[(c_.)*((d_) + (e_.)*(x_))^(n_.)]*(b_.))^(p_.)*((f_.) + (g_
.)*(x_))^(q_.)*((h_.) + (i_.)*(x_))^(r_.), x_Symbol] :> Dist[1/e, Subst[Int
[((g*x)/e)^q*((e*h - d*i)/e + (i*x)/e)^r*(a + b*Log[c*x^n])^p, x], x, d + e
*x], x] /; FreeQ[{a, b, c, d, e, f, g, h, i, n, p, q, r}, x] && EqQ[e*f - d
*g, 0] && (IGtQ[p, 0] || IGtQ[r, 0]) && IntegerQ[2*r]
```

Rule 2475

```
Int[((a_.) + Log[(c_.)*((d_) + (e_.)*(x_)^(n_))^(p_.)]*(b_.))^(q_.)*(x_)^(m
_.)*((f_) + (g_.)*(x_)^(s_))^(r_.), x_Symbol] :> Dist[1/n, Subst[Int[x^(Sim
plify[(m + 1)/n] - 1)*(f + g*x^(s/n))^r*(a + b*Log[c*(d + e*x)^p])^q, x], x
, x^n], x] /; FreeQ[{a, b, c, d, e, f, g, m, n, p, q, r, s}, x] && IntegerQ
[r] && IntegerQ[s/n] && IntegerQ[Simplify[(m + 1)/n]] && (GtQ[(m + 1)/n, 0]
 || IGtQ[q, 0])
```

Rule 5917

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)*((d_.)*(x_))^(m_.), x_Symbol]
 :> Simp[((d*x)^(m + 1)*(a + b*ArcCoth[c*x])^p)/(d*(m + 1)), x] - Dist[(b*c
*p)/(d*(m + 1)), Int[((d*x)^(m + 1)*(a + b*ArcCoth[c*x])^(p - 1))/(1 - c^2*
x^2), x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[p, 0] && (EqQ[p, 1] || In
tegerQ[m]) && NeQ[m, -1]
```

Rule 5949

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)/((d_) + (e_.)*(x_)^2), x_Symb
ol] :> Simp[(a + b*ArcCoth[c*x])^(p + 1)/(b*c*d*(p + 1)), x] /; FreeQ[{a, b
```

```
, c, d, e, p}, x] && EqQ[c^2*d + e, 0] && NeQ[p, -1]
```

Rule 5983

```
Int[(((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)*((f_.)*(x_))^(m_))/((d_) + (
e_.)*(x_)^2), x_Symbol] :> Dist[1/d, Int[(f*x)^m*(a + b*ArcCoth[c*x])^p, x]
, x] - Dist[e/(d*f^2), Int[((f*x)^(m + 2)*(a + b*ArcCoth[c*x])^p)/(d + e*x^
2), x], x] /; FreeQ[{a, b, c, d, e, f}, x] && GtQ[p, 0] && LtQ[m, -1]
```

Rule 6082

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))*((d_.) + Log[(f_.) + (g_.)*(x_)^2]*
(e_.))*(x_)^(m_.), x_Symbol] :> Simp[(x^(m + 1)*(d + e*Log[f + g*x^2])*(a +
 b*ArcCoth[c*x]))/(m + 1), x] + (-Dist[(b*c)/(m + 1), Int[(x^(m + 1)*(d + e
*Log[f + g*x^2]))/(1 - c^2*x^2), x], x] - Dist[(2*e*g)/(m + 1), Int[(x^(m +
 2)*(a + b*ArcCoth[c*x]))/(f + g*x^2), x], x]) /; FreeQ[{a, b, c, d, e, f,
g}, x] && ILtQ[m/2, 0]
```

Rubi steps

$$\int \frac{\left(a+b\coth^{-1}(cx)\right)\left(d+e\log\left(1-c^2x^2\right)\right)}{x^4}\,dx = -\frac{\left(a+b\coth^{-1}(cx)\right)\left(d+e\log\left(1-c^2x^2\right)\right)}{3x^3}+\frac{1}{3}(bc)\int\frac{d+e\,\mathrm{l}}{x^3\,(}$$

$$= -\frac{\left(a+b\coth^{-1}(cx)\right)\left(d+e\log\left(1-c^2x^2\right)\right)}{3x^3}+\frac{1}{6}(bc)\,\mathrm{Subst}\Bigg(\int$$

$$= \frac{2c^2e\left(a+b\coth^{-1}(cx)\right)}{3x}-\frac{c^3e\left(a+b\coth^{-1}(cx)\right)^2}{3b}-\frac{\left(a+b\,\mathrm{co}\right.}{}$$

$$= \frac{2c^2e\left(a+b\coth^{-1}(cx)\right)}{3x}-\frac{c^3e\left(a+b\coth^{-1}(cx)\right)^2}{3b}-\frac{\left(a+b\,\mathrm{co}\right.}{}$$

$$= \frac{2c^2e\left(a+b\coth^{-1}(cx)\right)}{3x}-\frac{c^3e\left(a+b\coth^{-1}(cx)\right)^2}{3b}-\frac{bc\left(1-c\right.}{}$$

$$= \frac{2c^2e\left(a+b\coth^{-1}(cx)\right)}{3x}-\frac{c^3e\left(a+b\coth^{-1}(cx)\right)^2}{3b}+\frac{1}{3}bc^3d\,\mathrm{lo}$$

$$= \frac{2c^2e\left(a+b\coth^{-1}(cx)\right)}{3x}-\frac{c^3e\left(a+b\coth^{-1}(cx)\right)^2}{3b}+\frac{1}{3}bc^3d\,\mathrm{lo}$$

**Mathematica [B]** time = 0.37, size = 457, normalized size = 2.32

$$\frac{1}{6}\Bigg(-4ac^3e\tanh^{-1}(cx)-\frac{2ae\log\left(1-c^2x^2\right)}{x^3}+\frac{4ac^2e}{x}-\frac{2ad}{x^3}+2bc^3d\log(x)-2bc^3e\mathrm{Li}_2(-cx)-2bc^3e\mathrm{Li}_2(cx)+bc$$

Antiderivative was successfully verified.

```
[In] Integrate[((a + b*ArcCoth[c*x])*(d + e*Log[1 - c^2*x^2]))/x^4,x]
```

```
[Out] ((-2*a*d)/x^3 - (b*c*d)/x^2 + (4*a*c^2*e)/x - (2*b*d*ArcCoth[c*x])/x^3 + (4
*b*c^2*e*ArcCoth[c*x])/x - 2*b*c^3*e*ArcCoth[c*x]^2 - 4*a*c^3*e*ArcTanh[c*x
] - 4*b*c^3*e*Log[1/Sqrt[1 - 1/(c^2*x^2)]] + 2*b*c^3*d*Log[x] - 2*b*c^3*e*L
og[x] + (b*c^3*e*Log[-c^(-1) + x]^2)/2 + (b*c^3*e*Log[c^(-1) + x]^2)/2 + b*
c^3*e*Log[c^(-1) + x]*Log[(1 - c*x)/2] - 2*b*c^3*e*Log[x]*Log[1 - c*x] + b*
c^3*e*Log[-c^(-1) + x]*Log[(1 + c*x)/2] - 2*b*c^3*e*Log[x]*Log[1 + c*x] - b
*c^3*d*Log[1 - c^2*x^2] + b*c^3*e*Log[1 - c^2*x^2] - (2*a*e*Log[1 - c^2*x^2
])/x^3 - (b*c*e*Log[1 - c^2*x^2])/x^2 - (2*b*e*ArcCoth[c*x]*Log[1 - c^2*x^2
])/x^3 + 2*b*c^3*e*Log[x]*Log[1 - c^2*x^2] - b*c^3*e*Log[-c^(-1) + x]*Log[1
 - c^2*x^2] - b*c^3*e*Log[c^(-1) + x]*Log[1 - c^2*x^2] - 2*b*c^3*e*PolyLog[
2, -(c*x)] - 2*b*c^3*e*PolyLog[2, c*x] + b*c^3*e*PolyLog[2, 1/2 - (c*x)/2]
+ b*c^3*e*PolyLog[2, (1 + c*x)/2])/6
```

**fricas [F]** time = 0.62, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{bd\,\text{arcoth}\,(cx) + ad + (be\,\text{arcoth}\,(cx) + ae)\log\left(-c^2x^2 + 1\right)}{x^4}, x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccoth(c*x))*(d+e*log(-c^2*x^2+1))/x^4,x, algorithm="fricas
")
```

```
[Out] integral((b*d*arccoth(c*x) + a*d + (b*e*arccoth(c*x) + a*e)*log(-c^2*x^2 +
1))/x^4, x)
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{(b\,\text{arcoth}\,(cx) + a)\left(e\log\left(-c^2x^2 + 1\right) + d\right)}{x^4}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccoth(c*x))*(d+e*log(-c^2*x^2+1))/x^4,x, algorithm="giac")
```

```
[Out] integrate((b*arccoth(c*x) + a)*(e*log(-c^2*x^2 + 1) + d)/x^4, x)
```

**maple [F(-2)]** time = 180.00, size = 0, normalized size = 0.00

$$\int \frac{(a + b\,\text{arccoth}\,(cx))\left(d + e\ln\left(-c^2x^2 + 1\right)\right)}{x^4}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a+b*arccoth(c*x))*(d+e*ln(-c^2*x^2+1))/x^4,x)
```

```
[Out] int((a+b*arccoth(c*x))*(d+e*ln(-c^2*x^2+1))/x^4,x)
```

**maxima [F]** time = 0.00, size = 0, normalized size = 0.00

$$-\frac{1}{6}\left(\left(c^2\log\left(c^2x^2 - 1\right) - c^2\log\left(x^2\right) + \frac{1}{x^2}\right)c + \frac{2\,\text{arcoth}\,(cx)}{x^3}\right)bd - \frac{1}{3}\left(\left(c\log\left(cx + 1\right) - c\log\left(cx - 1\right) - \frac{2}{x}\right)c^2 + \frac{\log(}{}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccoth(c*x))*(d+e*log(-c^2*x^2+1))/x^4,x, algorithm="maxima
")
```

```
[Out] -1/6*((c^2*log(c^2*x^2 - 1) - c^2*log(x^2) + 1/x^2)*c + 2*arccoth(c*x)/x^3)
*b*d - 1/3*((c*log(c*x + 1) - c*log(c*x - 1) - 2/x)*c^2 + log(-c^2*x^2 + 1)
/x^3)*a*e - 1/6*b*e*(log(c*x + 1)^2/x^3 - 3*integrate(-1/3*(3*(c*x + 1)*log
```

```
(c*x - 1)^2 - (3*I*pi + (3*I*pi*c + 2*c)*x)*log(c*x + 1) - (-3*I*pi - 3*I*p
i*c*x)*log(c*x - 1))/(c*x^5 + x^4), x)) - 1/3*a*d/x^3
```

**mupad** [F] time = 0.00, size = -1, normalized size = -0.01

$$\int \frac{(a + b\,\mathrm{acoth}\,(c\,x))\,\left(d + e\,\ln\left(1 - c^2\,x^2\right)\right)}{x^4}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(((a + b*acoth(c*x))*(d + e*log(1 - c^2*x^2)))/x^4,x)
```

```
[Out] int(((a + b*acoth(c*x))*(d + e*log(1 - c^2*x^2)))/x^4, x)
```

**sympy** [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{(a + b\,\mathrm{acoth}\,(cx))\,\left(d + e\log\left(-c^2x^2 + 1\right)\right)}{x^4}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*acoth(c*x))*(d+e*ln(-c**2*x**2+1))/x**4,x)
```

```
[Out] Integral((a + b*acoth(c*x))*(d + e*log(-c**2*x**2 + 1))/x**4, x)
```

# 3.277 $\int \frac{\left(a+b\coth^{-1}(cx)\right)\left(d+e\log\left(1-c^2x^2\right)\right)}{x^6}\,dx$

**Optimal**. Leaf size=256

$$-\frac{c^5e\left(a+b\coth^{-1}(cx)\right)^2}{5b}+\frac{2c^4e\left(a+b\coth^{-1}(cx)\right)}{5x}-\frac{\left(a+b\coth^{-1}(cx)\right)\left(e\log\left(1-c^2x^2\right)+d\right)}{5x^5}+\frac{2c^2e\left(a+b\coth^{-1}(\right.}{15x^3}$$

```
[Out] 7/60*b*c^3*e/x^2+2/15*c^2*e*(a+b*arccoth(c*x))/x^3+2/5*c^4*e*(a+b*arccoth(c
*x))/x-1/5*c^5*e*(a+b*arccoth(c*x))^2/b-5/6*b*c^5*e*ln(x)+19/60*b*c^5*e*ln(
-c^2*x^2+1)-1/20*b*c*(d+e*ln(-c^2*x^2+1))/x^4-1/10*b*c^3*(-c^2*x^2+1)*(d+e*
ln(-c^2*x^2+1))/x^2-1/5*(a+b*arccoth(c*x))*(d+e*ln(-c^2*x^2+1))/x^5+1/10*b*
c^5*(d+e*ln(-c^2*x^2+1))*ln(1-1/(-c^2*x^2+1))-1/10*b*c^5*e*polylog(2,1/(-c^
2*x^2+1))
```

**Rubi [A]** time = 0.67, antiderivative size = 250, normalized size of antiderivative = 0.98, number of steps used = 26, number of rules used = 18, integrand size = 27, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.667, Rules used = {6082, 2475, 2411, 2347, 2344, 2301, 2316, 2315, 2314, 31, 2319, 44, 5983, 5917, 266, 36, 29, 5949}

$$-\frac{1}{10}bc^5e\text{PolyLog}\left(2,c^2x^2\right)-\frac{\left(a+b\coth^{-1}(cx)\right)\left(e\log\left(1-c^2x^2\right)+d\right)}{5x^5}+\frac{2c^2e\left(a+b\coth^{-1}(cx)\right)}{15x^3}-\frac{c^5e\left(a+b\coth^{-1}(\right.}{5b}$$

Antiderivative was successfully verified.

```
[In] Int[((a + b*ArcCoth[c*x])*(d + e*Log[1 - c^2*x^2]))/x^6,x]
```

```
[Out] (7*b*c^3*e)/(60*x^2) + (2*c^2*e*(a + b*ArcCoth[c*x]))/(15*x^3) + (2*c^4*e*(
a + b*ArcCoth[c*x]))/(5*x) - (c^5*e*(a + b*ArcCoth[c*x])^2)/(5*b) + (b*c^5*
d*Log[x])/5 - (5*b*c^5*e*Log[x])/6 + (19*b*c^5*e*Log[1 - c^2*x^2])/60 - (b*
c*(d + e*Log[1 - c^2*x^2]))/(20*x^4) - (b*c^3*(1 - c^2*x^2)*(d + e*Log[1 -
c^2*x^2]))/(10*x^2) - ((a + b*ArcCoth[c*x])*(d + e*Log[1 - c^2*x^2]))/(5*x^
5) - (b*c^5*(d + e*Log[1 - c^2*x^2])^2)/(20*e) - (b*c^5*e*PolyLog[2, c^2*x^
2])/10
```

Rule 29

```
Int[(x_)^(-1), x_Symbol] :> Simp[Log[x], x]
```

Rule 31

```
Int[((a_) + (b_.)*(x_))^(-1), x_Symbol] :> Simp[Log[RemoveContent[a + b*x,
x]]/b, x] /; FreeQ[{a, b}, x]
```

Rule 36

```
Int[1/(((a_.) + (b_.)*(x_))*((c_.) + (d_.)*(x_))), x_Symbol] :> Dist[b/(b*c
 - a*d), Int[1/(a + b*x), x], x] - Dist[d/(b*c - a*d), Int[1/(c + d*x), x],
 x] /; FreeQ[{a, b, c, d}, x] && NeQ[b*c - a*d, 0]
```

Rule 44

```
Int[((a_) + (b_.)*(x_))^(m_.)*((c_.) + (d_.)*(x_))^(n_.), x_Symbol] :> Int[
ExpandIntegrand[(a + b*x)^m*(c + d*x)^n, x], x] /; FreeQ[{a, b, c, d}, x] &
& NeQ[b*c - a*d, 0] && ILtQ[m, 0] && IntegerQ[n] &&  !(IGtQ[n, 0] && LtQ[m
+ n + 2, 0])
```

Rule 266

```
Int[(x_)^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Dist[1/n, Subst[
Int[x^(Simplify[(m + 1)/n] - 1)*(a + b*x)^p, x], x, x^n], x] /; FreeQ[{a, b
, m, n, p}, x] && IntegerQ[Simplify[(m + 1)/n]]
```

Rule 2301

```
Int[((a_.) + Log[(c_.)*(x_)^(n_.)]*(b_.))/(x_), x_Symbol] :> Simp[(a + b*Lo
g[c*x^n])^2/(2*b*n), x] /; FreeQ[{a, b, c, n}, x]
```

Rule 2314

```
Int[((a_.) + Log[(c_.)*(x_)^(n_.)]*(b_.))*((d_) + (e_.)*(x_)^(r_.))^(q_), x
_Symbol] :> Simp[(x*(d + e*x^r)^(q + 1)*(a + b*Log[c*x^n]))/d, x] - Dist[(b
*n)/d, Int[(d + e*x^r)^(q + 1), x], x] /; FreeQ[{a, b, c, d, e, n, q, r}, x
] && EqQ[r*(q + 1) + 1, 0]
```

Rule 2315

```
Int[Log[(c_.)*(x_)]/((d_) + (e_.)*(x_)), x_Symbol] :> -Simp[PolyLog[2, 1 -
c*x]/e, x] /; FreeQ[{c, d, e}, x] && EqQ[e + c*d, 0]
```

Rule 2316

```
Int[((a_.) + Log[(c_.)*(x_)]*(b_.))/((d_) + (e_.)*(x_)), x_Symbol] :> Simp[
((a + b*Log[-((c*d)/e)])*Log[d + e*x])/e, x] + Dist[b, Int[Log[-((e*x)/d)]/
(d + e*x), x], x] /; FreeQ[{a, b, c, d, e}, x] && GtQ[-((c*d)/e), 0]
```

Rule 2319

```
Int[((a_.) + Log[(c_.)*(x_)^(n_.)]*(b_.))^(p_.)*((d_) + (e_.)*(x_))^(q_.),
x_Symbol] :> Simp[((d + e*x)^(q + 1)*(a + b*Log[c*x^n])^p)/(e*(q + 1)), x]
- Dist[(b*n*p)/(e*(q + 1)), Int[((d + e*x)^(q + 1)*(a + b*Log[c*x^n])^(p -
1))/x, x], x] /; FreeQ[{a, b, c, d, e, n, p, q}, x] && GtQ[p, 0] && NeQ[q,
-1] && (EqQ[p, 1] || (IntegersQ[2*p, 2*q] &&  !IGtQ[q, 0]) || (EqQ[p, 2] &&
 NeQ[q, 1]))
```

Rule 2344

```
Int[((a_.) + Log[(c_.)*(x_)^(n_.)]*(b_.))^(p_.)/((x_)*((d_) + (e_.)*(x_))),
 x_Symbol] :> Dist[1/d, Int[(a + b*Log[c*x^n])^p/x, x], x] - Dist[e/d, Int[
(a + b*Log[c*x^n])^p/(d + e*x), x], x] /; FreeQ[{a, b, c, d, e, n}, x] && I
GtQ[p, 0]
```

Rule 2347

```
Int[(((a_.) + Log[(c_.)*(x_)^(n_.)]*(b_.))^(p_.)*((d_) + (e_.)*(x_))^(q_))/
(x_), x_Symbol] :> Dist[1/d, Int[((d + e*x)^(q + 1)*(a + b*Log[c*x^n])^p)/x
, x], x] - Dist[e/d, Int[(d + e*x)^q*(a + b*Log[c*x^n])^p, x], x] /; FreeQ[
{a, b, c, d, e, n}, x] && IGtQ[p, 0] && LtQ[q, -1] && IntegerQ[2*q]
```

Rule 2411

```
Int[((a_.) + Log[(c_.)*((d_) + (e_.)*(x_))^(n_.)]*(b_.))^(p_.)*((f_.) + (g_
.)*(x_))^(q_.)*((h_.) + (i_.)*(x_))^(r_.), x_Symbol] :> Dist[1/e, Subst[Int
[((g*x)/e)^q*((e*h - d*i)/e + (i*x)/e)^r*(a + b*Log[c*x^n])^p, x], x, d + e
*x], x] /; FreeQ[{a, b, c, d, e, f, g, h, i, n, p, q, r}, x] && EqQ[e*f - d
*g, 0] && (IGtQ[p, 0] || IGtQ[r, 0]) && IntegerQ[2*r]
```

Rule 2475

```
Int[((a_.) + Log[(c_.)*((d_) + (e_.)*(x_)^(n_))^(p_.)]*(b_.))^(q_.)*(x_)^(m
_.)*((f_) + (g_.)*(x_)^(s_))^(r_.), x_Symbol] :> Dist[1/n, Subst[Int[x^(Sim
plify[(m + 1)/n] - 1)*(f + g*x^(s/n))^r*(a + b*Log[c*(d + e*x)^p])^q, x], x
, x^n], x] /; FreeQ[{a, b, c, d, e, f, g, m, n, p, q, r, s}, x] && IntegerQ
[r] && IntegerQ[s/n] && IntegerQ[Simplify[(m + 1)/n]] && (GtQ[(m + 1)/n, 0]
 || IGtQ[q, 0])
```

Rule 5917

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)*((d_.)*(x_))^(m_.), x_Symbol]
 :> Simp[((d*x)^(m + 1)*(a + b*ArcCoth[c*x])^p)/(d*(m + 1)), x] - Dist[(b*c
*p)/(d*(m + 1)), Int[((d*x)^(m + 1)*(a + b*ArcCoth[c*x])^(p - 1))/(1 - c^2*
x^2), x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[p, 0] && (EqQ[p, 1] || In
tegerQ[m]) && NeQ[m, -1]
```

Rule 5949

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)/((d_) + (e_.)*(x_)^2), x_Symb
ol] :> Simp[(a + b*ArcCoth[c*x])^(p + 1)/(b*c*d*(p + 1)), x] /; FreeQ[{a, b
, c, d, e, p}, x] && EqQ[c^2*d + e, 0] && NeQ[p, -1]
```

Rule 5983

```
Int[(((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)*((f_.)*(x_))^(m_))/((d_) + (
e_.)*(x_)^2), x_Symbol] :> Dist[1/d, Int[(f*x)^m*(a + b*ArcCoth[c*x])^p, x]
, x] - Dist[e/(d*f^2), Int[((f*x)^(m + 2)*(a + b*ArcCoth[c*x])^p)/(d + e*x^
2), x], x] /; FreeQ[{a, b, c, d, e, f}, x] && GtQ[p, 0] && LtQ[m, -1]
```

Rule 6082

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))*((d_.) + Log[(f_.) + (g_.)*(x_)^2]*
(e_.))*(x_)^(m_.), x_Symbol] :> Simp[(x^(m + 1)*(d + e*Log[f + g*x^2])*(a +
 b*ArcCoth[c*x]))/(m + 1), x] + (-Dist[(b*c)/(m + 1), Int[(x^(m + 1)*(d + e
*Log[f + g*x^2]))/(1 - c^2*x^2), x], x] - Dist[(2*e*g)/(m + 1), Int[(x^(m +
 2)*(a + b*ArcCoth[c*x]))/(f + g*x^2), x], x]) /; FreeQ[{a, b, c, d, e, f,
g}, x] && ILtQ[m/2, 0]
```

Rubi steps

$$\int \frac{\left(a+b\coth^{-1}(cx)\right)\left(d+e\log\left(1-c^2x^2\right)\right)}{x^6}\,dx = -\frac{\left(a+b\coth^{-1}(cx)\right)\left(d+e\log\left(1-c^2x^2\right)\right)}{5x^5}+\frac{1}{5}(bc)\int\frac{d+e\,\mathrm{l}}{x^5\,(}$$

$$= -\frac{\left(a+b\coth^{-1}(cx)\right)\left(d+e\log\left(1-c^2x^2\right)\right)}{5x^5}+\frac{1}{10}(bc)\,\mathrm{Subst}\Bigg(\int$$

$$= \frac{2c^2e\left(a+b\coth^{-1}(cx)\right)}{15x^3}-\frac{\left(a+b\coth^{-1}(cx)\right)\left(d+e\log\left(1-c\right.\right.}{5x^5}$$

$$= \frac{2c^2e\left(a+b\coth^{-1}(cx)\right)}{15x^3}+\frac{2c^4e\left(a+b\coth^{-1}(cx)\right)}{5x}-\frac{c^5e\left(a+\right.}{}$$

$$= \frac{2c^2e\left(a+b\coth^{-1}(cx)\right)}{15x^3}+\frac{2c^4e\left(a+b\coth^{-1}(cx)\right)}{5x}-\frac{c^5e\left(a+\right.}{}$$

$$= \frac{bc^3e}{15x^2}+\frac{2c^2e\left(a+b\coth^{-1}(cx)\right)}{15x^3}+\frac{2c^4e\left(a+b\coth^{-1}(cx)\right)}{5x}-$$

$$= \frac{7bc^3e}{60x^2}+\frac{2c^2e\left(a+b\coth^{-1}(cx)\right)}{15x^3}+\frac{2c^4e\left(a+b\coth^{-1}(cx)\right)}{5x}-$$

$$= \frac{7bc^3e}{60x^2}+\frac{2c^2e\left(a+b\coth^{-1}(cx)\right)}{15x^3}+\frac{2c^4e\left(a+b\coth^{-1}(cx)\right)}{5x}-$$

**Mathematica [F]** time = 0.30, size = 0, normalized size = 0.00

$$\int \frac{\left(a+b\coth^{-1}(cx)\right)\left(d+e\log\left(1-c^2x^2\right)\right)}{x^6}\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[((a + b*ArcCoth[c*x])*(d + e*Log[1 - c^2*x^2]))/x^6,x]
```

```
[Out] Integrate[((a + b*ArcCoth[c*x])*(d + e*Log[1 - c^2*x^2]))/x^6, x]
```

**fricas [F]** time = 0.44, size = 0, normalized size = 0.00

$$\mathrm{integral}\left(\frac{bd\,\mathrm{arcoth}\,(cx)+ad+(be\,\mathrm{arcoth}\,(cx)+ae)\log\left(-c^2x^2+1\right)}{x^6},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccoth(c*x))*(d+e*log(-c^2*x^2+1))/x^6,x, algorithm="fricas
")
```

```
[Out] integral((b*d*arccoth(c*x) + a*d + (b*e*arccoth(c*x) + a*e)*log(-c^2*x^2 +
1))/x^6, x)
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{(b\,\mathrm{arcoth}\,(cx)+a)\left(e\log\left(-c^2x^2+1\right)+d\right)}{x^6}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccoth(c*x))*(d+e*log(-c^2*x^2+1))/x^6,x, algorithm="giac")
```

```
[Out] integrate((b*arccoth(c*x) + a)*(e*log(-c^2*x^2 + 1) + d)/x^6, x)
```

**maple [F(-2)]** time = 180.00, size = 0, normalized size = 0.00

$$\int \frac{(a+b\,\mathrm{arccoth}(cx))\left(d+e\ln\left(-c^2x^2+1\right)\right)}{x^6}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a+b*arccoth(c*x))*(d+e*ln(-c^2*x^2+1))/x^6,x)
```

```
[Out] int((a+b*arccoth(c*x))*(d+e*ln(-c^2*x^2+1))/x^6,x)
```

**maxima [F]** time = 0.00, size = 0, normalized size = 0.00

$$-\frac{1}{20}\left(\left(2\,c^4\log\left(c^2x^2-1\right)-2\,c^4\log\left(x^2\right)+\frac{2\,c^2x^2+1}{x^4}\right)c+\frac{4\,\mathrm{arcoth}(cx)}{x^5}\right)bd-\frac{1}{15}\left(\left(3\,c^3\log(cx+1)-3\,c^3\log(cx\right.\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccoth(c*x))*(d+e*log(-c^2*x^2+1))/x^6,x, algorithm="maxima
")
```

```
[Out] -1/20*((2*c^4*log(c^2*x^2 - 1) - 2*c^4*log(x^2) + (2*c^2*x^2 + 1)/x^4)*c +
4*arccoth(c*x)/x^5)*b*d - 1/15*((3*c^3*log(c*x + 1) - 3*c^3*log(c*x - 1) -
2*(3*c^2*x^2 + 1)/x^3)*c^2 + 3*log(-c^2*x^2 + 1)/x^5)*a*e - 1/10*b*e*(log(c
*x + 1)^2/x^5 - 5*integrate(-1/5*(5*(c*x + 1)*log(c*x - 1)^2 - (5*I*pi + (5
*I*pi*c + 2*c)*x)*log(c*x + 1) - (-5*I*pi - 5*I*pi*c*x)*log(c*x - 1))/(c*x^
7 + x^6), x)) - 1/5*a*d/x^5
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.00

$$\int \frac{(a+b\,\mathrm{acoth}(c\,x))\,\left(d+e\,\ln\left(1-c^2\,x^2\right)\right)}{x^6}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(((a + b*acoth(c*x))*(d + e*log(1 - c^2*x^2)))/x^6,x)
```

```
[Out] int(((a + b*acoth(c*x))*(d + e*log(1 - c^2*x^2)))/x^6, x)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{(a+b\,\mathrm{acoth}(cx))\left(d+e\log\left(-c^2x^2+1\right)\right)}{x^6}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*acoth(c*x))*(d+e*ln(-c**2*x**2+1))/x**6,x)
```

```
[Out] Integral((a + b*acoth(c*x))*(d + e*log(-c**2*x**2 + 1))/x**6, x)
```

# 3.278 $\int x\left(a+b\coth^{-1}(cx)\right)\left(d+e\log\left(f+gx^2\right)\right)\,dx$

**Optimal**. Leaf size=512

$$\frac{1}{2}dx^2\left(a+b\coth^{-1}(cx)\right)+\frac{e\left(f+gx^2\right)\log\left(f+gx^2\right)\left(a+b\coth^{-1}(cx)\right)}{2g}-\frac{1}{2}ex^2\left(a+b\coth^{-1}(cx)\right)-\frac{b(d-e)\tanh}{2c^2}$$

```
[Out] 1/2*b*(d-e)*x/c-b*e*x/c+1/2*d*x^2*(a+b*arccoth(c*x))-1/2*e*x^2*(a+b*arccoth
(c*x))-1/2*b*(d-e)*arctanh(c*x)/c^2-b*e*(c^2*f+g)*arctanh(c*x)*ln(2/(c*x+1)
)/c^2/g+1/2*b*e*x*ln(g*x^2+f)/c+1/2*e*(g*x^2+f)*(a+b*arccoth(c*x))*ln(g*x^2
+f)/g-1/2*b*e*(c^2*f+g)*arctanh(c*x)*ln(g*x^2+f)/c^2/g+1/2*b*e*(c^2*f+g)*ar
ctanh(c*x)*ln(2*c*((-f)^(1/2)-x*g^(1/2))/(c*x+1)/(c*(-f)^(1/2)-g^(1/2)))/c^
2/g+1/2*b*e*(c^2*f+g)*arctanh(c*x)*ln(2*c*((-f)^(1/2)+x*g^(1/2))/(c*x+1)/(c
*(-f)^(1/2)+g^(1/2)))/c^2/g+1/2*b*e*(c^2*f+g)*polylog(2,1-2/(c*x+1))/c^2/g-
1/4*b*e*(c^2*f+g)*polylog(2,1-2*c*((-f)^(1/2)-x*g^(1/2))/(c*x+1)/(c*(-f)^(1
/2)-g^(1/2)))/c^2/g-1/4*b*e*(c^2*f+g)*polylog(2,1-2*c*((-f)^(1/2)+x*g^(1/2)
)/(c*x+1)/(c*(-f)^(1/2)+g^(1/2)))/c^2/g+b*e*arctan(x*g^(1/2)/f^(1/2))*f^(1/
2)/c/g^(1/2)
```

**Rubi** [A] time = 0.77, antiderivative size = 512, normalized size of antiderivative = 1.00, number of steps used = 22, number of rules used = 17, integrand size = 22, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.773, Rules used = {2454, 2389, 2295, 6084, 321, 207, 517, 2528, 2448, 205, 2470, 12, 5992, 5920, 2402, 2315, 2447}

$$\frac{be\left(c^2f+g\right)\text{PolyLog}\left(2,1-\frac{2}{cx+1}\right)}{2c^2g}-\frac{be\left(c^2f+g\right)\text{PolyLog}\left(2,1-\frac{2c\left(\sqrt{-f}-\sqrt{g}x\right)}{(cx+1)\left(c\sqrt{-f}-\sqrt{g}\right)}\right)}{4c^2g}-\frac{be\left(c^2f+g\right)\text{PolyLog}\left(2,\right.}{4c^2g}$$

Antiderivative was successfully verified.

```
[In] Int[x*(a + b*ArcCoth[c*x])*(d + e*Log[f + g*x^2]),x]
```

```
[Out] (b*(d - e)*x)/(2*c) - (b*e*x)/c + (d*x^2*(a + b*ArcCoth[c*x]))/2 - (e*x^2*(
a + b*ArcCoth[c*x]))/2 + (b*e*Sqrt[f]*ArcTan[(Sqrt[g]*x)/Sqrt[f]])/(c*Sqrt[
g]) - (b*(d - e)*ArcTanh[c*x])/(2*c^2) - (b*e*(c^2*f + g)*ArcTanh[c*x]*Log[
2/(1 + c*x)])/(c^2*g) + (b*e*(c^2*f + g)*ArcTanh[c*x]*Log[(2*c*(Sqrt[-f] -
Sqrt[g]*x))/((c*Sqrt[-f] - Sqrt[g])*(1 + c*x))])/(2*c^2*g) + (b*e*(c^2*f +
g)*ArcTanh[c*x]*Log[(2*c*(Sqrt[-f] + Sqrt[g]*x))/((c*Sqrt[-f] + Sqrt[g])*(1
 + c*x))])/(2*c^2*g) + (b*e*x*Log[f + g*x^2])/(2*c) + (e*(f + g*x^2)*(a + b
*ArcCoth[c*x])*Log[f + g*x^2])/(2*g) - (b*e*(c^2*f + g)*ArcTanh[c*x]*Log[f
+ g*x^2])/(2*c^2*g) + (b*e*(c^2*f + g)*PolyLog[2, 1 - 2/(1 + c*x)])/(2*c^2*
g) - (b*e*(c^2*f + g)*PolyLog[2, 1 - (2*c*(Sqrt[-f] - Sqrt[g]*x))/((c*Sqrt[
-f] - Sqrt[g])*(1 + c*x))])/(4*c^2*g) - (b*e*(c^2*f + g)*PolyLog[2, 1 - (2*
c*(Sqrt[-f] + Sqrt[g]*x))/((c*Sqrt[-f] + Sqrt[g])*(1 + c*x))])/(4*c^2*g)
```

Rule 12

```
Int[(a_)*(u_), x_Symbol] :> Dist[a, Int[u, x], x] /; FreeQ[a, x] &&  !Match
Q[u, (b_)*(v_) /; FreeQ[b, x]]
```

Rule 205

```
Int[((a_) + (b_.)*(x_)^2)^(-1), x_Symbol] :> Simp[(Rt[a/b, 2]*ArcTan[x/Rt[a
/b, 2]])/a, x] /; FreeQ[{a, b}, x] && PosQ[a/b]
```

Rule 207

```
Int[((a_) + (b_.)*(x_)^2)^(-1), x_Symbol] :> -Simp[ArcTanh[(Rt[b, 2]*x)/Rt[
-a, 2]]/(Rt[-a, 2]*Rt[b, 2]), x] /; FreeQ[{a, b}, x] && NegQ[a/b] && (LtQ[a
```

```
, 0] || GtQ[b, 0])
```

Rule 321

```
Int[((c_.)*(x_))^(m_)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Simp[(c^(
n - 1)*(c*x)^(m - n + 1)*(a + b*x^n)^(p + 1))/(b*(m + n*p + 1)), x] - Dist[
(a*c^n*(m - n + 1))/(b*(m + n*p + 1)), Int[(c*x)^(m - n)*(a + b*x^n)^p, x],
 x] /; FreeQ[{a, b, c, p}, x] && IGtQ[n, 0] && GtQ[m, n - 1] && NeQ[m + n*p
 + 1, 0] && IntBinomialQ[a, b, c, n, m, p, x]
```

Rule 517

```
Int[(u_.)*((c_) + (d_.)*(x_)^(n_.))^(q_.)*((a1_) + (b1_.)*(x_)^(non2_.))^(p
_.)*((a2_) + (b2_.)*(x_)^(non2_.))^(p_.), x_Symbol] :> Int[u*(a1*a2 + b1*b2
*x^n)^p*(c + d*x^n)^q, x] /; FreeQ[{a1, b1, a2, b2, c, d, n, p, q}, x] && E
qQ[non2, n/2] && EqQ[a2*b1 + a1*b2, 0] && (IntegerQ[p] || (GtQ[a1, 0] && Gt
Q[a2, 0]))
```

Rule 2295

```
Int[Log[(c_.)*(x_)^(n_.)], x_Symbol] :> Simp[x*Log[c*x^n], x] - Simp[n*x, x
] /; FreeQ[{c, n}, x]
```

Rule 2315

```
Int[Log[(c_.)*(x_)]/((d_) + (e_.)*(x_)), x_Symbol] :> -Simp[PolyLog[2, 1 -
c*x]/e, x] /; FreeQ[{c, d, e}, x] && EqQ[e + c*d, 0]
```

Rule 2389

```
Int[((a_.) + Log[(c_.)*((d_) + (e_.)*(x_))^(n_.)]*(b_.))^(p_.), x_Symbol] :
> Dist[1/e, Subst[Int[(a + b*Log[c*x^n])^p, x], x, d + e*x], x] /; FreeQ[{a
, b, c, d, e, n, p}, x]
```

Rule 2402

```
Int[Log[(c_.)/((d_) + (e_.)*(x_))]/((f_) + (g_.)*(x_)^2), x_Symbol] :> -Dis
t[e/g, Subst[Int[Log[2*d*x]/(1 - 2*d*x), x], x, 1/(d + e*x)], x] /; FreeQ[{
c, d, e, f, g}, x] && EqQ[c, 2*d] && EqQ[e^2*f + d^2*g, 0]
```

Rule 2447

```
Int[Log[u_]*(Pq_)^(m_.), x_Symbol] :> With[{C = FullSimplify[(Pq^m*(1 - u))
/D[u, x]]}, Simp[C*PolyLog[2, 1 - u], x] /; FreeQ[C, x]] /; IntegerQ[m] &&
PolyQ[Pq, x] && RationalFunctionQ[u, x] && LeQ[RationalFunctionExponents[u,
 x][[2]], Expon[Pq, x]]
```

Rule 2448

```
Int[Log[(c_.)*((d_) + (e_.)*(x_)^(n_))^(p_.)], x_Symbol] :> Simp[x*Log[c*(d
 + e*x^n)^p], x] - Dist[e*n*p, Int[x^n/(d + e*x^n), x], x] /; FreeQ[{c, d,
e, n, p}, x]
```

Rule 2454

```
Int[((a_.) + Log[(c_.)*((d_) + (e_.)*(x_)^(n_))^(p_.)]*(b_.))^(q_.)*(x_)^(m
_.), x_Symbol] :> Dist[1/n, Subst[Int[x^(Simplify[(m + 1)/n] - 1)*(a + b*Lo
g[c*(d + e*x)^p])^q, x], x, x^n], x] /; FreeQ[{a, b, c, d, e, m, n, p, q},
x] && IntegerQ[Simplify[(m + 1)/n]] && (GtQ[(m + 1)/n, 0] || IGtQ[q, 0]) &&
```

```
!(EqQ[q, 1] && ILtQ[n, 0] && IGtQ[m, 0])
```

Rule 2470

```
Int[((a_.) + Log[(c_.)*((d_) + (e_.)*(x_)^(n_))^(p_.)]*(b_.))/((f_) + (g_.)
*(x_)^2), x_Symbol] :> With[{u = IntHide[1/(f + g*x^2), x]}, Simp[u*(a + b*
Log[c*(d + e*x^n)^p]), x] - Dist[b*e*n*p, Int[(u*x^(n - 1))/(d + e*x^n), x]
, x]] /; FreeQ[{a, b, c, d, e, f, g, n, p}, x] && IntegerQ[n]
```

Rule 2528

```
Int[((a_.) + Log[(c_.)*(RFx_)^(p_.)]*(b_.))^(n_.)*(RGx_), x_Symbol] :> With
[{u = ExpandIntegrand[(a + b*Log[c*RFx^p])^n, RGx, x]}, Int[u, x] /; SumQ[u
]] /; FreeQ[{a, b, c, p}, x] && RationalFunctionQ[RFx, x] && RationalFuncti
onQ[RGx, x] && IGtQ[n, 0]
```

Rule 5920

```
Int[((a_.) + ArcTanh[(c_.)*(x_)]*(b_.))/((d_) + (e_.)*(x_)), x_Symbol] :> -
Simp[((a + b*ArcTanh[c*x])*Log[2/(1 + c*x)])/e, x] + (Dist[(b*c)/e, Int[Log
[2/(1 + c*x)]/(1 - c^2*x^2), x], x] - Dist[(b*c)/e, Int[Log[(2*c*(d + e*x))
/((c*d + e)*(1 + c*x))]/(1 - c^2*x^2), x], x] + Simp[((a + b*ArcTanh[c*x])*
Log[(2*c*(d + e*x))/((c*d + e)*(1 + c*x))])/e, x]) /; FreeQ[{a, b, c, d, e}
, x] && NeQ[c^2*d^2 - e^2, 0]
```

Rule 5992

```
Int[(((a_.) + ArcTanh[(c_.)*(x_)]*(b_.))*(x_)^(m_.))/((d_) + (e_.)*(x_)^2),
 x_Symbol] :> Int[ExpandIntegrand[a + b*ArcTanh[c*x], x^m/(d + e*x^2), x],
x] /; FreeQ[{a, b, c, d, e}, x] && IntegerQ[m] &&  !(EqQ[m, 1] && NeQ[a, 0]
)
```

Rule 6084

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))*((d_.) + Log[(f_.) + (g_.)*(x_)^2]*
(e_.))*(x_)^(m_.), x_Symbol] :> With[{u = IntHide[x^m*(d + e*Log[f + g*x^2]
), x]}, Dist[a + b*ArcCoth[c*x], u, x] - Dist[b*c, Int[ExpandIntegrand[u/(1
 - c^2*x^2), x], x], x]] /; FreeQ[{a, b, c, d, e, f, g}, x] && IGtQ[(m + 1)
/2, 0]
```

Rubi steps

$$\int x\left(a+b\coth^{-1}(cx)\right)\left(d+e\log\left(f+gx^2\right)\right)\,dx=\frac{1}{2}dx^2\left(a+b\coth^{-1}(cx)\right)-\frac{1}{2}ex^2\left(a+b\coth^{-1}(cx)\right)+\frac{e\left(f+gx\right.}{}$$

$$=\frac{1}{2}dx^2\left(a+b\coth^{-1}(cx)\right)-\frac{1}{2}ex^2\left(a+b\coth^{-1}(cx)\right)+\frac{e\left(f+gx\right.}{}$$

$$=\frac{b(d-e)x}{2c}+\frac{1}{2}dx^2\left(a+b\coth^{-1}(cx)\right)-\frac{1}{2}ex^2\left(a+b\coth^{-1}(cx)\right)$$

$$=\frac{b(d-e)x}{2c}+\frac{1}{2}dx^2\left(a+b\coth^{-1}(cx)\right)-\frac{1}{2}ex^2\left(a+b\coth^{-1}(cx)\right)$$

$$=\frac{b(d-e)x}{2c}+\frac{1}{2}dx^2\left(a+b\coth^{-1}(cx)\right)-\frac{1}{2}ex^2\left(a+b\coth^{-1}(cx)\right)$$

$$=\frac{b(d-e)x}{2c}+\frac{1}{2}dx^2\left(a+b\coth^{-1}(cx)\right)-\frac{1}{2}ex^2\left(a+b\coth^{-1}(cx)\right)$$

$$=\frac{b(d-e)x}{2c}-\frac{bex}{c}+\frac{1}{2}dx^2\left(a+b\coth^{-1}(cx)\right)-\frac{1}{2}ex^2\left(a+b\coth\right.$$

$$=\frac{b(d-e)x}{2c}-\frac{bex}{c}+\frac{1}{2}dx^2\left(a+b\coth^{-1}(cx)\right)-\frac{1}{2}ex^2\left(a+b\coth\right.$$

$$=\frac{b(d-e)x}{2c}-\frac{bex}{c}+\frac{1}{2}dx^2\left(a+b\coth^{-1}(cx)\right)-\frac{1}{2}ex^2\left(a+b\coth\right.$$

$$=\frac{b(d-e)x}{2c}-\frac{bex}{c}+\frac{1}{2}dx^2\left(a+b\coth^{-1}(cx)\right)-\frac{1}{2}ex^2\left(a+b\coth\right.$$

$$=\frac{b(d-e)x}{2c}-\frac{bex}{c}+\frac{1}{2}dx^2\left(a+b\coth^{-1}(cx)\right)-\frac{1}{2}ex^2\left(a+b\coth\right.$$

$$=\frac{b(d-e)x}{2c}-\frac{bex}{c}+\frac{1}{2}dx^2\left(a+b\coth^{-1}(cx)\right)-\frac{1}{2}ex^2\left(a+b\coth\right.$$

**Mathematica [A]** time = 4.43, size = 677, normalized size = 1.32

$$\frac{2ac^2dgx^2+2ac^2egx^2\log\left(f+gx^2\right)+2ac^2ef\log\left(f+gx^2\right)-2ac^2egx^2+2bc^2dgx^2\coth^{-1}(cx)+bc^2ef\,\mathrm{Li}_2\left(\frac{e^{2\coth^{-1}}}{fc^2+2\sqrt{}}\right.}{}$$

Warning: Unable to verify antiderivative.

```
[In] Integrate[x*(a + b*ArcCoth[c*x])*(d + e*Log[f + g*x^2]),x]
```

```
[Out] (2*b*c*d*g*x - 6*b*c*e*g*x + 2*a*c^2*d*g*x^2 - 2*a*c^2*e*g*x^2 - 2*b*d*g*Ar
cCoth[c*x] + 2*b*e*g*ArcCoth[c*x] + 2*b*c^2*d*g*x^2*ArcCoth[c*x] - 2*b*c^2*
e*g*x^2*ArcCoth[c*x] - 4*b*c^2*e*f*ArcCoth[c*x]^2 - 4*b*e*g*ArcCoth[c*x]^2
+ 4*b*c*e*Sqrt[f]*Sqrt[g]*ArcTan[(Sqrt[g]*x)/Sqrt[f]] - 4*b*c^2*e*f*ArcCoth
[c*x]*Log[1 - E^(-2*ArcCoth[c*x])] - 4*b*e*g*ArcCoth[c*x]*Log[1 - E^(-2*Arc
```

```
Coth[c*x])] + 2*b*c^2*e*f*ArcCoth[c*x]*Log[1 + (E^(2*ArcCoth[c*x])*(c^2*f +
 g))/(-(c^2*f) - 2*c*Sqrt[-f]*Sqrt[g] + g)] + 2*b*e*g*ArcCoth[c*x]*Log[1 +
(E^(2*ArcCoth[c*x])*(c^2*f + g))/(-(c^2*f) - 2*c*Sqrt[-f]*Sqrt[g] + g)] + 2
*b*c^2*e*f*ArcCoth[c*x]*Log[1 + (E^(2*ArcCoth[c*x])*(c^2*f + g))/(-(c^2*f)
+ 2*c*Sqrt[-f]*Sqrt[g] + g)] + 2*b*e*g*ArcCoth[c*x]*Log[1 + (E^(2*ArcCoth[c
*x])*(c^2*f + g))/(-(c^2*f) + 2*c*Sqrt[-f]*Sqrt[g] + g)] + 2*a*c^2*e*f*Log[
f + g*x^2] + 2*b*c*e*g*x*Log[f + g*x^2] + 2*a*c^2*e*g*x^2*Log[f + g*x^2] -
2*b*e*g*ArcCoth[c*x]*Log[f + g*x^2] + 2*b*c^2*e*g*x^2*ArcCoth[c*x]*Log[f +
g*x^2] + 2*b*e*(c^2*f + g)*PolyLog[2, E^(-2*ArcCoth[c*x])] + b*e*(c^2*f + g
)*PolyLog[2, (E^(2*ArcCoth[c*x])*(c^2*f + g))/(c^2*f - 2*c*Sqrt[-f]*Sqrt[g]
 - g)] + b*c^2*e*f*PolyLog[2, (E^(2*ArcCoth[c*x])*(c^2*f + g))/(c^2*f + 2*c
*Sqrt[-f]*Sqrt[g] - g)] + b*e*g*PolyLog[2, (E^(2*ArcCoth[c*x])*(c^2*f + g))
/(c^2*f + 2*c*Sqrt[-f]*Sqrt[g] - g)])/(4*c^2*g)
```

**fricas [F]** time = 0.60, size = 0, normalized size = 0.00

$$\text{integral}\left(bdx\operatorname{arcoth}(cx) + adx + (bex\operatorname{arcoth}(cx) + aex)\log\left(gx^2 + f\right), x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*(a+b*arccoth(c*x))*(d+e*log(g*x^2+f)),x, algorithm="fricas")
```

```
[Out] integral(b*d*x*arccoth(c*x) + a*d*x + (b*e*x*arccoth(c*x) + a*e*x)*log(g*x^
2 + f), x)
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int (b\operatorname{arcoth}(cx) + a)\left(e\log\left(gx^2 + f\right) + d\right)x\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*(a+b*arccoth(c*x))*(d+e*log(g*x^2+f)),x, algorithm="giac")
```

```
[Out] integrate((b*arccoth(c*x) + a)*(e*log(g*x^2 + f) + d)*x, x)
```

**maple [C]** time = 3.14, size = 8491, normalized size = 16.58

output too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x*(a+b*arccoth(c*x))*(d+e*ln(g*x^2+f)),x)
```

```
[Out] result too large to display
```

**maxima [F]** time = 0.00, size = 0, normalized size = 0.00

$$\frac{1}{2}adx^2 + \frac{1}{4}\left(2x^2\operatorname{arcoth}(cx) + c\left(\frac{2x}{c^2} - \frac{\log(cx+1)}{c^3} + \frac{\log(cx-1)}{c^3}\right)\right)bd - \frac{1}{4}\left(2c^2g\int \frac{x^3\log(cx+1)}{c^2gx^2 + c^2f}\,dx - 2c^2g\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*(a+b*arccoth(c*x))*(d+e*log(g*x^2+f)),x, algorithm="maxima")
```

```
[Out] 1/2*a*d*x^2 + 1/4*(2*x^2*arccoth(c*x) + c*(2*x/c^2 - log(c*x + 1)/c^3 + log
(c*x - 1)/c^3))*b*d - 1/4*(2*c^2*g*integrate(x^3*log(c*x + 1)/(c^2*g*x^2 +
c^2*f), x) - 2*c^2*g*integrate(x^3*log(c*x - 1)/(c^2*g*x^2 + c^2*f), x) - 2
*c*g*(-I*f*(log(I*g*x/sqrt(f*g) + 1) - log(-I*g*x/sqrt(f*g) + 1))/(sqrt(f*g
)*c^2*g) - 2*x/(c^2*g)) - 2*g*integrate(x*log(c*x + 1)/(c^2*g*x^2 + c^2*f),
 x) + 2*g*integrate(x*log(c*x - 1)/(c^2*g*x^2 + c^2*f), x) - (2*c*x + (c^2*
```

```
x^2 - 1)*log(c*x + 1) - (c^2*x^2 - 1)*log(c*x - 1))*log(g*x^2 + f)/c^2)*b*e
 - 1/2*(g*x^2 - (g*x^2 + f)*log(g*x^2 + f) + f)*a*e/g
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.00

$$\int x\,\left(a+b\,\mathrm{acoth}\left(c\,x\right)\right)\,\left(d+e\,\ln\left(g\,x^2+f\right)\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x*(a + b*acoth(c*x))*(d + e*log(f + g*x^2)),x)
```

```
[Out] int(x*(a + b*acoth(c*x))*(d + e*log(f + g*x^2)), x)
```

**sympy [F(-1)]** time = 0.00, size = 0, normalized size = 0.00

Timed out

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*(a+b*acoth(c*x))*(d+e*ln(g*x**2+f)),x)
```

```
[Out] Timed out
```

# 3.279 $\int \left(a+b\coth^{-1}(cx)\right)\left(d+e\log\left(f+gx^2\right)\right)\,dx$

**Optimal**. Leaf size=546

$$x\left(a+b\coth^{-1}(cx)\right)\left(d+e\log\left(f+gx^2\right)\right)+\frac{2ae\sqrt{f}\,\tan^{-1}\left(\frac{\sqrt{g}\,x}{\sqrt{f}}\right)}{\sqrt{g}}-2aex+\frac{b\log\left(\frac{g\left(1-c^2x^2\right)}{c^2f+g}\right)\left(d+e\log\left(f+gx^2\right)\right)}{2c}+$$

```
[Out] -2*a*e*x-2*b*e*x*arccoth(c*x)-b*e*ln(-c^2*x^2+1)/c+x*(a+b*arccoth(c*x))*(d+
e*ln(g*x^2+f))+1/2*b*ln(g*(-c^2*x^2+1)/(c^2*f+g))*(d+e*ln(g*x^2+f))/c+1/2*b
*e*polylog(2,c^2*(g*x^2+f)/(c^2*f+g))/c+2*a*e*arctan(x*g^(1/2)/f^(1/2))*f^(
1/2)/g^(1/2)-b*e*arctan(x*g^(1/2)/f^(1/2))*ln(1-1/c/x)*f^(1/2)/g^(1/2)+b*e*
arctan(x*g^(1/2)/f^(1/2))*ln(1+1/c/x)*f^(1/2)/g^(1/2)+b*e*arctan(x*g^(1/2)/
f^(1/2))*ln(-2*(-c*x+1)*f^(1/2)*g^(1/2)/(I*c*f^(1/2)-g^(1/2))/(f^(1/2)-I*x*
g^(1/2)))*f^(1/2)/g^(1/2)-b*e*arctan(x*g^(1/2)/f^(1/2))*ln(2*(c*x+1)*f^(1/2
)*g^(1/2)/(I*c*f^(1/2)+g^(1/2))/(f^(1/2)-I*x*g^(1/2)))*f^(1/2)/g^(1/2)-1/2*
I*b*e*polylog(2,1+2*(-c*x+1)*f^(1/2)*g^(1/2)/(I*c*f^(1/2)-g^(1/2))/(f^(1/2)
-I*x*g^(1/2)))*f^(1/2)/g^(1/2)+1/2*I*b*e*polylog(2,1-2*(c*x+1)*f^(1/2)*g^(1
/2)/(I*c*f^(1/2)+g^(1/2))/(f^(1/2)-I*x*g^(1/2)))*f^(1/2)/g^(1/2)
```

**Rubi** [A] time = 1.39, antiderivative size = 546, normalized size of antiderivative = 1.00, number of steps used = 38, number of rules used = 20, integrand size = 21, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.952, Rules used = {6074, 2475, 2394, 2393, 2391, 5981, 5911, 260, 5975, 205, 5973, 2470, 12, 6688, 4876, 4848, 4856, 2402, 2315, 2447}

$$\frac{be\,\text{PolyLog}\left(2,\frac{c^2\left(f+gx^2\right)}{c^2f+g}\right)}{2c}-\frac{ibe\sqrt{f}\,\text{PolyLog}\left(2,1+\frac{2\sqrt{f}\,\sqrt{g}\,(1-cx)}{\left(-\sqrt{g}+ic\sqrt{f}\right)\left(\sqrt{f}-i\sqrt{g}\,x\right)}\right)}{2\sqrt{g}}+\frac{ibe\sqrt{f}\,\text{PolyLog}\left(2,1-\frac{2\sqrt{f}\,\sqrt{g}\,(cx}{\left(\sqrt{g}+ic\sqrt{f}\right)\left(\sqrt{f}\right.}\right.}{2\sqrt{g}}$$

Antiderivative was successfully verified.

```
[In] Int[(a + b*ArcCoth[c*x])*(d + e*Log[f + g*x^2]),x]
```

```
[Out] -2*a*e*x - 2*b*e*x*ArcCoth[c*x] + (2*a*e*Sqrt[f]*ArcTan[(Sqrt[g]*x)/Sqrt[f]
])/Sqrt[g] - (b*e*Sqrt[f]*ArcTan[(Sqrt[g]*x)/Sqrt[f]]*Log[1 - 1/(c*x)])/Sqr
t[g] + (b*e*Sqrt[f]*ArcTan[(Sqrt[g]*x)/Sqrt[f]]*Log[1 + 1/(c*x)])/Sqrt[g] +
 (b*e*Sqrt[f]*ArcTan[(Sqrt[g]*x)/Sqrt[f]]*Log[(-2*Sqrt[f]*Sqrt[g]*(1 - c*x)
)/((I*c*Sqrt[f] - Sqrt[g])*(Sqrt[f] - I*Sqrt[g]*x))])/Sqrt[g] - (b*e*Sqrt[f
]*ArcTan[(Sqrt[g]*x)/Sqrt[f]]*Log[(2*Sqrt[f]*Sqrt[g]*(1 + c*x))/((I*c*Sqrt[
f] + Sqrt[g])*(Sqrt[f] - I*Sqrt[g]*x))])/Sqrt[g] - (b*e*Log[1 - c^2*x^2])/c
 + x*(a + b*ArcCoth[c*x])*(d + e*Log[f + g*x^2]) + (b*Log[(g*(1 - c^2*x^2))
/(c^2*f + g)]*(d + e*Log[f + g*x^2]))/(2*c) + (b*e*PolyLog[2, (c^2*(f + g*x
^2))/(c^2*f + g)])/(2*c) - ((I/2)*b*e*Sqrt[f]*PolyLog[2, 1 + (2*Sqrt[f]*Sqr
t[g]*(1 - c*x))/((I*c*Sqrt[f] - Sqrt[g])*(Sqrt[f] - I*Sqrt[g]*x))])/Sqrt[g]
 + ((I/2)*b*e*Sqrt[f]*PolyLog[2, 1 - (2*Sqrt[f]*Sqrt[g]*(1 + c*x))/((I*c*Sq
rt[f] + Sqrt[g])*(Sqrt[f] - I*Sqrt[g]*x))])/Sqrt[g]
```

Rule 12

```
Int[(a_)*(u_), x_Symbol] :> Dist[a, Int[u, x], x] /; FreeQ[a, x] &&  !Match
Q[u, (b_)*(v_) /; FreeQ[b, x]]
```

Rule 205

```
Int[((a_) + (b_.)*(x_)^2)^(-1), x_Symbol] :> Simp[(Rt[a/b, 2]*ArcTan[x/Rt[a
/b, 2]])/a, x] /; FreeQ[{a, b}, x] && PosQ[a/b]
```

Rule 260

```
Int[(x_)^(m_.)/((a_) + (b_.)*(x_)^(n_)), x_Symbol] :> Simp[Log[RemoveConten
t[a + b*x^n, x]]/(b*n), x] /; FreeQ[{a, b, m, n}, x] && EqQ[m, n - 1]
```

Rule 2315

```
Int[Log[(c_.)*(x_)]/((d_) + (e_.)*(x_)), x_Symbol] :> -Simp[PolyLog[2, 1 -
c*x]/e, x] /; FreeQ[{c, d, e}, x] && EqQ[e + c*d, 0]
```

Rule 2391

```
Int[Log[(c_.)*((d_) + (e_.)*(x_)^(n_.))]/(x_), x_Symbol] :> -Simp[PolyLog[2
, -(c*e*x^n)]/n, x] /; FreeQ[{c, d, e, n}, x] && EqQ[c*d, 1]
```

Rule 2393

```
Int[((a_.) + Log[(c_.)*((d_) + (e_.)*(x_))]*(b_.))/((f_.) + (g_.)*(x_)), x_
Symbol] :> Dist[1/g, Subst[Int[(a + b*Log[1 + (c*e*x)/g])/x, x], x, f + g*x
], x] /; FreeQ[{a, b, c, d, e, f, g}, x] && NeQ[e*f - d*g, 0] && EqQ[g + c*
(e*f - d*g), 0]
```

Rule 2394

```
Int[((a_.) + Log[(c_.)*((d_) + (e_.)*(x_))^(n_.)]*(b_.))/((f_.) + (g_.)*(x_
)), x_Symbol] :> Simp[(Log[(e*(f + g*x))/(e*f - d*g)]*(a + b*Log[c*(d + e*x
)^n]))/g, x] - Dist[(b*e*n)/g, Int[Log[(e*(f + g*x))/(e*f - d*g)]/(d + e*x)
, x], x] /; FreeQ[{a, b, c, d, e, f, g, n}, x] && NeQ[e*f - d*g, 0]
```

Rule 2402

```
Int[Log[(c_.)/((d_) + (e_.)*(x_))]/((f_) + (g_.)*(x_)^2), x_Symbol] :> -Dis
t[e/g, Subst[Int[Log[2*d*x]/(1 - 2*d*x), x], x, 1/(d + e*x)], x] /; FreeQ[{
c, d, e, f, g}, x] && EqQ[c, 2*d] && EqQ[e^2*f + d^2*g, 0]
```

Rule 2447

```
Int[Log[u_]*(Pq_)^(m_.), x_Symbol] :> With[{C = FullSimplify[(Pq^m*(1 - u))
/D[u, x]]}, Simp[C*PolyLog[2, 1 - u], x] /; FreeQ[C, x]] /; IntegerQ[m] &&
PolyQ[Pq, x] && RationalFunctionQ[u, x] && LeQ[RationalFunctionExponents[u,
 x][[2]], Expon[Pq, x]]
```

Rule 2470

```
Int[((a_.) + Log[(c_.)*((d_) + (e_.)*(x_)^(n_))^(p_.)]*(b_.))/((f_) + (g_.)
*(x_)^2), x_Symbol] :> With[{u = IntHide[1/(f + g*x^2), x]}, Simp[u*(a + b*
Log[c*(d + e*x^n)^p]), x] - Dist[b*e*n*p, Int[(u*x^(n - 1))/(d + e*x^n), x]
, x]] /; FreeQ[{a, b, c, d, e, f, g, n, p}, x] && IntegerQ[n]
```

Rule 2475

```
Int[((a_.) + Log[(c_.)*((d_) + (e_.)*(x_)^(n_))^(p_.)]*(b_.))^(q_.)*(x_)^(m
_.)*((f_) + (g_.)*(x_)^(s_))^(r_.), x_Symbol] :> Dist[1/n, Subst[Int[x^(Sim
plify[(m + 1)/n] - 1)*(f + g*x^(s/n))^r*(a + b*Log[c*(d + e*x)^p])^q, x], x
, x^n], x] /; FreeQ[{a, b, c, d, e, f, g, m, n, p, q, r, s}, x] && IntegerQ
[r] && IntegerQ[s/n] && IntegerQ[Simplify[(m + 1)/n]] && (GtQ[(m + 1)/n, 0]
 || IGtQ[q, 0])
```

Rule 4848

```
Int[((a_.) + ArcTan[(c_.)*(x_)]*(b_.))/(x_), x_Symbol] :> Simp[a*Log[x], x]
 + (Dist[(I*b)/2, Int[Log[1 - I*c*x]/x, x], x] - Dist[(I*b)/2, Int[Log[1 +
I*c*x]/x, x], x]) /; FreeQ[{a, b, c}, x]
```

Rule 4856

```
Int[((a_.) + ArcTan[(c_.)*(x_)]*(b_.))/((d_) + (e_.)*(x_)), x_Symbol] :> -S
imp[((a + b*ArcTan[c*x])*Log[2/(1 - I*c*x)])/e, x] + (Dist[(b*c)/e, Int[Log
[2/(1 - I*c*x)]/(1 + c^2*x^2), x], x] - Dist[(b*c)/e, Int[Log[(2*c*(d + e*x
))/((c*d + I*e)*(1 - I*c*x))]/(1 + c^2*x^2), x], x] + Simp[((a + b*ArcTan[c
*x])*Log[(2*c*(d + e*x))/((c*d + I*e)*(1 - I*c*x))])/e, x]) /; FreeQ[{a, b,
 c, d, e}, x] && NeQ[c^2*d^2 + e^2, 0]
```

Rule 4876

```
Int[((a_.) + ArcTan[(c_.)*(x_)]*(b_.))^(p_.)*((f_.)*(x_))^(m_.)*((d_) + (e_
.)*(x_))^(q_.), x_Symbol] :> Int[ExpandIntegrand[(a + b*ArcTan[c*x])^p, (f*
x)^m*(d + e*x)^q, x], x] /; FreeQ[{a, b, c, d, e, f, m}, x] && IGtQ[p, 0] &
& IntegerQ[q] && (GtQ[q, 0] || NeQ[a, 0] || IntegerQ[m])
```

Rule 5911

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.), x_Symbol] :> Simp[x*(a + b*A
rcCoth[c*x])^p, x] - Dist[b*c*p, Int[(x*(a + b*ArcCoth[c*x])^(p - 1))/(1 -
c^2*x^2), x], x] /; FreeQ[{a, b, c}, x] && IGtQ[p, 0]
```

Rule 5973

```
Int[ArcCoth[(c_.)*(x_)]/((d_.) + (e_.)*(x_)^2), x_Symbol] :> Dist[1/2, Int[
Log[1 + 1/(c*x)]/(d + e*x^2), x], x] - Dist[1/2, Int[Log[1 - 1/(c*x)]/(d +
e*x^2), x], x] /; FreeQ[{c, d, e}, x]
```

Rule 5975

```
Int[(ArcCoth[(c_.)*(x_)]*(b_.) + (a_))/((d_.) + (e_.)*(x_)^2), x_Symbol] :>
 Dist[a, Int[1/(d + e*x^2), x], x] + Dist[b, Int[ArcCoth[c*x]/(d + e*x^2),
x], x] /; FreeQ[{a, b, c, d, e}, x]
```

Rule 5981

```
Int[(((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)*((f_.)*(x_))^(m_))/((d_) + (
e_.)*(x_)^2), x_Symbol] :> Dist[f^2/e, Int[(f*x)^(m - 2)*(a + b*ArcCoth[c*x
])^p, x], x] - Dist[(d*f^2)/e, Int[((f*x)^(m - 2)*(a + b*ArcCoth[c*x])^p)/(
d + e*x^2), x], x] /; FreeQ[{a, b, c, d, e, f}, x] && GtQ[p, 0] && GtQ[m, 1
]
```

Rule 6074

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))*((d_.) + Log[(f_.) + (g_.)*(x_)^2]*
(e_.)), x_Symbol] :> Simp[x*(d + e*Log[f + g*x^2])*(a + b*ArcCoth[c*x]), x]
 + (-Dist[b*c, Int[(x*(d + e*Log[f + g*x^2]))/(1 - c^2*x^2), x], x] - Dist[
2*e*g, Int[(x^2*(a + b*ArcCoth[c*x]))/(f + g*x^2), x], x]) /; FreeQ[{a, b,
c, d, e, f, g}, x]
```

Rule 6688

```
Int[u_, x_Symbol] :> With[{v = SimplifyIntegrand[u, x]}, Int[v, x] /; Simpl
erIntegrandQ[v, u, x]]
```

Rubi steps

$$\int \left(a+b\coth^{-1}(cx)\right)\left(d+e\log\left(f+gx^2\right)\right)\,dx = x\left(a+b\coth^{-1}(cx)\right)\left(d+e\log\left(f+gx^2\right)\right)-(bc)\int \frac{x\left(d+e\log\left(\right.\right.}{1-c^{2}}$$

$$= x\left(a+b\coth^{-1}(cx)\right)\left(d+e\log\left(f+gx^2\right)\right)-\frac{1}{2}(bc)\,\mathrm{Subst}\left(\int \frac{d+}{}\right.$$

$$= -2aex+x\left(a+b\coth^{-1}(cx)\right)\left(d+e\log\left(f+gx^2\right)\right)+\frac{b\log\left(\frac{g(1-}{c^2 f}\right.}{}$$

$$= -2aex-2bex\coth^{-1}(cx)+\frac{2ae\sqrt{f}\,\tan^{-1}\left(\frac{\sqrt{g}\,x}{\sqrt{f}}\right)}{\sqrt{g}}+x\left(a+b\coth^{-1}\right.$$

$$= -2aex-2bex\coth^{-1}(cx)+\frac{2ae\sqrt{f}\,\tan^{-1}\left(\frac{\sqrt{g}\,x}{\sqrt{f}}\right)}{\sqrt{g}}-\frac{be\sqrt{f}\,\tan^{-1}\left(\right.}{}$$

$$= -2aex-2bex\coth^{-1}(cx)+\frac{2ae\sqrt{f}\,\tan^{-1}\left(\frac{\sqrt{g}\,x}{\sqrt{f}}\right)}{\sqrt{g}}-\frac{be\sqrt{f}\,\tan^{-1}\left(\right.}{}$$

$$= -2aex-2bex\coth^{-1}(cx)+\frac{2ae\sqrt{f}\,\tan^{-1}\left(\frac{\sqrt{g}\,x}{\sqrt{f}}\right)}{\sqrt{g}}-\frac{be\sqrt{f}\,\tan^{-1}\left(\right.}{}$$

$$= -2aex-2bex\coth^{-1}(cx)+\frac{2ae\sqrt{f}\,\tan^{-1}\left(\frac{\sqrt{g}\,x}{\sqrt{f}}\right)}{\sqrt{g}}-\frac{be\sqrt{f}\,\tan^{-1}\left(\right.}{}$$

$$= -2aex-2bex\coth^{-1}(cx)+\frac{2ae\sqrt{f}\,\tan^{-1}\left(\frac{\sqrt{g}\,x}{\sqrt{f}}\right)}{\sqrt{g}}-\frac{be\sqrt{f}\,\tan^{-1}\left(\right.}{}$$

$$= -2aex-2bex\coth^{-1}(cx)+\frac{2ae\sqrt{f}\,\tan^{-1}\left(\frac{\sqrt{g}\,x}{\sqrt{f}}\right)}{\sqrt{g}}-\frac{be\sqrt{f}\,\tan^{-1}\left(\right.}{}$$

$$= -2aex-2bex\coth^{-1}(cx)+\frac{2ae\sqrt{f}\,\tan^{-1}\left(\frac{\sqrt{g}\,x}{\sqrt{f}}\right)}{\sqrt{g}}-\frac{be\sqrt{f}\,\tan^{-1}\left(\right.}{}$$

$$= -2aex-2bex\coth^{-1}(cx)+\frac{2ae\sqrt{f}\,\tan^{-1}\left(\frac{\sqrt{g}\,x}{\sqrt{f}}\right)}{\sqrt{g}}-\frac{be\sqrt{f}\,\tan^{-1}\left(\right.}{}$$

**Mathematica [B]** time = 3.22, size = 1287, normalized size = 2.36

result too large to display

Antiderivative was successfully verified.

```
[In] Integrate[(a + b*ArcCoth[c*x])*(d + e*Log[f + g*x^2]),x]
```

```
[Out] a*d*x - 2*a*e*x + b*d*x*ArcCoth[c*x] + (2*a*e*Sqrt[f]*ArcTan[(Sqrt[g]*x)/Sq
rt[f]])/Sqrt[g] + (b*d*Log[1 - c^2*x^2])/(2*c) + a*e*x*Log[f + g*x^2] + b*e
*(x*ArcCoth[c*x] + Log[1 - c^2*x^2]/(2*c))*Log[f + g*x^2] + (b*e*(-4*c*x*Ar
cCoth[c*x] + 4*Log[1/(c*Sqrt[1 - 1/(c^2*x^2)]*x)] + (Sqrt[c^2*f*g]*((-2*I)*
ArcCos[(c^2*f - g)/(c^2*f + g)]*ArcTan[Sqrt[c^2*f*g]/(c*g*x)] + 4*ArcCoth[c
*x]*ArcTan[(c*g*x)/Sqrt[c^2*f*g]] - (ArcCos[(c^2*f - g)/(c^2*f + g)] + 2*Ar
cTan[Sqrt[c^2*f*g]/(c*g*x)])*Log[((2*I)*g*(I*c^2*f + Sqrt[c^2*f*g])*(-1 + 1
/(c*x)))/((c^2*f + g)*(g + (I*Sqrt[c^2*f*g])/(c*x)))] - (ArcCos[(c^2*f - g)
/(c^2*f + g)] - 2*ArcTan[Sqrt[c^2*f*g]/(c*g*x)])*Log[(2*g*(c^2*f + I*Sqrt[c
^2*f*g])*(1 + 1/(c*x)))/((c^2*f + g)*(g + (I*Sqrt[c^2*f*g])/(c*x)))] + (Arc
Cos[(c^2*f - g)/(c^2*f + g)] + 2*(ArcTan[Sqrt[c^2*f*g]/(c*g*x)] + ArcTan[(c
*g*x)/Sqrt[c^2*f*g]]))*Log[(Sqrt[2]*Sqrt[c^2*f*g])/(E^ArcCoth[c*x]*Sqrt[c^2
*f + g]*Sqrt[-(c^2*f) + g + (c^2*f + g)*Cosh[2*ArcCoth[c*x]]])] + (ArcCos[(
c^2*f - g)/(c^2*f + g)] - 2*(ArcTan[Sqrt[c^2*f*g]/(c*g*x)] + ArcTan[(c*g*x)
/Sqrt[c^2*f*g]]))*Log[(Sqrt[2]*E^ArcCoth[c*x]*Sqrt[c^2*f*g])/(Sqrt[c^2*f +
g]*Sqrt[-(c^2*f) + g + (c^2*f + g)*Cosh[2*ArcCoth[c*x]]])] + I*(-PolyLog[2,
 ((-(c^2*f) + g + (2*I)*Sqrt[c^2*f*g])*(g - (I*Sqrt[c^2*f*g])/(c*x)))/((c^2
*f + g)*(g + (I*Sqrt[c^2*f*g])/(c*x)))] + PolyLog[2, ((c^2*f - g + (2*I)*Sq
rt[c^2*f*g])*(I*g + Sqrt[c^2*f*g]/(c*x)))/((c^2*f + g)*((-I)*g + Sqrt[c^2*f
*g]/(c*x)))]))))/g))/(2*c) - (b*e*g*(((-Log[-c^(-1) + x] - Log[c^(-1) + x] +
 Log[1 - c^2*x^2])*Log[f + g*x^2])/(2*g) + (Log[-c^(-1) + x]*Log[1 - (Sqrt[
g]*(-c^(-1) + x))/((-I)*Sqrt[f] - Sqrt[g]/c)] + PolyLog[2, (Sqrt[g]*(-c^(-1
) + x))/((-I)*Sqrt[f] - Sqrt[g]/c)])/(2*g) + (Log[-c^(-1) + x]*Log[1 - (Sqr
t[g]*(-c^(-1) + x))/(I*Sqrt[f] - Sqrt[g]/c)] + PolyLog[2, (Sqrt[g]*(-c^(-1)
 + x))/(I*Sqrt[f] - Sqrt[g]/c)])/(2*g) + (Log[c^(-1) + x]*Log[1 - (Sqrt[g]*
(c^(-1) + x))/((-I)*Sqrt[f] + Sqrt[g]/c)] + PolyLog[2, (Sqrt[g]*(c^(-1) + x
))/((-I)*Sqrt[f] + Sqrt[g]/c)])/(2*g) + (Log[c^(-1) + x]*Log[1 - (Sqrt[g]*(
c^(-1) + x))/(I*Sqrt[f] + Sqrt[g]/c)] + PolyLog[2, (Sqrt[g]*(c^(-1) + x))/(
I*Sqrt[f] + Sqrt[g]/c)])/(2*g)))/c
```

**fricas [F]** time = 0.64, size = 0, normalized size = 0.00

$$\text{integral}\left(bd\operatorname{arcoth}(cx) + ad + (be\operatorname{arcoth}(cx) + ae)\log\left(gx^2 + f\right), x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccoth(c*x))*(d+e*log(g*x^2+f)),x, algorithm="fricas")
```

```
[Out] integral(b*d*arccoth(c*x) + a*d + (b*e*arccoth(c*x) + a*e)*log(g*x^2 + f),
x)
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int (b\operatorname{arcoth}(cx) + a)\left(e\log\left(gx^2 + f\right) + d\right)dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccoth(c*x))*(d+e*log(g*x^2+f)),x, algorithm="giac")
```

```
[Out] integrate((b*arccoth(c*x) + a)*(e*log(g*x^2 + f) + d), x)
```

**maple [F]** time = 2.96, size = 0, normalized size = 0.00

$$\int (a + b\operatorname{arccoth}(cx))\left(d + e\ln\left(g\,x^2 + f\right)\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a+b*arccoth(c*x))*(d+e*ln(g*x^2+f)),x)
```

```
[Out] int((a+b*arccoth(c*x))*(d+e*ln(g*x^2+f)),x)
```

**maxima [F]** time = 0.00, size = 0, normalized size = 0.00

$$\left(2g\left(\frac{f\arctan\left(\frac{gx}{\sqrt{fg}}\right)}{\sqrt{fg}g}-\frac{x}{g}\right)+x\log\left(gx^2+f\right)\right)ae+adx+\frac{1}{2}be\left(\frac{\left((cx+1)\log(cx+1)-(cx-1)\log(cx-1)\right)\log\left(gx^2\right.}{c}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccoth(c*x))*(d+e*log(g*x^2+f)),x, algorithm="maxima")
```

```
[Out] (2*g*(f*arctan(g*x/sqrt(f*g))/(sqrt(f*g)*g) - x/g) + x*log(g*x^2 + f))*a*e
+ a*d*x + 1/2*b*e*(((c*x + 1)*log(c*x + 1) - (c*x - 1)*log(c*x - 1))*log(g*
x^2 + f)/c - integrate(2*((c*g*x^2 + g*x)*log(c*x + 1) - (c*g*x^2 - g*x)*lo
g(c*x - 1))/(c*g*x^2 + c*f), x)) + 1/2*(2*c*x*arccoth(c*x) + log(-c^2*x^2 +
 1))*b*d/c
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.00

$$\int (a+b\,\mathrm{acoth}\,(c\,x))\,\left(d+e\,\ln\left(g\,x^2+f\right)\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a + b*acoth(c*x))*(d + e*log(f + g*x^2)),x)
```

```
[Out] int((a + b*acoth(c*x))*(d + e*log(f + g*x^2)), x)
```

**sympy [F(-1)]** time = 0.00, size = 0, normalized size = 0.00

Timed out

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*acoth(c*x))*(d+e*ln(g*x**2+f)),x)
```

```
[Out] Timed out
```

# 3.280 $\int \frac{(a+b\coth^{-1}(cx))(d+e\log(f+gx^2))}{x}\,dx$

**Optimal**. Leaf size=101

$$be\text{Int}\left(\frac{\coth^{-1}(cx)\log(f+gx^2)}{x},x\right)+ad\log(x)+\frac{1}{2}ae\text{Li}_2\left(\frac{gx^2}{f}+1\right)+\frac{1}{2}ae\log\left(-\frac{gx^2}{f}\right)\log(f+gx^2)+\frac{1}{2}bd\text{Li}_2\left(-\right.$$

```
[Out] b*e*CannotIntegrate(arccoth(c*x)*ln(g*x^2+f)/x,x)+a*d*ln(x)+1/2*a*e*ln(-g*x
^2/f)*ln(g*x^2+f)+1/2*b*d*polylog(2,-1/c/x)-1/2*b*d*polylog(2,1/c/x)+1/2*a*
e*polylog(2,1+g*x^2/f)
```

**Rubi [A]** time = 0.25, antiderivative size = 0, normalized size of antiderivative = 0.00, number of steps used = 0, number of rules used = 0, integrand size = 0, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.000, Rules used = {}

$$\int \frac{(a+b\coth^{-1}(cx))(d+e\log(f+gx^2))}{x}\,dx$$

Verification is Not applicable to the result.

```
[In] Int[((a + b*ArcCoth[c*x])*(d + e*Log[f + g*x^2]))/x,x]
```

```
[Out] a*d*Log[x] + (a*e*Log[-((g*x^2)/f)]*Log[f + g*x^2])/2 + (b*d*PolyLog[2, -(1
/(c*x))])/2 - (b*d*PolyLog[2, 1/(c*x)])/2 + (a*e*PolyLog[2, 1 + (g*x^2)/f])
/2 + b*e*Defer[Int][(ArcCoth[c*x]*Log[f + g*x^2])/x, x]
```

Rubi steps

$$\begin{aligned}
\int \frac{(a+b\coth^{-1}(cx))(d+e\log(f+gx^2))}{x}\,dx &= d\int \frac{a+b\coth^{-1}(cx)}{x}\,dx+e\int \frac{(a+b\coth^{-1}(cx))\log(f+g\\
&= ad\log(x)+\frac{1}{2}bd\text{Li}_2\left(-\frac{1}{cx}\right)-\frac{1}{2}bd\text{Li}_2\left(\frac{1}{cx}\right)+(ae)\int \frac{\log(f+}{x}\\
&= ad\log(x)+\frac{1}{2}bd\text{Li}_2\left(-\frac{1}{cx}\right)-\frac{1}{2}bd\text{Li}_2\left(\frac{1}{cx}\right)+\frac{1}{2}(ae)\,\text{Subst}\left(\int\right.\\
&= ad\log(x)+\frac{1}{2}ae\log\left(-\frac{gx^2}{f}\right)\log(f+gx^2)+\frac{1}{2}bd\text{Li}_2\left(-\frac{1}{cx}\right)-\\
&= ad\log(x)+\frac{1}{2}ae\log\left(-\frac{gx^2}{f}\right)\log(f+gx^2)+\frac{1}{2}bd\text{Li}_2\left(-\frac{1}{cx}\right)-
\end{aligned}$$

**Mathematica [A]** time = 0.24, size = 0, normalized size = 0.00

$$\int \frac{(a+b\coth^{-1}(cx))(d+e\log(f+gx^2))}{x}\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[((a + b*ArcCoth[c*x])*(d + e*Log[f + g*x^2]))/x,x]
```

```
[Out] Integrate[((a + b*ArcCoth[c*x])*(d + e*Log[f + g*x^2]))/x, x]
```

**fricas [A]** time = 0.50, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{bd\,\text{arcoth}(cx)+ad+(be\,\text{arcoth}(cx)+ae)\log(gx^2+f)}{x},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccoth(c*x))*(d+e*log(g*x^2+f))/x,x, algorithm="fricas")
```

```
[Out] integral((b*d*arccoth(c*x) + a*d + (b*e*arccoth(c*x) + a*e)*log(g*x^2 + f))
/x, x)
```

**giac [A]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{(b\,\mathrm{arcoth}\,(cx) + a)\left(e\log\left(gx^2 + f\right) + d\right)}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccoth(c*x))*(d+e*log(g*x^2+f))/x,x, algorithm="giac")
```

```
[Out] integrate((b*arccoth(c*x) + a)*(e*log(g*x^2 + f) + d)/x, x)
```

**maple [A]** time = 1.49, size = 0, normalized size = 0.00

$$\int \frac{(a + b\,\mathrm{arccoth}\,(cx))\left(d + e\ln\left(g\,x^2 + f\right)\right)}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a+b*arccoth(c*x))*(d+e*ln(g*x^2+f))/x,x)
```

```
[Out] int((a+b*arccoth(c*x))*(d+e*ln(g*x^2+f))/x,x)
```

**maxima [A]** time = 0.00, size = 0, normalized size = 0.00

$$ad\log(x) + \int \frac{be\left(\log\left(\frac{1}{cx} + 1\right) - \log\left(-\frac{1}{cx} + 1\right)\right)\log\left(gx^2 + f\right)}{2\,x} + \frac{bd\left(\log\left(\frac{1}{cx} + 1\right) - \log\left(-\frac{1}{cx} + 1\right)\right)}{2\,x} + \frac{ae\log\left(gx^2 + f\right)}{x}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccoth(c*x))*(d+e*log(g*x^2+f))/x,x, algorithm="maxima")
```

```
[Out] a*d*log(x) + integrate(1/2*b*e*(log(1/(c*x) + 1) - log(-1/(c*x) + 1))*log(g
*x^2 + f)/x + 1/2*b*d*(log(1/(c*x) + 1) - log(-1/(c*x) + 1))/x + a*e*log(g*
x^2 + f)/x, x)
```

**mupad [A]** time = 0.00, size = -1, normalized size = -0.01

$$\int \frac{(a + b\,\mathrm{acoth}\,(c\,x))\,\left(d + e\,\ln\left(g\,x^2 + f\right)\right)}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(((a + b*acoth(c*x))*(d + e*log(f + g*x^2)))/x,x)
```

```
[Out] int(((a + b*acoth(c*x))*(d + e*log(f + g*x^2)))/x, x)
```

**sympy [F(-1)]** time = 0.00, size = 0, normalized size = 0.00

Timed out

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*acoth(c*x))*(d+e*ln(g*x**2+f))/x,x)
```

```
[Out] Timed out
```

# 3.281 $\int \frac{\left(a+b\coth^{-1}(cx)\right)\left(d+e\log\left(f+gx^2\right)\right)}{x^2}\,dx$

**Optimal**. Leaf size=560

$$-\frac{\left(a+b\coth^{-1}(cx)\right)\left(d+e\log\left(f+gx^2\right)\right)}{x}+\frac{2ae\sqrt{g}\tan^{-1}\left(\frac{\sqrt{g}x}{\sqrt{f}}\right)}{\sqrt{f}}-\frac{1}{2}bc\log\left(\frac{g\left(1-c^2x^2\right)}{c^2f+g}\right)\left(d+e\log\left(f+gx^2\right)\right)-$$

```
[Out] -(a+b*arccoth(c*x))*(d+e*ln(g*x^2+f))/x+1/2*b*c*ln(-g*x^2/f)*(d+e*ln(g*x^2+
f))-1/2*b*c*ln(g*(-c^2*x^2+1)/(c^2*f+g))*(d+e*ln(g*x^2+f))-1/2*b*c*e*polylo
g(2,c^2*(g*x^2+f)/(c^2*f+g))+1/2*b*c*e*polylog(2,1+g*x^2/f)+2*a*e*arctan(x*
g^(1/2)/f^(1/2))*g^(1/2)/f^(1/2)-b*e*arctan(x*g^(1/2)/f^(1/2))*ln(1-1/c/x)*
g^(1/2)/f^(1/2)+b*e*arctan(x*g^(1/2)/f^(1/2))*ln(1+1/c/x)*g^(1/2)/f^(1/2)+b
*e*arctan(x*g^(1/2)/f^(1/2))*ln(-2*(-c*x+1)*f^(1/2)*g^(1/2)/(I*c*f^(1/2)-g^
(1/2))/(f^(1/2)-I*x*g^(1/2)))*g^(1/2)/f^(1/2)-b*e*arctan(x*g^(1/2)/f^(1/2))
*ln(2*(c*x+1)*f^(1/2)*g^(1/2)/(I*c*f^(1/2)+g^(1/2))/(f^(1/2)-I*x*g^(1/2)))*
g^(1/2)/f^(1/2)-1/2*I*b*e*polylog(2,1+2*(-c*x+1)*f^(1/2)*g^(1/2)/(I*c*f^(1/
2)-g^(1/2))/(f^(1/2)-I*x*g^(1/2)))*g^(1/2)/f^(1/2)+1/2*I*b*e*polylog(2,1-2*
(c*x+1)*f^(1/2)*g^(1/2)/(I*c*f^(1/2)+g^(1/2))/(f^(1/2)-I*x*g^(1/2)))*g^(1/2
)/f^(1/2)
```

**Rubi [A]** time = 1.26, antiderivative size = 560, normalized size of antiderivative = 1.00, number of steps used = 38, number of rules used = 22, integrand size = 24, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.917, Rules used = {6082, 2475, 36, 29, 31, 2416, 2394, 2315, 2393, 2391, 5975, 205, 5973, 2470, 12, 260, 6688, 4876, 4848, 4856, 2402, 2447}

$$-\frac{1}{2}bce\text{PolyLog}\left(2,\frac{c^2\left(f+gx^2\right)}{c^2f+g}\right)+\frac{1}{2}bce\text{PolyLog}\left(2,\frac{gx^2}{f}+1\right)-\frac{ibe\sqrt{g}\text{PolyLog}\left(2,1+\frac{2\sqrt{f}\sqrt{g}(1-cx)}{\left(-\sqrt{g}+ic\sqrt{f}\right)\left(\sqrt{f}-i\sqrt{g}x\right)}\right)}{2\sqrt{f}}+$$

Antiderivative was successfully verified.

```
[In] Int[((a + b*ArcCoth[c*x])*(d + e*Log[f + g*x^2]))/x^2,x]
```

```
[Out] (2*a*e*Sqrt[g]*ArcTan[(Sqrt[g]*x)/Sqrt[f]])/Sqrt[f] - (b*e*Sqrt[g]*ArcTan[(
Sqrt[g]*x)/Sqrt[f]]*Log[1 - 1/(c*x)])/Sqrt[f] + (b*e*Sqrt[g]*ArcTan[(Sqrt[g
]*x)/Sqrt[f]]*Log[1 + 1/(c*x)])/Sqrt[f] + (b*e*Sqrt[g]*ArcTan[(Sqrt[g]*x)/S
qrt[f]]*Log[(-2*Sqrt[f]*Sqrt[g]*(1 - c*x))/((I*c*Sqrt[f] - Sqrt[g])*(Sqrt[f
] - I*Sqrt[g]*x))])/Sqrt[f] - (b*e*Sqrt[g]*ArcTan[(Sqrt[g]*x)/Sqrt[f]]*Log[
(2*Sqrt[f]*Sqrt[g]*(1 + c*x))/((I*c*Sqrt[f] + Sqrt[g])*(Sqrt[f] - I*Sqrt[g]
*x))])/Sqrt[f] - ((a + b*ArcCoth[c*x])*(d + e*Log[f + g*x^2]))/x + (b*c*Log
[-((g*x^2)/f)]*(d + e*Log[f + g*x^2]))/2 - (b*c*Log[(g*(1 - c^2*x^2))/(c^2*
f + g)]*(d + e*Log[f + g*x^2]))/2 - (b*c*e*PolyLog[2, (c^2*(f + g*x^2))/(c^
2*f + g)])/2 + (b*c*e*PolyLog[2, 1 + (g*x^2)/f])/2 - ((I/2)*b*e*Sqrt[g]*Pol
yLog[2, 1 + (2*Sqrt[f]*Sqrt[g]*(1 - c*x))/((I*c*Sqrt[f] - Sqrt[g])*(Sqrt[f]
 - I*Sqrt[g]*x))])/Sqrt[f] + ((I/2)*b*e*Sqrt[g]*PolyLog[2, 1 - (2*Sqrt[f]*S
qrt[g]*(1 + c*x))/((I*c*Sqrt[f] + Sqrt[g])*(Sqrt[f] - I*Sqrt[g]*x))])/Sqrt[
f]
```

Rule 12

```
Int[(a_)*(u_), x_Symbol] :> Dist[a, Int[u, x], x] /; FreeQ[a, x] &&  !Match
Q[u, (b_)*(v_) /; FreeQ[b, x]]
```

Rule 29

```
Int[(x_)^(-1), x_Symbol] :> Simp[Log[x], x]
```

Rule 31

```
Int[((a_) + (b_.)*(x_))^(-1), x_Symbol] :> Simp[Log[RemoveContent[a + b*x,
x]]/b, x] /; FreeQ[{a, b}, x]
```

Rule 36

```
Int[1/(((a_.) + (b_.)*(x_))*((c_.) + (d_.)*(x_))), x_Symbol] :> Dist[b/(b*c
 - a*d), Int[1/(a + b*x), x], x] - Dist[d/(b*c - a*d), Int[1/(c + d*x), x],
 x] /; FreeQ[{a, b, c, d}, x] && NeQ[b*c - a*d, 0]
```

Rule 205

```
Int[((a_) + (b_.)*(x_)^2)^(-1), x_Symbol] :> Simp[(Rt[a/b, 2]*ArcTan[x/Rt[a
/b, 2]])/a, x] /; FreeQ[{a, b}, x] && PosQ[a/b]
```

Rule 260

```
Int[(x_)^(m_.)/((a_) + (b_.)*(x_)^(n_)), x_Symbol] :> Simp[Log[RemoveConten
t[a + b*x^n, x]]/(b*n), x] /; FreeQ[{a, b, m, n}, x] && EqQ[m, n - 1]
```

Rule 2315

```
Int[Log[(c_.)*(x_)]/((d_) + (e_.)*(x_)), x_Symbol] :> -Simp[PolyLog[2, 1 -
c*x]/e, x] /; FreeQ[{c, d, e}, x] && EqQ[e + c*d, 0]
```

Rule 2391

```
Int[Log[(c_.)*((d_) + (e_.)*(x_)^(n_.))]/(x_), x_Symbol] :> -Simp[PolyLog[2
, -(c*e*x^n)]/n, x] /; FreeQ[{c, d, e, n}, x] && EqQ[c*d, 1]
```

Rule 2393

```
Int[((a_.) + Log[(c_.)*((d_) + (e_.)*(x_))]*(b_.))/((f_.) + (g_.)*(x_)), x_
Symbol] :> Dist[1/g, Subst[Int[(a + b*Log[1 + (c*e*x)/g])/x, x], x, f + g*x
], x] /; FreeQ[{a, b, c, d, e, f, g}, x] && NeQ[e*f - d*g, 0] && EqQ[g + c*
(e*f - d*g), 0]
```

Rule 2394

```
Int[((a_.) + Log[(c_.)*((d_) + (e_.)*(x_))^(n_.)]*(b_.))/((f_.) + (g_.)*(x_
)), x_Symbol] :> Simp[(Log[(e*(f + g*x))/(e*f - d*g)]*(a + b*Log[c*(d + e*x
)^n]))/g, x] - Dist[(b*e*n)/g, Int[Log[(e*(f + g*x))/(e*f - d*g)]/(d + e*x)
, x], x] /; FreeQ[{a, b, c, d, e, f, g, n}, x] && NeQ[e*f - d*g, 0]
```

Rule 2402

```
Int[Log[(c_.)/((d_) + (e_.)*(x_))]/((f_) + (g_.)*(x_)^2), x_Symbol] :> -Dis
t[e/g, Subst[Int[Log[2*d*x]/(1 - 2*d*x), x], x, 1/(d + e*x)], x] /; FreeQ[{
c, d, e, f, g}, x] && EqQ[c, 2*d] && EqQ[e^2*f + d^2*g, 0]
```

Rule 2416

```
Int[((a_.) + Log[(c_.)*((d_) + (e_.)*(x_))^(n_.)]*(b_.))^(p_.)*((h_.)*(x_))
^(m_.)*((f_) + (g_.)*(x_)^(r_.))^(q_.), x_Symbol] :> Int[ExpandIntegrand[(a
 + b*Log[c*(d + e*x)^n])^p, (h*x)^m*(f + g*x^r)^q, x], x] /; FreeQ[{a, b, c
, d, e, f, g, h, m, n, p, q, r}, x] && IntegerQ[m] && IntegerQ[q]
```

Rule 2447

```
Int[Log[u_]*(Pq_)^(m_.), x_Symbol] :> With[{C = FullSimplify[(Pq^m*(1 - u))
/D[u, x]]}, Simp[C*PolyLog[2, 1 - u], x] /; FreeQ[C, x]] /; IntegerQ[m] &&
PolyQ[Pq, x] && RationalFunctionQ[u, x] && LeQ[RationalFunctionExponents[u,
 x][[2]], Expon[Pq, x]]
```

Rule 2470

```
Int[((a_.) + Log[(c_.)*((d_) + (e_.)*(x_)^(n_))^(p_.)]*(b_.))/((f_) + (g_.)
*(x_)^2), x_Symbol] :> With[{u = IntHide[1/(f + g*x^2), x]}, Simp[u*(a + b*
Log[c*(d + e*x^n)^p]), x] - Dist[b*e*n*p, Int[(u*x^(n - 1))/(d + e*x^n), x]
, x]] /; FreeQ[{a, b, c, d, e, f, g, n, p}, x] && IntegerQ[n]
```

Rule 2475

```
Int[((a_.) + Log[(c_.)*((d_) + (e_.)*(x_)^(n_))^(p_.)]*(b_.))^(q_.)*(x_)^(m
_.)*((f_) + (g_.)*(x_)^(s_))^(r_.), x_Symbol] :> Dist[1/n, Subst[Int[x^(Sim
plify[(m + 1)/n] - 1)*(f + g*x^(s/n))^r*(a + b*Log[c*(d + e*x)^p])^q, x], x
, x^n], x] /; FreeQ[{a, b, c, d, e, f, g, m, n, p, q, r, s}, x] && IntegerQ
[r] && IntegerQ[s/n] && IntegerQ[Simplify[(m + 1)/n]] && (GtQ[(m + 1)/n, 0]
 || IGtQ[q, 0])
```

Rule 4848

```
Int[((a_.) + ArcTan[(c_.)*(x_)]*(b_.))/(x_), x_Symbol] :> Simp[a*Log[x], x]
 + (Dist[(I*b)/2, Int[Log[1 - I*c*x]/x, x], x] - Dist[(I*b)/2, Int[Log[1 +
I*c*x]/x, x], x]) /; FreeQ[{a, b, c}, x]
```

Rule 4856

```
Int[((a_.) + ArcTan[(c_.)*(x_)]*(b_.))/((d_) + (e_.)*(x_)), x_Symbol] :> -S
imp[((a + b*ArcTan[c*x])*Log[2/(1 - I*c*x)])/e, x] + (Dist[(b*c)/e, Int[Log
[2/(1 - I*c*x)]/(1 + c^2*x^2), x], x] - Dist[(b*c)/e, Int[Log[(2*c*(d + e*x
))/((c*d + I*e)*(1 - I*c*x))]/(1 + c^2*x^2), x], x] + Simp[((a + b*ArcTan[c
*x])*Log[(2*c*(d + e*x))/((c*d + I*e)*(1 - I*c*x))])/e, x]) /; FreeQ[{a, b,
 c, d, e}, x] && NeQ[c^2*d^2 + e^2, 0]
```

Rule 4876

```
Int[((a_.) + ArcTan[(c_.)*(x_)]*(b_.))^(p_.)*((f_.)*(x_))^(m_.)*((d_) + (e_
.)*(x_))^(q_.), x_Symbol] :> Int[ExpandIntegrand[(a + b*ArcTan[c*x])^p, (f*
x)^m*(d + e*x)^q, x], x] /; FreeQ[{a, b, c, d, e, f, m}, x] && IGtQ[p, 0] &
& IntegerQ[q] && (GtQ[q, 0] || NeQ[a, 0] || IntegerQ[m])
```

Rule 5973

```
Int[ArcCoth[(c_.)*(x_)]/((d_.) + (e_.)*(x_)^2), x_Symbol] :> Dist[1/2, Int[
Log[1 + 1/(c*x)]/(d + e*x^2), x], x] - Dist[1/2, Int[Log[1 - 1/(c*x)]/(d +
e*x^2), x], x] /; FreeQ[{c, d, e}, x]
```

Rule 5975

```
Int[(ArcCoth[(c_.)*(x_)]*(b_.) + (a_))/((d_.) + (e_.)*(x_)^2), x_Symbol] :>
 Dist[a, Int[1/(d + e*x^2), x], x] + Dist[b, Int[ArcCoth[c*x]/(d + e*x^2),
x], x] /; FreeQ[{a, b, c, d, e}, x]
```

Rule 6082

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))*((d_.) + Log[(f_.) + (g_.)*(x_)^2]*
(e_.))*(x_)^(m_.), x_Symbol] :> Simp[(x^(m + 1)*(d + e*Log[f + g*x^2])*(a +
```

```
 b*ArcCoth[c*x]))/(m + 1), x] + (-Dist[(b*c)/(m + 1), Int[(x^(m + 1)*(d + e
*Log[f + g*x^2]))/(1 - c^2*x^2), x], x] - Dist[(2*e*g)/(m + 1), Int[(x^(m +
 2)*(a + b*ArcCoth[c*x]))/(f + g*x^2), x], x]) /; FreeQ[{a, b, c, d, e, f,
g}, x] && ILtQ[m/2, 0]
```

Rule 6688

```
Int[u_, x_Symbol] :> With[{v = SimplifyIntegrand[u, x]}, Int[v, x] /; Simpl
erIntegrandQ[v, u, x]]
```

Rubi steps

$$\int \frac{\left(a+b\coth^{-1}(cx)\right)\left(d+e\log\left(f+gx^2\right)\right)}{x^2}\,dx = -\frac{\left(a+b\coth^{-1}(cx)\right)\left(d+e\log\left(f+gx^2\right)\right)}{x} + (bc)\int \frac{d+e\log}{x\left(1-\right.}$$

$$= -\frac{\left(a+b\coth^{-1}(cx)\right)\left(d+e\log\left(f+gx^2\right)\right)}{x} + \frac{1}{2}(bc)\,\mathrm{Subst}\left(\int\right.$$

$$= \frac{2ae\sqrt{g}\,\tan^{-1}\left(\frac{\sqrt{g}\,x}{\sqrt{f}}\right)}{\sqrt{f}} - \frac{\left(a+b\coth^{-1}(cx)\right)\left(d+e\log\left(f+gx^2\right.\right.}{x}$$

$$= \frac{2ae\sqrt{g}\,\tan^{-1}\left(\frac{\sqrt{g}\,x}{\sqrt{f}}\right)}{\sqrt{f}} - \frac{be\sqrt{g}\,\tan^{-1}\left(\frac{\sqrt{g}\,x}{\sqrt{f}}\right)\log\left(1-\frac{1}{cx}\right)}{\sqrt{f}} + \frac{be\sqrt{}}{}$$

$$= \frac{2ae\sqrt{g}\,\tan^{-1}\left(\frac{\sqrt{g}\,x}{\sqrt{f}}\right)}{\sqrt{f}} - \frac{be\sqrt{g}\,\tan^{-1}\left(\frac{\sqrt{g}\,x}{\sqrt{f}}\right)\log\left(1-\frac{1}{cx}\right)}{\sqrt{f}} + \frac{be\sqrt{}}{}$$

$$= \frac{2ae\sqrt{g}\,\tan^{-1}\left(\frac{\sqrt{g}\,x}{\sqrt{f}}\right)}{\sqrt{f}} - \frac{be\sqrt{g}\,\tan^{-1}\left(\frac{\sqrt{g}\,x}{\sqrt{f}}\right)\log\left(1-\frac{1}{cx}\right)}{\sqrt{f}} + \frac{be\sqrt{}}{}$$

$$= \frac{2ae\sqrt{g}\,\tan^{-1}\left(\frac{\sqrt{g}\,x}{\sqrt{f}}\right)}{\sqrt{f}} - \frac{be\sqrt{g}\,\tan^{-1}\left(\frac{\sqrt{g}\,x}{\sqrt{f}}\right)\log\left(1-\frac{1}{cx}\right)}{\sqrt{f}} + \frac{be\sqrt{}}{}$$

$$= \frac{2ae\sqrt{g}\,\tan^{-1}\left(\frac{\sqrt{g}\,x}{\sqrt{f}}\right)}{\sqrt{f}} - \frac{be\sqrt{g}\,\tan^{-1}\left(\frac{\sqrt{g}\,x}{\sqrt{f}}\right)\log\left(1-\frac{1}{cx}\right)}{\sqrt{f}} + \frac{be\sqrt{}}{}$$

$$= \frac{2ae\sqrt{g}\,\tan^{-1}\left(\frac{\sqrt{g}\,x}{\sqrt{f}}\right)}{\sqrt{f}} - \frac{be\sqrt{g}\,\tan^{-1}\left(\frac{\sqrt{g}\,x}{\sqrt{f}}\right)\log\left(1-\frac{1}{cx}\right)}{\sqrt{f}} + \frac{be\sqrt{}}{}$$

$$= \frac{2ae\sqrt{g}\,\tan^{-1}\left(\frac{\sqrt{g}\,x}{\sqrt{f}}\right)}{\sqrt{f}} - \frac{be\sqrt{g}\,\tan^{-1}\left(\frac{\sqrt{g}\,x}{\sqrt{f}}\right)\log\left(1-\frac{1}{cx}\right)}{\sqrt{f}} + \frac{be\sqrt{}}{}$$

$$= \frac{2ae\sqrt{g}\,\tan^{-1}\left(\frac{\sqrt{g}\,x}{\sqrt{f}}\right)}{\sqrt{f}} - \frac{be\sqrt{g}\,\tan^{-1}\left(\frac{\sqrt{g}\,x}{\sqrt{f}}\right)\log\left(1-\frac{1}{cx}\right)}{\sqrt{f}} + \frac{be\sqrt{}}{}$$

**Mathematica [B]** time = 3.59, size = 1236, normalized size = 2.21

result too large to display

Warning: Unable to verify antiderivative.

```
[In] Integrate[((a + b*ArcCoth[c*x])*(d + e*Log[f + g*x^2]))/x^2,x]
```

```
[Out] -((a*d)/x) - (b*d*ArcCoth[c*x])/x + b*c*d*Log[x] - (b*c*d*Log[1 - c^2*x^2])
/2 + a*e*((2*Sqrt[g]*ArcTan[(Sqrt[g]*x)/Sqrt[f]])/Sqrt[f] - Log[f + g*x^2]/
```

```
x) + (b*e*(-(((2*ArcCoth[c*x] + c*x*(-2*Log[x] + Log[1 - c^2*x^2]))*Log[f +
 g*x^2])/x) - 2*c*(Log[x]*(Log[1 - (I*Sqrt[g]*x)/Sqrt[f]] + Log[1 + (I*Sqrt
[g]*x)/Sqrt[f]]) + PolyLog[2, ((-I)*Sqrt[g]*x)/Sqrt[f]] + PolyLog[2, (I*Sqr
t[g]*x)/Sqrt[f]]) + c*(Log[-c^(-1) + x]*Log[(c*(Sqrt[f] - I*Sqrt[g]*x))/(c*
Sqrt[f] - I*Sqrt[g])] + Log[c^(-1) + x]*Log[(c*(Sqrt[f] - I*Sqrt[g]*x))/(c*
Sqrt[f] + I*Sqrt[g])] + Log[-c^(-1) + x]*Log[(c*(Sqrt[f] + I*Sqrt[g]*x))/(c
*Sqrt[f] + I*Sqrt[g])] - (Log[-c^(-1) + x] + Log[c^(-1) + x] - Log[1 - c^2*
x^2])*Log[f + g*x^2] + Log[c^(-1) + x]*Log[1 - (Sqrt[g]*(1 + c*x))/(I*c*Sqr
t[f] + Sqrt[g])] + PolyLog[2, (c*Sqrt[g]*(c^(-1) + x))/(I*c*Sqrt[f] + Sqrt[
g])] + PolyLog[2, (I*Sqrt[g]*(-1 + c*x))/(c*Sqrt[f] - I*Sqrt[g])] + PolyLog
[2, ((-I)*Sqrt[g]*(-1 + c*x))/(c*Sqrt[f] + I*Sqrt[g])] + PolyLog[2, (I*Sqrt
[g]*(1 + c*x))/(c*Sqrt[f] + I*Sqrt[g])]) - (c*g*((2*I)*ArcCos[(c^2*f - g)/(
c^2*f + g)]*ArcTan[(c*f)/(Sqrt[c^2*f*g]*x)] - 4*ArcCoth[c*x]*ArcTan[(c*g*x)
/Sqrt[c^2*f*g]] + (ArcCos[(c^2*f - g)/(c^2*f + g)] + 2*ArcTan[(c*f)/(Sqrt[c
^2*f*g]*x)])*Log[(2*g*(c^2*f - I*Sqrt[c^2*f*g])*(-1 + c*x))/((c^2*f + g)*(I
*Sqrt[c^2*f*g] + c*g*x))] + (ArcCos[(c^2*f - g)/(c^2*f + g)] - 2*ArcTan[(c*
f)/(Sqrt[c^2*f*g]*x)])*Log[(2*g*(c^2*f + I*Sqrt[c^2*f*g])*(1 + c*x))/((c^2*
f + g)*(I*Sqrt[c^2*f*g] + c*g*x))] - (ArcCos[(c^2*f - g)/(c^2*f + g)] + 2*(
ArcTan[(c*f)/(Sqrt[c^2*f*g]*x)] + ArcTan[(c*g*x)/Sqrt[c^2*f*g]]))*Log[(Sqrt
[2]*Sqrt[c^2*f*g])/(E^ArcCoth[c*x]*Sqrt[c^2*f + g]*Sqrt[-(c^2*f) + g + (c^2
*f + g)*Cosh[2*ArcCoth[c*x]]])] - (ArcCos[(c^2*f - g)/(c^2*f + g)] - 2*(Arc
Tan[(c*f)/(Sqrt[c^2*f*g]*x)] + ArcTan[(c*g*x)/Sqrt[c^2*f*g]]))*Log[(Sqrt[2]
*E^ArcCoth[c*x]*Sqrt[c^2*f*g])/(Sqrt[c^2*f + g]*Sqrt[-(c^2*f) + g + (c^2*f
+ g)*Cosh[2*ArcCoth[c*x]]])] + I*(PolyLog[2, ((c^2*f - g - (2*I)*Sqrt[c^2*f
*g])*(Sqrt[c^2*f*g] + I*c*g*x))/((c^2*f + g)*(Sqrt[c^2*f*g] - I*c*g*x))] -
PolyLog[2, ((c^2*f - g + (2*I)*Sqrt[c^2*f*g])*(Sqrt[c^2*f*g] + I*c*g*x))/((
c^2*f + g)*(Sqrt[c^2*f*g] - I*c*g*x))]))))/Sqrt[c^2*f*g]))/2
```

**fricas [F]** time = 0.63, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{bd\,\text{arcoth}\,(cx) + ad + (be\,\text{arcoth}\,(cx) + ae)\log\left(gx^2 + f\right)}{x^2}, x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccoth(c*x))*(d+e*log(g*x^2+f))/x^2,x, algorithm="fricas")
```

```
[Out] integral((b*d*arccoth(c*x) + a*d + (b*e*arccoth(c*x) + a*e)*log(g*x^2 + f))
/x^2, x)
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{(b\,\text{arcoth}\,(cx) + a)\left(e\log\left(gx^2 + f\right) + d\right)}{x^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccoth(c*x))*(d+e*log(g*x^2+f))/x^2,x, algorithm="giac")
```

```
[Out] integrate((b*arccoth(c*x) + a)*(e*log(g*x^2 + f) + d)/x^2, x)
```

**maple [F]** time = 2.20, size = 0, normalized size = 0.00

$$\int \frac{(a + b\,\text{arccoth}\,(cx))\left(d + e\ln\left(g\,x^2 + f\right)\right)}{x^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a+b*arccoth(c*x))*(d+e*ln(g*x^2+f))/x^2,x)
```

```
[Out] int((a+b*arccoth(c*x))*(d+e*ln(g*x^2+f))/x^2,x)
```

**maxima [F]** time = 0.00, size = 0, normalized size = 0.00

$$-\frac{1}{2}\left(c\left(\log\left(c^2x^2-1\right)-\log\left(x^2\right)\right)+\frac{2\,\operatorname{arcoth}(cx)}{x}\right)bd+\left(\frac{2\,g\arctan\left(\frac{gx}{\sqrt{fg}}\right)}{\sqrt{fg}}-\frac{\log\left(gx^2+f\right)}{x}\right)ae+\frac{1}{2}\,be\int\frac{\left(\log\left(\frac{1}{cx}\right.\right.}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccoth(c*x))*(d+e*log(g*x^2+f))/x^2,x, algorithm="maxima")
```

```
[Out] -1/2*(c*(log(c^2*x^2 - 1) - log(x^2)) + 2*arccoth(c*x)/x)*b*d + (2*g*arctan
(g*x/sqrt(f*g))/sqrt(f*g) - log(g*x^2 + f)/x)*a*e + 1/2*b*e*integrate((log(
1/(c*x) + 1) - log(-1/(c*x) + 1))*log(g*x^2 + f)/x^2, x) - a*d/x
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.00

$$\int\frac{(a+b\operatorname{acoth}(c\,x))\,\left(d+e\,\ln\left(g\,x^2+f\right)\right)}{x^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(((a + b*acoth(c*x))*(d + e*log(f + g*x^2)))/x^2,x)
```

```
[Out] int(((a + b*acoth(c*x))*(d + e*log(f + g*x^2)))/x^2, x)
```

**sympy [F(-1)]** time = 0.00, size = 0, normalized size = 0.00

Timed out

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*acoth(c*x))*(d+e*ln(g*x**2+f))/x**2,x)
```

```
[Out] Timed out
```

# 3.282 $\int \frac{\left(a+b\coth^{-1}(cx)\right)\left(d+e\log\left(f+gx^2\right)\right)}{x^3}\,dx$

**Optimal**. Leaf size=712

$$-\frac{\left(a+b\coth^{-1}(cx)\right)\left(d+e\log\left(f+gx^2\right)\right)}{2x^2}-\frac{aeg\log\left(f+gx^2\right)}{2f}+\frac{aeg\log(x)}{f}+\frac{1}{2}bc^2\tanh^{-1}(cx)\left(d+e\log\left(f+gx^2\right)\right)$$

```
[Out] a*e*g*ln(x)/f+b*e*g*arccoth(c*x)*ln(2/(c*x+1))/f+b*c^2*e*arctanh(c*x)*ln(2/
(c*x+1))-1/2*a*e*g*ln(g*x^2+f)/f-1/2*b*c*(d+e*ln(g*x^2+f))/x-1/2*(a+b*arcco
th(c*x))*(d+e*ln(g*x^2+f))/x^2+1/2*b*c^2*arctanh(c*x)*(d+e*ln(g*x^2+f))-1/2
*b*e*g*arccoth(c*x)*ln(2*c*((-f)^(1/2)-x*g^(1/2))/(c*x+1)/(c*(-f)^(1/2)-g^(
1/2)))/f-1/2*b*c^2*e*arctanh(c*x)*ln(2*c*((-f)^(1/2)-x*g^(1/2))/(c*x+1)/(c*
(-f)^(1/2)-g^(1/2)))-1/2*b*e*g*arccoth(c*x)*ln(2*c*((-f)^(1/2)+x*g^(1/2))/(
c*x+1)/(c*(-f)^(1/2)+g^(1/2)))/f-1/2*b*c^2*e*arctanh(c*x)*ln(2*c*((-f)^(1/2
)+x*g^(1/2))/(c*x+1)/(c*(-f)^(1/2)+g^(1/2)))+1/2*b*e*g*polylog(2,-1/c/x)/f-
1/2*b*e*g*polylog(2,1/c/x)/f-1/2*b*c^2*e*polylog(2,1-2/(c*x+1))-1/2*b*e*g*p
olylog(2,1-2/(c*x+1))/f+1/4*b*c^2*e*polylog(2,1-2*c*((-f)^(1/2)-x*g^(1/2))/
(c*x+1)/(c*(-f)^(1/2)-g^(1/2)))+1/4*b*e*g*polylog(2,1-2*c*((-f)^(1/2)-x*g^(
1/2))/(c*x+1)/(c*(-f)^(1/2)-g^(1/2)))/f+1/4*b*c^2*e*polylog(2,1-2*c*((-f)^(
1/2)+x*g^(1/2))/(c*x+1)/(c*(-f)^(1/2)+g^(1/2)))+1/4*b*e*g*polylog(2,1-2*c*(
(-f)^(1/2)+x*g^(1/2))/(c*x+1)/(c*(-f)^(1/2)+g^(1/2)))/f+b*c*e*arctan(x*g^(1
/2)/f^(1/2))*g^(1/2)/f^(1/2)
```

**Rubi [A]** time = 1.11, antiderivative size = 712, normalized size of antiderivative = 1.00, number of steps used = 32, number of rules used = 17, integrand size = 24, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.708, Rules used = {5917, 325, 206, 6086, 6725, 801, 635, 205, 260, 5993, 5913, 5921, 2402, 2315, 2447, 5992, 5920}

$$\frac{1}{4}bc^2e\text{PolyLog}\left(2,1-\frac{2c\left(\sqrt{-f}-\sqrt{g}x\right)}{(cx+1)\left(c\sqrt{-f}-\sqrt{g}\right)}\right)+\frac{1}{4}bc^2e\text{PolyLog}\left(2,1-\frac{2c\left(\sqrt{-f}+\sqrt{g}x\right)}{(cx+1)\left(c\sqrt{-f}+\sqrt{g}\right)}\right)-\frac{1}{2}bc^2e\text{PolyLog}\left(\right.$$

Antiderivative was successfully verified.

```
[In] Int[((a + b*ArcCoth[c*x])*(d + e*Log[f + g*x^2]))/x^3,x]
```

```
[Out] (b*c*e*Sqrt[g]*ArcTan[(Sqrt[g]*x)/Sqrt[f]])/Sqrt[f] + (a*e*g*Log[x])/f + (b
*e*g*ArcCoth[c*x]*Log[2/(1 + c*x)])/f + b*c^2*e*ArcTanh[c*x]*Log[2/(1 + c*x
)] - (b*e*g*ArcCoth[c*x]*Log[(2*c*(Sqrt[-f] - Sqrt[g]*x))/((c*Sqrt[-f] - Sq
rt[g])*(1 + c*x))])/(2*f) - (b*c^2*e*ArcTanh[c*x]*Log[(2*c*(Sqrt[-f] - Sqrt
[g]*x))/((c*Sqrt[-f] - Sqrt[g])*(1 + c*x))])/2 - (b*e*g*ArcCoth[c*x]*Log[(2
*c*(Sqrt[-f] + Sqrt[g]*x))/((c*Sqrt[-f] + Sqrt[g])*(1 + c*x))])/(2*f) - (b*
c^2*e*ArcTanh[c*x]*Log[(2*c*(Sqrt[-f] + Sqrt[g]*x))/((c*Sqrt[-f] + Sqrt[g])
*(1 + c*x))])/2 - (a*e*g*Log[f + g*x^2])/(2*f) - (b*c*(d + e*Log[f + g*x^2]
))/(2*x) - ((a + b*ArcCoth[c*x])*(d + e*Log[f + g*x^2]))/(2*x^2) + (b*c^2*A
rcTanh[c*x]*(d + e*Log[f + g*x^2]))/2 + (b*e*g*PolyLog[2, -(1/(c*x))])/(2*f
) - (b*e*g*PolyLog[2, 1/(c*x)])/(2*f) - (b*c^2*e*PolyLog[2, 1 - 2/(1 + c*x)
])/2 - (b*e*g*PolyLog[2, 1 - 2/(1 + c*x)])/(2*f) + (b*c^2*e*PolyLog[2, 1 -
(2*c*(Sqrt[-f] - Sqrt[g]*x))/((c*Sqrt[-f] - Sqrt[g])*(1 + c*x))])/4 + (b*e*
g*PolyLog[2, 1 - (2*c*(Sqrt[-f] - Sqrt[g]*x))/((c*Sqrt[-f] - Sqrt[g])*(1 +
c*x))])/(4*f) + (b*c^2*e*PolyLog[2, 1 - (2*c*(Sqrt[-f] + Sqrt[g]*x))/((c*Sq
rt[-f] + Sqrt[g])*(1 + c*x))])/4 + (b*e*g*PolyLog[2, 1 - (2*c*(Sqrt[-f] + S
qrt[g]*x))/((c*Sqrt[-f] + Sqrt[g])*(1 + c*x))])/(4*f)
```

Rule 205

```
Int[((a_) + (b_.)*(x_)^2)^(-1), x_Symbol] :> Simp[(Rt[a/b, 2]*ArcTan[x/Rt[a
/b, 2]])/a, x] /; FreeQ[{a, b}, x] && PosQ[a/b]
```

Rule 206

```
Int[((a_) + (b_.)*(x_)^2)^(-1), x_Symbol] :> Simp[(1*ArcTanh[(Rt[-b, 2]*x)/
Rt[a, 2]])/(Rt[a, 2]*Rt[-b, 2]), x] /; FreeQ[{a, b}, x] && NegQ[a/b] && (Gt
Q[a, 0] || LtQ[b, 0])
```

Rule 260

```
Int[(x_)^(m_.)/((a_) + (b_.)*(x_)^(n_)), x_Symbol] :> Simp[Log[RemoveConten
t[a + b*x^n, x]]/(b*n), x] /; FreeQ[{a, b, m, n}, x] && EqQ[m, n - 1]
```

Rule 325

```
Int[((c_.)*(x_))^(m_)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Simp[((c*
x)^(m + 1)*(a + b*x^n)^(p + 1))/(a*c*(m + 1)), x] - Dist[(b*(m + n*(p + 1)
+ 1))/(a*c^n*(m + 1)), Int[(c*x)^(m + n)*(a + b*x^n)^p, x], x] /; FreeQ[{a,
 b, c, p}, x] && IGtQ[n, 0] && LtQ[m, -1] && IntBinomialQ[a, b, c, n, m, p,
 x]
```

Rule 635

```
Int[((d_) + (e_.)*(x_))/((a_) + (c_.)*(x_)^2), x_Symbol] :> Dist[d, Int[1/(
a + c*x^2), x], x] + Dist[e, Int[x/(a + c*x^2), x], x] /; FreeQ[{a, c, d, e
}, x] &&  !NiceSqrtQ[-(a*c)]
```

Rule 801

```
Int[(((d_.) + (e_.)*(x_))^(m_)*((f_.) + (g_.)*(x_)))/((a_) + (c_.)*(x_)^2),
 x_Symbol] :> Int[ExpandIntegrand[((d + e*x)^m*(f + g*x))/(a + c*x^2), x],
x] /; FreeQ[{a, c, d, e, f, g}, x] && NeQ[c*d^2 + a*e^2, 0] && IntegerQ[m]
```

Rule 2315

```
Int[Log[(c_.)*(x_)]/((d_) + (e_.)*(x_)), x_Symbol] :> -Simp[PolyLog[2, 1 -
c*x]/e, x] /; FreeQ[{c, d, e}, x] && EqQ[e + c*d, 0]
```

Rule 2402

```
Int[Log[(c_.)/((d_) + (e_.)*(x_))]/((f_) + (g_.)*(x_)^2), x_Symbol] :> -Dis
t[e/g, Subst[Int[Log[2*d*x]/(1 - 2*d*x), x], x, 1/(d + e*x)], x] /; FreeQ[{
c, d, e, f, g}, x] && EqQ[c, 2*d] && EqQ[e^2*f + d^2*g, 0]
```

Rule 2447

```
Int[Log[u_]*(Pq_)^(m_.), x_Symbol] :> With[{C = FullSimplify[(Pq^m*(1 - u))
/D[u, x]]}, Simp[C*PolyLog[2, 1 - u], x] /; FreeQ[C, x]] /; IntegerQ[m] &&
PolyQ[Pq, x] && RationalFunctionQ[u, x] && LeQ[RationalFunctionExponents[u,
 x][[2]], Expon[Pq, x]]
```

Rule 5913

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))/(x_), x_Symbol] :> Simp[a*Log[x], x
] + (Simp[(b*PolyLog[2, -(c*x)^(-1)])/2, x] - Simp[(b*PolyLog[2, 1/(c*x)])/
2, x]) /; FreeQ[{a, b, c}, x]
```

Rule 5917

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.)*((d_.)*(x_))^(m_.), x_Symbol]
 :> Simp[((d*x)^(m + 1)*(a + b*ArcCoth[c*x])^p)/(d*(m + 1)), x] - Dist[(b*c
*p)/(d*(m + 1)), Int[((d*x)^(m + 1)*(a + b*ArcCoth[c*x])^(p - 1))/(1 - c^2*
```

```
x^2), x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[p, 0] && (EqQ[p, 1] || In
tegerQ[m]) && NeQ[m, -1]
```

Rule 5920

```
Int[((a_.) + ArcTanh[(c_.)*(x_)]*(b_.))/((d_) + (e_.)*(x_)), x_Symbol] :> -
Simp[((a + b*ArcTanh[c*x])*Log[2/(1 + c*x)])/e, x] + (Dist[(b*c)/e, Int[Log
[2/(1 + c*x)]/(1 - c^2*x^2), x], x] - Dist[(b*c)/e, Int[Log[(2*c*(d + e*x))
/((c*d + e)*(1 + c*x))]/(1 - c^2*x^2), x], x] + Simp[((a + b*ArcTanh[c*x])*
Log[(2*c*(d + e*x))/((c*d + e)*(1 + c*x))])/e, x]) /; FreeQ[{a, b, c, d, e}
, x] && NeQ[c^2*d^2 - e^2, 0]
```

Rule 5921

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))/((d_) + (e_.)*(x_)), x_Symbol] :> -
Simp[((a + b*ArcCoth[c*x])*Log[2/(1 + c*x)])/e, x] + (Dist[(b*c)/e, Int[Log
[2/(1 + c*x)]/(1 - c^2*x^2), x], x] - Dist[(b*c)/e, Int[Log[(2*c*(d + e*x))
/((c*d + e)*(1 + c*x))]/(1 - c^2*x^2), x], x] + Simp[((a + b*ArcCoth[c*x])*
Log[(2*c*(d + e*x))/((c*d + e)*(1 + c*x))])/e, x]) /; FreeQ[{a, b, c, d, e}
, x] && NeQ[c^2*d^2 - e^2, 0]
```

Rule 5992

```
Int[(((a_.) + ArcTanh[(c_.)*(x_)]*(b_.))*(x_)^(m_.))/((d_) + (e_.)*(x_)^2),
 x_Symbol] :> Int[ExpandIntegrand[a + b*ArcTanh[c*x], x^m/(d + e*x^2), x],
x] /; FreeQ[{a, b, c, d, e}, x] && IntegerQ[m] &&  !(EqQ[m, 1] && NeQ[a, 0]
)
```

Rule 5993

```
Int[(((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))*(x_)^(m_.))/((d_) + (e_.)*(x_)^2),
 x_Symbol] :> Int[ExpandIntegrand[a + b*ArcCoth[c*x], x^m/(d + e*x^2), x],
x] /; FreeQ[{a, b, c, d, e}, x] && IntegerQ[m] &&  !(EqQ[m, 1] && NeQ[a, 0]
)
```

Rule 6086

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))*((d_.) + Log[(f_.) + (g_.)*(x_)^2]*
(e_.))*(x_)^(m_.), x_Symbol] :> With[{u = IntHide[x^m*(a + b*ArcCoth[c*x]),
 x]}, Dist[d + e*Log[f + g*x^2], u, x] - Dist[2*e*g, Int[ExpandIntegrand[(x
*u)/(f + g*x^2), x], x], x]] /; FreeQ[{a, b, c, d, e, f, g}, x] && IntegerQ
[m] && NeQ[m, -1]
```

Rule 6725

```
Int[(u_)/((a_) + (b_.)*(x_)^(n_)), x_Symbol] :> With[{v = RationalFunctionE
xpand[u/(a + b*x^n), x]}, Int[v, x] /; SumQ[v]] /; FreeQ[{a, b}, x] && IGtQ
[n, 0]
```

Rubi steps

$$\int \frac{\left(a+b\coth^{-1}(cx)\right)\left(d+e\log\left(f+gx^2\right)\right)}{x^3}\,dx = -\frac{bc\left(d+e\log\left(f+gx^2\right)\right)}{2x} - \frac{\left(a+b\coth^{-1}(cx)\right)\left(d+e\log\left(f\right.\right.}{2x^2}$$

$$= -\frac{bc\left(d+e\log\left(f+gx^2\right)\right)}{2x} - \frac{\left(a+b\coth^{-1}(cx)\right)\left(d+e\log\left(f\right.\right.}{2x^2}$$

$$= -\frac{bc\left(d+e\log\left(f+gx^2\right)\right)}{2x} - \frac{\left(a+b\coth^{-1}(cx)\right)\left(d+e\log\left(f\right.\right.}{2x^2}$$

$$= -\frac{bc\left(d+e\log\left(f+gx^2\right)\right)}{2x} - \frac{\left(a+b\coth^{-1}(cx)\right)\left(d+e\log\left(f\right.\right.}{2x^2}$$

$$= bc^2e\tanh^{-1}(cx)\log\left(\frac{2}{1+cx}\right) - \frac{1}{2}bc^2e\tanh^{-1}(cx)\log\left(\frac{2c\left(\right.}{\left(c\sqrt{-f}\right.}\right.$$

$$= \frac{aeg\log(x)}{f} + bc^2e\tanh^{-1}(cx)\log\left(\frac{2}{1+cx}\right) - \frac{1}{2}bc^2e\tanh^{-1}(cx$$

$$= \frac{aeg\log(x)}{f} + bc^2e\tanh^{-1}(cx)\log\left(\frac{2}{1+cx}\right) - \frac{1}{2}bc^2e\tanh^{-1}(cx$$

$$= \frac{bce\sqrt{g}\,\tan^{-1}\left(\frac{\sqrt{g}\,x}{\sqrt{f}}\right)}{\sqrt{f}} + \frac{aeg\log(x)}{f} + bc^2e\tanh^{-1}(cx)\log\left(\frac{2}{1+\right.}$$

$$= \frac{bce\sqrt{g}\,\tan^{-1}\left(\frac{\sqrt{g}\,x}{\sqrt{f}}\right)}{\sqrt{f}} + \frac{aeg\log(x)}{f} + \frac{beg\coth^{-1}(cx)\log\left(\frac{2}{1+cx}\right.}{f}$$

$$= \frac{bce\sqrt{g}\,\tan^{-1}\left(\frac{\sqrt{g}\,x}{\sqrt{f}}\right)}{\sqrt{f}} + \frac{aeg\log(x)}{f} + \frac{beg\coth^{-1}(cx)\log\left(\frac{2}{1+cx}\right.}{f}$$

$$= \frac{bce\sqrt{g}\,\tan^{-1}\left(\frac{\sqrt{g}\,x}{\sqrt{f}}\right)}{\sqrt{f}} + \frac{aeg\log(x)}{f} + \frac{beg\coth^{-1}(cx)\log\left(\frac{2}{1+cx}\right.}{f}$$

**<u>Mathematica</u> [C]** time = 5.90, size = 1318, normalized size = 1.85

result too large to display

Warning: Unable to verify antiderivative.

```
[In] Integrate[((a + b*ArcCoth[c*x])*(d + e*Log[f + g*x^2]))/x^3,x]
```

```
[Out] -1/4*(2*a*d*f - 4*b*c*e*Sqrt[f]*Sqrt[g]*x^2*ArcTan[(Sqrt[g]*x)/Sqrt[f]] - 4
*a*e*g*x^2*Log[x] + 2*a*e*g*x^2*Log[f + g*x^2] + 2*e*f*(a + b*c*x + (b - b*
c^2*x^2)*ArcCoth[c*x])*Log[f + g*x^2] + b*c^2*e*f*x^2*(-4*ArcCoth[c*x]^2 -
4*ArcCoth[c*x]*Log[1 - E^(-2*ArcCoth[c*x])] + 2*ArcCoth[c*x]*Log[1 + (E^(2*
ArcCoth[c*x])*(c^2*f + g))/(-(c^2*f) - 2*c*Sqrt[-f]*Sqrt[g] + g)] + 2*ArcCo
th[c*x]*Log[1 + (E^(2*ArcCoth[c*x])*(c^2*f + g))/(-(c^2*f) + 2*c*Sqrt[-f]*S
qrt[g] + g)] + 2*PolyLog[2, E^(-2*ArcCoth[c*x])] + PolyLog[2, (E^(2*ArcCoth
[c*x])*(c^2*f + g))/(c^2*f - 2*c*Sqrt[-f]*Sqrt[g] - g)] + PolyLog[2, (E^(2*
ArcCoth[c*x])*(c^2*f + g))/(c^2*f + 2*c*Sqrt[-f]*Sqrt[g] - g)]) - b*d*(-2*(
c*f*x + g*x^2*ArcCoth[c*x]^2 + ArcCoth[c*x]*(f - c^2*f*x^2 + 2*g*x^2*Log[1
```

```
+ E^(-2*ArcCoth[c*x])]) - g*x^2*PolyLog[2, -E^(-2*ArcCoth[c*x])]) + g*x^2*(
2*ArcCoth[c*x]*(-ArcCoth[c*x] + Log[1 + (E^(2*ArcCoth[c*x])*(c^2*f + g))/(-
(c^2*f) - 2*c*Sqrt[-f]*Sqrt[g] + g)] + Log[1 + (E^(2*ArcCoth[c*x])*(c^2*f +
 g))/(-(c^2*f) + 2*c*Sqrt[-f]*Sqrt[g] + g)]) + PolyLog[2, (E^(2*ArcCoth[c*x
])*(c^2*f + g))/(c^2*f - 2*c*Sqrt[-f]*Sqrt[g] - g)] + PolyLog[2, (E^(2*ArcC
oth[c*x])*(c^2*f + g))/(c^2*f + 2*c*Sqrt[-f]*Sqrt[g] - g)])) + b*d*g*x^2*(2
*ArcCoth[c*x]^2 - (4*I)*ArcSin[Sqrt[g/(c^2*f + g)]]*ArcTanh[(c*f)/(Sqrt[-(c
^2*f*g)]*x)] - 2*ArcCoth[c*x]*(ArcCoth[c*x] + 2*Log[1 + E^(-2*ArcCoth[c*x])
]) + 2*(ArcCoth[c*x] - I*ArcSin[Sqrt[g/(c^2*f + g)]])*Log[(c^2*(-1 + E^(2*A
rcCoth[c*x]))*f + g + E^(2*ArcCoth[c*x])*g - 2*Sqrt[-(c^2*f*g)])/(E^(2*ArcC
oth[c*x])*(c^2*f + g))] + 2*(ArcCoth[c*x] + I*ArcSin[Sqrt[g/(c^2*f + g)]])*
Log[(c^2*(-1 + E^(2*ArcCoth[c*x]))*f + g + E^(2*ArcCoth[c*x])*g + 2*Sqrt[-(
c^2*f*g)])/(E^(2*ArcCoth[c*x])*(c^2*f + g))] + 2*PolyLog[2, -E^(-2*ArcCoth[
c*x])] - PolyLog[2, (c^2*f - g + 2*Sqrt[-(c^2*f*g)])/(E^(2*ArcCoth[c*x])*(c
^2*f + g))] - PolyLog[2, -((-(c^2*f) + g + 2*Sqrt[-(c^2*f*g)])/(E^(2*ArcCot
h[c*x])*(c^2*f + g)))]) + b*e*g*x^2*(2*ArcCoth[c*x]^2 - (4*I)*ArcSin[Sqrt[g
/(c^2*f + g)]]*ArcTanh[(c*f)/(Sqrt[-(c^2*f*g)]*x)] - 2*ArcCoth[c*x]*(ArcCot
h[c*x] + 2*Log[1 + E^(-2*ArcCoth[c*x])]) + 2*(ArcCoth[c*x] - I*ArcSin[Sqrt[
g/(c^2*f + g)]])*Log[(c^2*(-1 + E^(2*ArcCoth[c*x]))*f + g + E^(2*ArcCoth[c*
x])*g - 2*Sqrt[-(c^2*f*g)])/(E^(2*ArcCoth[c*x])*(c^2*f + g))] + 2*(ArcCoth[
c*x] + I*ArcSin[Sqrt[g/(c^2*f + g)]])*Log[(c^2*(-1 + E^(2*ArcCoth[c*x]))*f
+ g + E^(2*ArcCoth[c*x])*g + 2*Sqrt[-(c^2*f*g)])/(E^(2*ArcCoth[c*x])*(c^2*f
 + g))] + 2*PolyLog[2, -E^(-2*ArcCoth[c*x])] - PolyLog[2, (c^2*f - g + 2*Sq
rt[-(c^2*f*g)])/(E^(2*ArcCoth[c*x])*(c^2*f + g))] - PolyLog[2, -((-(c^2*f)
+ g + 2*Sqrt[-(c^2*f*g)])/(E^(2*ArcCoth[c*x])*(c^2*f + g)))]))/(f*x^2)
```

**fricas [F]** time = 0.61, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{bd\,\text{arcoth}\,(cx) + ad + (be\,\text{arcoth}\,(cx) + ae)\log\left(gx^2 + f\right)}{x^3}, x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccoth(c*x))*(d+e*log(g*x^2+f))/x^3,x, algorithm="fricas")
```

```
[Out] integral((b*d*arccoth(c*x) + a*d + (b*e*arccoth(c*x) + a*e)*log(g*x^2 + f))
/x^3, x)
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{(b\,\text{arcoth}\,(cx) + a)\left(e\log\left(gx^2 + f\right) + d\right)}{x^3}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccoth(c*x))*(d+e*log(g*x^2+f))/x^3,x, algorithm="giac")
```

```
[Out] integrate((b*arccoth(c*x) + a)*(e*log(g*x^2 + f) + d)/x^3, x)
```

**maple [A]** time = 4.68, size = 936, normalized size = 1.31

$$\frac{db\,c^2\ln(cx+1)}{4} - \frac{db\ln(cx+1)}{4x^2} + \frac{aeg\ln(x)}{f} - \frac{aeg\ln\left(g\,x^2+f\right)}{2f} - \frac{da}{2x^2} - \frac{bcd}{2x} + \left(-\frac{be\ln(cx+1)}{4x^2} + \frac{e\left(b\,c^2\ln(cx+1)\,x^2\right.}{}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a+b*arccoth(c*x))*(d+e*ln(g*x^2+f))/x^3,x)
```

```
[Out] 1/4*d*b*c^2*ln(c*x+1)-1/4*d*b*ln(c*x+1)/x^2+a*e*g*ln(x)/f-1/2*a*e*g*ln(g*x^
2+f)/f-1/2/x^2*d*a-1/2*b*c*d/x+(-1/4*b*e/x^2*ln(c*x+1)+1/4*e*(b*c^2*ln(c*x+
```

```
1)*x^2-b*c^2*ln(c*x-1)*x^2-2*x*b*c+b*ln(c*x-1)-2*a)/x^2)*ln(g*x^2+f)-1/2*g*
b*e*dilog(c*x+1)/f-1/4*b*e*dilog((c*(-f*g)^(1/2)-(c*x+1)*g+g)/(c*(-f*g)^(1/
2)+g))*c^2-1/4*b*e*dilog((c*(-f*g)^(1/2)+(c*x+1)*g-g)/(c*(-f*g)^(1/2)-g))*c
^2-1/4*b*e*ln(c*x+1)*ln((c*(-f*g)^(1/2)-(c*x+1)*g+g)/(c*(-f*g)^(1/2)+g))*c^
2-1/4*b*e*ln(c*x+1)*ln((c*(-f*g)^(1/2)+(c*x+1)*g-g)/(c*(-f*g)^(1/2)-g))*c^2
-1/4*g*b*e/f*dilog((c*(-f*g)^(1/2)-(c*x+1)*g+g)/(c*(-f*g)^(1/2)+g))-1/4*g*b
*e/f*dilog((c*(-f*g)^(1/2)+(c*x+1)*g-g)/(c*(-f*g)^(1/2)-g))-1/4*g*b*e/f*ln(
c*x+1)*ln((c*(-f*g)^(1/2)-(c*x+1)*g+g)/(c*(-f*g)^(1/2)+g))-1/4*g*b*e/f*ln(c
*x+1)*ln((c*(-f*g)^(1/2)+(c*x+1)*g-g)/(c*(-f*g)^(1/2)-g))+g*e*b*c/(f*g)^(1/
2)*arctan(x*g/(f*g)^(1/2))-1/4*d*b*c^2*ln(c*x-1)+1/4*d*b*ln(c*x-1)/x^2+1/4*
b*e*ln(c*x-1)*ln((c*(-f*g)^(1/2)-(c*x-1)*g-g)/(c*(-f*g)^(1/2)-g))*c^2+1/4*b
*e*ln(c*x-1)*ln((c*(-f*g)^(1/2)+(c*x-1)*g+g)/(c*(-f*g)^(1/2)+g))*c^2+1/4*g*
b*e/f*dilog((c*(-f*g)^(1/2)-(c*x-1)*g-g)/(c*(-f*g)^(1/2)-g))+1/4*b*e*dilog(
(c*(-f*g)^(1/2)-(c*x-1)*g-g)/(c*(-f*g)^(1/2)-g))*c^2+1/4*b*e*dilog((c*(-f*g
)^(1/2)+(c*x-1)*g+g)/(c*(-f*g)^(1/2)+g))*c^2+1/4*g*b*e/f*ln(c*x-1)*ln((c*(-
f*g)^(1/2)-(c*x-1)*g-g)/(c*(-f*g)^(1/2)-g))+1/4*g*b*e/f*ln(c*x-1)*ln((c*(-f
*g)^(1/2)+(c*x-1)*g+g)/(c*(-f*g)^(1/2)+g))-1/2*g*b*e/f*ln(c*x-1)*ln(c*x)+1/
4*g*b*e/f*dilog((c*(-f*g)^(1/2)+(c*x-1)*g+g)/(c*(-f*g)^(1/2)+g))-1/2*g*b*e/
f*dilog(c*x)
```

**maxima [F]** time = 0.00, size = 0, normalized size = 0.00

$$\frac{1}{4}\left(\left(c\log\left(cx+1\right)-c\log\left(cx-1\right)-\frac{2}{x}\right)c-\frac{2\,\mathrm{arcoth}\left(cx\right)}{x^2}\right)bd-\frac{1}{2}\left(g\left(\frac{\log\left(gx^2+f\right)}{f}-\frac{\log\left(x^2\right)}{f}\right)+\frac{\log\left(gx^2+f\right)}{x^2}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccoth(c*x))*(d+e*log(g*x^2+f))/x^3,x, algorithm="maxima")
```

```
[Out] 1/4*((c*log(c*x + 1) - c*log(c*x - 1) - 2/x)*c - 2*arccoth(c*x)/x^2)*b*d -
1/2*(g*(log(g*x^2 + f)/f - log(x^2)/f) + log(g*x^2 + f)/x^2)*a*e - 1/4*(2*c
^2*g*integrate(x^2*log(c*x + 1)/(g*x^3 + f*x), x) - 2*c^2*g*integrate(x^2*l
og(c*x - 1)/(g*x^3 + f*x), x) + 2*I*c*g*(log(I*g*x/sqrt(f*g) + 1) - log(-I*
g*x/sqrt(f*g) + 1))/sqrt(f*g) - 2*g*integrate(log(c*x + 1)/(g*x^3 + f*x), x
) + 2*g*integrate(log(c*x - 1)/(g*x^3 + f*x), x) + (2*c*x - (c^2*x^2 - 1)*l
og(c*x + 1) + (c^2*x^2 - 1)*log(c*x - 1))*log(g*x^2 + f)/x^2)*b*e - 1/2*a*d
/x^2
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.00

$$\int \frac{\left(a+b\,\mathrm{acoth}\left(c\,x\right)\right)\,\left(d+e\,\ln\left(g\,x^2+f\right)\right)}{x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(((a + b*acoth(c*x))*(d + e*log(f + g*x^2)))/x^3,x)
```

```
[Out] int(((a + b*acoth(c*x))*(d + e*log(f + g*x^2)))/x^3, x)
```

**sympy [F(-1)]** time = 0.00, size = 0, normalized size = 0.00

Timed out

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*acoth(c*x))*(d+e*ln(g*x**2+f))/x**3,x)
```

```
[Out] Timed out
```

# 3.283 $\int \coth^{-1}(e^x)\,dx$

**Optimal**. Leaf size=25

$$\frac{\text{Li}_2(-e^{-x})}{2}-\frac{\text{Li}_2(e^{-x})}{2}$$

[Out] 1/2*polylog(2,-1/exp(x))-1/2*polylog(2,exp(-x))

**Rubi [A]** time = 0.01, antiderivative size = 25, normalized size of antiderivative = 1.00, number of steps used = 2, number of rules used = 2, integrand size = 4, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.500, Rules used = {2282, 5913}

$$\frac{1}{2}\text{PolyLog}(2,-e^{-x})-\frac{1}{2}\text{PolyLog}(2,e^{-x})$$

Antiderivative was successfully verified.

[In] Int[ArcCoth[E^x],x]

[Out] PolyLog[2, -E^(-x)]/2 - PolyLog[2, E^(-x)]/2

Rule 2282

```
Int[u_, x_Symbol] :> With[{v = FunctionOfExponential[u, x]}, Dist[v/D[v, x]
, Subst[Int[FunctionOfExponentialFunction[u, x]/x, x], x, v], x]] /; Functi
onOfExponentialQ[u, x] && !MatchQ[u, (w_)*((a_.)*(v_)^(n_))^(m_) /; FreeQ[
{a, m, n}, x] && IntegerQ[m*n]] && !MatchQ[u, E^((c_.)*((a_.) + (b_.)*x))*
(F_)[v_] /; FreeQ[{a, b, c}, x] && InverseFunctionQ[F[x]]]
```

Rule 5913

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))/(x_), x_Symbol] :> Simp[a*Log[x], x
] + (Simp[(b*PolyLog[2, -(c*x)^(-1)])/2, x] - Simp[(b*PolyLog[2, 1/(c*x)])/
2, x]) /; FreeQ[{a, b, c}, x]
```

Rubi steps

$$\begin{aligned}\int \coth^{-1}(e^x)\,dx&=\text{Subst}\left(\int \frac{\coth^{-1}(x)}{x}\,dx,x,e^x\right)\\&=\frac{\text{Li}_2(-e^{-x})}{2}-\frac{\text{Li}_2(e^{-x})}{2}\end{aligned}$$

**Mathematica [B]** time = 0.04, size = 51, normalized size = 2.04

$$-\frac{\text{Li}_2(-e^x)}{2}+\frac{\text{Li}_2(e^x)}{2}+\frac{1}{2}x\log(1-e^x)-\frac{1}{2}x\log(e^x+1)+x\coth^{-1}(e^x)$$

Antiderivative was successfully verified.

[In] Integrate[ArcCoth[E^x],x]

[Out] x*ArcCoth[E^x] + (x*Log[1 - E^x])/2 - (x*Log[1 + E^x])/2 - PolyLog[2, -E^x]
/2 + PolyLog[2, E^x]/2

**fricas [B]** time = 0.58, size = 64, normalized size = 2.56

$$\frac{1}{2}x\log\left(\frac{\cosh(x)+\sinh(x)+1}{\cosh(x)+\sinh(x)-1}\right)-\frac{1}{2}x\log(\cosh(x)+\sinh(x)+1)+\frac{1}{2}x\log(-\cosh(x)-\sinh(x)+1)+\frac{1}{2}\text{Li}_2(\text{cosl}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(exp(x)),x, algorithm="fricas")
```

```
[Out] 1/2*x*log((cosh(x) + sinh(x) + 1)/(cosh(x) + sinh(x) - 1)) - 1/2*x*log(cosh
(x) + sinh(x) + 1) + 1/2*x*log(-cosh(x) - sinh(x) + 1) + 1/2*dilog(cosh(x)
+ sinh(x)) - 1/2*dilog(-cosh(x) - sinh(x))
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \operatorname{arcoth}(e^x)\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(exp(x)),x, algorithm="giac")
```

```
[Out] integrate(arccoth(e^x), x)
```

**maple [A]** time = 0.10, size = 31, normalized size = 1.24

$$\ln(e^x)\operatorname{arccoth}(e^x) - \frac{\operatorname{dilog}(e^x)}{2} - \frac{\operatorname{dilog}(e^x+1)}{2} - \frac{\ln(e^x)\ln(e^x+1)}{2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(arccoth(exp(x)),x)
```

```
[Out] ln(exp(x))*arccoth(exp(x))-1/2*dilog(exp(x))-1/2*dilog(exp(x)+1)-1/2*ln(exp
(x))*ln(exp(x)+1)
```

**maxima [B]** time = 0.32, size = 58, normalized size = 2.32

$$-\frac{1}{2}x\left(\log(e^x+1)-\log(e^x-1)\right)+x\operatorname{arcoth}(e^x)+\frac{1}{2}\log(-e^x)\log(e^x+1)-\frac{1}{2}x\log(e^x-1)+\frac{1}{2}\operatorname{Li}_2(e^x+1)-\frac{1}{2}\operatorname{Li}_2$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(exp(x)),x, algorithm="maxima")
```

```
[Out] -1/2*x*(log(e^x + 1) - log(e^x - 1)) + x*arccoth(e^x) + 1/2*log(-e^x)*log(e
^x + 1) - 1/2*x*log(e^x - 1) + 1/2*dilog(e^x + 1) - 1/2*dilog(-e^x + 1)
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.04

$$\int \operatorname{acoth}(e^x)\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(exp(x)),x)
```

```
[Out] int(acoth(exp(x)), x)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \operatorname{acoth}(e^x)\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(exp(x)),x)
```

```
[Out] Integral(acoth(exp(x)), x)
```

# 3.284 $\int x \coth^{-1}(e^x)\,dx$

**Optimal**. Leaf size=51

$$\frac{1}{2}x\text{Li}_2\left(-e^{-x}\right)-\frac{1}{2}x\text{Li}_2\left(e^{-x}\right)+\frac{\text{Li}_3\left(-e^{-x}\right)}{2}-\frac{\text{Li}_3\left(e^{-x}\right)}{2}$$

```
[Out] 1/2*x*polylog(2,-1/exp(x))-1/2*x*polylog(2,exp(-x))+1/2*polylog(3,-1/exp(x)
)-1/2*polylog(3,exp(-x))
```

**Rubi** [A] time = 0.05, antiderivative size = 51, normalized size of antiderivative = 1.00, number of steps used = 7, number of rules used = 4, integrand size = 6, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.667, Rules used = {6214, 2531, 2282, 6589}

$$\frac{1}{2}x\text{PolyLog}\left(2,-e^{-x}\right)-\frac{1}{2}x\text{PolyLog}\left(2,e^{-x}\right)+\frac{1}{2}\text{PolyLog}\left(3,-e^{-x}\right)-\frac{1}{2}\text{PolyLog}\left(3,e^{-x}\right)$$

Antiderivative was successfully verified.

```
[In] Int[x*ArcCoth[E^x],x]
```

```
[Out] (x*PolyLog[2, -E^(-x)])/2 - (x*PolyLog[2, E^(-x)])/2 + PolyLog[3, -E^(-x)]/
2 - PolyLog[3, E^(-x)]/2
```

Rule 2282

```
Int[u_, x_Symbol] :> With[{v = FunctionOfExponential[u, x]}, Dist[v/D[v, x]
, Subst[Int[FunctionOfExponentialFunction[u, x]/x, x], x, v], x]] /; Functi
onOfExponentialQ[u, x] &&  !MatchQ[u, (w_)*((a_.)*(v_)^(n_))^(m_) /; FreeQ[
{a, m, n}, x] && IntegerQ[m*n]] &&  !MatchQ[u, E^((c_.)*((a_.) + (b_.)*x))*
(F_)[v_] /; FreeQ[{a, b, c}, x] && InverseFunctionQ[F[x]]]
```

Rule 2531

```
Int[Log[1 + (e_.)*((F_)^((c_.)*((a_.) + (b_.)*(x_))))^(n_.)]*((f_.) + (g_.)
*(x_))^(m_.), x_Symbol] :> -Simp[((f + g*x)^m*PolyLog[2, -(e*(F^(c*(a + b*x
)))^n)])/(b*c*n*Log[F]), x] + Dist[(g*m)/(b*c*n*Log[F]), Int[(f + g*x)^(m -
 1)*PolyLog[2, -(e*(F^(c*(a + b*x)))^n)], x], x] /; FreeQ[{F, a, b, c, e, f
, g, n}, x] && GtQ[m, 0]
```

Rule 6214

```
Int[ArcCoth[(a_.) + (b_.)*(f_)^((c_.) + (d_.)*(x_))]*(x_)^(m_.), x_Symbol]
:> Dist[1/2, Int[x^m*Log[1 + 1/(a + b*f^(c + d*x))], x], x] - Dist[1/2, Int
[x^m*Log[1 - 1/(a + b*f^(c + d*x))], x], x] /; FreeQ[{a, b, c, d, f}, x] &&
 IGtQ[m, 0]
```

Rule 6589

```
Int[PolyLog[n_, (c_.)*((a_.) + (b_.)*(x_))^(p_.)]/((d_.) + (e_.)*(x_)), x_S
ymbol] :> Simp[PolyLog[n + 1, c*(a + b*x)^p]/(e*p), x] /; FreeQ[{a, b, c, d
, e, n, p}, x] && EqQ[b*d, a*e]
```

Rubi steps

$$\begin{aligned}\int x\coth^{-1}(e^x)\,dx &= -\left(\frac{1}{2}\int x\log\left(1-e^{-x}\right)\,dx\right)+\frac{1}{2}\int x\log\left(1+e^{-x}\right)\,dx\\ &= \frac{1}{2}x\text{Li}_2\left(-e^{-x}\right)-\frac{1}{2}x\text{Li}_2\left(e^{-x}\right)-\frac{1}{2}\int \text{Li}_2\left(-e^{-x}\right)\,dx+\frac{1}{2}\int \text{Li}_2\left(e^{-x}\right)\,dx\\ &= \frac{1}{2}x\text{Li}_2\left(-e^{-x}\right)-\frac{1}{2}x\text{Li}_2\left(e^{-x}\right)+\frac{1}{2}\text{Subst}\left(\int\frac{\text{Li}_2(-x)}{x}\,dx,x,e^{-x}\right)-\frac{1}{2}\text{Subst}\left(\int\frac{\text{Li}_2(x)}{x}\,dx,x\right.\\ &= \frac{1}{2}x\text{Li}_2\left(-e^{-x}\right)-\frac{1}{2}x\text{Li}_2\left(e^{-x}\right)+\frac{\text{Li}_3\left(-e^{-x}\right)}{2}-\frac{\text{Li}_3\left(e^{-x}\right)}{2}\end{aligned}$$

**Mathematica [A]** time = 0.03, size = 71, normalized size = 1.39

$$\frac{1}{4}\left(-2x\text{Li}_2\left(-e^x\right)+2x\text{Li}_2\left(e^x\right)+2\text{Li}_3\left(-e^x\right)-2\text{Li}_3\left(e^x\right)+x^2\log\left(1-e^x\right)-x^2\log\left(e^x+1\right)+2x^2\coth^{-1}\left(e^x\right)\right)$$

Antiderivative was successfully verified.

```
[In] Integrate[x*ArcCoth[E^x],x]
```

```
[Out] (2*x^2*ArcCoth[E^x] + x^2*Log[1 - E^x] - x^2*Log[1 + E^x] - 2*x*PolyLog[2,
-E^x] + 2*x*PolyLog[2, E^x] + 2*PolyLog[3, -E^x] - 2*PolyLog[3, E^x])/4
```

**fricas [C]** time = 0.58, size = 94, normalized size = 1.84

$$\frac{1}{4}x^2\log\left(\frac{\cosh(x)+\sinh(x)+1}{\cosh(x)+\sinh(x)-1}\right)-\frac{1}{4}x^2\log\left(\cosh(x)+\sinh(x)+1\right)+\frac{1}{4}x^2\log\left(-\cosh(x)-\sinh(x)+1\right)+\frac{1}{2}x\text{L}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*arccoth(exp(x)),x, algorithm="fricas")
```

```
[Out] 1/4*x^2*log((cosh(x) + sinh(x) + 1)/(cosh(x) + sinh(x) - 1)) - 1/4*x^2*log(
cosh(x) + sinh(x) + 1) + 1/4*x^2*log(-cosh(x) - sinh(x) + 1) + 1/2*x*dilog(
cosh(x) + sinh(x)) - 1/2*x*dilog(-cosh(x) - sinh(x)) - 1/2*polylog(3, cosh(
x) + sinh(x)) + 1/2*polylog(3, -cosh(x) - sinh(x))
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int x\,\text{arcoth}\left(e^x\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*arccoth(exp(x)),x, algorithm="giac")
```

```
[Out] integrate(x*arccoth(e^x), x)
```

**maple [A]** time = 0.06, size = 62, normalized size = 1.22

$$\frac{x^2\text{arccoth}\left(e^x\right)}{2}-\frac{x^2\ln\left(e^x+1\right)}{4}-\frac{x\,\text{polylog}\left(2,-e^x\right)}{2}+\frac{\text{polylog}\left(3,-e^x\right)}{2}+\frac{x^2\ln\left(1-e^x\right)}{4}+\frac{x\,\text{polylog}\left(2,e^x\right)}{2}-\text{polyl}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x*arccoth(exp(x)),x)
```

```
[Out] 1/2*x^2*arccoth(exp(x))-1/4*x^2*ln(exp(x)+1)-1/2*x*polylog(2,-exp(x))+1/2*p
olylog(3,-exp(x))+1/4*x^2*ln(1-exp(x))+1/2*x*polylog(2,exp(x))-1/2*polylog(
3,exp(x))
```

**maxima** [A] time = 0.32, size = 59, normalized size = 1.16

$$\frac{1}{2}x^2 \operatorname{arcoth}(e^x) - \frac{1}{4}x^2 \log(e^x + 1) + \frac{1}{4}x^2 \log(-e^x + 1) - \frac{1}{2}x\operatorname{Li}_2(-e^x) + \frac{1}{2}x\operatorname{Li}_2(e^x) + \frac{1}{2}\operatorname{Li}_3(-e^x) - \frac{1}{2}\operatorname{Li}_3(e^x)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*arccoth(exp(x)),x, algorithm="maxima")
```

```
[Out] 1/2*x^2*arccoth(e^x) - 1/4*x^2*log(e^x + 1) + 1/4*x^2*log(-e^x + 1) - 1/2*x
*dilog(-e^x) + 1/2*x*dilog(e^x) + 1/2*polylog(3, -e^x) - 1/2*polylog(3, e^x
)
```

**mupad** [F] time = 0.00, size = -1, normalized size = -0.02

$$\int x \operatorname{acoth}(\mathrm{e}^x) \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x*acoth(exp(x)),x)
```

```
[Out] int(x*acoth(exp(x)), x)
```

**sympy** [F] time = 0.00, size = 0, normalized size = 0.00

$$\int x \operatorname{acoth}(e^x)\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*acoth(exp(x)),x)
```

```
[Out] Integral(x*acoth(exp(x)), x)
```

# 3.285 $\int x^2 \coth^{-1}(e^x)\, dx$

**Optimal**. Leaf size=70

$$\frac{1}{2}x^2\text{Li}_2\left(-e^{-x}\right) - \frac{1}{2}x^2\text{Li}_2\left(e^{-x}\right) + x\text{Li}_3\left(-e^{-x}\right) - x\text{Li}_3\left(e^{-x}\right) + \text{Li}_4\left(-e^{-x}\right) - \text{Li}_4\left(e^{-x}\right)$$

```
[Out] 1/2*x^2*polylog(2,-1/exp(x))-1/2*x^2*polylog(2,exp(-x))+x*polylog(3,-1/exp(
x))-x*polylog(3,exp(-x))+polylog(4,-1/exp(x))-polylog(4,exp(-x))
```

**Rubi [A]** time = 0.07, antiderivative size = 70, normalized size of antiderivative = 1.00, number of steps used = 9, number of rules used = 5, integrand size = 8, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.625, Rules used = {6214, 2531, 6609, 2282, 6589}

$$\frac{1}{2}x^2\text{PolyLog}\left(2,-e^{-x}\right)-\frac{1}{2}x^2\text{PolyLog}\left(2,e^{-x}\right)+x\text{PolyLog}\left(3,-e^{-x}\right)-x\text{PolyLog}\left(3,e^{-x}\right)+\text{PolyLog}\left(4,-e^{-x}\right)-\text{Poly}$$

Antiderivative was successfully verified.

```
[In] Int[x^2*ArcCoth[E^x],x]
```

```
[Out] (x^2*PolyLog[2, -E^(-x)])/2 - (x^2*PolyLog[2, E^(-x)])/2 + x*PolyLog[3, -E^
(-x)] - x*PolyLog[3, E^(-x)] + PolyLog[4, -E^(-x)] - PolyLog[4, E^(-x)]
```

Rule 2282

```
Int[u_, x_Symbol] :> With[{v = FunctionOfExponential[u, x]}, Dist[v/D[v, x]
, Subst[Int[FunctionOfExponentialFunction[u, x]/x, x], x, v], x]] /; Functi
onOfExponentialQ[u, x] &&  !MatchQ[u, (w_)*((a_.)*(v_)^(n_))^(m_) /; FreeQ[
{a, m, n}, x] && IntegerQ[m*n]] &&  !MatchQ[u, E^((c_.)*((a_.) + (b_.)*x))*
(F_)[v_] /; FreeQ[{a, b, c}, x] && InverseFunctionQ[F[x]]]
```

Rule 2531

```
Int[Log[1 + (e_.)*((F_)^((c_.)*((a_.) + (b_.)*(x_))))^(n_.)]*((f_.) + (g_.)
*(x_))^(m_.), x_Symbol] :> -Simp[((f + g*x)^m*PolyLog[2, -(e*(F^(c*(a + b*x
)))^n)])/(b*c*n*Log[F]), x] + Dist[(g*m)/(b*c*n*Log[F]), Int[(f + g*x)^(m -
 1)*PolyLog[2, -(e*(F^(c*(a + b*x)))^n)], x], x] /; FreeQ[{F, a, b, c, e, f
, g, n}, x] && GtQ[m, 0]
```

Rule 6214

```
Int[ArcCoth[(a_.) + (b_.)*(f_)^((c_.) + (d_.)*(x_))]*(x_)^(m_.), x_Symbol]
:> Dist[1/2, Int[x^m*Log[1 + 1/(a + b*f^(c + d*x))], x], x] - Dist[1/2, Int
[x^m*Log[1 - 1/(a + b*f^(c + d*x))], x], x] /; FreeQ[{a, b, c, d, f}, x] &&
 IGtQ[m, 0]
```

Rule 6589

```
Int[PolyLog[n_, (c_.)*((a_.) + (b_.)*(x_))^(p_.)]/((d_.) + (e_.)*(x_)), x_S
ymbol] :> Simp[PolyLog[n + 1, c*(a + b*x)^p]/(e*p), x] /; FreeQ[{a, b, c, d
, e, n, p}, x] && EqQ[b*d, a*e]
```

Rule 6609

```
Int[((e_.) + (f_.)*(x_))^(m_.)*PolyLog[n_, (d_.)*((F_)^((c_.)*((a_.) + (b_.
)*(x_))))^(p_.)], x_Symbol] :> Simp[((e + f*x)^m*PolyLog[n + 1, d*(F^(c*(a
+ b*x)))^p])/(b*c*p*Log[F]), x] - Dist[(f*m)/(b*c*p*Log[F]), Int[(e + f*x)^
(m - 1)*PolyLog[n + 1, d*(F^(c*(a + b*x)))^p], x], x] /; FreeQ[{F, a, b, c,
 d, e, f, n, p}, x] && GtQ[m, 0]
```

Rubi steps

$$\int x^2 \coth^{-1}(e^x)\, dx = -\left(\frac{1}{2}\int x^2 \log(1-e^{-x})\, dx\right) + \frac{1}{2}\int x^2 \log(1+e^{-x})\, dx$$
$$= \frac{1}{2}x^2\text{Li}_2(-e^{-x}) - \frac{1}{2}x^2\text{Li}_2(e^{-x}) - \int x\text{Li}_2(-e^{-x})\, dx + \int x\text{Li}_2(e^{-x})\, dx$$
$$= \frac{1}{2}x^2\text{Li}_2(-e^{-x}) - \frac{1}{2}x^2\text{Li}_2(e^{-x}) + x\text{Li}_3(-e^{-x}) - x\text{Li}_3(e^{-x}) - \int \text{Li}_3(-e^{-x})\, dx + \int \text{Li}_3(e^{-x})\, d$$
$$= \frac{1}{2}x^2\text{Li}_2(-e^{-x}) - \frac{1}{2}x^2\text{Li}_2(e^{-x}) + x\text{Li}_3(-e^{-x}) - x\text{Li}_3(e^{-x}) + \text{Subst}\left(\int \frac{\text{Li}_3(-x)}{x}\, dx, x, e^{-x}\right) -$$
$$= \frac{1}{2}x^2\text{Li}_2(-e^{-x}) - \frac{1}{2}x^2\text{Li}_2(e^{-x}) + x\text{Li}_3(-e^{-x}) - x\text{Li}_3(e^{-x}) + \text{Li}_4(-e^{-x}) - \text{Li}_4(e^{-x})$$

**Mathematica [A]** time = 0.03, size = 93, normalized size = 1.33

$$\frac{1}{6}\left(-3x^2\text{Li}_2(-e^x) + 3x^2\text{Li}_2(e^x) + 6x\text{Li}_3(-e^x) - 6x\text{Li}_3(e^x) - 6\text{Li}_4(-e^x) + 6\text{Li}_4(e^x) + x^3\log(1-e^x) - x^3\log(e^x +$$

Antiderivative was successfully verified.

```
[In] Integrate[x^2*ArcCoth[E^x],x]
```

```
[Out] (2*x^3*ArcCoth[E^x] + x^3*Log[1 - E^x] - x^3*Log[1 + E^x] - 3*x^2*PolyLog[2
, -E^x] + 3*x^2*PolyLog[2, E^x] + 6*x*PolyLog[3, -E^x] - 6*x*PolyLog[3, E^x
] - 6*PolyLog[4, -E^x] + 6*PolyLog[4, E^x])/6
```

**fricas [C]** time = 0.69, size = 119, normalized size = 1.70

$$\frac{1}{6}x^3\log\left(\frac{\cosh(x)+\sinh(x)+1}{\cosh(x)+\sinh(x)-1}\right) - \frac{1}{6}x^3\log(\cosh(x)+\sinh(x)+1) + \frac{1}{6}x^3\log(-\cosh(x)-\sinh(x)+1) + \frac{1}{2}x^2\text{Li}_2$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*arccoth(exp(x)),x, algorithm="fricas")
```

```
[Out] 1/6*x^3*log((cosh(x) + sinh(x) + 1)/(cosh(x) + sinh(x) - 1)) - 1/6*x^3*log(
cosh(x) + sinh(x) + 1) + 1/6*x^3*log(-cosh(x) - sinh(x) + 1) + 1/2*x^2*dilo
g(cosh(x) + sinh(x)) - 1/2*x^2*dilog(-cosh(x) - sinh(x)) - x*polylog(3, cos
h(x) + sinh(x)) + x*polylog(3, -cosh(x) - sinh(x)) + polylog(4, cosh(x) + s
inh(x)) - polylog(4, -cosh(x) - sinh(x))
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int x^2 \operatorname{arcoth}(e^x)\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*arccoth(exp(x)),x, algorithm="giac")
```

```
[Out] integrate(x^2*arccoth(e^x), x)
```

**maple [A]** time = 0.06, size = 79, normalized size = 1.13

$$\frac{x^3\text{arccoth}(e^x)}{3} - \frac{x^3\ln(e^x+1)}{6} - \frac{x^2\text{polylog}(2,-e^x)}{2} + x\,\text{polylog}(3,-e^x) - \text{polylog}(4,-e^x) + \frac{x^3\ln(1-e^x)}{6} + \frac{x^2\text{poly}}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^2*arccoth(exp(x)),x)
```

```
[Out] 1/3*x^3*arccoth(exp(x))-1/6*x^3*ln(exp(x)+1)-1/2*x^2*polylog(2,-exp(x))+x*p
olylog(3,-exp(x))-polylog(4,-exp(x))+1/6*x^3*ln(1-exp(x))+1/2*x^2*polylog(2
,exp(x))-x*polylog(3,exp(x))+polylog(4,exp(x))
```

**maxima [A]** time = 0.32, size = 76, normalized size = 1.09

$$\frac{1}{3}x^3\operatorname{arcoth}(e^x)-\frac{1}{6}x^3\log(e^x+1)+\frac{1}{6}x^3\log(-e^x+1)-\frac{1}{2}x^2\mathrm{Li}_2(-e^x)+\frac{1}{2}x^2\mathrm{Li}_2(e^x)+x\mathrm{Li}_3(-e^x)-x\mathrm{Li}_3(e^x)-\mathrm{Li}_4(-e$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*arccoth(exp(x)),x, algorithm="maxima")
```

```
[Out] 1/3*x^3*arccoth(e^x) - 1/6*x^3*log(e^x + 1) + 1/6*x^3*log(-e^x + 1) - 1/2*x
^2*dilog(-e^x) + 1/2*x^2*dilog(e^x) + x*polylog(3, -e^x) - x*polylog(3, e^x
) - polylog(4, -e^x) + polylog(4, e^x)
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.01

$$\int x^2\operatorname{acoth}(\mathrm{e}^x)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^2*acoth(exp(x)),x)
```

```
[Out] int(x^2*acoth(exp(x)), x)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int x^2\operatorname{acoth}(e^x)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**2*acoth(exp(x)),x)
```

```
[Out] Integral(x**2*acoth(exp(x)), x)
```

# 3.286 $\int \coth^{-1}\left(e^{a+bx}\right) dx$

**Optimal**. Leaf size=41

$$\frac{\text{Li}_2\left(-e^{-a-bx}\right)}{2b}-\frac{\text{Li}_2\left(e^{-a-bx}\right)}{2b}$$

```
[Out] 1/2*polylog(2,-exp(-b*x-a))/b-1/2*polylog(2,exp(-b*x-a))/b
```

**Rubi [A]** time = 0.02, antiderivative size = 41, normalized size of antiderivative = 1.00, number of steps used = 2, number of rules used = 2, integrand size = 8, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.250, Rules used = {2282, 5913}

$$\frac{\text{PolyLog}\left(2,-e^{-a-bx}\right)}{2b}-\frac{\text{PolyLog}\left(2,e^{-a-bx}\right)}{2b}$$

Antiderivative was successfully verified.

```
[In] Int[ArcCoth[E^(a + b*x)],x]
```

```
[Out] PolyLog[2, -E^(-a - b*x)]/(2*b) - PolyLog[2, E^(-a - b*x)]/(2*b)
```

Rule 2282

```
Int[u_, x_Symbol] :> With[{v = FunctionOfExponential[u, x]}, Dist[v/D[v, x]
, Subst[Int[FunctionOfExponentialFunction[u, x]/x, x], x, v], x]] /; Functi
onOfExponentialQ[u, x] &&  !MatchQ[u, (w_)*((a_.)*(v_)^(n_))^(m_) /; FreeQ[
{a, m, n}, x] && IntegerQ[m*n]] &&  !MatchQ[u, E^((c_.)*((a_.) + (b_.)*x))*
(F_)[v_] /; FreeQ[{a, b, c}, x] && InverseFunctionQ[F[x]]]
```

Rule 5913

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))/(x_), x_Symbol] :> Simp[a*Log[x], x
] + (Simp[(b*PolyLog[2, -(c*x)^(-1)])/2, x] - Simp[(b*PolyLog[2, 1/(c*x)])/
2, x]) /; FreeQ[{a, b, c}, x]
```

Rubi steps

$$\begin{aligned}\int \coth^{-1}\left(e^{a+bx}\right) dx &= \frac{\text{Subst}\left(\int \frac{\coth^{-1}(x)}{x} \, dx, x, e^{a+bx}\right)}{b}\\ &= \frac{\text{Li}_2\left(-e^{-a-bx}\right)}{2b}-\frac{\text{Li}_2\left(e^{-a-bx}\right)}{2b}\end{aligned}$$

**Mathematica [A]** time = 0.08, size = 68, normalized size = 1.66

$$\frac{-\text{Li}_2\left(-e^{a+bx}\right)+\text{Li}_2\left(e^{a+bx}\right)+bx\left(\log\left(1-e^{a+bx}\right)-\log\left(e^{a+bx}+1\right)+2\coth^{-1}\left(e^{a+bx}\right)\right)}{2b}$$

Antiderivative was successfully verified.

```
[In] Integrate[ArcCoth[E^(a + b*x)],x]
```

```
[Out] (b*x*(2*ArcCoth[E^(a + b*x)] + Log[1 - E^(a + b*x)] - Log[1 + E^(a + b*x)])
 - PolyLog[2, -E^(a + b*x)] + PolyLog[2, E^(a + b*x)])/(2*b)
```

**fricas [B]** time = 0.63, size = 137, normalized size = 3.34

$$bx\log\left(\frac{\cosh(bx+a)+\sinh(bx+a)+1}{\cosh(bx+a)+\sinh(bx+a)-1}\right)-bx\log\left(\cosh\left(bx+a\right)+\sinh\left(bx+a\right)+1\right)-a\log\left(\cosh\left(bx+a\right)+\sinh\left(bx+a\right)\right.$$

Verification of antiderivative is not currently implemented for this CAS.

[In] integrate(arccoth(exp(b*x+a)),x, algorithm="fricas")

[Out] 1/2*(b*x*log((cosh(b*x + a) + sinh(b*x + a) + 1)/(cosh(b*x + a) + sinh(b*x + a) - 1)) - b*x*log(cosh(b*x + a) + sinh(b*x + a) + 1) - a*log(cosh(b*x + a) + sinh(b*x + a) - 1) + (b*x + a)*log(-cosh(b*x + a) - sinh(b*x + a) + 1) + dilog(cosh(b*x + a) + sinh(b*x + a)) - dilog(-cosh(b*x + a) - sinh(b*x + a)))/b

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \operatorname{arcoth}\left(e^{(bx+a)}\right) dx$$

Verification of antiderivative is not currently implemented for this CAS.

[In] integrate(arccoth(exp(b*x+a)),x, algorithm="giac")

[Out] integrate(arccoth(e^(b*x + a)), x)

**maple [A]** time = 0.07, size = 67, normalized size = 1.63

$$\frac{\ln\left(e^{bx+a}\right)\operatorname{arccoth}\left(e^{bx+a}\right)}{b}-\frac{\operatorname{dilog}\left(e^{bx+a}\right)}{2b}-\frac{\operatorname{dilog}\left(e^{bx+a}+1\right)}{2b}-\frac{\ln\left(e^{bx+a}\right)\ln\left(e^{bx+a}+1\right)}{2b}$$

Verification of antiderivative is not currently implemented for this CAS.

[In] int(arccoth(exp(b*x+a)),x)

[Out] 1/b*ln(exp(b*x+a))*arccoth(exp(b*x+a))-1/2/b*dilog(exp(b*x+a))-1/2/b*dilog(exp(b*x+a)+1)-1/2/b*ln(exp(b*x+a))*ln(exp(b*x+a)+1)

**maxima [B]** time = 0.33, size = 107, normalized size = 2.61

$$\frac{(bx+a)\operatorname{arcoth}\left(e^{(bx+a)}\right)}{b}-\frac{(bx+a)\left(\log\left(e^{(bx+a)}+1\right)-\log\left(e^{(bx+a)}-1\right)\right)-\log\left(-e^{(bx+a)}\right)\log\left(e^{(bx+a)}+1\right)+(bx}{2b}$$

Verification of antiderivative is not currently implemented for this CAS.

[In] integrate(arccoth(exp(b*x+a)),x, algorithm="maxima")

[Out] (b*x + a)*arccoth(e^(b*x + a))/b - 1/2*((b*x + a)*(log(e^(b*x + a) + 1) - log(e^(b*x + a) - 1)) - log(-e^(b*x + a))*log(e^(b*x + a) + 1) + (b*x + a)*log(e^(b*x + a) - 1) - dilog(e^(b*x + a) + 1) + dilog(-e^(b*x + a) + 1))/b

**mupad [F]** time = 0.00, size = -1, normalized size = -0.02

$$\int \operatorname{acoth}\left(e^{a+b\,x}\right) dx$$

Verification of antiderivative is not currently implemented for this CAS.

[In] int(acoth(exp(a + b*x)),x)

[Out] int(acoth(exp(a + b*x)), x)

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \operatorname{acoth}\left(e^{a+bx}\right) dx$$

Verification of antiderivative is not currently implemented for this CAS.

[In] integrate(acoth(exp(b*x+a)),x)

[Out] Integral(acoth(exp(a + b*x)), x)

# 3.287 $\int x \coth^{-1}\left(e^{a+bx}\right) dx$

**Optimal**. Leaf size=83

$$\frac{\text{Li}_3\left(-e^{-a-bx}\right)}{2b^2}-\frac{\text{Li}_3\left(e^{-a-bx}\right)}{2b^2}+\frac{x\text{Li}_2\left(-e^{-a-bx}\right)}{2b}-\frac{x\text{Li}_2\left(e^{-a-bx}\right)}{2b}$$

```
[Out] 1/2*x*polylog(2,-exp(-b*x-a))/b-1/2*x*polylog(2,exp(-b*x-a))/b+1/2*polylog(
3,-exp(-b*x-a))/b^2-1/2*polylog(3,exp(-b*x-a))/b^2
```

**Rubi [A]** time = 0.06, antiderivative size = 83, normalized size of antiderivative = 1.00, number of steps used = 7, number of rules used = 4, integrand size = 10, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.400, Rules used = {6214, 2531, 2282, 6589}

$$\frac{\text{PolyLog}\left(3,-e^{-a-bx}\right)}{2b^2}-\frac{\text{PolyLog}\left(3,e^{-a-bx}\right)}{2b^2}+\frac{x\text{PolyLog}\left(2,-e^{-a-bx}\right)}{2b}-\frac{x\text{PolyLog}\left(2,e^{-a-bx}\right)}{2b}$$

Antiderivative was successfully verified.

```
[In] Int[x*ArcCoth[E^(a + b*x)],x]
```

```
[Out] (x*PolyLog[2, -E^(-a - b*x)])/(2*b) - (x*PolyLog[2, E^(-a - b*x)])/(2*b) +
PolyLog[3, -E^(-a - b*x)]/(2*b^2) - PolyLog[3, E^(-a - b*x)]/(2*b^2)
```

Rule 2282

```
Int[u_, x_Symbol] :> With[{v = FunctionOfExponential[u, x]}, Dist[v/D[v, x]
, Subst[Int[FunctionOfExponentialFunction[u, x]/x, x], x, v], x]] /; Functi
onOfExponentialQ[u, x] &&  !MatchQ[u, (w_)*((a_.)*(v_)^(n_))^(m_) /; FreeQ[
{a, m, n}, x] && IntegerQ[m*n]] &&  !MatchQ[u, E^((c_.)*((a_.) + (b_.)*x))*
(F_)[v_] /; FreeQ[{a, b, c}, x] && InverseFunctionQ[F[x]]]
```

Rule 2531

```
Int[Log[1 + (e_.)*((F_)^((c_.)*((a_.) + (b_.)*(x_))))^(n_.)]*((f_.) + (g_.)
*(x_))^(m_.), x_Symbol] :> -Simp[((f + g*x)^m*PolyLog[2, -(e*(F^(c*(a + b*x
)))^n)])/(b*c*n*Log[F]), x] + Dist[(g*m)/(b*c*n*Log[F]), Int[(f + g*x)^(m -
 1)*PolyLog[2, -(e*(F^(c*(a + b*x)))^n)], x], x] /; FreeQ[{F, a, b, c, e, f
, g, n}, x] && GtQ[m, 0]
```

Rule 6214

```
Int[ArcCoth[(a_.) + (b_.)*(f_)^((c_.) + (d_.)*(x_))]*(x_)^(m_.), x_Symbol]
:> Dist[1/2, Int[x^m*Log[1 + 1/(a + b*f^(c + d*x))], x], x] - Dist[1/2, Int
[x^m*Log[1 - 1/(a + b*f^(c + d*x))], x], x] /; FreeQ[{a, b, c, d, f}, x] &&
 IGtQ[m, 0]
```

Rule 6589

```
Int[PolyLog[n_, (c_.)*((a_.) + (b_.)*(x_))^(p_.)]/((d_.) + (e_.)*(x_)), x_S
ymbol] :> Simp[PolyLog[n + 1, c*(a + b*x)^p]/(e*p), x] /; FreeQ[{a, b, c, d
, e, n, p}, x] && EqQ[b*d, a*e]
```

Rubi steps

$$\int x\coth^{-1}\left(e^{a+bx}\right)dx = -\left(\frac{1}{2}\int x\log\left(1-e^{-a-bx}\right)dx\right)+\frac{1}{2}\int x\log\left(1+e^{-a-bx}\right)dx$$
$$= \frac{x\text{Li}_2\left(-e^{-a-bx}\right)}{2b}-\frac{x\text{Li}_2\left(e^{-a-bx}\right)}{2b}-\frac{\int\text{Li}_2\left(-e^{-a-bx}\right)dx}{2b}+\frac{\int\text{Li}_2\left(e^{-a-bx}\right)dx}{2b}$$
$$= \frac{x\text{Li}_2\left(-e^{-a-bx}\right)}{2b}-\frac{x\text{Li}_2\left(e^{-a-bx}\right)}{2b}+\frac{\text{Subst}\left(\int\frac{\text{Li}_2(-x)}{x}dx,x,e^{-a-bx}\right)}{2b^2}-\frac{\text{Subst}\left(\int\frac{\text{Li}_2(x)}{x}dx,\right.}{2b^2}$$
$$= \frac{x\text{Li}_2\left(-e^{-a-bx}\right)}{2b}-\frac{x\text{Li}_2\left(e^{-a-bx}\right)}{2b}+\frac{\text{Li}_3\left(-e^{-a-bx}\right)}{2b^2}-\frac{\text{Li}_3\left(e^{-a-bx}\right)}{2b^2}$$

**Mathematica [A]** time = 0.05, size = 113, normalized size = 1.36

$$\frac{b^2x^2\log\left(1-e^{a+bx}\right)-b^2x^2\log\left(e^{a+bx}+1\right)+2b^2x^2\coth^{-1}\left(e^{a+bx}\right)-2bx\text{Li}_2\left(-e^{a+bx}\right)+2bx\text{Li}_2\left(e^{a+bx}\right)+2\text{Li}_3\left(-\right.}{4b^2}$$

Antiderivative was successfully verified.

```
[In] Integrate[x*ArcCoth[E^(a + b*x)],x]
```

```
[Out] (2*b^2*x^2*ArcCoth[E^(a + b*x)] + b^2*x^2*Log[1 - E^(a + b*x)] - b^2*x^2*Lo
g[1 + E^(a + b*x)] - 2*b*x*PolyLog[2, -E^(a + b*x)] + 2*b*x*PolyLog[2, E^(a
 + b*x)] + 2*PolyLog[3, -E^(a + b*x)] - 2*PolyLog[3, E^(a + b*x)])/(4*b^2)
```

**fricas [C]** time = 0.64, size = 198, normalized size = 2.39

$$\frac{b^2x^2\log\left(\frac{\cosh(bx+a)+\sinh(bx+a)+1}{\cosh(bx+a)+\sinh(bx+a)-1}\right)-b^2x^2\log\left(\cosh\left(bx+a\right)+\sinh\left(bx+a\right)+1\right)+2\,bx\text{Li}_2\left(\cosh\left(bx+a\right)+\sinh\right.}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*arccoth(exp(b*x+a)),x, algorithm="fricas")
```

```
[Out] 1/4*(b^2*x^2*log((cosh(b*x + a) + sinh(b*x + a) + 1)/(cosh(b*x + a) + sinh(
b*x + a) - 1)) - b^2*x^2*log(cosh(b*x + a) + sinh(b*x + a) + 1) + 2*b*x*dil
og(cosh(b*x + a) + sinh(b*x + a)) - 2*b*x*dilog(-cosh(b*x + a) - sinh(b*x +
 a)) + a^2*log(cosh(b*x + a) + sinh(b*x + a) - 1) + (b^2*x^2 - a^2)*log(-co
sh(b*x + a) - sinh(b*x + a) + 1) - 2*polylog(3, cosh(b*x + a) + sinh(b*x +
a)) + 2*polylog(3, -cosh(b*x + a) - sinh(b*x + a)))/b^2
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int x\,\text{arcoth}\left(e^{(bx+a)}\right)dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*arccoth(exp(b*x+a)),x, algorithm="giac")
```

```
[Out] integrate(x*arccoth(e^(b*x + a)), x)
```

**maple [B]** time = 0.08, size = 153, normalized size = 1.84

$$\frac{x^2\text{arccoth}\left(e^{bx+a}\right)}{2}-\frac{\ln\left(e^{bx+a}+1\right)x^2}{4}+\frac{\ln\left(e^{bx+a}+1\right)a^2}{4b^2}-\frac{x\,\text{polylog}\left(2,-e^{bx+a}\right)}{2b}+\frac{\text{polylog}\left(3,-e^{bx+a}\right)}{2b^2}+\frac{\ln\left(1-\right.}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x*arccoth(exp(b*x+a)),x)
```

```
[Out] 1/2*x^2*arccoth(exp(b*x+a))-1/4*ln(exp(b*x+a)+1)*x^2+1/4/b^2*ln(exp(b*x+a)+
1)*a^2-1/2*x*polylog(2,-exp(b*x+a))/b+1/2*polylog(3,-exp(b*x+a))/b^2+1/4*ln
(1-exp(b*x+a))*x^2-1/4/b^2*ln(1-exp(b*x+a))*a^2+1/2*x*polylog(2,exp(b*x+a))
/b-1/2*polylog(3,exp(b*x+a))/b^2-1/2/b^2*a^2*arctanh(exp(b*x+a))
```

**maxima [A]** time = 0.34, size = 108, normalized size = 1.30

$$\frac{1}{2}x^2 \operatorname{arcoth}\left(e^{(bx+a)}\right) - \frac{1}{4}b\left(\frac{b^2x^2\log\left(e^{(bx+a)}+1\right)+2\,bx\operatorname{Li}_2\left(-e^{(bx+a)}\right)-2\operatorname{Li}_3(-e^{(bx+a)})}{b^3} - \frac{b^2x^2\log\left(-e^{(bx+a)}+1\right)+2}{}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*arccoth(exp(b*x+a)),x, algorithm="maxima")
```

```
[Out] 1/2*x^2*arccoth(e^(b*x + a)) - 1/4*b*((b^2*x^2*log(e^(b*x + a) + 1) + 2*b*x
*dilog(-e^(b*x + a)) - 2*polylog(3, -e^(b*x + a)))/b^3 - (b^2*x^2*log(-e^(b
*x + a) + 1) + 2*b*x*dilog(e^(b*x + a)) - 2*polylog(3, e^(b*x + a)))/b^3)
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.01

$$\int x \operatorname{acoth}\left(\mathrm{e}^{a+b\,x}\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x*acoth(exp(a + b*x)),x)
```

```
[Out] int(x*acoth(exp(a + b*x)), x)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int x \operatorname{acoth}\left(e^{a}e^{bx}\right)dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*acoth(exp(b*x+a)),x)
```

```
[Out] Integral(x*acoth(exp(a)*exp(b*x)), x)
```

# 3.288 $\int x^2 \coth^{-1}\left(e^{a+bx}\right) dx$

**Optimal**. Leaf size=119

$$\frac{\text{Li}_4\left(-e^{-a-bx}\right)}{b^3}-\frac{\text{Li}_4\left(e^{-a-bx}\right)}{b^3}+\frac{x\text{Li}_3\left(-e^{-a-bx}\right)}{b^2}-\frac{x\text{Li}_3\left(e^{-a-bx}\right)}{b^2}+\frac{x^2\text{Li}_2\left(-e^{-a-bx}\right)}{2b}-\frac{x^2\text{Li}_2\left(e^{-a-bx}\right)}{2b}$$

```
[Out] 1/2*x^2*polylog(2,-exp(-b*x-a))/b-1/2*x^2*polylog(2,exp(-b*x-a))/b+x*polylo
g(3,-exp(-b*x-a))/b^2-x*polylog(3,exp(-b*x-a))/b^2+polylog(4,-exp(-b*x-a))/
b^3-polylog(4,exp(-b*x-a))/b^3
```

**Rubi [A]** time = 0.10, antiderivative size = 119, normalized size of antiderivative = 1.00, number of steps used = 9, number of rules used = 5, integrand size = 12, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.417, Rules used = {6214, 2531, 6609, 2282, 6589}

$$\frac{x\text{PolyLog}\left(3,-e^{-a-bx}\right)}{b^2}-\frac{x\text{PolyLog}\left(3,e^{-a-bx}\right)}{b^2}+\frac{\text{PolyLog}\left(4,-e^{-a-bx}\right)}{b^3}-\frac{\text{PolyLog}\left(4,e^{-a-bx}\right)}{b^3}+\frac{x^2\text{PolyLog}\left(2,-e\right.}{2b}$$

Antiderivative was successfully verified.

```
[In] Int[x^2*ArcCoth[E^(a + b*x)],x]
```

```
[Out] (x^2*PolyLog[2, -E^(-a - b*x)])/(2*b) - (x^2*PolyLog[2, E^(-a - b*x)])/(2*b
) + (x*PolyLog[3, -E^(-a - b*x)])/b^2 - (x*PolyLog[3, E^(-a - b*x)])/b^2 +
PolyLog[4, -E^(-a - b*x)]/b^3 - PolyLog[4, E^(-a - b*x)]/b^3
```

Rule 2282

```
Int[u_, x_Symbol] :> With[{v = FunctionOfExponential[u, x]}, Dist[v/D[v, x]
, Subst[Int[FunctionOfExponentialFunction[u, x]/x, x], x, v], x]] /; Functi
onOfExponentialQ[u, x] &&  !MatchQ[u, (w_)*((a_.)*(v_)^(n_))^(m_) /; FreeQ[
{a, m, n}, x] && IntegerQ[m*n]] &&  !MatchQ[u, E^((c_.)*((a_.) + (b_.)*x))*
(F_)[v_] /; FreeQ[{a, b, c}, x] && InverseFunctionQ[F[x]]]
```

Rule 2531

```
Int[Log[1 + (e_.)*((F_)^((c_.)*((a_.) + (b_.)*(x_))))^(n_.)]*((f_.) + (g_.)
*(x_))^(m_.), x_Symbol] :> -Simp[((f + g*x)^m*PolyLog[2, -(e*(F^(c*(a + b*x
)))^n)])/(b*c*n*Log[F]), x] + Dist[(g*m)/(b*c*n*Log[F]), Int[(f + g*x)^(m -
 1)*PolyLog[2, -(e*(F^(c*(a + b*x)))^n)], x], x] /; FreeQ[{F, a, b, c, e, f
, g, n}, x] && GtQ[m, 0]
```

Rule 6214

```
Int[ArcCoth[(a_.) + (b_.)*(f_)^((c_.) + (d_.)*(x_))]*(x_)^(m_.), x_Symbol]
:> Dist[1/2, Int[x^m*Log[1 + 1/(a + b*f^(c + d*x))], x], x] - Dist[1/2, Int
[x^m*Log[1 - 1/(a + b*f^(c + d*x))], x], x] /; FreeQ[{a, b, c, d, f}, x] &&
 IGtQ[m, 0]
```

Rule 6589

```
Int[PolyLog[n_, (c_.)*((a_.) + (b_.)*(x_))^(p_.)]/((d_.) + (e_.)*(x_)), x_S
ymbol] :> Simp[PolyLog[n + 1, c*(a + b*x)^p]/(e*p), x] /; FreeQ[{a, b, c, d
, e, n, p}, x] && EqQ[b*d, a*e]
```

Rule 6609

```
Int[((e_.) + (f_.)*(x_))^(m_.)*PolyLog[n_, (d_.)*((F_)^((c_.)*((a_.) + (b_.
)*(x_))))^(p_.)], x_Symbol] :> Simp[((e + f*x)^m*PolyLog[n + 1, d*(F^(c*(a
+ b*x)))^p])/(b*c*p*Log[F]), x] - Dist[(f*m)/(b*c*p*Log[F]), Int[(e + f*x)^
```

```
(m - 1)*PolyLog[n + 1, d*(F^(c*(a + b*x)))^p], x], x] /; FreeQ[{F, a, b, c,
 d, e, f, n, p}, x] && GtQ[m, 0]
```

Rubi steps

$$\int x^2 \coth^{-1}\left(e^{a+bx}\right) dx = -\left(\frac{1}{2}\int x^2 \log\left(1-e^{-a-bx}\right) dx\right) + \frac{1}{2}\int x^2 \log\left(1+e^{-a-bx}\right) dx$$
$$= \frac{x^2 \text{Li}_2\left(-e^{-a-bx}\right)}{2b} - \frac{x^2 \text{Li}_2\left(e^{-a-bx}\right)}{2b} - \frac{\int x \text{Li}_2\left(-e^{-a-bx}\right) dx}{b} + \frac{\int x \text{Li}_2\left(e^{-a-bx}\right) dx}{b}$$
$$= \frac{x^2 \text{Li}_2\left(-e^{-a-bx}\right)}{2b} - \frac{x^2 \text{Li}_2\left(e^{-a-bx}\right)}{2b} + \frac{x \text{Li}_3\left(-e^{-a-bx}\right)}{b^2} - \frac{x \text{Li}_3\left(e^{-a-bx}\right)}{b^2} - \frac{\int \text{Li}_3\left(-e^{-a-bx}\right) d}{b^2}$$
$$= \frac{x^2 \text{Li}_2\left(-e^{-a-bx}\right)}{2b} - \frac{x^2 \text{Li}_2\left(e^{-a-bx}\right)}{2b} + \frac{x \text{Li}_3\left(-e^{-a-bx}\right)}{b^2} - \frac{x \text{Li}_3\left(e^{-a-bx}\right)}{b^2} + \frac{\text{Subst}\left(\int \frac{\text{Li}_3(-x)}{x} d\right.}{b^3}$$
$$= \frac{x^2 \text{Li}_2\left(-e^{-a-bx}\right)}{2b} - \frac{x^2 \text{Li}_2\left(e^{-a-bx}\right)}{2b} + \frac{x \text{Li}_3\left(-e^{-a-bx}\right)}{b^2} - \frac{x \text{Li}_3\left(e^{-a-bx}\right)}{b^2} + \frac{\text{Li}_4\left(-e^{-a-bx}\right)}{b^3} - \frac{\text{L}}{}$$

**Mathematica [A]** time = 0.04, size = 149, normalized size = 1.25

$$\frac{b^3x^3 \log\left(1-e^{a+bx}\right) - b^3x^3 \log\left(e^{a+bx}+1\right) + 2b^3x^3 \coth^{-1}\left(e^{a+bx}\right) - 3b^2x^2 \text{Li}_2\left(-e^{a+bx}\right) + 3b^2x^2 \text{Li}_2\left(e^{a+bx}\right) + 6bx\text{Li}}{6b^3}$$

Antiderivative was successfully verified.

```
[In] Integrate[x^2*ArcCoth[E^(a + b*x)],x]
```

```
[Out] (2*b^3*x^3*ArcCoth[E^(a + b*x)] + b^3*x^3*Log[1 - E^(a + b*x)] - b^3*x^3*Lo
g[1 + E^(a + b*x)] - 3*b^2*x^2*PolyLog[2, -E^(a + b*x)] + 3*b^2*x^2*PolyLog
[2, E^(a + b*x)] + 6*b*x*PolyLog[3, -E^(a + b*x)] - 6*b*x*PolyLog[3, E^(a +
 b*x)] - 6*PolyLog[4, -E^(a + b*x)] + 6*PolyLog[4, E^(a + b*x)])/(6*b^3)
```

**fricas [C]** time = 0.57, size = 247, normalized size = 2.08

$$b^3x^3 \log\left(\frac{\cosh(bx+a)+\sinh(bx+a)+1}{\cosh(bx+a)+\sinh(bx+a)-1}\right) - b^3x^3 \log\left(\cosh\left(bx+a\right)+\sinh\left(bx+a\right)+1\right) + 3\,b^2x^2 \text{Li}_2\left(\cosh\left(bx+a\right)+\sinh\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*arccoth(exp(b*x+a)),x, algorithm="fricas")
```

```
[Out] 1/6*(b^3*x^3*log((cosh(b*x + a) + sinh(b*x + a) + 1)/(cosh(b*x + a) + sinh(
b*x + a) - 1)) - b^3*x^3*log(cosh(b*x + a) + sinh(b*x + a) + 1) + 3*b^2*x^2
*dilog(cosh(b*x + a) + sinh(b*x + a)) - 3*b^2*x^2*dilog(-cosh(b*x + a) - si
nh(b*x + a)) - a^3*log(cosh(b*x + a) + sinh(b*x + a) - 1) - 6*b*x*polylog(3
, cosh(b*x + a) + sinh(b*x + a)) + 6*b*x*polylog(3, -cosh(b*x + a) - sinh(b
*x + a)) + (b^3*x^3 + a^3)*log(-cosh(b*x + a) - sinh(b*x + a) + 1) + 6*poly
log(4, cosh(b*x + a) + sinh(b*x + a)) - 6*polylog(4, -cosh(b*x + a) - sinh(
b*x + a)))/b^3
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int x^2 \operatorname{arcoth}\left(e^{(bx+a)}\right) dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*arccoth(exp(b*x+a)),x, algorithm="giac")
```

```
[Out] integrate(x^2*arccoth(e^(b*x + a)), x)
```

**maple [A]** time = 0.07, size = 185, normalized size = 1.55

$$\frac{x^3\mathrm{arccoth}\left(\mathrm{e}^{bx+a}\right)}{3}-\frac{x^2\,\mathrm{polylog}\left(2,-\mathrm{e}^{bx+a}\right)}{2b}+\frac{x\,\mathrm{polylog}\left(3,-\mathrm{e}^{bx+a}\right)}{b^2}+\frac{\ln\left(1-\mathrm{e}^{bx+a}\right)x^3}{6}+\frac{x^2\,\mathrm{polylog}\left(2,\mathrm{e}^{bx+a}\right)}{2b}+$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^2*arccoth(exp(b*x+a)),x)
```

```
[Out] 1/3*x^3*arccoth(exp(b*x+a))-1/2*x^2*polylog(2,-exp(b*x+a))/b+x*polylog(3,-e
xp(b*x+a))/b^2+1/6*ln(1-exp(b*x+a))*x^3+1/2*x^2*polylog(2,exp(b*x+a))/b+1/3
/b^3*a^3*arctanh(exp(b*x+a))+polylog(4,exp(b*x+a))/b^3-polylog(4,-exp(b*x+a
))/b^3-x*polylog(3,exp(b*x+a))/b^2-1/6*ln(exp(b*x+a)+1)*x^3-1/6/b^3*ln(exp(
b*x+a)+1)*a^3+1/6/b^3*ln(1-exp(b*x+a))*a^3
```

**maxima [A]** time = 0.35, size = 142, normalized size = 1.19

$$\frac{1}{3}\,x^3\,\mathrm{arcoth}\left(e^{(bx+a)}\right)-\frac{1}{6}\,b\left(\frac{b^3x^3\,\log\left(e^{(bx+a)}+1\right)+3\,b^2x^2\mathrm{Li}_2\left(-e^{(bx+a)}\right)-6\,bx\mathrm{Li}_3(-e^{(bx+a)})+6\,\mathrm{Li}_4(-e^{(bx+a)})}{b^4}-\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*arccoth(exp(b*x+a)),x, algorithm="maxima")
```

```
[Out] 1/3*x^3*arccoth(e^(b*x + a)) - 1/6*b*((b^3*x^3*log(e^(b*x + a) + 1) + 3*b^2
*x^2*dilog(-e^(b*x + a)) - 6*b*x*polylog(3, -e^(b*x + a)) + 6*polylog(4, -e
^(b*x + a)))/b^4 - (b^3*x^3*log(-e^(b*x + a) + 1) + 3*b^2*x^2*dilog(e^(b*x
+ a)) - 6*b*x*polylog(3, e^(b*x + a)) + 6*polylog(4, e^(b*x + a)))/b^4)
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.01

$$\int x^2\,\mathrm{acoth}\left(\mathrm{e}^{a+b\,x}\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^2*acoth(exp(a + b*x)),x)
```

```
[Out] int(x^2*acoth(exp(a + b*x)), x)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int x^2\,\mathrm{acoth}\left(e^a e^{bx}\right)dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**2*acoth(exp(b*x+a)),x)
```

```
[Out] Integral(x**2*acoth(exp(a)*exp(b*x)), x)
```

## 3.289 $\int \coth^{-1}\left(a+bf^{c+dx}\right)\,dx$

**Optimal**. Leaf size=168

$$\frac{\text{Li}_2\left(1-\frac{2}{bf^{c+dx}+a+1}\right)}{2d\log(f)}-\frac{\text{Li}_2\left(1-\frac{2bf^{c+dx}}{(1-a)\left(bf^{c+dx}+a+1\right)}\right)}{2d\log(f)}-\frac{\log\left(\frac{2}{a+bf^{c+dx}+1}\right)\coth^{-1}\left(a+bf^{c+dx}\right)}{d\log(f)}+\frac{\log\left(\frac{2bf^{c+dx}}{(1-a)\left(a+bf^{c+dx}+1\right)}\right)\text{coth}}{d\log(f)}$$

```
[Out] -arccoth(a+b*f^(d*x+c))*ln(2/(1+a+b*f^(d*x+c)))/d/ln(f)+arccoth(a+b*f^(d*x+
c))*ln(2*b*f^(d*x+c)/(1-a)/(1+a+b*f^(d*x+c)))/d/ln(f)+1/2*polylog(2,1-2/(1+
a+b*f^(d*x+c)))/d/ln(f)-1/2*polylog(2,1-2*b*f^(d*x+c)/(1-a)/(1+a+b*f^(d*x+c
)))/d/ln(f)
```

**Rubi [A]** time = 0.13, antiderivative size = 168, normalized size of antiderivative = 1.00, number of steps used = 6, number of rules used = 6, integrand size = 12, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.500, Rules used = {2282, 6112, 5921, 2402, 2315, 2447}

$$\frac{\text{PolyLog}\left(2,1-\frac{2}{a+bf^{c+dx}+1}\right)}{2d\log(f)}-\frac{\text{PolyLog}\left(2,1-\frac{2bf^{c+dx}}{(1-a)\left(a+bf^{c+dx}+1\right)}\right)}{2d\log(f)}-\frac{\log\left(\frac{2}{a+bf^{c+dx}+1}\right)\coth^{-1}\left(a+bf^{c+dx}\right)}{d\log(f)}+\frac{\log\left(\frac{2}{(1-a)(}\right.}{}$$

Antiderivative was successfully verified.

```
[In] Int[ArcCoth[a + b*f^(c + d*x)],x]
```

```
[Out] -((ArcCoth[a + b*f^(c + d*x)]*Log[2/(1 + a + b*f^(c + d*x))])/(d*Log[f])) +
 (ArcCoth[a + b*f^(c + d*x)]*Log[(2*b*f^(c + d*x))/((1 - a)*(1 + a + b*f^(c
 + d*x)))])/(d*Log[f]) + PolyLog[2, 1 - 2/(1 + a + b*f^(c + d*x))]/(2*d*Log
[f]) - PolyLog[2, 1 - (2*b*f^(c + d*x))/((1 - a)*(1 + a + b*f^(c + d*x)))]/
(2*d*Log[f])
```

Rule 2282

```
Int[u_, x_Symbol] :> With[{v = FunctionOfExponential[u, x]}, Dist[v/D[v, x]
, Subst[Int[FunctionOfExponentialFunction[u, x]/x, x], x, v], x]] /; Functi
onOfExponentialQ[u, x] &&  !MatchQ[u, (w_)*((a_.)*(v_)^(n_))^(m_) /; FreeQ[
{a, m, n}, x] && IntegerQ[m*n]] &&  !MatchQ[u, E^((c_.)*((a_.) + (b_.)*x))*
(F_)[v_] /; FreeQ[{a, b, c}, x] && InverseFunctionQ[F[x]]]
```

Rule 2315

```
Int[Log[(c_.)*(x_)]/((d_) + (e_.)*(x_)), x_Symbol] :> -Simp[PolyLog[2, 1 -
c*x]/e, x] /; FreeQ[{c, d, e}, x] && EqQ[e + c*d, 0]
```

Rule 2402

```
Int[Log[(c_.)/((d_) + (e_.)*(x_))]/((f_) + (g_.)*(x_)^2), x_Symbol] :> -Dis
t[e/g, Subst[Int[Log[2*d*x]/(1 - 2*d*x), x], x, 1/(d + e*x)], x] /; FreeQ[{
c, d, e, f, g}, x] && EqQ[c, 2*d] && EqQ[e^2*f + d^2*g, 0]
```

Rule 2447

```
Int[Log[u_]*(Pq_)^(m_.), x_Symbol] :> With[{C = FullSimplify[(Pq^m*(1 - u))
/D[u, x]]}, Simp[C*PolyLog[2, 1 - u], x] /; FreeQ[C, x]] /; IntegerQ[m] &&
PolyQ[Pq, x] && RationalFunctionQ[u, x] && LeQ[RationalFunctionExponents[u,
 x][[2]], Expon[Pq, x]]
```

Rule 5921

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))/((d_) + (e_.)*(x_)), x_Symbol] :> -
Simp[((a + b*ArcCoth[c*x])*Log[2/(1 + c*x)])/e, x] + (Dist[(b*c)/e, Int[Log
```

```
[2/(1 + c*x)]/(1 - c^2*x^2), x], x] - Dist[(b*c)/e, Int[Log[(2*c*(d + e*x))
/((c*d + e)*(1 + c*x))]/(1 - c^2*x^2), x], x] + Simp[((a + b*ArcCoth[c*x])*
Log[(2*c*(d + e*x))/((c*d + e)*(1 + c*x))])/e, x]) /; FreeQ[{a, b, c, d, e}
, x] && NeQ[c^2*d^2 - e^2, 0]
```

Rule 6112

```
Int[((a_.) + ArcCoth[(c_) + (d_.)*(x_)]*(b_.))^(p_.)*((e_.) + (f_.)*(x_))^(
m_.), x_Symbol] :> Dist[1/d, Subst[Int[((d*e - c*f)/d + (f*x)/d)^m*(a + b*A
rcCoth[x])^p, x], x, c + d*x], x] /; FreeQ[{a, b, c, d, e, f, m}, x] && IGt
Q[p, 0]
```

Rule steps

$$\int \coth^{-1}\left(a+bf^{c+dx}\right)dx = \frac{\text{Subst}\left(\int \frac{\coth^{-1}(a+bx)}{x}\,dx, x, f^{c+dx}\right)}{d\log(f)}$$
$$= \frac{\text{Subst}\left(\int \frac{\coth^{-1}(x)}{-\frac{a}{b}+\frac{x}{b}}\,dx, x, a+bf^{c+dx}\right)}{bd\log(f)}$$

$$= -\frac{\coth^{-1}\left(a+bf^{c+dx}\right)\log\left(\frac{2}{1+a+bf^{c+dx}}\right)}{d\log(f)} + \frac{\coth^{-1}\left(a+bf^{c+dx}\right)\log\left(\frac{2bf^{c+dx}}{(1-a)\left(1+a+bf^{c+dx}\right)}\right)}{d\log(f)}$$
$$= -\frac{\coth^{-1}\left(a+bf^{c+dx}\right)\log\left(\frac{2}{1+a+bf^{c+dx}}\right)}{d\log(f)} + \frac{\coth^{-1}\left(a+bf^{c+dx}\right)\log\left(\frac{2bf^{c+dx}}{(1-a)\left(1+a+bf^{c+dx}\right)}\right)}{d\log(f)}$$
$$= -\frac{\coth^{-1}\left(a+bf^{c+dx}\right)\log\left(\frac{2}{1+a+bf^{c+dx}}\right)}{d\log(f)} + \frac{\coth^{-1}\left(a+bf^{c+dx}\right)\log\left(\frac{2bf^{c+dx}}{(1-a)\left(1+a+bf^{c+dx}\right)}\right)}{d\log(f)}$$

**Mathematica [A]** time = 0.09, size = 108, normalized size = 0.64

$$\frac{\text{Li}_2\left(-\frac{bf^{c+dx}}{a-1}\right)-\text{Li}_2\left(-\frac{bf^{c+dx}}{a+1}\right)+dx\log(f)\left(\log\left(\frac{a+bf^{c+dx}-1}{a-1}\right)-\log\left(\frac{a+bf^{c+dx}+1}{a+1}\right)+2\coth^{-1}\left(a+bf^{c+dx}\right)\right)}{2d\log(f)}$$

Antiderivative was successfully verified.

```
[In] Integrate[ArcCoth[a + b*f^(c + d*x)],x]
```

```
[Out] (d*x*Log[f]*(2*ArcCoth[a + b*f^(c + d*x)] + Log[(-1 + a + b*f^(c + d*x))/(-
1 + a)] - Log[(1 + a + b*f^(c + d*x))/(1 + a)]) + PolyLog[2, -((b*f^(c + d*
x))/(-1 + a))] - PolyLog[2, -((b*f^(c + d*x))/(1 + a))])/(2*d*Log[f])
```

**fricas [A]** time = 0.58, size = 283, normalized size = 1.68

$$dx\log(f)\log\left(\frac{b\cosh\left((dx+c)\log(f)\right)+b\sinh\left((dx+c)\log(f)\right)+a+1}{b\cosh\left((dx+c)\log(f)\right)+b\sinh\left((dx+c)\log(f)\right)+a-1}\right)+c\log\left(b\cosh\left((dx+c)\log(f)\right)+b\sinh\left((dx+c)\log\right.\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(a+b*f^(d*x+c)),x, algorithm="fricas")
```

```
[Out] 1/2*(d*x*log(f)*log((b*cosh((d*x + c)*log(f)) + b*sinh((d*x + c)*log(f)) +
a + 1)/(b*cosh((d*x + c)*log(f)) + b*sinh((d*x + c)*log(f)) + a - 1)) + c*l
og(b*cosh((d*x + c)*log(f)) + b*sinh((d*x + c)*log(f)) + a + 1)*log(f) - c*
log(b*cosh((d*x + c)*log(f)) + b*sinh((d*x + c)*log(f)) + a - 1)*log(f) - (
d*x + c)*log(f)*log((b*cosh((d*x + c)*log(f)) + b*sinh((d*x + c)*log(f)) +
a + 1)/(a + 1)) + (d*x + c)*log(f)*log((b*cosh((d*x + c)*log(f)) + b*sinh((
d*x + c)*log(f)) + a - 1)/(a - 1)) - dilog(-(b*cosh((d*x + c)*log(f)) + b*s
inh((d*x + c)*log(f)) + a + 1)/(a + 1) + 1) + dilog(-(b*cosh((d*x + c)*log(
f)) + b*sinh((d*x + c)*log(f)) + a - 1)/(a - 1) + 1))/(d*log(f))
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \operatorname{arcoth}\left(bf^{dx+c} + a\right) dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(a+b*f^(d*x+c)),x, algorithm="giac")
```

```
[Out] integrate(arccoth(b*f^(d*x + c) + a), x)
```

**maple [A]** time = 0.15, size = 164, normalized size = 0.98

$$\frac{\ln\left(b\,f^{dx+c}\right)\operatorname{arccoth}\left(a+b\,f^{dx+c}\right)}{d\ln(f)}+\frac{\operatorname{dilog}\left(\frac{b\,f^{dx+c}+a-1}{a-1}\right)}{2d\ln(f)}+\frac{\ln\left(b\,f^{dx+c}\right)\ln\left(\frac{b\,f^{dx+c}+a-1}{a-1}\right)}{2d\ln(f)}-\frac{\operatorname{dilog}\left(\frac{1+a+b\,f^{dx+c}}{1+a}\right)}{2d\ln(f)}-\frac{\ln\left(b\,f^{d\cdots}\right.}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(arccoth(a+b*f^(d*x+c)),x)
```

```
[Out] 1/d/ln(f)*ln(b*f^(d*x+c))*arccoth(a+b*f^(d*x+c))+1/2/d/ln(f)*dilog((b*f^(d*
x+c)+a-1)/(a-1))+1/2/d/ln(f)*ln(b*f^(d*x+c))*ln((b*f^(d*x+c)+a-1)/(a-1))-1/
2/d/ln(f)*dilog((1+a+b*f^(d*x+c))/(1+a))-1/2/d/ln(f)*ln(b*f^(d*x+c))*ln((1+
a+b*f^(d*x+c))/(1+a))
```

**maxima [A]** time = 0.33, size = 202, normalized size = 1.20

$$\frac{(dx+c)\operatorname{arcoth}\left(bf^{dx+c}+a\right)}{d}-\frac{(dx+c)b\left(\frac{\log\left(bf^{dx+c}+a+1\right)}{b}-\frac{\log\left(bf^{dx+c}+a-1\right)}{b}\right)\log(f)-b\left(\frac{\log\left(bf^{dx+c}+a+1\right)\log\left(-\frac{bf^{dx+c}+a+1}{a+1}+1\cdots\right.}{b}\right.}{2\,d\log(f)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(arccoth(a+b*f^(d*x+c)),x, algorithm="maxima")
```

```
[Out] (d*x + c)*arccoth(b*f^(d*x + c) + a)/d - 1/2*((d*x + c)*b*(log(b*f^(d*x + c
) + a + 1)/b - log(b*f^(d*x + c) + a - 1)/b)*log(f) - b*((log(b*f^(d*x + c)
 + a + 1)*log(-(b*f^(d*x + c) + a + 1)/(a + 1) + 1) + dilog((b*f^(d*x + c)
+ a + 1)/(a + 1)))/b - (log(b*f^(d*x + c) + a - 1)*log(-(b*f^(d*x + c) + a
- 1)/(a - 1) + 1) + dilog((b*f^(d*x + c) + a - 1)/(a - 1)))/b))/(d*log(f))
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.01

$$\int \operatorname{acoth}\left(a+b\,f^{c+d\,x}\right) dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(a + b*f^(c + d*x)),x)
```

```
[Out] int(acoth(a + b*f^(c + d*x)), x)
```

**sympy [F(-1)]** time = 0.00, size = 0, normalized size = 0.00

Timed out

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(acoth(a+b*f**(d*x+c)),x)
[Out] Timed out
```

# 3.290 $\int x \coth^{-1}\left(a+bf^{c+dx}\right)\,dx$

**Optimal**. Leaf size=216

$$-\frac{\text{Li}_3\left(\frac{bf^{c+dx}}{1-a}\right)}{2d^2\log^2(f)}+\frac{\text{Li}_3\left(-\frac{bf^{c+dx}}{a+1}\right)}{2d^2\log^2(f)}+\frac{x\text{Li}_2\left(\frac{bf^{c+dx}}{1-a}\right)}{2d\log(f)}-\frac{x\text{Li}_2\left(-\frac{bf^{c+dx}}{a+1}\right)}{2d\log(f)}+\frac{1}{4}x^2\log\left(1-\frac{bf^{c+dx}}{1-a}\right)-\frac{1}{4}x^2\log\left(\frac{bf^{c+dx}}{a+1}+1\right)-\frac{1}{4}x^2\text{lo}$$

```
[Out] 1/4*x^2*ln(1-b*f^(d*x+c)/(1-a))-1/4*x^2*ln(1+b*f^(d*x+c)/(1+a))-1/4*x^2*ln(
1-1/(a+b*f^(d*x+c)))+1/4*x^2*ln(1+1/(a+b*f^(d*x+c)))+1/2*x*polylog(2,b*f^(d
*x+c)/(1-a))/d/ln(f)-1/2*x*polylog(2,-b*f^(d*x+c)/(1+a))/d/ln(f)-1/2*polylo
g(3,b*f^(d*x+c)/(1-a))/d^2/ln(f)^2+1/2*polylog(3,-b*f^(d*x+c)/(1+a))/d^2/ln
(f)^2
```

**Rubi [A]** time = 2.71, antiderivative size = 216, normalized size of antiderivative = 1.00, number of steps used = 25, number of rules used = 8, integrand size = 14, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.571, Rules used = {6214, 2551, 12, 6742, 2190, 2531, 2282, 6589}

$$-\frac{\text{PolyLog}\left(3,\frac{bf^{c+dx}}{1-a}\right)}{2d^2\log^2(f)}+\frac{\text{PolyLog}\left(3,-\frac{bf^{c+dx}}{a+1}\right)}{2d^2\log^2(f)}+\frac{x\text{PolyLog}\left(2,\frac{bf^{c+dx}}{1-a}\right)}{2d\log(f)}-\frac{x\text{PolyLog}\left(2,-\frac{bf^{c+dx}}{a+1}\right)}{2d\log(f)}+\frac{1}{4}x^2\log\left(1-\frac{bf^{c+dx}}{1-a}\right.$$

Antiderivative was successfully verified.

```
[In] Int[x*ArcCoth[a + b*f^(c + d*x)],x]
```

```
[Out] (x^2*Log[1 - (b*f^(c + d*x))/(1 - a)])/4 - (x^2*Log[1 + (b*f^(c + d*x))/(1
+ a)])/4 - (x^2*Log[1 - (a + b*f^(c + d*x))^(-1)])/4 + (x^2*Log[1 + (a + b*
f^(c + d*x))^(-1)])/4 + (x*PolyLog[2, (b*f^(c + d*x))/(1 - a)])/(2*d*Log[f]
) - (x*PolyLog[2, -((b*f^(c + d*x))/(1 + a))])/(2*d*Log[f]) - PolyLog[3, (b
*f^(c + d*x))/(1 - a)]/(2*d^2*Log[f]^2) + PolyLog[3, -((b*f^(c + d*x))/(1 +
 a))]/(2*d^2*Log[f]^2)
```

Rule 12

```
Int[(a_)*(u_), x_Symbol] :> Dist[a, Int[u, x], x] /; FreeQ[a, x] &&  !Match
Q[u, (b_)*(v_) /; FreeQ[b, x]]
```

Rule 2190

```
Int[(((F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m_.))/
((a_) + (b_.)*((F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)), x_Symbol] :> Simp
[((c + d*x)^m*Log[1 + (b*(F^(g*(e + f*x)))^n)/a])/(b*f*g*n*Log[F]), x] - Di
st[(d*m)/(b*f*g*n*Log[F]), Int[(c + d*x)^(m - 1)*Log[1 + (b*(F^(g*(e + f*x)
))^n)/a], x], x] /; FreeQ[{F, a, b, c, d, e, f, g, n}, x] && IGtQ[m, 0]
```

Rule 2282

```
Int[u_, x_Symbol] :> With[{v = FunctionOfExponential[u, x]}, Dist[v/D[v, x]
, Subst[Int[FunctionOfExponentialFunction[u, x]/x, x], x, v], x]] /; Functi
onOfExponentialQ[u, x] &&  !MatchQ[u, (w_)*((a_.)*(v_)^(n_))^(m_) /; FreeQ[
{a, m, n}, x] && IntegerQ[m*n]] &&  !MatchQ[u, E^((c_.)*((a_.) + (b_.)*x))*
(F_)[v_] /; FreeQ[{a, b, c}, x] && InverseFunctionQ[F[x]]]
```

Rule 2531

```
Int[Log[1 + (e_.)*((F_)^((c_.)*((a_.) + (b_.)*(x_))))^(n_.)]*((f_.) + (g_.)
*(x_))^(m_.), x_Symbol] :> -Simp[((f + g*x)^m*PolyLog[2, -(e*(F^(c*(a + b*x
)))^n)])/(b*c*n*Log[F]), x] + Dist[(g*m)/(b*c*n*Log[F]), Int[(f + g*x)^(m -
 1)*PolyLog[2, -(e*(F^(c*(a + b*x)))^n)], x], x] /; FreeQ[{F, a, b, c, e, f
```

```
, g, n}, x] && GtQ[m, 0]
```

Rule 2551

```
Int[Log[u_]*((a_.) + (b_.)*(x_))^(m_.), x_Symbol] :> Simp[((a + b*x)^(m + 1
)*Log[u])/(b*(m + 1)), x] - Dist[1/(b*(m + 1)), Int[SimplifyIntegrand[((a +
 b*x)^(m + 1)*D[u, x])/u, x], x], x] /; FreeQ[{a, b, m}, x] && InverseFunct
ionFreeQ[u, x] && NeQ[m, -1]
```

Rule 6214

```
Int[ArcCoth[(a_.) + (b_.)*(f_)^((c_.) + (d_.)*(x_))]*(x_)^(m_.), x_Symbol]
:> Dist[1/2, Int[x^m*Log[1 + 1/(a + b*f^(c + d*x))], x], x] - Dist[1/2, Int
[x^m*Log[1 - 1/(a + b*f^(c + d*x))], x], x] /; FreeQ[{a, b, c, d, f}, x] &&
 IGtQ[m, 0]
```

Rule 6589

```
Int[PolyLog[n_, (c_.)*((a_.) + (b_.)*(x_))^(p_.)]/((d_.) + (e_.)*(x_)), x_S
ymbol] :> Simp[PolyLog[n + 1, c*(a + b*x)^p]/(e*p), x] /; FreeQ[{a, b, c, d
, e, n, p}, x] && EqQ[b*d, a*e]
```

Rule 6742

```
Int[u_, x_Symbol] :> With[{v = ExpandIntegrand[u, x]}, Int[v, x] /; SumQ[v]
]
```

Rubi steps

$$\int x\coth^{-1}\left(a+bf^{c+dx}\right)dx = -\left(\frac{1}{2}\int x\log\left(1-\frac{1}{a+bf^{c+dx}}\right)dx\right)+\frac{1}{2}\int x\log\left(1+\frac{1}{a+bf^{c+dx}}\right)dx$$

$$= -\frac{1}{4}x^2\log\left(1-\frac{1}{a+bf^{c+dx}}\right)+\frac{1}{4}x^2\log\left(1+\frac{1}{a+bf^{c+dx}}\right)+\frac{1}{4}\int\frac{bdf^{c+dx}x^2}{\left(-1+a+bf^{c+dx}\right.}$$

$$= -\frac{1}{4}x^2\log\left(1-\frac{1}{a+bf^{c+dx}}\right)+\frac{1}{4}x^2\log\left(1+\frac{1}{a+bf^{c+dx}}\right)+\frac{1}{4}(bd\log(f))\int\frac{}{\left(-1+\right.}$$

$$= -\frac{1}{4}x^2\log\left(1-\frac{1}{a+bf^{c+dx}}\right)+\frac{1}{4}x^2\log\left(1+\frac{1}{a+bf^{c+dx}}\right)+\frac{1}{4}(bd\log(f))\int\left(\frac{f^{c}}{-a-}\right.$$

$$= -\frac{1}{4}x^2\log\left(1-\frac{1}{a+bf^{c+dx}}\right)+\frac{1}{4}x^2\log\left(1+\frac{1}{a+bf^{c+dx}}\right)+\frac{1}{4}(bd\log(f))\int\frac{f}{-1+}$$

$$= \frac{1}{4}x^2\log\left(1-\frac{bf^{c+dx}}{1-a}\right)-\frac{1}{4}x^2\log\left(1+\frac{bf^{c+dx}}{1+a}\right)-\frac{1}{4}x^2\log\left(1-\frac{1}{a+bf^{c+dx}}\right)+\frac{1}{4}x^2$$

$$= \frac{1}{4}x^2\log\left(1-\frac{bf^{c+dx}}{1-a}\right)-\frac{1}{4}x^2\log\left(1+\frac{bf^{c+dx}}{1+a}\right)-\frac{1}{4}x^2\log\left(1-\frac{1}{a+bf^{c+dx}}\right)+\frac{1}{4}x^2$$

$$= \frac{1}{4}x^2\log\left(1-\frac{bf^{c+dx}}{1-a}\right)-\frac{1}{4}x^2\log\left(1+\frac{bf^{c+dx}}{1+a}\right)-\frac{1}{4}x^2\log\left(1-\frac{1}{a+bf^{c+dx}}\right)+\frac{1}{4}x^2$$

$$= \frac{1}{4}x^2\log\left(1-\frac{bf^{c+dx}}{1-a}\right)-\frac{1}{4}x^2\log\left(1+\frac{bf^{c+dx}}{1+a}\right)-\frac{1}{4}x^2\log\left(1-\frac{1}{a+bf^{c+dx}}\right)+\frac{1}{4}x^2$$

**Mathematica [A]** time = 0.11, size = 177, normalized size = 0.82

$$\frac{d^2x^2\log^2(f)\log\left(\frac{bf^{c+dx}}{a-1}+1\right)-d^2x^2\log^2(f)\log\left(\frac{bf^{c+dx}}{a+1}+1\right)+2d^2x^2\log^2(f)\coth^{-1}\left(a+bf^{c+dx}\right)-2\text{Li}_3\left(-\frac{bf^{c+dx}}{a-1}\right)}{4d^2\log^2(f)}$$

Antiderivative was successfully verified.

```
[In] Integrate[x*ArcCoth[a + b*f^(c + d*x)],x]
```

```
[Out] (2*d^2*x^2*ArcCoth[a + b*f^(c + d*x)]*Log[f]^2 + d^2*x^2*Log[f]^2*Log[1 + (
b*f^(c + d*x))/(-1 + a)] - d^2*x^2*Log[f]^2*Log[1 + (b*f^(c + d*x))/(1 + a)
] + 2*d*x*Log[f]*PolyLog[2, -((b*f^(c + d*x))/(-1 + a))] - 2*d*x*Log[f]*Pol
yLog[2, -((b*f^(c + d*x))/(1 + a))] - 2*PolyLog[3, -((b*f^(c + d*x))/(-1 +
a))] + 2*PolyLog[3, -((b*f^(c + d*x))/(1 + a))])/(4*d^2*Log[f]^2)
```

**fricas [C]** time = 0.66, size = 395, normalized size = 1.83

$$d^2x^2\log(f)^2\log\left(\frac{b\cosh\left((dx+c)\log(f)\right)+b\sinh\left((dx+c)\log(f)\right)+a+1}{b\cosh\left((dx+c)\log(f)\right)+b\sinh\left((dx+c)\log(f)\right)+a-1}\right)-c^2\log\left(b\cosh\left((dx+c)\log(f)\right)+b\sinh\left((dx+c)\log\right.\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*arccoth(a+b*f^(d*x+c)),x, algorithm="fricas")
```

```
[Out] 1/4*(d^2*x^2*log(f)^2*log((b*cosh((d*x + c)*log(f)) + b*sinh((d*x + c)*log(
f)) + a + 1)/(b*cosh((d*x + c)*log(f)) + b*sinh((d*x + c)*log(f)) + a - 1))
 - c^2*log(b*cosh((d*x + c)*log(f)) + b*sinh((d*x + c)*log(f)) + a + 1)*log
(f)^2 + c^2*log(b*cosh((d*x + c)*log(f)) + b*sinh((d*x + c)*log(f)) + a - 1
)*log(f)^2 - 2*d*x*dilog(-(b*cosh((d*x + c)*log(f)) + b*sinh((d*x + c)*log(
f)) + a + 1)/(a + 1) + 1)*log(f) + 2*d*x*dilog(-(b*cosh((d*x + c)*log(f)) +
 b*sinh((d*x + c)*log(f)) + a - 1)/(a - 1) + 1)*log(f) - (d^2*x^2 - c^2)*lo
g(f)^2*log((b*cosh((d*x + c)*log(f)) + b*sinh((d*x + c)*log(f)) + a + 1)/(a
 + 1)) + (d^2*x^2 - c^2)*log(f)^2*log((b*cosh((d*x + c)*log(f)) + b*sinh((d
*x + c)*log(f)) + a - 1)/(a - 1)) + 2*polylog(3, -(b*cosh((d*x + c)*log(f))
 + b*sinh((d*x + c)*log(f)))/(a + 1)) - 2*polylog(3, -(b*cosh((d*x + c)*log
(f)) + b*sinh((d*x + c)*log(f)))/(a - 1)))/(d^2*log(f)^2)
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int x\,\text{arcoth}\left(bf^{dx+c}+a\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*arccoth(a+b*f^(d*x+c)),x, algorithm="giac")
```

```
[Out] integrate(x*arccoth(b*f^(d*x + c) + a), x)
```

**maple [B]** time = 0.18, size = 590, normalized size = 2.73

$$-\frac{x^2\ln\left(bf^{dx+c}+a-1\right)}{4}+\frac{x^2\ln\left(1+a+bf^{dx+c}\right)}{4}-\frac{\ln\left(1-\frac{bf^{dx}f^c}{-1-a}\right)x^2}{4}-\frac{\ln\left(1-\frac{bf^{dx}f^c}{-1-a}\right)xc}{2d}-\frac{\ln\left(1-\frac{bf^{dx}f^c}{-1-a}\right)c^2}{4d^2}-\text{polyl}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x*arccoth(a+b*f^(d*x+c)),x)
```

```
[Out] -1/4*x^2*ln(b*f^(d*x+c)+a-1)+1/4*x^2*ln(1+a+b*f^(d*x+c))-1/4*ln(1-b*f^(d*x)
*f^c/(-1-a))*x^2-1/2/d*ln(1-b*f^(d*x)*f^c/(-1-a))*x*c-1/4/d^2*ln(1-b*f^(d*x
)*f^c/(-1-a))*c^2-1/2/ln(f)/d*polylog(2,b*f^(d*x)*f^c/(-1-a))*x-1/2/ln(f)/d
```

```
^2*polylog(2,b*f^(d*x)*f^c/(-1-a))*c+1/2/ln(f)^2/d^2*polylog(3,b*f^(d*x)*f^
c/(-1-a))-1/4/d^2*c^2*ln(1+a+f^c*f^(d*x)*b)+1/2/ln(f)/d^2*c*dilog((1+a+f^c*
f^(d*x)*b)/(1+a))+1/2/d*c*ln((1+a+f^c*f^(d*x)*b)/(1+a))*x+1/2/d^2*c^2*ln((1
+a+f^c*f^(d*x)*b)/(1+a))+1/4*ln(1-b*f^(d*x)*f^c/(1-a))*x^2+1/2/d*ln(1-b*f^(
d*x)*f^c/(1-a))*x*c+1/4/d^2*ln(1-b*f^(d*x)*f^c/(1-a))*c^2+1/2/ln(f)/d*polyl
og(2,b*f^(d*x)*f^c/(1-a))*x+1/2/ln(f)/d^2*polylog(2,b*f^(d*x)*f^c/(1-a))*c-
1/2/ln(f)^2/d^2*polylog(3,b*f^(d*x)*f^c/(1-a))+1/4/d^2*c^2*ln(f^c*f^(d*x)*b
+a-1)-1/2/ln(f)/d^2*c*dilog((f^c*f^(d*x)*b+a-1)/(a-1))-1/2/d*c*ln((f^c*f^(d
*x)*b+a-1)/(a-1))*x-1/2/d^2*c^2*ln((f^c*f^(d*x)*b+a-1)/(a-1))
```

**maxima [A]** time = 0.38, size = 194, normalized size = 0.90

$$-\frac{1}{4}\,bd\left(\frac{d^2x^2\log\left(\frac{bf^{dx}f^c}{a+1}+1\right)\log(f)^2+2\,dx\mathrm{Li}_2\left(-\frac{bf^{dx}f^c}{a+1}\right)\log(f)-2\,\mathrm{Li}_3(-\frac{bf^{dx}f^c}{a+1})}{bd^3\log(f)^3}-\frac{d^2x^2\log\left(\frac{bf^{dx}f^c}{a-1}+1\right)\log(f)\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*arccoth(a+b*f^(d*x+c)),x, algorithm="maxima")
```

```
[Out] -1/4*b*d*((d^2*x^2*log(b*f^(d*x)*f^c/(a + 1) + 1)*log(f)^2 + 2*d*x*dilog(-b
*f^(d*x)*f^c/(a + 1))*log(f) - 2*polylog(3, -b*f^(d*x)*f^c/(a + 1)))/(b*d^3
*log(f)^3) - (d^2*x^2*log(b*f^(d*x)*f^c/(a - 1) + 1)*log(f)^2 + 2*d*x*dilog
(-b*f^(d*x)*f^c/(a - 1))*log(f) - 2*polylog(3, -b*f^(d*x)*f^c/(a - 1)))/(b*
d^3*log(f)^3))*log(f) + 1/2*x^2*arccoth(b*f^(d*x + c) + a)
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.00

$$\int x\,\mathrm{acoth}\left(a+b\,f^{c+d\,x}\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x*acoth(a + b*f^(c + d*x)),x)
```

```
[Out] int(x*acoth(a + b*f^(c + d*x)), x)
```

**sympy [F(-1)]** time = 0.00, size = 0, normalized size = 0.00

Timed out

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*acoth(a+b*f**(d*x+c)),x)
```

```
[Out] Timed out
```

# 3.291 $\int x^2 \coth^{-1}\left(a + bf^{c+dx}\right) dx$

**Optimal**. Leaf size=269

$$\frac{\text{Li}_4\left(\frac{bf^{c+dx}}{1-a}\right)}{d^3\log^3(f)}-\frac{\text{Li}_4\left(-\frac{bf^{c+dx}}{a+1}\right)}{d^3\log^3(f)}-\frac{x\text{Li}_3\left(\frac{bf^{c+dx}}{1-a}\right)}{d^2\log^2(f)}+\frac{x\text{Li}_3\left(-\frac{bf^{c+dx}}{a+1}\right)}{d^2\log^2(f)}+\frac{x^2\text{Li}_2\left(\frac{bf^{c+dx}}{1-a}\right)}{2d\log(f)}-\frac{x^2\text{Li}_2\left(-\frac{bf^{c+dx}}{a+1}\right)}{2d\log(f)}+\frac{1}{6}x^3\log\left(1-\frac{bf^{c+dx}}{1-a}\right)$$

```
[Out] 1/6*x^3*ln(1-b*f^(d*x+c)/(1-a))-1/6*x^3*ln(1+b*f^(d*x+c)/(1+a))-1/6*x^3*ln(
1-1/(a+b*f^(d*x+c)))+1/6*x^3*ln(1+1/(a+b*f^(d*x+c)))+1/2*x^2*polylog(2,b*f^
(d*x+c)/(1-a))/d/ln(f)-1/2*x^2*polylog(2,-b*f^(d*x+c)/(1+a))/d/ln(f)-x*poly
log(3,b*f^(d*x+c)/(1-a))/d^2/ln(f)^2+x*polylog(3,-b*f^(d*x+c)/(1+a))/d^2/ln
(f)^2+polylog(4,b*f^(d*x+c)/(1-a))/d^3/ln(f)^3-polylog(4,-b*f^(d*x+c)/(1+a)
)/d^3/ln(f)^3
```

**Rubi [A]** time = 2.59, antiderivative size = 269, normalized size of antiderivative = 1.00, number of steps used = 29, number of rules used = 9, integrand size = 16, $\frac{\text{number of rules}}{\text{integrand size}} = 0.562$, Rules used = {6214, 2551, 12, 6742, 2190, 2531, 6609, 2282, 6589}

$$-\frac{x\text{PolyLog}\left(3,\frac{bf^{c+dx}}{1-a}\right)}{d^2\log^2(f)}+\frac{x\text{PolyLog}\left(3,-\frac{bf^{c+dx}}{a+1}\right)}{d^2\log^2(f)}+\frac{\text{PolyLog}\left(4,\frac{bf^{c+dx}}{1-a}\right)}{d^3\log^3(f)}-\frac{\text{PolyLog}\left(4,-\frac{bf^{c+dx}}{a+1}\right)}{d^3\log^3(f)}+\frac{x^2\text{PolyLog}\left(2,\frac{bf^{c+dx}}{1-a}\right)}{2d\log(f)}$$

Antiderivative was successfully verified.

```
[In] Int[x^2*ArcCoth[a + b*f^(c + d*x)],x]
```

```
[Out] (x^3*Log[1 - (b*f^(c + d*x))/(1 - a)])/6 - (x^3*Log[1 + (b*f^(c + d*x))/(1
+ a)])/6 - (x^3*Log[1 - (a + b*f^(c + d*x))^(-1)])/6 + (x^3*Log[1 + (a + b*
f^(c + d*x))^(-1)])/6 + (x^2*PolyLog[2, (b*f^(c + d*x))/(1 - a)])/(2*d*Log[
f]) - (x^2*PolyLog[2, -((b*f^(c + d*x))/(1 + a))])/(2*d*Log[f]) - (x*PolyLo
g[3, (b*f^(c + d*x))/(1 - a)])/(d^2*Log[f]^2) + (x*PolyLog[3, -((b*f^(c + d
*x))/(1 + a))])/(d^2*Log[f]^2) + PolyLog[4, (b*f^(c + d*x))/(1 - a)]/(d^3*L
og[f]^3) - PolyLog[4, -((b*f^(c + d*x))/(1 + a))]/(d^3*Log[f]^3)
```

Rule 12

```
Int[(a_)*(u_), x_Symbol] :> Dist[a, Int[u, x], x] /; FreeQ[a, x] &&  !Match
Q[u, (b_)*(v_) /; FreeQ[b, x]]
```

Rule 2190

```
Int[(((F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)*((c_.) + (d_.)*(x_))^(m_.))/
((a_) + (b_.)*((F_)^((g_.)*((e_.) + (f_.)*(x_))))^(n_.)), x_Symbol] :> Simp
[((c + d*x)^m*Log[1 + (b*(F^(g*(e + f*x)))^n)/a])/(b*f*g*n*Log[F]), x] - Di
st[(d*m)/(b*f*g*n*Log[F]), Int[(c + d*x)^(m - 1)*Log[1 + (b*(F^(g*(e + f*x)
))^n)/a], x], x] /; FreeQ[{F, a, b, c, d, e, f, g, n}, x] && IGtQ[m, 0]
```

Rule 2282

```
Int[u_, x_Symbol] :> With[{v = FunctionOfExponential[u, x]}, Dist[v/D[v, x]
, Subst[Int[FunctionOfExponentialFunction[u, x]/x, x], x, v], x]] /; Functi
onOfExponentialQ[u, x] &&  !MatchQ[u, (w_)*((a_.)*(v_)^(n_))^(m_) /; FreeQ[
{a, m, n}, x] && IntegerQ[m*n]] &&  !MatchQ[u, E^((c_.)*((a_.) + (b_.)*x))*
(F_)[v_] /; FreeQ[{a, b, c}, x] && InverseFunctionQ[F[x]]]
```

Rule 2531

```
Int[Log[1 + (e_.)*((F_)^((c_.)*((a_.) + (b_.)*(x_))))^(n_.)]*((f_.) + (g_.)
*(x_))^(m_.), x_Symbol] :> -Simp[((f + g*x)^m*PolyLog[2, -(e*(F^(c*(a + b*x
)))^n)])/(b*c*n*Log[F]), x] + Dist[(g*m)/(b*c*n*Log[F]), Int[(f + g*x)^(m -
```

```
 1)*PolyLog[2, -(e*(F^(c*(a + b*x)))^n)], x], x] /; FreeQ[{F, a, b, c, e, f
, g, n}, x] && GtQ[m, 0]
```

Rule 2551

```
Int[Log[u_]*((a_.) + (b_.)*(x_))^(m_.), x_Symbol] :> Simp[((a + b*x)^(m + 1
)*Log[u])/(b*(m + 1)), x] - Dist[1/(b*(m + 1)), Int[SimplifyIntegrand[((a +
 b*x)^(m + 1)*D[u, x])/u, x], x], x] /; FreeQ[{a, b, m}, x] && InverseFunct
ionFreeQ[u, x] && NeQ[m, -1]
```

Rule 6214

```
Int[ArcCoth[(a_.) + (b_.)*(f_)^((c_.) + (d_.)*(x_))]*(x_)^(m_.), x_Symbol]
:> Dist[1/2, Int[x^m*Log[1 + 1/(a + b*f^(c + d*x))], x], x] - Dist[1/2, Int
[x^m*Log[1 - 1/(a + b*f^(c + d*x))], x], x] /; FreeQ[{a, b, c, d, f}, x] &&
 IGtQ[m, 0]
```

Rule 6589

```
Int[PolyLog[n_, (c_.)*((a_.) + (b_.)*(x_))^(p_.)]/((d_.) + (e_.)*(x_)), x_S
ymbol] :> Simp[PolyLog[n + 1, c*(a + b*x)^p]/(e*p), x] /; FreeQ[{a, b, c, d
, e, n, p}, x] && EqQ[b*d, a*e]
```

Rule 6609

```
Int[((e_.) + (f_.)*(x_))^(m_.)*PolyLog[n_, (d_.)*((F_)^((c_.)*((a_.) + (b_.
)*(x_))))^(p_.)], x_Symbol] :> Simp[((e + f*x)^m*PolyLog[n + 1, d*(F^(c*(a
+ b*x)))^p])/(b*c*p*Log[F]), x] - Dist[(f*m)/(b*c*p*Log[F]), Int[(e + f*x)^
(m - 1)*PolyLog[n + 1, d*(F^(c*(a + b*x)))^p], x], x] /; FreeQ[{F, a, b, c,
 d, e, f, n, p}, x] && GtQ[m, 0]
```

Rule 6742

```
Int[u_, x_Symbol] :> With[{v = ExpandIntegrand[u, x]}, Int[v, x] /; SumQ[v]
]
```

Rubi steps

$$\int x^2 \coth^{-1}\left(a+bf^{c+dx}\right)dx = -\left(\frac{1}{2}\int x^2\log\left(1-\frac{1}{a+bf^{c+dx}}\right)dx\right)+\frac{1}{2}\int x^2\log\left(1+\frac{1}{a+bf^{c+dx}}\right)dx$$

$$= -\frac{1}{6}x^3\log\left(1-\frac{1}{a+bf^{c+dx}}\right)+\frac{1}{6}x^3\log\left(1+\frac{1}{a+bf^{c+dx}}\right)+\frac{1}{6}\int\frac{bdf^{c+dx}x^3\,\mathrm{l}}{\left(-1+a+bf^{c+dx}\right)}$$

$$= -\frac{1}{6}x^3\log\left(1-\frac{1}{a+bf^{c+dx}}\right)+\frac{1}{6}x^3\log\left(1+\frac{1}{a+bf^{c+dx}}\right)+\frac{1}{6}(bd\log(f))\int\frac{}{\left(-1+a\right.}$$

$$= -\frac{1}{6}x^3\log\left(1-\frac{1}{a+bf^{c+dx}}\right)+\frac{1}{6}x^3\log\left(1+\frac{1}{a+bf^{c+dx}}\right)+\frac{1}{6}(bd\log(f))\int\left(\frac{f^{c+d}}{-a-b}\right.$$

$$= -\frac{1}{6}x^3\log\left(1-\frac{1}{a+bf^{c+dx}}\right)+\frac{1}{6}x^3\log\left(1+\frac{1}{a+bf^{c+dx}}\right)+\frac{1}{6}(bd\log(f))\int\frac{f^{c+}}{-1+a}$$

$$= \frac{1}{6}x^3\log\left(1-\frac{bf^{c+dx}}{1-a}\right)-\frac{1}{6}x^3\log\left(1+\frac{bf^{c+dx}}{1+a}\right)-\frac{1}{6}x^3\log\left(1-\frac{1}{a+bf^{c+dx}}\right)+\frac{1}{6}x^3\mathrm{l}$$

$$= \frac{1}{6}x^3\log\left(1-\frac{bf^{c+dx}}{1-a}\right)-\frac{1}{6}x^3\log\left(1+\frac{bf^{c+dx}}{1+a}\right)-\frac{1}{6}x^3\log\left(1-\frac{1}{a+bf^{c+dx}}\right)+\frac{1}{6}x^3\mathrm{l}$$

$$= \frac{1}{6}x^3\log\left(1-\frac{bf^{c+dx}}{1-a}\right)-\frac{1}{6}x^3\log\left(1+\frac{bf^{c+dx}}{1+a}\right)-\frac{1}{6}x^3\log\left(1-\frac{1}{a+bf^{c+dx}}\right)+\frac{1}{6}x^3\mathrm{l}$$

$$= \frac{1}{6}x^3\log\left(1-\frac{bf^{c+dx}}{1-a}\right)-\frac{1}{6}x^3\log\left(1+\frac{bf^{c+dx}}{1+a}\right)-\frac{1}{6}x^3\log\left(1-\frac{1}{a+bf^{c+dx}}\right)+\frac{1}{6}x^3\mathrm{l}$$

$$= \frac{1}{6}x^3\log\left(1-\frac{bf^{c+dx}}{1-a}\right)-\frac{1}{6}x^3\log\left(1+\frac{bf^{c+dx}}{1+a}\right)-\frac{1}{6}x^3\log\left(1-\frac{1}{a+bf^{c+dx}}\right)+\frac{1}{6}x^3\mathrm{l}$$

**Mathematica [A]** time = 0.08, size = 235, normalized size = 0.87

$$\frac{d^3x^3\log^3(f)\log\left(\frac{bf^{c+dx}}{a-1}+1\right)-d^3x^3\log^3(f)\log\left(\frac{bf^{c+dx}}{a+1}+1\right)+2d^3x^3\log^3(f)\coth^{-1}\left(a+bf^{c+dx}\right)+3d^2x^2\log^2(f)}{}$$

Antiderivative was successfully verified.

```
[In] Integrate[x^2*ArcCoth[a + b*f^(c + d*x)],x]
```

```
[Out] (2*d^3*x^3*ArcCoth[a + b*f^(c + d*x)]*Log[f]^3 + d^3*x^3*Log[f]^3*Log[1 + (
b*f^(c + d*x))/(-1 + a)] - d^3*x^3*Log[f]^3*Log[1 + (b*f^(c + d*x))/(1 + a)
] + 3*d^2*x^2*Log[f]^2*PolyLog[2, -((b*f^(c + d*x))/(-1 + a))] - 3*d^2*x^2*
Log[f]^2*PolyLog[2, -((b*f^(c + d*x))/(1 + a))] - 6*d*x*Log[f]*PolyLog[3, -
((b*f^(c + d*x))/(-1 + a))] + 6*d*x*Log[f]*PolyLog[3, -((b*f^(c + d*x))/(1
+ a))] + 6*PolyLog[4, -((b*f^(c + d*x))/(-1 + a))] - 6*PolyLog[4, -((b*f^(c
 + d*x))/(1 + a))])/(6*d^3*Log[f]^3)
```

**fricas [C]** time = 0.70, size = 479, normalized size = 1.78

$$\frac{d^3x^3\log(f)^3\log\left(\frac{b\cosh\left((dx+c)\log(f)\right)+b\sinh\left((dx+c)\log(f)\right)+a+1}{b\cosh\left((dx+c)\log(f)\right)+b\sinh\left((dx+c)\log(f)\right)+a-1}\right)-3\,d^2x^2\mathrm{Li}_2\left(-\frac{b\cosh\left((dx+c)\log(f)\right)+b\sinh\left((dx+c)\log(f)\right)+a+1}{a+1}+\right.}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*arccoth(a+b*f^(d*x+c)),x, algorithm="fricas")
```

```
[Out] 1/6*(d^3*x^3*log(f)^3*log((b*cosh((d*x + c)*log(f)) + b*sinh((d*x + c)*log(
f)) + a + 1)/(b*cosh((d*x + c)*log(f)) + b*sinh((d*x + c)*log(f)) + a - 1))
 - 3*d^2*x^2*dilog(-(b*cosh((d*x + c)*log(f)) + b*sinh((d*x + c)*log(f)) +
a + 1)/(a + 1) + 1)*log(f)^2 + 3*d^2*x^2*dilog(-(b*cosh((d*x + c)*log(f)) +
 b*sinh((d*x + c)*log(f)) + a - 1)/(a - 1) + 1)*log(f)^2 + c^3*log(b*cosh((
d*x + c)*log(f)) + b*sinh((d*x + c)*log(f)) + a + 1)*log(f)^3 - c^3*log(b*c
osh((d*x + c)*log(f)) + b*sinh((d*x + c)*log(f)) + a - 1)*log(f)^3 - (d^3*x
^3 + c^3)*log(f)^3*log((b*cosh((d*x + c)*log(f)) + b*sinh((d*x + c)*log(f))
 + a + 1)/(a + 1)) + (d^3*x^3 + c^3)*log(f)^3*log((b*cosh((d*x + c)*log(f))
 + b*sinh((d*x + c)*log(f)) + a - 1)/(a - 1)) + 6*d*x*log(f)*polylog(3, -(b
*cosh((d*x + c)*log(f)) + b*sinh((d*x + c)*log(f)))/(a + 1)) - 6*d*x*log(f)
*polylog(3, -(b*cosh((d*x + c)*log(f)) + b*sinh((d*x + c)*log(f)))/(a - 1))
 - 6*polylog(4, -(b*cosh((d*x + c)*log(f)) + b*sinh((d*x + c)*log(f)))/(a +
 1)) + 6*polylog(4, -(b*cosh((d*x + c)*log(f)) + b*sinh((d*x + c)*log(f)))/
(a - 1)))/(d^3*log(f)^3)
```

**giac** [F] time = 0.00, size = 0, normalized size = 0.00

$$\int x^2 \operatorname{arcoth}\left(bf^{dx+c} + a\right) dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*arccoth(a+b*f^(d*x+c)),x, algorithm="giac")
```

```
[Out] integrate(x^2*arccoth(b*f^(d*x + c) + a), x)
```

**maple** [B] time = 0.18, size = 666, normalized size = 2.48

$$-\frac{x^3 \ln\left(b f^{dx+c} + a - 1\right)}{6} + \frac{x^3 \ln\left(1 + a + b f^{dx+c}\right)}{6} - \frac{\ln\left(1 - \frac{b f^{dx} f^c}{-1-a}\right) x^3}{6} + \frac{\ln\left(1 - \frac{b f^{dx} f^c}{-1-a}\right) x c^2}{2d^2} + \frac{\ln\left(1 - \frac{b f^{dx} f^c}{-1-a}\right) c^3}{3d^3} - \cdots$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^2*arccoth(a+b*f^(d*x+c)),x)
```

```
[Out] -1/6*x^3*ln(b*f^(d*x+c)+a-1)+1/6*x^3*ln(1+a+b*f^(d*x+c))-1/6*ln(1-b*f^(d*x)
*f^c/(-1-a))*x^3+1/2/d^2*ln(1-b*f^(d*x)*f^c/(-1-a))*x*c^2+1/3/d^3*ln(1-b*f^
(d*x)*f^c/(-1-a))*c^3-1/2/ln(f)/d*polylog(2,b*f^(d*x)*f^c/(-1-a))*x^2+1/2/l
n(f)/d^3*polylog(2,b*f^(d*x)*f^c/(-1-a))*c^2+1/ln(f)^2/d^2*polylog(3,b*f^(d
*x)*f^c/(-1-a))*x-1/ln(f)^3/d^3*polylog(4,b*f^(d*x)*f^c/(-1-a))+1/6/d^3*c^3
*ln(1+a+f^c*f^(d*x)*b)-1/2/ln(f)/d^3*c^2*dilog((1+a+f^c*f^(d*x)*b)/(1+a))-1
/2/d^2*c^2*ln((1+a+f^c*f^(d*x)*b)/(1+a))*x-1/2/d^3*c^3*ln((1+a+f^c*f^(d*x)*
b)/(1+a))+1/6*ln(1-b*f^(d*x)*f^c/(1-a))*x^3-1/2/d^2*ln(1-b*f^(d*x)*f^c/(1-a
))*x*c^2-1/3/d^3*ln(1-b*f^(d*x)*f^c/(1-a))*c^3+1/2/ln(f)/d*polylog(2,b*f^(d
*x)*f^c/(1-a))*x^2-1/2/ln(f)/d^3*polylog(2,b*f^(d*x)*f^c/(1-a))*c^2-1/ln(f)
^2/d^2*polylog(3,b*f^(d*x)*f^c/(1-a))*x+1/ln(f)^3/d^3*polylog(4,b*f^(d*x)*f
^c/(1-a))-1/6/d^3*c^3*ln(f^c*f^(d*x)*b+a-1)+1/2/ln(f)/d^3*c^2*dilog((f^c*f^
(d*x)*b+a-1)/(a-1))+1/2/d^2*c^2*ln((f^c*f^(d*x)*b+a-1)/(a-1))*x+1/2/d^3*c^3
*ln((f^c*f^(d*x)*b+a-1)/(a-1))
```

**maxima** [A] time = 0.37, size = 254, normalized size = 0.94

$$\frac{1}{3}x^3 \operatorname{arcoth}\left(bf^{dx+c} + a\right) - \frac{1}{6}bd\left(\frac{d^3x^3 \log\left(\frac{bf^{dx}f^c}{a+1} + 1\right)\log(f)^3 + 3d^2x^2\mathrm{Li}_2\left(-\frac{bf^{dx}f^c}{a+1}\right)\log(f)^2 - 6dx\log(f)\mathrm{Li}_3(- \cdots}{bd^4\log(f)^4}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*arccoth(a+b*f^(d*x+c)),x, algorithm="maxima")
```

```
[Out] 1/3*x^3*arccoth(b*f^(d*x + c) + a) - 1/6*b*d*((d^3*x^3*log(b*f^(d*x)*f^c/(a
 + 1) + 1)*log(f)^3 + 3*d^2*x^2*dilog(-b*f^(d*x)*f^c/(a + 1))*log(f)^2 - 6*
d*x*log(f)*polylog(3, -b*f^(d*x)*f^c/(a + 1)) + 6*polylog(4, -b*f^(d*x)*f^c
/(a + 1)))/(b*d^4*log(f)^4) - (d^3*x^3*log(b*f^(d*x)*f^c/(a - 1) + 1)*log(f
)^3 + 3*d^2*x^2*dilog(-b*f^(d*x)*f^c/(a - 1))*log(f)^2 - 6*d*x*log(f)*polyl
og(3, -b*f^(d*x)*f^c/(a - 1)) + 6*polylog(4, -b*f^(d*x)*f^c/(a - 1)))/(b*d^
4*log(f)^4))*log(f)
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.00

$$\int x^2 \operatorname{acoth}\left(a + b\, f^{c+d\,x}\right) \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^2*acoth(a + b*f^(c + d*x)),x)
```

```
[Out] int(x^2*acoth(a + b*f^(c + d*x)), x)
```

**sympy [F(-1)]** time = 0.00, size = 0, normalized size = 0.00

Timed out

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**2*acoth(a+b*f**(d*x+c)),x)
```

```
[Out] Timed out
```

## 3.292 $\int \frac{1}{(a-ax^2)(b-2b\coth^{-1}(x))}\,dx$

**Optimal**. Leaf size=17

$$-\frac{\log\left(1-2\coth^{-1}(x)\right)}{2ab}$$

```
[Out] -1/2*ln(1-2*arccoth(x))/a/b
```

**Rubi [A]** time = 0.04, antiderivative size = 17, normalized size of antiderivative = 1.00, number of steps used = 1, number of rules used = 1, integrand size = 20, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.050, Rules used = {5947}

$$-\frac{\log\left(1-2\coth^{-1}(x)\right)}{2ab}$$

Antiderivative was successfully verified.

```
[In] Int[1/((a - a*x^2)*(b - 2*b*ArcCoth[x])),x]
```

```
[Out] -Log[1 - 2*ArcCoth[x]]/(2*a*b)
```

Rule 5947

```
Int[1/(((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))*((d_) + (e_.)*(x_)^2)), x_Symbol
] :> Simp[Log[RemoveContent[a + b*ArcCoth[c*x], x]]/(b*c*d), x] /; FreeQ[{a
, b, c, d, e}, x] && EqQ[c^2*d + e, 0]
```

Rubi steps

$$\int \frac{1}{\left(a-ax^2\right)\left(b-2b\coth^{-1}(x)\right)}\,dx = -\frac{\log\left(1-2\coth^{-1}(x)\right)}{2ab}$$

**Mathematica [A]** time = 0.06, size = 17, normalized size = 1.00

$$-\frac{\log\left(2\coth^{-1}(x)-1\right)}{2ab}$$

Antiderivative was successfully verified.

```
[In] Integrate[1/((a - a*x^2)*(b - 2*b*ArcCoth[x])),x]
```

```
[Out] -1/2*Log[-1 + 2*ArcCoth[x]]/(a*b)
```

**fricas [A]** time = 0.73, size = 21, normalized size = 1.24

$$-\frac{\log\left(\log\left(\frac{x+1}{x-1}\right)-1\right)}{2\,ab}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(-a*x^2+a)/(b-2*b*arccoth(x)),x, algorithm="fricas")
```

```
[Out] -1/2*log(log((x + 1)/(x - 1)) - 1)/(a*b)
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{1}{\left(ax^2-a\right)(2\,b\,\mathrm{arcoth}(x)-b)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(-a*x^2+a)/(b-2*b*arccoth(x)),x, algorithm="giac")
```

```
[Out] integrate(1/((a*x^2 - a)*(2*b*arccoth(x) - b)), x)
```

**maple [A]** time = 0.07, size = 19, normalized size = 1.12

$$-\frac{\ln \left(2 b \operatorname{arccoth}(x)-b\right)}{2 a b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(1/(-a*x^2+a)/(b-2*b*arccoth(x)),x)
```

```
[Out] -1/2/a*ln(2*b*arccoth(x)-b)/b
```

**maxima [A]** time = 0.33, size = 21, normalized size = 1.24

$$-\frac{\log \left(\log \left(x+1\right)-\log \left(x-1\right)-1\right)}{2 \, a b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(-a*x^2+a)/(b-2*b*arccoth(x)),x, algorithm="maxima")
```

```
[Out] -1/2*log(log(x + 1) - log(x - 1) - 1)/(a*b)
```

**mupad [B]** time = 1.40, size = 15, normalized size = 0.88

$$-\frac{\ln \left(2\,\mathrm{acoth}(x)-1\right)}{2\,a\,b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(1/((a - a*x^2)*(b - 2*b*acoth(x))),x)
```

```
[Out] -log(2*acoth(x) - 1)/(2*a*b)
```

**sympy [A]** time = 0.57, size = 14, normalized size = 0.82

$$-\frac{\log \left(\operatorname{acoth}{\left(x \right)} - \frac{1}{2} \right)}{2 a b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(-a*x**2+a)/(b-2*b*acoth(x)),x)
```

```
[Out] -log(acoth(x) - 1/2)/(2*a*b)
```

# 3.293 $\int x^3 \coth^{-1}\left(a+bx^4\right) dx$

**Optimal**. Leaf size=44

$$\frac{\log\left(1-\left(a+bx^4\right)^2\right)}{8b}+\frac{\left(a+bx^4\right)\coth^{-1}\left(a+bx^4\right)}{4b}$$

```
[Out] 1/4*(b*x^4+a)*arccoth(b*x^4+a)/b+1/8*ln(1-(b*x^4+a)^2)/b
```

**Rubi [A]** time = 0.05, antiderivative size = 44, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 4, integrand size = 12, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.333, Rules used = {6715, 6104, 5911, 260}

$$\frac{\log\left(1-\left(a+bx^4\right)^2\right)}{8b}+\frac{\left(a+bx^4\right)\coth^{-1}\left(a+bx^4\right)}{4b}$$

Antiderivative was successfully verified.

```
[In] Int[x^3*ArcCoth[a + b*x^4],x]
```

```
[Out] ((a + b*x^4)*ArcCoth[a + b*x^4])/(4*b) + Log[1 - (a + b*x^4)^2]/(8*b)
```

Rule 260

```
Int[(x_)^(m_.)/((a_) + (b_.)*(x_)^(n_)), x_Symbol] :> Simp[Log[RemoveConten
t[a + b*x^n, x]]/(b*n), x] /; FreeQ[{a, b, m, n}, x] && EqQ[m, n - 1]
```

Rule 5911

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.), x_Symbol] :> Simp[x*(a + b*A
rcCoth[c*x])^p, x] - Dist[b*c*p, Int[(x*(a + b*ArcCoth[c*x])^(p - 1))/(1 -
c^2*x^2), x], x] /; FreeQ[{a, b, c}, x] && IGtQ[p, 0]
```

Rule 6104

```
Int[((a_.) + ArcCoth[(c_) + (d_.)*(x_)]*(b_.))^(p_.), x_Symbol] :> Dist[1/d
, Subst[Int[(a + b*ArcCoth[x])^p, x], x, c + d*x], x] /; FreeQ[{a, b, c, d}
, x] && IGtQ[p, 0]
```

Rule 6715

```
Int[(u_)*(x_)^(m_.), x_Symbol] :> Dist[1/(m + 1), Subst[Int[SubstFor[x^(m +
 1), u, x], x], x, x^(m + 1)], x] /; FreeQ[m, x] && NeQ[m, -1] && FunctionO
fQ[x^(m + 1), u, x]
```

Rubi steps

$$\begin{aligned}
\int x^3 \coth^{-1}\left(a+bx^4\right) dx &= \frac{1}{4}\text{Subst}\left(\int \coth^{-1}(a+bx)\, dx, x, x^4\right)\\
&= \frac{\text{Subst}\left(\int \coth^{-1}(x)\, dx, x, a+bx^4\right)}{4b}\\
&= \frac{\left(a+bx^4\right)\coth^{-1}\left(a+bx^4\right)}{4b}-\frac{\text{Subst}\left(\int \frac{x}{1-x^2}\, dx, x, a+bx^4\right)}{4b}\\
&= \frac{\left(a+bx^4\right)\coth^{-1}\left(a+bx^4\right)}{4b}+\frac{\log\left(1-\left(a+bx^4\right)^2\right)}{8b}
\end{aligned}$$

**Mathematica** [A] time = 0.02, size = 39, normalized size = 0.89

$$\frac{\log\left(1-\left(a+bx^4\right)^2\right)+2\left(a+bx^4\right)\coth^{-1}\left(a+bx^4\right)}{8b}$$

Antiderivative was successfully verified.

```
[In] Integrate[x^3*ArcCoth[a + b*x^4],x]
[Out] (2*(a + b*x^4)*ArcCoth[a + b*x^4] + Log[1 - (a + b*x^4)^2])/(8*b)
```

**fricas** [A] time = 0.61, size = 58, normalized size = 1.32

$$\frac{bx^4\log\left(\frac{bx^4+a+1}{bx^4+a-1}\right)+(a+1)\log\left(bx^4+a+1\right)-(a-1)\log\left(bx^4+a-1\right)}{8\,b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^3*arccoth(b*x^4+a),x, algorithm="fricas")
[Out] 1/8*(b*x^4*log((b*x^4 + a + 1)/(b*x^4 + a - 1)) + (a + 1)*log(b*x^4 + a + 1
) - (a - 1)*log(b*x^4 + a - 1))/b
```

**giac** [F] time = 0.00, size = 0, normalized size = 0.00

$$\int x^3\,\mathrm{arcoth}\left(bx^4+a\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^3*arccoth(b*x^4+a),x, algorithm="giac")
[Out] integrate(x^3*arccoth(b*x^4 + a), x)
```

**maple** [A] time = 0.07, size = 46, normalized size = 1.05

$$\frac{\mathrm{arccoth}\left(b\,x^4+a\right)x^4}{4}+\frac{\mathrm{arccoth}\left(b\,x^4+a\right)a}{4b}+\frac{\ln\left(\left(b\,x^4+a\right)^2-1\right)}{8b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^3*arccoth(b*x^4+a),x)
[Out] 1/4*arccoth(b*x^4+a)*x^4+1/4/b*arccoth(b*x^4+a)*a+1/8/b*ln((b*x^4+a)^2-1)
```

**maxima** [A] time = 0.32, size = 37, normalized size = 0.84

$$\frac{2\left(bx^4+a\right)\mathrm{arcoth}\left(bx^4+a\right)+\log\left(-\left(bx^4+a\right)^2+1\right)}{8\,b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^3*arccoth(b*x^4+a),x, algorithm="maxima")
[Out] 1/8*(2*(b*x^4 + a)*arccoth(b*x^4 + a) + log(-(b*x^4 + a)^2 + 1))/b
```

**mupad** [B] time = 1.56, size = 107, normalized size = 2.43

$$\frac{x^4\,\ln\left(\frac{b\,x^4+a+1}{b\,x^4+a}\right)}{8}-\frac{x^4\,\ln\left(\frac{b\,x^4+a-1}{b\,x^4+a}\right)}{8}+\frac{\ln\left(b\,x^4+a-1\right)}{8\,b}+\frac{\ln\left(b\,x^4+a+1\right)}{8\,b}-\frac{a\,\ln\left(b\,x^4+a-1\right)}{8\,b}+\frac{a\,\ln\left(b\,x^4+a+1\right)}{8\,b}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^3*acoth(a + b*x^4),x)
```

```
[Out] (x^4*log((a + b*x^4 + 1)/(a + b*x^4)))/8 - (x^4*log((a + b*x^4 - 1)/(a + b*
x^4)))/8 + log(a + b*x^4 - 1)/(8*b) + log(a + b*x^4 + 1)/(8*b) - (a*log(a +
 b*x^4 - 1))/(8*b) + (a*log(a + b*x^4 + 1))/(8*b)
```

**sympy [A]** time = 4.22, size = 60, normalized size = 1.36

$$\begin{cases} \frac{a \operatorname{acoth}\left(a+bx^{4}\right)}{4b} + \frac{x^{4} \operatorname{acoth}\left(a+bx^{4}\right)}{4} + \frac{\log\left(a+bx^{4}+1\right)}{4b} - \frac{\operatorname{acoth}\left(a+bx^{4}\right)}{4b} & \text{for}\: b \neq 0 \\ \frac{x^{4} \operatorname{acoth}\left(a\right)}{4} & \text{otherwise} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**3*acoth(b*x**4+a),x)
```

```
[Out] Piecewise((a*acoth(a + b*x**4)/(4*b) + x**4*acoth(a + b*x**4)/4 + log(a + b
*x**4 + 1)/(4*b) - acoth(a + b*x**4)/(4*b), Ne(b, 0)), (x**4*acoth(a)/4, Tr
ue))
```

# 3.294 $\int x^{-1+n} \coth^{-1}(a+bx^n)\,dx$

**Optimal**. Leaf size=47

$$\frac{\log\left(1-(a+bx^n)^2\right)}{2bn}+\frac{(a+bx^n)\coth^{-1}(a+bx^n)}{bn}$$

```
[Out] (a+b*x^n)*arccoth(a+b*x^n)/b/n+1/2*ln(1-(a+b*x^n)^2)/b/n
```

**Rubi [A]** time = 0.06, antiderivative size = 47, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 4, integrand size = 14, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.286, Rules used = {6715, 6104, 5911, 260}

$$\frac{\log\left(1-(a+bx^n)^2\right)}{2bn}+\frac{(a+bx^n)\coth^{-1}(a+bx^n)}{bn}$$

Antiderivative was successfully verified.

```
[In] Int[x^(-1 + n)*ArcCoth[a + b*x^n],x]
```

```
[Out] ((a + b*x^n)*ArcCoth[a + b*x^n])/(b*n) + Log[1 - (a + b*x^n)^2]/(2*b*n)
```

Rule 260

```
Int[(x_)^(m_.)/((a_) + (b_.)*(x_)^(n_)), x_Symbol] :> Simp[Log[RemoveConten
t[a + b*x^n, x]]/(b*n), x] /; FreeQ[{a, b, m, n}, x] && EqQ[m, n - 1]
```

Rule 5911

```
Int[((a_.) + ArcCoth[(c_.)*(x_)]*(b_.))^(p_.), x_Symbol] :> Simp[x*(a + b*A
rcCoth[c*x])^p, x] - Dist[b*c*p, Int[(x*(a + b*ArcCoth[c*x])^(p - 1))/(1 -
c^2*x^2), x], x] /; FreeQ[{a, b, c}, x] && IGtQ[p, 0]
```

Rule 6104

```
Int[((a_.) + ArcCoth[(c_) + (d_.)*(x_)]*(b_.))^(p_.), x_Symbol] :> Dist[1/d
, Subst[Int[(a + b*ArcCoth[x])^p, x], x, c + d*x], x] /; FreeQ[{a, b, c, d}
, x] && IGtQ[p, 0]
```

Rule 6715

```
Int[(u_)*(x_)^(m_.), x_Symbol] :> Dist[1/(m + 1), Subst[Int[SubstFor[x^(m +
 1), u, x], x], x, x^(m + 1)], x] /; FreeQ[m, x] && NeQ[m, -1] && FunctionO
fQ[x^(m + 1), u, x]
```

Rubi steps

$$\begin{aligned}
\int x^{-1+n}\coth^{-1}(a+bx^n)\,dx &= \frac{\text{Subst}\left(\int \coth^{-1}(a+bx)\,dx,x,x^n\right)}{n}\\
&= \frac{\text{Subst}\left(\int \coth^{-1}(x)\,dx,x,a+bx^n\right)}{bn}\\
&= \frac{(a+bx^n)\coth^{-1}(a+bx^n)}{bn}-\frac{\text{Subst}\left(\int \frac{x}{1-x^2}\,dx,x,a+bx^n\right)}{bn}\\
&= \frac{(a+bx^n)\coth^{-1}(a+bx^n)}{bn}+\frac{\log\left(1-(a+bx^n)^2\right)}{2bn}
\end{aligned}$$

**Mathematica** [A] time = 0.04, size = 42, normalized size = 0.89

$$\frac{\log\left(1-(a+bx^n)^2\right)+2(a+bx^n)\coth^{-1}(a+bx^n)}{2bn}$$

Antiderivative was successfully verified.

```
[In] Integrate[x^(-1 + n)*ArcCoth[a + b*x^n],x]
[Out] (2*(a + b*x^n)*ArcCoth[a + b*x^n] + Log[1 - (a + b*x^n)^2])/(2*b*n)
```

**fricas** [B] time = 0.64, size = 108, normalized size = 2.30

$$\frac{(a+1)\log\left(b\cosh\left(n\log(x)\right)+b\sinh\left(n\log(x)\right)+a+1\right)-(a-1)\log\left(b\cosh\left(n\log(x)\right)+b\sinh\left(n\log(x)\right)\right)}{2\,bn}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^(-1+n)*arccoth(a+b*x^n),x, algorithm="fricas")
[Out] 1/2*((a + 1)*log(b*cosh(n*log(x)) + b*sinh(n*log(x)) + a + 1) - (a - 1)*log
(b*cosh(n*log(x)) + b*sinh(n*log(x)) + a - 1) + (b*cosh(n*log(x)) + b*sinh(
n*log(x)))*log((b*cosh(n*log(x)) + b*sinh(n*log(x)) + a + 1)/(b*cosh(n*log(
x)) + b*sinh(n*log(x)) + a - 1)))/(b*n)
```

**giac** [F] time = 0.00, size = 0, normalized size = 0.00

$$\int x^{n-1}\operatorname{arcoth}(bx^n+a)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^(-1+n)*arccoth(a+b*x^n),x, algorithm="giac")
[Out] integrate(x^(n - 1)*arccoth(b*x^n + a), x)
```

**maple** [B] time = 0.13, size = 118, normalized size = 2.51

$$\frac{x^n\ln(1+a+b\,x^n)}{2n}-\frac{x^n\ln(-1+a+b\,x^n)}{2n}-\frac{\ln\left(x^n+\frac{a-1}{b}\right)a}{2nb}+\frac{\ln\left(x^n+\frac{1+a}{b}\right)a}{2nb}+\frac{\ln\left(x^n+\frac{a-1}{b}\right)}{2nb}+\frac{\ln\left(x^n+\frac{1+a}{b}\right)}{2nb}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^(-1+n)*arccoth(a+b*x^n),x)
[Out] 1/2/n*x^n*ln(1+a+b*x^n)-1/2/n*x^n*ln(-1+a+b*x^n)-1/2/n/b*ln(x^n+(a-1)/b)*a+
1/2/n/b*ln(x^n+(1+a)/b)*a+1/2/n/b*ln(x^n+(a-1)/b)+1/2/n/b*ln(x^n+(1+a)/b)
```

**maxima** [A] time = 0.30, size = 40, normalized size = 0.85

$$\frac{2(bx^n+a)\operatorname{arcoth}(bx^n+a)+\log\left(-(bx^n+a)^2+1\right)}{2\,bn}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^(-1+n)*arccoth(a+b*x^n),x, algorithm="maxima")
[Out] 1/2*(2*(b*x^n + a)*arccoth(b*x^n + a) + log(-(b*x^n + a)^2 + 1))/(b*n)
```

**mupad** [B] time = 2.51, size = 58, normalized size = 1.23

$$\frac{\frac{\ln\left(a^2+b^2\,x^{2\,n}+2\,a\,b\,x^n-1\right)}{2}+a\operatorname{acoth}(a+b\,x^n)}{b\,n}+\frac{x^n\operatorname{acoth}(a+b\,x^n)}{n}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^(n - 1)*acoth(a + b*x^n),x)
```

```
[Out] (log(a^2 + b^2*x^(2*n) + 2*a*b*x^n - 1)/2 + a*acoth(a + b*x^n))/(b*n) + (x^
n*acoth(a + b*x^n))/n
```

**sympy [F(-2)]** time = 0.00, size = 0, normalized size = 0.00

Exception raised: HeuristicGCDFailed

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**(-1+n)*acoth(a+b*x**n),x)
```

```
[Out] Exception raised: HeuristicGCDFailed
```

# 3.295 $\int e^{c(a+bx)} \coth^{-1}(\sinh(ac+bcx))\,dx$

**Optimal**. Leaf size=107

$$\frac{\left(1-\sqrt{2}\right)\log\left(-e^{2c(a+bx)}+3-2\sqrt{2}\right)}{2bc}+\frac{\left(1+\sqrt{2}\right)\log\left(-e^{2c(a+bx)}+3+2\sqrt{2}\right)}{2bc}+\frac{e^{ac+bcx}\coth^{-1}(\sinh(c(a+bx)))}{bc}$$

```
[Out] exp(b*c*x+a*c)*arccoth(sinh(c*(b*x+a)))/b/c+1/2*ln(3-exp(2*c*(b*x+a))-2*2^(
1/2))*(1-2^(1/2))/b/c+1/2*ln(3-exp(2*c*(b*x+a))+2*2^(1/2))*(1+2^(1/2))/b/c
```

**Rubi [A]** time = 0.15, antiderivative size = 107, normalized size of antiderivative = 1.00, number of steps used = 8, number of rules used = 7, integrand size = 20, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.350, Rules used = {2194, 6276, 2282, 12, 1247, 632, 31}

$$\frac{\left(1-\sqrt{2}\right)\log\left(-e^{2c(a+bx)}+3-2\sqrt{2}\right)}{2bc}+\frac{\left(1+\sqrt{2}\right)\log\left(-e^{2c(a+bx)}+3+2\sqrt{2}\right)}{2bc}+\frac{e^{ac+bcx}\coth^{-1}(\sinh(c(a+bx)))}{bc}$$

Antiderivative was successfully verified.

```
[In] Int[E^(c*(a + b*x))*ArcCoth[Sinh[a*c + b*c*x]],x]
```

```
[Out] (E^(a*c + b*c*x)*ArcCoth[Sinh[c*(a + b*x)]])/(b*c) + ((1 - Sqrt[2])*Log[3 -
 2*Sqrt[2] - E^(2*c*(a + b*x))])/(2*b*c) + ((1 + Sqrt[2])*Log[3 + 2*Sqrt[2]
 - E^(2*c*(a + b*x))])/(2*b*c)
```

Rule 12

```
Int[(a_)*(u_), x_Symbol] :> Dist[a, Int[u, x], x] /; FreeQ[a, x] &&  !Match
Q[u, (b_)*(v_) /; FreeQ[b, x]]
```

Rule 31

```
Int[((a_) + (b_.)*(x_))^(-1), x_Symbol] :> Simp[Log[RemoveContent[a + b*x,
x]]/b, x] /; FreeQ[{a, b}, x]
```

Rule 632

```
Int[((d_.) + (e_.)*(x_))/((a_) + (b_.)*(x_) + (c_.)*(x_)^2), x_Symbol] :> W
ith[{q = Rt[b^2 - 4*a*c, 2]}, Dist[(c*d - e*(b/2 - q/2))/q, Int[1/(b/2 - q/
2 + c*x), x], x] - Dist[(c*d - e*(b/2 + q/2))/q, Int[1/(b/2 + q/2 + c*x), x
], x]] /; FreeQ[{a, b, c, d, e}, x] && NeQ[2*c*d - b*e, 0] && NeQ[b^2 - 4*a
*c, 0] && NiceSqrtQ[b^2 - 4*a*c]
```

Rule 1247

```
Int[(x_)*((d_) + (e_.)*(x_)^2)^(q_.)*((a_) + (b_.)*(x_)^2 + (c_.)*(x_)^4)^(
p_.), x_Symbol] :> Dist[1/2, Subst[Int[(d + e*x)^q*(a + b*x + c*x^2)^p, x],
 x, x^2], x] /; FreeQ[{a, b, c, d, e, p, q}, x]
```

Rule 2194

```
Int[((F_)^((c_.)*((a_.) + (b_.)*(x_))))^(n_.), x_Symbol] :> Simp[(F^(c*(a +
 b*x)))^n/(b*c*n*Log[F]), x] /; FreeQ[{F, a, b, c, n}, x]
```

Rule 2282

```
Int[u_, x_Symbol] :> With[{v = FunctionOfExponential[u, x]}, Dist[v/D[v, x]
, Subst[Int[FunctionOfExponentialFunction[u, x]/x, x], x, v], x]] /; Functi
onOfExponentialQ[u, x] &&  !MatchQ[u, (w_)*((a_.)*(v_)^(n_))^(m_) /; FreeQ[
{a, m, n}, x] && IntegerQ[m*n]] &&  !MatchQ[u, E^((c_.)*((a_.) + (b_.)*x))*
```

```
(F_)[v_] /; FreeQ[{a, b, c}, x] && InverseFunctionQ[F[x]]]
```

Rule 6276

```
Int[((a_.) + ArcCoth[u_]*(b_.))*(v_), x_Symbol] :> With[{w = IntHide[v, x]}
, Dist[a + b*ArcCoth[u], w, x] - Dist[b, Int[SimplifyIntegrand[(w*D[u, x])/
(1 - u^2), x], x], x] /; InverseFunctionFreeQ[w, x]] /; FreeQ[{a, b}, x] &&
 InverseFunctionFreeQ[u, x] &&  !MatchQ[v, ((c_.) + (d_.)*x)^(m_.) /; FreeQ
[{c, d, m}, x]] && FalseQ[FunctionOfLinear[v*(a + b*ArcCoth[u]), x]]
```

Rubi steps

$$\int e^{c(a+bx)}\coth^{-1}(\sinh(ac+bcx))\,dx=\frac{\text{Subst}\left(\int e^x\coth^{-1}(\sinh(x))\,dx,x,ac+bcx\right)}{bc}$$
$$=\frac{e^{ac+bcx}\coth^{-1}(\sinh(c(a+bx)))}{bc}-\frac{\text{Subst}\left(\int\frac{e^x\cosh(x)}{1-\sinh^2(x)}\,dx,x,ac+bcx\right)}{bc}$$
$$=\frac{e^{ac+bcx}\coth^{-1}(\sinh(c(a+bx)))}{bc}-\frac{\text{Subst}\left(\int\frac{2x(-1-x^2)}{1-6x^2+x^4}\,dx,x,e^{ac+bcx}\right)}{bc}$$
$$=\frac{e^{ac+bcx}\coth^{-1}(\sinh(c(a+bx)))}{bc}-\frac{2\,\text{Subst}\left(\int\frac{x(-1-x^2)}{1-6x^2+x^4}\,dx,x,e^{ac+bcx}\right)}{bc}$$
$$=\frac{e^{ac+bcx}\coth^{-1}(\sinh(c(a+bx)))}{bc}-\frac{\text{Subst}\left(\int\frac{-1-x}{1-6x+x^2}\,dx,x,e^{2ac+2bcx}\right)}{bc}$$
$$=\frac{e^{ac+bcx}\coth^{-1}(\sinh(c(a+bx)))}{bc}+\frac{\left(1-\sqrt{2}\right)\text{Subst}\left(\int\frac{1}{-3+2\sqrt{2}+x}\,dx,x,e^{2ac+\cdots}\right.}{2bc}$$
$$=\frac{e^{ac+bcx}\coth^{-1}(\sinh(c(a+bx)))}{bc}+\frac{\left(1-\sqrt{2}\right)\log\left(3-2\sqrt{2}-e^{2ac+2bcx}\right)}{2bc}+\cdots$$

**Mathematica [A]** time = 0.18, size = 153, normalized size = 1.43

$$\frac{\log\left(-2e^{c(a+bx)}-e^{2c(a+bx)}+1\right)+\log\left(2e^{c(a+bx)}-e^{2c(a+bx)}+1\right)-2\sqrt{2}\tanh^{-1}\left(\frac{e^{c(a+bx)}-1}{\sqrt{2}}\right)+2\sqrt{2}\tanh^{-1}\left(\frac{e^{c(a+bx)}+1}{\sqrt{2}}\right)\cdots}{2bc}$$

Warning: Unable to verify antiderivative.

```
[In] Integrate[E^(c*(a + b*x))*ArcCoth[Sinh[a*c + b*c*x]],x]
```

```
[Out] (-2*E^(c*(a + b*x))*ArcCoth[1/(2*E^(c*(a + b*x))) - E^(c*(a + b*x))/2] - 2*
Sqrt[2]*ArcTanh[(-1 + E^(c*(a + b*x)))/Sqrt[2]] + 2*Sqrt[2]*ArcTanh[(1 + E^
(c*(a + b*x)))/Sqrt[2]] + Log[1 - 2*E^(c*(a + b*x)) - E^(2*c*(a + b*x))] +
Log[1 + 2*E^(c*(a + b*x)) - E^(2*c*(a + b*x))])/(2*b*c)
```

**fricas [B]** time = 0.59, size = 233, normalized size = 2.18

$$\frac{(\cosh(bcx+ac)+\sinh(bcx+ac))\log\left(\frac{\sinh(bcx+ac)+1}{\sinh(bcx+ac)-1}\right)+\sqrt{2}\log\left(\frac{3\left(2\sqrt{2}+3\right)\cosh(bcx+ac)^2-4\left(3\sqrt{2}+4\right)\cosh(bcx+ac)\sinh(bc\cdots}{\cosh(bcx+ac)^2+\sinh(bcx+\cdots}\right.}{2\,bc}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(c*(b*x+a))*arccoth(sinh(b*c*x+a*c)),x, algorithm="fricas")
```

```
[Out] 1/2*((cosh(b*c*x + a*c) + sinh(b*c*x + a*c))*log((sinh(b*c*x + a*c) + 1)/(s
inh(b*c*x + a*c) - 1)) + sqrt(2)*log((3*(2*sqrt(2) + 3)*cosh(b*c*x + a*c)^2
 - 4*(3*sqrt(2) + 4)*cosh(b*c*x + a*c)*sinh(b*c*x + a*c) + 3*(2*sqrt(2) + 3
)*sinh(b*c*x + a*c)^2 - 2*sqrt(2) - 3)/(cosh(b*c*x + a*c)^2 + sinh(b*c*x +
a*c)^2 - 3)) + log(2*(cosh(b*c*x + a*c)^2 + sinh(b*c*x + a*c)^2 - 3)/(cosh(
b*c*x + a*c)^2 - 2*cosh(b*c*x + a*c)*sinh(b*c*x + a*c) + sinh(b*c*x + a*c)^
2)))/(b*c)
```

**giac** [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \operatorname{arcoth}\left(\sinh\left(bcx+ac\right)\right)e^{\left((bx+a)c\right)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(c*(b*x+a))*arccoth(sinh(b*c*x+a*c)),x, algorithm="giac")
```

```
[Out] integrate(arccoth(sinh(b*c*x + a*c))*e^((b*x + a)*c), x)
```

**maple** [C] time = 0.51, size = 794, normalized size = 7.42

result too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(c*(b*x+a))*arccoth(sinh(b*c*x+a*c)),x)
```

```
[Out] 1/2/b/c*exp(c*(b*x+a))*ln(exp(2*c*(b*x+a))+2*exp(c*(b*x+a))-1)-1/4*I/b/c*Pi
*csgn(I*exp(-c*(b*x+a))*(-exp(2*c*(b*x+a))+2*exp(c*(b*x+a))+1))^3*exp(c*(b*
x+a))-1/4*I/b/c*Pi*csgn(I*exp(-c*(b*x+a)))*csgn(I*exp(-c*(b*x+a))*(-exp(2*c
*(b*x+a))+2*exp(c*(b*x+a))+1))^2*exp(c*(b*x+a))+1/4*I/b/c*Pi*csgn(I*(-exp(2
*c*(b*x+a))+2*exp(c*(b*x+a))+1))*csgn(I*exp(-c*(b*x+a))*(-exp(2*c*(b*x+a))+
2*exp(c*(b*x+a))+1))^2*exp(c*(b*x+a))+1/4*I/b/c*Pi*csgn(I*(-exp(2*c*(b*x+a)
)+2*exp(c*(b*x+a))+1))*csgn(I*exp(-c*(b*x+a)))*csgn(I*exp(-c*(b*x+a))*(-exp
(2*c*(b*x+a))+2*exp(c*(b*x+a))+1))*exp(c*(b*x+a))+1/4*I/b/c*Pi*csgn(I*(exp(
2*c*(b*x+a))+2*exp(c*(b*x+a))-1))*csgn(I*exp(-c*(b*x+a))*(exp(2*c*(b*x+a))+
2*exp(c*(b*x+a))-1))^2*exp(c*(b*x+a))-1/4*I/b/c*Pi*csgn(I*(exp(2*c*(b*x+a))
+2*exp(c*(b*x+a))-1))*csgn(I*exp(-c*(b*x+a)))*csgn(I*exp(-c*(b*x+a))*(exp(2
*c*(b*x+a))+2*exp(c*(b*x+a))-1))*exp(c*(b*x+a))-1/4*I/b/c*Pi*csgn(I*exp(-c*
(b*x+a))*(exp(2*c*(b*x+a))+2*exp(c*(b*x+a))-1))^3*exp(c*(b*x+a))+1/4*I/b/c*
Pi*csgn(I*exp(-c*(b*x+a)))*csgn(I*exp(-c*(b*x+a))*(exp(2*c*(b*x+a))+2*exp(c
*(b*x+a))-1))^2*exp(c*(b*x+a))-1/2/b/c*exp(c*(b*x+a))*ln(exp(2*c*(b*x+a))-2
*exp(c*(b*x+a))-1)-1/2/b/c*ln(exp(2*c*(b*x+a))-(2^(1/2)-1)^2)*2^(1/2)+1/2/b
/c*ln(exp(2*c*(b*x+a))-(1+2^(1/2))^2)*2^(1/2)-2*a/b+1/2/b/c*ln(exp(2*c*(b*x
+a))-(2^(1/2)-1)^2)+1/2/b/c*ln(exp(2*c*(b*x+a))-(1+2^(1/2))^2)
```

**maxima** [B] time = 0.41, size = 184, normalized size = 1.72

$$\frac{\operatorname{arcoth}\left(\sinh\left(bcx+ac\right)\right)e^{\left((bx+a)c\right)}}{bc}+\frac{\sqrt{2}\log\left(-\frac{\sqrt{2}-e^{(bcx+ac)}+1}{\sqrt{2}+e^{(bcx+ac)}-1}\right)}{2\,bc}-\frac{\sqrt{2}\log\left(-\frac{\sqrt{2}-e^{(bcx+ac)}-1}{\sqrt{2}+e^{(bcx+ac)}+1}\right)}{2\,bc}+\frac{\log\left(e^{(2\,bcx+2\,ac)}+2\,e^{(bc}\right.}{2\,bc}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(c*(b*x+a))*arccoth(sinh(b*c*x+a*c)),x, algorithm="maxima")
```

```
[Out] arccoth(sinh(b*c*x + a*c))*e^((b*x + a)*c)/(b*c) + 1/2*sqrt(2)*log(-(sqrt(2
) - e^(b*c*x + a*c) + 1)/(sqrt(2) + e^(b*c*x + a*c) - 1))/(b*c) - 1/2*sqrt(
2)*log(-(sqrt(2) - e^(b*c*x + a*c) - 1)/(sqrt(2) + e^(b*c*x + a*c) + 1))/(b
*c) + 1/2*log(e^(2*b*c*x + 2*a*c) + 2*e^(b*c*x + a*c) - 1)/(b*c) + 1/2*log(
e^(2*b*c*x + 2*a*c) - 2*e^(b*c*x + a*c) - 1)/(b*c)
```

**mupad [B]** time = 1.67, size = 187, normalized size = 1.75

$$\frac{\ln\left(6\sqrt{2}\,e^{2c(a+bx)}-2\sqrt{2}-8\,e^{2c(a+bx)}\right)\left(\sqrt{2}+1\right)}{2bc}-\frac{e^{ac+bcx}\ln\left(1-\frac{1}{\frac{e^{bcx}e^{ac}}{2}-\frac{e^{-bcx}e^{-ac}}{2}}\right)}{2bc}-\frac{\ln\left(2\sqrt{2}-8\,e^{2c(a+bx)}-\right.}{2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(c*(a + b*x))*acoth(sinh(a*c + b*c*x)),x)
```

```
[Out] (log(6*2^(1/2)*exp(2*c*(a + b*x)) - 2*2^(1/2) - 8*exp(2*c*(a + b*x)))*(2^(1
/2) + 1))/(2*b*c) - (exp(a*c + b*c*x)*log(1 - 1/((exp(b*c*x)*exp(a*c))/2 -
(exp(-b*c*x)*exp(-a*c))/2)))/(2*b*c) - (log(2*2^(1/2) - 8*exp(2*c*(a + b*x)
) - 6*2^(1/2)*exp(2*c*(a + b*x)))*(2^(1/2) - 1))/(2*b*c) + (log(1/((exp(b*c
*x)*exp(a*c))/2 - (exp(-b*c*x)*exp(-a*c))/2) + 1)*exp(a*c + b*c*x))/(2*b*c)
```

**sympy [F(-1)]** time = 0.00, size = 0, normalized size = 0.00

Timed out

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(c*(b*x+a))*acoth(sinh(b*c*x+a*c)),x)
```

```
[Out] Timed out
```

# 3.296 $\int e^{c(a+bx)} \coth^{-1}(\cosh(ac+bcx))\,dx$

**Optimal**. Leaf size=49

$$\frac{\log\left(1-e^{2c(a+bx)}\right)}{bc}+\frac{e^{ac+bcx}\coth^{-1}(\cosh(c(a+bx)))}{bc}$$

```
[Out] exp(b*c*x+a*c)*arccoth(cosh(c*(b*x+a)))/b/c+ln(1-exp(2*c*(b*x+a)))/b/c
```

**Rubi [A]** time = 0.08, antiderivative size = 49, normalized size of antiderivative = 1.00, number of steps used = 5, number of rules used = 5, integrand size = 20, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.250, Rules used = {2194, 6276, 2282, 12, 260}

$$\frac{\log\left(1-e^{2c(a+bx)}\right)}{bc}+\frac{e^{ac+bcx}\coth^{-1}(\cosh(c(a+bx)))}{bc}$$

Antiderivative was successfully verified.

```
[In] Int[E^(c*(a + b*x))*ArcCoth[Cosh[a*c + b*c*x]],x]
```

```
[Out] (E^(a*c + b*c*x)*ArcCoth[Cosh[c*(a + b*x)]])/(b*c) + Log[1 - E^(2*c*(a + b*
x))]/(b*c)
```

Rule 12

```
Int[(a_)*(u_), x_Symbol] :> Dist[a, Int[u, x], x] /; FreeQ[a, x] &&  !Match
Q[u, (b_)*(v_) /; FreeQ[b, x]]
```

Rule 260

```
Int[(x_)^(m_.)/((a_) + (b_.)*(x_)^(n_)), x_Symbol] :> Simp[Log[RemoveConten
t[a + b*x^n, x]]/(b*n), x] /; FreeQ[{a, b, m, n}, x] && EqQ[m, n - 1]
```

Rule 2194

```
Int[((F_)^((c_.)*((a_.) + (b_.)*(x_))))^(n_.), x_Symbol] :> Simp[(F^(c*(a +
 b*x)))^n/(b*c*n*Log[F]), x] /; FreeQ[{F, a, b, c, n}, x]
```

Rule 2282

```
Int[u_, x_Symbol] :> With[{v = FunctionOfExponential[u, x]}, Dist[v/D[v, x]
, Subst[Int[FunctionOfExponentialFunction[u, x]/x, x], x, v], x]] /; Functi
onOfExponentialQ[u, x] &&  !MatchQ[u, (w_)*((a_.)*(v_)^(n_))^(m_) /; FreeQ[
{a, m, n}, x] && IntegerQ[m*n]] &&  !MatchQ[u, E^((c_.)*((a_.) + (b_.)*x))*
(F_)[v_] /; FreeQ[{a, b, c}, x] && InverseFunctionQ[F[x]]]
```

Rule 6276

```
Int[((a_.) + ArcCoth[u_]*(b_.))*(v_), x_Symbol] :> With[{w = IntHide[v, x]}
, Dist[a + b*ArcCoth[u], w, x] - Dist[b, Int[SimplifyIntegrand[(w*D[u, x])/
(1 - u^2), x], x], x] /; InverseFunctionFreeQ[w, x]] /; FreeQ[{a, b}, x] &&
 InverseFunctionFreeQ[u, x] &&  !MatchQ[v, ((c_.) + (d_.)*x)^(m_.) /; FreeQ
[{c, d, m}, x]] && FalseQ[FunctionOfLinear[v*(a + b*ArcCoth[u]), x]]
```

Rubi steps

$$\begin{aligned}\int e^{c(a+bx)}\coth^{-1}(\cosh(ac+bcx))\,dx &= \frac{\text{Subst}\left(\int e^x\coth^{-1}(\cosh(x))\,dx,x,ac+bcx\right)}{bc}\\ &= \frac{e^{ac+bcx}\coth^{-1}(\cosh(c(a+bx)))}{bc}+\frac{\text{Subst}\left(\int e^x\text{csch}(x)\,dx,x,ac+bcx\right)}{bc}\\ &= \frac{e^{ac+bcx}\coth^{-1}(\cosh(c(a+bx)))}{bc}+\frac{\text{Subst}\left(\int \frac{2x}{-1+x^2}\,dx,x,e^{ac+bcx}\right)}{bc}\\ &= \frac{e^{ac+bcx}\coth^{-1}(\cosh(c(a+bx)))}{bc}+\frac{2\,\text{Subst}\left(\int \frac{x}{-1+x^2}\,dx,x,e^{ac+bcx}\right)}{bc}\\ &= \frac{e^{ac+bcx}\coth^{-1}(\cosh(c(a+bx)))}{bc}+\frac{\log\left(1-e^{2c(a+bx)}\right)}{bc}\end{aligned}$$

**Mathematica [A]** time = 0.09, size = 60, normalized size = 1.22

$$\frac{\log\left(1-e^{2c(a+bx)}\right)+e^{c(a+bx)}\coth^{-1}\left(\frac{1}{2}e^{-c(a+bx)}\left(e^{2c(a+bx)}+1\right)\right)}{bc}$$

Warning: Unable to verify antiderivative.

```
[In] Integrate[E^(c*(a + b*x))*ArcCoth[Cosh[a*c + b*c*x]],x]
```

```
[Out] (E^(c*(a + b*x))*ArcCoth[(1 + E^(2*c*(a + b*x)))/(2*E^(c*(a + b*x)))] + Log
[1 - E^(2*c*(a + b*x))])/(b*c)
```

**fricas [A]** time = 0.50, size = 92, normalized size = 1.88

$$\frac{\left(\cosh\left(bcx+ac\right)+\sinh\left(bcx+ac\right)\right)\log\left(\frac{\cosh(bcx+ac)+1}{\cosh(bcx+ac)-1}\right)+2\,\log\left(\frac{2\,\sinh(bcx+ac)}{\cosh(bcx+ac)-\sinh(bcx+ac)}\right)}{2\,bc}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(c*(b*x+a))*arccoth(cosh(b*c*x+a*c)),x, algorithm="fricas")
```

```
[Out] 1/2*((cosh(b*c*x + a*c) + sinh(b*c*x + a*c))*log((cosh(b*c*x + a*c) + 1)/(c
osh(b*c*x + a*c) - 1)) + 2*log(2*sinh(b*c*x + a*c)/(cosh(b*c*x + a*c) - sin
h(b*c*x + a*c))))/(b*c)
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \text{arcoth}\left(\cosh\left(bcx+ac\right)\right)e^{\left((bx+a)c\right)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(c*(b*x+a))*arccoth(cosh(b*c*x+a*c)),x, algorithm="giac")
```

```
[Out] integrate(arccoth(cosh(b*c*x + a*c))*e^((b*x + a)*c), x)
```

**maple [C]** time = 0.43, size = 824, normalized size = 16.82

result too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(c*(b*x+a))*arccoth(cosh(b*c*x+a*c)),x)
```

```
[Out] 1/b/c*exp(c*(b*x+a))*ln(exp(c*(b*x+a))+1)+1/4*I/b/c*Pi*csgn(I*exp(-c*(b*x+a
)))*csgn(I*(exp(c*(b*x+a))-1)^2)*csgn(I*exp(-c*(b*x+a))*(exp(c*(b*x+a))-1)^
```

```
2)*exp(c*(b*x+a))-1/4*I/b/c*Pi*csgn(I*(exp(c*(b*x+a))+1)^2)^3*exp(c*(b*x+a)
)+1/4*I/b/c*Pi*csgn(I*(exp(c*(b*x+a))-1))^2*csgn(I*(exp(c*(b*x+a))-1)^2)*ex
p(c*(b*x+a))-1/2*I/b/c*Pi*csgn(I*(exp(c*(b*x+a))-1))*csgn(I*(exp(c*(b*x+a))
-1)^2)^2*exp(c*(b*x+a))-1/4*I/b/c*Pi*csgn(I*(exp(c*(b*x+a))-1)^2)*csgn(I*ex
p(-c*(b*x+a))*(exp(c*(b*x+a))-1)^2)^2*exp(c*(b*x+a))-1/4*I/b/c*Pi*csgn(I*ex
p(-c*(b*x+a)))*csgn(I*(exp(c*(b*x+a))+1)^2)*csgn(I*exp(-c*(b*x+a))*(exp(c*(
b*x+a))+1)^2)*exp(c*(b*x+a))+1/4*I/b/c*Pi*csgn(I*exp(-c*(b*x+a)))*csgn(I*ex
p(-c*(b*x+a))*(exp(c*(b*x+a))+1)^2)^2*exp(c*(b*x+a))-1/4*I/b/c*Pi*csgn(I*(e
xp(c*(b*x+a))+1))^2*csgn(I*(exp(c*(b*x+a))+1)^2)*exp(c*(b*x+a))+1/2*I/b/c*P
i*csgn(I*(exp(c*(b*x+a))+1))*csgn(I*(exp(c*(b*x+a))+1)^2)^2*exp(c*(b*x+a))+
1/4*I/b/c*Pi*csgn(I*exp(-c*(b*x+a))*(exp(c*(b*x+a))-1)^2)^3*exp(c*(b*x+a))-
1/4*I/b/c*Pi*csgn(I*exp(-c*(b*x+a)))*csgn(I*exp(-c*(b*x+a))*(exp(c*(b*x+a))
-1)^2)^2*exp(c*(b*x+a))+1/4*I/b/c*Pi*csgn(I*(exp(c*(b*x+a))-1)^2)^3*exp(c*(
b*x+a))+1/4*I/b/c*Pi*csgn(I*(exp(c*(b*x+a))+1)^2)*csgn(I*exp(-c*(b*x+a))*(e
xp(c*(b*x+a))+1)^2)^2*exp(c*(b*x+a))-1/4*I/b/c*Pi*csgn(I*exp(-c*(b*x+a))*(e
xp(c*(b*x+a))+1)^2)^3*exp(c*(b*x+a))-1/b/c*exp(c*(b*x+a))*ln(exp(c*(b*x+a))
-1)-2*a/b+1/b/c*ln(exp(2*c*(b*x+a))-1)
```

**maxima [A]** time = 0.33, size = 64, normalized size = 1.31

$$\frac{\operatorname{arcoth}(\cosh(bcx+ac))\,e^{((bx+a)c)}}{bc}+\frac{\log\left(e^{(bcx+ac)}+1\right)}{bc}+\frac{\log\left(e^{(bcx+ac)}-1\right)}{bc}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(c*(b*x+a))*arccoth(cosh(b*c*x+a*c)),x, algorithm="maxima")
```

```
[Out] arccoth(cosh(b*c*x + a*c))*e^((b*x + a)*c)/(b*c) + log(e^(b*c*x + a*c) + 1)
/(b*c) + log(e^(b*c*x + a*c) - 1)/(b*c)
```

**mupad [B]** time = 1.83, size = 119, normalized size = 2.43

$$\frac{\ln\left(e^{2\,b\,c\,x}\,e^{2\,a\,c}-1\right)}{b\,c}-\frac{e^{a\,c+b\,c\,x}\,\ln\left(1-\frac{1}{\frac{e^{b\,c\,x}\,e^{a\,c}}{2}+\frac{e^{-b\,c\,x}\,e^{-a\,c}}{2}}\right)}{2\,b\,c}+\frac{\ln\left(\frac{1}{\frac{e^{b\,c\,x}\,e^{a\,c}}{2}+\frac{e^{-b\,c\,x}\,e^{-a\,c}}{2}}+1\right)\,e^{a\,c+b\,c\,x}}{2\,b\,c}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(c*(a + b*x))*acoth(cosh(a*c + b*c*x)),x)
```

```
[Out] log(exp(2*b*c*x)*exp(2*a*c) - 1)/(b*c) - (exp(a*c + b*c*x)*log(1 - 1/((exp(
b*c*x)*exp(a*c))/2 + (exp(-b*c*x)*exp(-a*c))/2)))/(2*b*c) + (log(1/((exp(b*
c*x)*exp(a*c))/2 + (exp(-b*c*x)*exp(-a*c))/2) + 1)*exp(a*c + b*c*x))/(2*b*c
)
```

**sympy [F(-1)]** time = 0.00, size = 0, normalized size = 0.00

Timed out

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(c*(b*x+a))*acoth(cosh(b*c*x+a*c)),x)
```

```
[Out] Timed out
```

# 3.297 $\int e^{c(a+bx)} \coth^{-1}(\tanh(ac+bcx))\,dx$

**Optimal**. Leaf size=45

$$\frac{e^{ac+bcx}\coth^{-1}(\tanh(c(a+bx)))}{bc}-\frac{e^{ac+bcx}}{bc}$$

```
[Out] -exp(b*c*x+a*c)/b/c+exp(b*c*x+a*c)*arccoth(tanh(c*(b*x+a)))/b/c
```

**Rubi [A]** time = 0.06, antiderivative size = 45, normalized size of antiderivative = 1.00, number of steps used = 3, number of rules used = 2, integrand size = 20, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.100, Rules used = {2194, 6276}

$$\frac{e^{ac+bcx}\coth^{-1}(\tanh(c(a+bx)))}{bc}-\frac{e^{ac+bcx}}{bc}$$

Antiderivative was successfully verified.

```
[In] Int[E^(c*(a + b*x))*ArcCoth[Tanh[a*c + b*c*x]],x]
```

```
[Out] -(E^(a*c + b*c*x)/(b*c)) + (E^(a*c + b*c*x)*ArcCoth[Tanh[c*(a + b*x)]])/(b*
c)
```

Rule 2194

```
Int[((F_)^((c_.)*((a_.) + (b_.)*(x_))))^(n_.), x_Symbol] :> Simp[(F^(c*(a +
 b*x)))^n/(b*c*n*Log[F]), x] /; FreeQ[{F, a, b, c, n}, x]
```

Rule 6276

```
Int[((a_.) + ArcCoth[u_]*(b_.))*(v_), x_Symbol] :> With[{w = IntHide[v, x]}
, Dist[a + b*ArcCoth[u], w, x] - Dist[b, Int[SimplifyIntegrand[(w*D[u, x])/
(1 - u^2), x], x], x] /; InverseFunctionFreeQ[w, x]] /; FreeQ[{a, b}, x] &&
 InverseFunctionFreeQ[u, x] &&  !MatchQ[v, ((c_.) + (d_.)*x)^(m_.) /; FreeQ
[{c, d, m}, x]] && FalseQ[FunctionOfLinear[v*(a + b*ArcCoth[u]), x]]
```

Rubi steps

$$\begin{aligned}\int e^{c(a+bx)}\coth^{-1}(\tanh(ac+bcx))\,dx&=\frac{\text{Subst}\left(\int e^x\coth^{-1}(\tanh(x))\,dx,x,ac+bcx\right)}{bc}\\&=\frac{e^{ac+bcx}\coth^{-1}(\tanh(c(a+bx)))}{bc}-\frac{\text{Subst}\left(\int e^x\,dx,x,ac+bcx\right)}{bc}\\&=-\frac{e^{ac+bcx}}{bc}+\frac{e^{ac+bcx}\coth^{-1}(\tanh(c(a+bx)))}{bc}\end{aligned}$$

**Mathematica [A]** time = 0.10, size = 46, normalized size = 1.02

$$\frac{e^{c(a+bx)}\left(\coth^{-1}\left(\frac{e^{2c(a+bx)}-1}{e^{2c(a+bx)}+1}\right)-1\right)}{bc}$$

Warning: Unable to verify antiderivative.

```
[In] Integrate[E^(c*(a + b*x))*ArcCoth[Tanh[a*c + b*c*x]],x]
```

```
[Out] (E^(c*(a + b*x))*(-1 + ArcCoth[(-1 + E^(2*c*(a + b*x)))/(1 + E^(2*c*(a + b*
x)))]))/(b*c)
```

**fricas** [A] time = 0.58, size = 25, normalized size = 0.56

$$\frac{(bcx+ac-1)e^{(bcx+ac)}}{bc}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(c*(b*x+a))*arccoth(tanh(b*c*x+a*c)),x, algorithm="fricas")
```

```
[Out] (b*c*x + a*c - 1)*e^(b*c*x + a*c)/(b*c)
```

**giac** [F] time = 0.00, size = 0, normalized size = 0.00

$$\int \operatorname{arcoth}(\tanh(bcx+ac))\,e^{((bx+a)c)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(c*(b*x+a))*arccoth(tanh(b*c*x+a*c)),x, algorithm="giac")
```

```
[Out] integrate(arccoth(tanh(b*c*x + a*c))*e^((b*x + a)*c), x)
```

**maple** [C] time = 0.38, size = 349, normalized size = 7.76

$$\frac{e^{c(bx+a)}\ln\left(e^{c(bx+a)}\right)}{bc}-\frac{i\left(-2\pi\operatorname{csgn}\left(\frac{i}{e^{2c(bx+a)}+1}\right)^{2}+\pi\operatorname{csgn}\left(ie^{c(bx+a)}\right)^{2}\operatorname{csgn}\left(ie^{2c(bx+a)}\right)-2\pi\operatorname{csgn}\left(ie^{c(bx+a)}\right)\operatorname{csgn}\right.}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(c*(b*x+a))*arccoth(tanh(b*c*x+a*c)),x)
```

```
[Out] 1/b/c*exp(c*(b*x+a))*ln(exp(c*(b*x+a)))-1/4*I*(-2*Pi*csgn(I/(exp(2*c*(b*x+a
))+1))^2+Pi*csgn(I*exp(c*(b*x+a)))^2*csgn(I*exp(2*c*(b*x+a)))-2*Pi*csgn(I*e
xp(c*(b*x+a)))*csgn(I*exp(2*c*(b*x+a)))^2+Pi*csgn(I*exp(2*c*(b*x+a)))^3+Pi*
csgn(I*exp(2*c*(b*x+a)))*csgn(I/(exp(2*c*(b*x+a))+1))*csgn(I*exp(2*c*(b*x+a
))/(exp(2*c*(b*x+a))+1))-Pi*csgn(I*exp(2*c*(b*x+a)))*csgn(I*exp(2*c*(b*x+a)
)/(exp(2*c*(b*x+a))+1))^2+2*Pi*csgn(I/(exp(2*c*(b*x+a))+1))^3-Pi*csgn(I/(ex
p(2*c*(b*x+a))+1))*csgn(I*exp(2*c*(b*x+a))/(exp(2*c*(b*x+a))+1))^2+Pi*csgn(
I*exp(2*c*(b*x+a))/(exp(2*c*(b*x+a))+1))^3-4*I+2*Pi)/b/c*exp(c*(b*x+a))
```

**maxima** [A] time = 0.33, size = 43, normalized size = 0.96

$$\frac{\operatorname{arcoth}(\tanh(bcx+ac))\,e^{((bx+a)c)}}{bc}-\frac{e^{(bcx+ac)}}{bc}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(c*(b*x+a))*arccoth(tanh(b*c*x+a*c)),x, algorithm="maxima")
```

```
[Out] arccoth(tanh(b*c*x + a*c))*e^((b*x + a)*c)/(b*c) - e^(b*c*x + a*c)/(b*c)
```

**mupad** [B] time = 0.10, size = 28, normalized size = 0.62

$$\frac{e^{a\,c+b\,c\,x}\,\left(\operatorname{acoth}\left(\tanh\left(a\,c+b\,c\,x\right)\right)-1\right)}{b\,c}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(c*(a + b*x))*acoth(tanh(a*c + b*c*x)),x)
```

```
[Out] (exp(a*c + b*c*x)*(acoth(tanh(a*c + b*c*x)) - 1))/(b*c)
```

**sympy [A]** time = 3.12, size = 66, normalized size = 1.47

$$\begin{cases} \frac{i\pi x}{2} & \text{for } b = 0 \wedge c = 0 \\ xe^{ac}\operatorname{acoth}(\tanh(ac)) & \text{for } b = 0 \\ \frac{i\pi x}{2} & \text{for } c = 0 \\ \frac{e^{ac}e^{bcx}\operatorname{acoth}(\tanh(ac+bcx))}{bc} - \frac{e^{ac}e^{bcx}}{bc} & \text{otherwise} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(c*(b*x+a))*acoth(tanh(b*c*x+a*c)),x)
```

```
[Out] Piecewise((I*pi*x/2, Eq(b, 0) & Eq(c, 0)), (x*exp(a*c)*acoth(tanh(a*c)), Eq
(b, 0)), (I*pi*x/2, Eq(c, 0)), (exp(a*c)*exp(b*c*x)*acoth(tanh(a*c + b*c*x)
)/(b*c) - exp(a*c)*exp(b*c*x)/(b*c), True))
```

# 3.298 $\int e^{c(a+bx)} \coth^{-1}(\coth(ac+bcx))\, dx$

**Optimal**. Leaf size=45

$$\frac{e^{ac+bcx}\coth^{-1}(\coth(c(a+bx)))}{bc} - \frac{e^{ac+bcx}}{bc}$$

```
[Out] -exp(b*c*x+a*c)/b/c+exp(b*c*x+a*c)*arccoth(coth(c*(b*x+a)))/b/c
```

**Rubi [A]** time = 0.06, antiderivative size = 45, normalized size of antiderivative = 1.00, number of steps used = 3, number of rules used = 2, integrand size = 20, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.100, Rules used = {2194, 6276}

$$\frac{e^{ac+bcx}\coth^{-1}(\coth(c(a+bx)))}{bc} - \frac{e^{ac+bcx}}{bc}$$

Antiderivative was successfully verified.

```
[In] Int[E^(c*(a + b*x))*ArcCoth[Coth[a*c + b*c*x]],x]
```

```
[Out] -(E^(a*c + b*c*x)/(b*c)) + (E^(a*c + b*c*x)*ArcCoth[Coth[c*(a + b*x)]])/(b*
c)
```

Rule 2194

```
Int[((F_)^((c_.)*((a_.) + (b_.)*(x_))))^(n_.), x_Symbol] :> Simp[(F^(c*(a +
 b*x)))^n/(b*c*n*Log[F]), x] /; FreeQ[{F, a, b, c, n}, x]
```

Rule 6276

```
Int[((a_.) + ArcCoth[u_]*(b_.))*(v_), x_Symbol] :> With[{w = IntHide[v, x]}
, Dist[a + b*ArcCoth[u], w, x] - Dist[b, Int[SimplifyIntegrand[(w*D[u, x])/
(1 - u^2), x], x], x] /; InverseFunctionFreeQ[w, x]] /; FreeQ[{a, b}, x] &&
 InverseFunctionFreeQ[u, x] &&  !MatchQ[v, ((c_.) + (d_.)*x)^(m_.) /; FreeQ
[{c, d, m}, x]] && FalseQ[FunctionOfLinear[v*(a + b*ArcCoth[u]), x]]
```

Rubi steps

$$\begin{aligned}
\int e^{c(a+bx)} \coth^{-1}(\coth(ac+bcx))\, dx &= \frac{\text{Subst}\left(\int e^x \coth^{-1}(\coth(x))\, dx, x, ac+bcx\right)}{bc}\\
&= \frac{e^{ac+bcx}\coth^{-1}(\coth(c(a+bx)))}{bc} - \frac{\text{Subst}\left(\int e^x\, dx, x, ac+bcx\right)}{bc}\\
&= -\frac{e^{ac+bcx}}{bc} + \frac{e^{ac+bcx}\coth^{-1}(\coth(c(a+bx)))}{bc}
\end{aligned}$$

**Mathematica [A]** time = 0.09, size = 46, normalized size = 1.02

$$\frac{e^{c(a+bx)}\left(\coth^{-1}\left(\frac{e^{2c(a+bx)}+1}{e^{2c(a+bx)}-1}\right)-1\right)}{bc}$$

Warning: Unable to verify antiderivative.

```
[In] Integrate[E^(c*(a + b*x))*ArcCoth[Coth[a*c + b*c*x]],x]
```

```
[Out] (E^(c*(a + b*x))*(-1 + ArcCoth[(1 + E^(2*c*(a + b*x)))/(-1 + E^(2*c*(a + b*
x)))]))/(b*c)
```

**fricas [A]** time = 0.53, size = 25, normalized size = 0.56

$$\frac{(bcx + ac - 1)e^{(bcx+ac)}}{bc}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(c*(b*x+a))*arccoth(coth(b*c*x+a*c)),x, algorithm="fricas")
[Out] (b*c*x + a*c - 1)*e^(b*c*x + a*c)/(b*c)
```

**giac [A]** time = 0.14, size = 35, normalized size = 0.78

$$\frac{\left(b^2c^2x + abc^2 - bc\right)e^{(bcx+ac)}}{b^2c^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(c*(b*x+a))*arccoth(coth(b*c*x+a*c)),x, algorithm="giac")
[Out] (b^2*c^2*x + a*b*c^2 - b*c)*e^(b*c*x + a*c)/(b^2*c^2)
```

**maple [A]** time = 0.29, size = 68, normalized size = 1.51

$$\frac{(xbc + ac)\,\mathrm{e}^{xbc+ac} - \mathrm{e}^{xbc+ac} + \mathrm{e}^{xbc+ac}\left(\mathrm{arccoth}\left(\coth\left(xbc + ac\right)\right) - xbc - ac\right)}{bc}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(c*(b*x+a))*arccoth(coth(b*c*x+a*c)),x)
[Out] 1/b/c*((b*c*x+a*c)*exp(b*c*x+a*c)-exp(b*c*x+a*c)+exp(b*c*x+a*c)*(arccoth(co
th(b*c*x+a*c))-x*b*c-a*c))
```

**maxima [A]** time = 0.31, size = 42, normalized size = 0.93

$$\frac{ae^{(bcx+ac)}}{b} + \frac{\left(bcxe^{(ac)} - e^{(ac)}\right)e^{(bcx)}}{bc}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(c*(b*x+a))*arccoth(coth(b*c*x+a*c)),x, algorithm="maxima")
[Out] a*e^(b*c*x + a*c)/b + (b*c*x*e^(a*c) - e^(a*c))*e^(b*c*x)/(b*c)
```

**mupad [B]** time = 1.21, size = 28, normalized size = 0.62

$$\frac{\mathrm{e}^{a\,c+b\,c\,x}\,\left(\mathrm{acoth}\left(\mathrm{coth}\left(a\,c+b\,c\,x\right)\right)-1\right)}{b\,c}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(c*(a + b*x))*acoth(coth(a*c + b*c*x)),x)
[Out] (exp(a*c + b*c*x)*(acoth(coth(a*c + b*c*x)) - 1))/(b*c)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$e^{ac}\int e^{bcx}\operatorname{acoth}\left(\coth\left(ac + bcx\right)\right)dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(c*(b*x+a))*acoth(coth(b*c*x+a*c)),x)
[Out] exp(a*c)*Integral(exp(b*c*x)*acoth(coth(a*c + b*c*x)), x)
```

# 3.299 $\int e^{c(a+bx)} \coth^{-1}(\mathbf{sech}(ac+bcx))\,dx$

**Optimal**. Leaf size=49

$$\frac{\log\left(1-e^{2c(a+bx)}\right)}{bc}+\frac{e^{ac+bcx}\coth^{-1}(\text{sech}(c(a+bx)))}{bc}$$

[Out] exp(b*c*x+a*c)*arccoth(sech(c*(b*x+a)))/b/c+ln(1-exp(2*c*(b*x+a)))/b/c

**Rubi** [A] time = 0.07, antiderivative size = 49, normalized size of antiderivative = 1.00, number of steps used = 5, number of rules used = 5, integrand size = 20, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.250, Rules used = {2194, 6276, 2282, 12, 260}

$$\frac{\log\left(1-e^{2c(a+bx)}\right)}{bc}+\frac{e^{ac+bcx}\coth^{-1}(\text{sech}(c(a+bx)))}{bc}$$

Antiderivative was successfully verified.

[In] Int[E^(c*(a + b*x))*ArcCoth[Sech[a*c + b*c*x]],x]

[Out] (E^(a*c + b*c*x)*ArcCoth[Sech[c*(a + b*x)]])/(b*c) + Log[1 - E^(2*c*(a + b*x))]/(b*c)

Rule 12

```
Int[(a_)*(u_), x_Symbol] :> Dist[a, Int[u, x], x] /; FreeQ[a, x] &&  !Match
Q[u, (b_)*(v_) /; FreeQ[b, x]]
```

Rule 260

```
Int[(x_)^(m_.)/((a_) + (b_.)*(x_)^(n_)), x_Symbol] :> Simp[Log[RemoveConten
t[a + b*x^n, x]]/(b*n), x] /; FreeQ[{a, b, m, n}, x] && EqQ[m, n - 1]
```

Rule 2194

```
Int[((F_)^((c_.)*((a_.) + (b_.)*(x_))))^(n_.), x_Symbol] :> Simp[(F^(c*(a +
 b*x)))^n/(b*c*n*Log[F]), x] /; FreeQ[{F, a, b, c, n}, x]
```

Rule 2282

```
Int[u_, x_Symbol] :> With[{v = FunctionOfExponential[u, x]}, Dist[v/D[v, x]
, Subst[Int[FunctionOfExponentialFunction[u, x]/x, x], x, v], x]] /; Functi
onOfExponentialQ[u, x] &&  !MatchQ[u, (w_)*((a_.)*(v_)^(n_))^(m_) /; FreeQ[
{a, m, n}, x] && IntegerQ[m*n]] &&  !MatchQ[u, E^((c_.)*((a_.) + (b_.)*x))*
(F_)[v_] /; FreeQ[{a, b, c}, x] && InverseFunctionQ[F[x]]]
```

Rule 6276

```
Int[((a_.) + ArcCoth[u_]*(b_.))*(v_), x_Symbol] :> With[{w = IntHide[v, x]}
, Dist[a + b*ArcCoth[u], w, x] - Dist[b, Int[SimplifyIntegrand[(w*D[u, x])/
(1 - u^2), x], x], x] /; InverseFunctionFreeQ[w, x]] /; FreeQ[{a, b}, x] &&
 InverseFunctionFreeQ[u, x] &&  !MatchQ[v, ((c_.) + (d_.)*x)^(m_.) /; FreeQ
[{c, d, m}, x]] && FalseQ[FunctionOfLinear[v*(a + b*ArcCoth[u]), x]]
```

Rubi steps

$$\int e^{c(a+bx)}\coth^{-1}(\mathrm{sech}(ac+bcx))\,dx = \frac{\mathrm{Subst}\left(\int e^x\coth^{-1}(\mathrm{sech}(x))\,dx, x, ac+bcx\right)}{bc}$$
$$= \frac{e^{ac+bcx}\coth^{-1}(\mathrm{sech}(c(a+bx)))}{bc} + \frac{\mathrm{Subst}\left(\int e^x\mathrm{csch}(x)\,dx, x, ac+bcx\right)}{bc}$$
$$= \frac{e^{ac+bcx}\coth^{-1}(\mathrm{sech}(c(a+bx)))}{bc} + \frac{\mathrm{Subst}\left(\int \frac{2x}{-1+x^2}\,dx, x, e^{ac+bcx}\right)}{bc}$$
$$= \frac{e^{ac+bcx}\coth^{-1}(\mathrm{sech}(c(a+bx)))}{bc} + \frac{2\,\mathrm{Subst}\left(\int \frac{x}{-1+x^2}\,dx, x, e^{ac+bcx}\right)}{bc}$$
$$= \frac{e^{ac+bcx}\coth^{-1}(\mathrm{sech}(c(a+bx)))}{bc} + \frac{\log\left(1-e^{2c(a+bx)}\right)}{bc}$$

**Mathematica [A]** time = 0.09, size = 59, normalized size = 1.20

$$\frac{\log\left(1-e^{2c(a+bx)}\right)+e^{c(a+bx)}\coth^{-1}\left(\frac{2e^{c(a+bx)}}{e^{2c(a+bx)}+1}\right)}{bc}$$

Warning: Unable to verify antiderivative.

```
[In] Integrate[E^(c*(a + b*x))*ArcCoth[Sech[a*c + b*c*x]],x]
[Out] (E^(c*(a + b*x))*ArcCoth[(2*E^(c*(a + b*x)))/(1 + E^(2*c*(a + b*x)))] + Log
[1 - E^(2*c*(a + b*x))])/(b*c)
```

**fricas [A]** time = 0.67, size = 93, normalized size = 1.90

$$\frac{(\cosh(bcx+ac)+\sinh(bcx+ac))\log\left(-\frac{\cosh(bcx+ac)+1}{\cosh(bcx+ac)-1}\right)+2\log\left(\frac{2\sinh(bcx+ac)}{\cosh(bcx+ac)-\sinh(bcx+ac)}\right)}{2\,bc}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(c*(b*x+a))*arccoth(sech(b*c*x+a*c)),x, algorithm="fricas")
[Out] 1/2*((cosh(b*c*x + a*c) + sinh(b*c*x + a*c))*log(-(cosh(b*c*x + a*c) + 1)/(
cosh(b*c*x + a*c) - 1)) + 2*log(2*sinh(b*c*x + a*c)/(cosh(b*c*x + a*c) - si
nh(b*c*x + a*c))))/(b*c)
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \mathrm{arcoth}(\mathrm{sech}(bcx+ac))\,e^{((bx+a)c)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(c*(b*x+a))*arccoth(sech(b*c*x+a*c)),x, algorithm="giac")
[Out] integrate(arccoth(sech(b*c*x + a*c))*e^((b*x + a)*c), x)
```

**maple [C]** time = 0.48, size = 939, normalized size = 19.16

result too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(c*(b*x+a))*arccoth(sech(b*c*x+a*c)),x)
[Out] 1/2*I/b/c*Pi*csgn(I*(exp(c*(b*x+a))-1)^2/(exp(2*c*(b*x+a))+1))^2*exp(c*(b*x
+a))+1/4*I/b/c*Pi*csgn(I*(exp(c*(b*x+a))-1)^2)^3*exp(c*(b*x+a))-1/4*I/b/c*P
```

```
i*csgn(I/(exp(2*c*(b*x+a))+1))*csgn(I*(exp(c*(b*x+a))-1)^2/(exp(2*c*(b*x+a)
)+1))^2*exp(c*(b*x+a))-1/4*I/b/c*Pi*csgn(I*(exp(c*(b*x+a))+1))^2*csgn(I*(ex
p(c*(b*x+a))+1)^2)*exp(c*(b*x+a))+1/2*I/b/c*Pi*csgn(I*(exp(c*(b*x+a))+1))*c
sgn(I*(exp(c*(b*x+a))+1)^2)^2*exp(c*(b*x+a))-1/2*I/b/c*exp(c*(b*x+a))*Pi+1/
4*I/b/c*Pi*csgn(I*(exp(c*(b*x+a))+1)^2)*csgn(I*(exp(c*(b*x+a))+1)^2/(exp(2*
c*(b*x+a))+1))^2*exp(c*(b*x+a))-1/4*I/b/c*Pi*csgn(I*(exp(c*(b*x+a))-1)^2/(e
xp(2*c*(b*x+a))+1))^3*exp(c*(b*x+a))-1/4*I/b/c*Pi*csgn(I*(exp(c*(b*x+a))-1)
^2)*csgn(I*(exp(c*(b*x+a))-1)^2/(exp(2*c*(b*x+a))+1))^2*exp(c*(b*x+a))+1/4*
I/b/c*Pi*csgn(I*(exp(c*(b*x+a))-1))^2*csgn(I*(exp(c*(b*x+a))-1)^2)*exp(c*(b
*x+a))-1/4*I/b/c*Pi*csgn(I*(exp(c*(b*x+a))+1)^2)*csgn(I/(exp(2*c*(b*x+a))+1
))*csgn(I*(exp(c*(b*x+a))+1)^2/(exp(2*c*(b*x+a))+1))*exp(c*(b*x+a))+1/4*I/b
/c*Pi*csgn(I/(exp(2*c*(b*x+a))+1))*csgn(I*(exp(c*(b*x+a))+1)^2/(exp(2*c*(b*
x+a))+1))^2*exp(c*(b*x+a))+1/4*I/b/c*Pi*csgn(I*(exp(c*(b*x+a))-1)^2)*csgn(I
/(exp(2*c*(b*x+a))+1))*csgn(I*(exp(c*(b*x+a))-1)^2/(exp(2*c*(b*x+a))+1))*ex
p(c*(b*x+a))-1/4*I/b/c*Pi*csgn(I*(exp(c*(b*x+a))+1)^2)^3*exp(c*(b*x+a))-1/2
*I/b/c*Pi*csgn(I*(exp(c*(b*x+a))-1))*csgn(I*(exp(c*(b*x+a))-1)^2)^2*exp(c*(
b*x+a))-1/4*I/b/c*Pi*csgn(I*(exp(c*(b*x+a))+1)^2/(exp(2*c*(b*x+a))+1))^3*ex
p(c*(b*x+a))-1/b/c*exp(c*(b*x+a))*ln(exp(c*(b*x+a))-1)+1/b/c*exp(c*(b*x+a))
*ln(exp(c*(b*x+a))+1)-2*a/b+1/b/c*ln(exp(2*c*(b*x+a))-1)
```

**maxima [A]** time = 0.33, size = 64, normalized size = 1.31

$$\frac{\operatorname{arcoth}\left(\operatorname{sech}\left(bcx+ac\right)\right)e^{\left(\left(bx+a\right)c\right)}}{bc}+\frac{\log\left(e^{\left(bcx+ac\right)}+1\right)}{bc}+\frac{\log\left(e^{\left(bcx+ac\right)}-1\right)}{bc}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(c*(b*x+a))*arccoth(sech(b*c*x+a*c)),x, algorithm="maxima")
```

```
[Out] arccoth(sech(b*c*x + a*c))*e^((b*x + a)*c)/(b*c) + log(e^(b*c*x + a*c) + 1)
/(b*c) + log(e^(b*c*x + a*c) - 1)/(b*c)
```

**mupad [B]** time = 1.44, size = 111, normalized size = 2.27

$$\frac{\ln\left(e^{2\,b\,c\,x}\,e^{2\,a\,c}-1\right)}{b\,c}-\frac{e^{b\,c\,x}\,e^{a\,c}\,\ln\left(1-\frac{e^{-b\,c\,x}\,e^{-a\,c}}{2}-\frac{e^{b\,c\,x}\,e^{a\,c}}{2}\right)}{2\,b\,c}+\frac{e^{b\,c\,x}\,e^{a\,c}\,\ln\left(\frac{e^{b\,c\,x}\,e^{a\,c}}{2}+\frac{e^{-b\,c\,x}\,e^{-a\,c}}{2}+1\right)}{2\,b\,c}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(1/cosh(a*c + b*c*x))*exp(c*(a + b*x)),x)
```

```
[Out] log(exp(2*b*c*x)*exp(2*a*c) - 1)/(b*c) - (exp(b*c*x)*exp(a*c)*log(1 - (exp(
-b*c*x)*exp(-a*c))/2 - (exp(b*c*x)*exp(a*c))/2))/(2*b*c) + (exp(b*c*x)*exp(
a*c)*log((exp(b*c*x)*exp(a*c))/2 + (exp(-b*c*x)*exp(-a*c))/2 + 1))/(2*b*c)
```

**sympy [F(-1)]** time = 0.00, size = 0, normalized size = 0.00

Timed out

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(c*(b*x+a))*acoth(sech(b*c*x+a*c)),x)
```

```
[Out] Timed out
```

# 3.300 $\int e^{c(a+bx)} \coth^{-1}(\mathbf{csch}(ac+bcx))\,dx$

**Optimal**. Leaf size=107

$$\frac{\left(1-\sqrt{2}\right)\log\left(-e^{2c(a+bx)}+3-2\sqrt{2}\right)}{2bc}+\frac{\left(1+\sqrt{2}\right)\log\left(-e^{2c(a+bx)}+3+2\sqrt{2}\right)}{2bc}+\frac{e^{ac+bcx}\coth^{-1}(\operatorname{csch}(c(a+bx)))}{bc}$$

```
[Out] exp(b*c*x+a*c)*arccoth(csch(c*(b*x+a)))/b/c+1/2*ln(3-exp(2*c*(b*x+a))-2*2^(
1/2))*(1-2^(1/2))/b/c+1/2*ln(3-exp(2*c*(b*x+a))+2*2^(1/2))*(1+2^(1/2))/b/c
```

**Rubi [A]** time = 0.15, antiderivative size = 107, normalized size of antiderivative = 1.00, number of steps used = 8, number of rules used = 7, integrand size = 20, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.350, Rules used = {2194, 6276, 2282, 12, 1247, 632, 31}

$$\frac{\left(1-\sqrt{2}\right)\log\left(-e^{2c(a+bx)}+3-2\sqrt{2}\right)}{2bc}+\frac{\left(1+\sqrt{2}\right)\log\left(-e^{2c(a+bx)}+3+2\sqrt{2}\right)}{2bc}+\frac{e^{ac+bcx}\coth^{-1}(\operatorname{csch}(c(a+bx)))}{bc}$$

Antiderivative was successfully verified.

```
[In] Int[E^(c*(a + b*x))*ArcCoth[Csch[a*c + b*c*x]],x]
```

```
[Out] (E^(a*c + b*c*x)*ArcCoth[Csch[c*(a + b*x)]])/(b*c) + ((1 - Sqrt[2])*Log[3 -
 2*Sqrt[2] - E^(2*c*(a + b*x))])/(2*b*c) + ((1 + Sqrt[2])*Log[3 + 2*Sqrt[2]
 - E^(2*c*(a + b*x))])/(2*b*c)
```

Rule 12

```
Int[(a_)*(u_), x_Symbol] :> Dist[a, Int[u, x], x] /; FreeQ[a, x] &&  !Match
Q[u, (b_)*(v_) /; FreeQ[b, x]]
```

Rule 31

```
Int[((a_) + (b_.)*(x_))^(-1), x_Symbol] :> Simp[Log[RemoveContent[a + b*x,
x]]/b, x] /; FreeQ[{a, b}, x]
```

Rule 632

```
Int[((d_.) + (e_.)*(x_))/((a_) + (b_.)*(x_) + (c_.)*(x_)^2), x_Symbol] :> W
ith[{q = Rt[b^2 - 4*a*c, 2]}, Dist[(c*d - e*(b/2 - q/2))/q, Int[1/(b/2 - q/
2 + c*x), x], x] - Dist[(c*d - e*(b/2 + q/2))/q, Int[1/(b/2 + q/2 + c*x), x
], x]] /; FreeQ[{a, b, c, d, e}, x] && NeQ[2*c*d - b*e, 0] && NeQ[b^2 - 4*a
*c, 0] && NiceSqrtQ[b^2 - 4*a*c]
```

Rule 1247

```
Int[(x_)*((d_) + (e_.)*(x_)^2)^(q_.)*((a_) + (b_.)*(x_)^2 + (c_.)*(x_)^4)^(
p_.), x_Symbol] :> Dist[1/2, Subst[Int[(d + e*x)^q*(a + b*x + c*x^2)^p, x],
 x, x^2], x] /; FreeQ[{a, b, c, d, e, p, q}, x]
```

Rule 2194

```
Int[((F_)^((c_.)*((a_.) + (b_.)*(x_))))^(n_.), x_Symbol] :> Simp[(F^(c*(a +
 b*x)))^n/(b*c*n*Log[F]), x] /; FreeQ[{F, a, b, c, n}, x]
```

Rule 2282

```
Int[u_, x_Symbol] :> With[{v = FunctionOfExponential[u, x]}, Dist[v/D[v, x]
, Subst[Int[FunctionOfExponentialFunction[u, x]/x, x], x, v], x]] /; Functi
onOfExponentialQ[u, x] &&  !MatchQ[u, (w_)*((a_.)*(v_)^(n_))^(m_) /; FreeQ[
{a, m, n}, x] && IntegerQ[m*n]] &&  !MatchQ[u, E^((c_.)*((a_.) + (b_.)*x))*
```

```
(F_)[v_] /; FreeQ[{a, b, c}, x] && InverseFunctionQ[F[x]]]
```

Rule 6276

```
Int[((a_.) + ArcCoth[u_]*(b_.))*(v_), x_Symbol] :> With[{w = IntHide[v, x]}
, Dist[a + b*ArcCoth[u], w, x] - Dist[b, Int[SimplifyIntegrand[(w*D[u, x])/
(1 - u^2), x], x], x] /; InverseFunctionFreeQ[w, x]] /; FreeQ[{a, b}, x] &&
 InverseFunctionFreeQ[u, x] &&  !MatchQ[v, ((c_.) + (d_.)*x)^(m_.) /; FreeQ
[{c, d, m}, x]] && FalseQ[FunctionOfLinear[v*(a + b*ArcCoth[u]), x]]
```

Rubi steps

$$\int e^{c(a+bx)}\coth^{-1}(\operatorname{csch}(ac+bcx))\,dx = \frac{\operatorname{Subst}\left(\int e^x\coth^{-1}(\operatorname{csch}(x))\,dx, x, ac+bcx\right)}{bc}$$
$$= \frac{e^{ac+bcx}\coth^{-1}(\operatorname{csch}(c(a+bx)))}{bc} + \frac{\operatorname{Subst}\left(\int \frac{e^x\coth(x)\operatorname{csch}(x)}{1-\operatorname{csch}^2(x)}\,dx, x, ac+bc\right.}{bc}$$
$$= \frac{e^{ac+bcx}\coth^{-1}(\operatorname{csch}(c(a+bx)))}{bc} + \frac{\operatorname{Subst}\left(\int \frac{2x(1+x^2)}{1-6x^2+x^4}\,dx, x, e^{ac+bcx}\right)}{bc}$$
$$= \frac{e^{ac+bcx}\coth^{-1}(\operatorname{csch}(c(a+bx)))}{bc} + \frac{2\operatorname{Subst}\left(\int \frac{x(1+x^2)}{1-6x^2+x^4}\,dx, x, e^{ac+bcx}\right)}{bc}$$
$$= \frac{e^{ac+bcx}\coth^{-1}(\operatorname{csch}(c(a+bx)))}{bc} + \frac{\operatorname{Subst}\left(\int \frac{1+x}{1-6x+x^2}\,dx, x, e^{2ac+2bcx}\right)}{bc}$$
$$= \frac{e^{ac+bcx}\coth^{-1}(\operatorname{csch}(c(a+bx)))}{bc} + \frac{\left(1-\sqrt{2}\right)\operatorname{Subst}\left(\int \frac{1}{-3+2\sqrt{2}+x}\,dx, x, e\right.}{2bc}$$
$$= \frac{e^{ac+bcx}\coth^{-1}(\operatorname{csch}(c(a+bx)))}{bc} + \frac{\left(1-\sqrt{2}\right)\log\left(3-2\sqrt{2}-e^{2ac+2bcx}\right)}{2bc}$$

**Mathematica [A]** time = 0.17, size = 150, normalized size = 1.40

$$\frac{\log\left(-2e^{c(a+bx)}-e^{2c(a+bx)}+1\right)+\log\left(2e^{c(a+bx)}-e^{2c(a+bx)}+1\right)-2\sqrt{2}\tanh^{-1}\left(\frac{e^{c(a+bx)}-1}{\sqrt{2}}\right)+2\sqrt{2}\tanh^{-1}\left(\frac{e^{c(a+bx)}+}{\sqrt{2}}\right.}{2bc}$$

Warning: Unable to verify antiderivative.

```
[In] Integrate[E^(c*(a + b*x))*ArcCoth[Csch[a*c + b*c*x]],x]
```

```
[Out] (2*E^(c*(a + b*x))*ArcCoth[(2*E^(c*(a + b*x)))/(-1 + E^(2*c*(a + b*x)))] -
2*Sqrt[2]*ArcTanh[(-1 + E^(c*(a + b*x)))/Sqrt[2]] + 2*Sqrt[2]*ArcTanh[(1 +
E^(c*(a + b*x)))/Sqrt[2]] + Log[1 - 2*E^(c*(a + b*x)) - E^(2*c*(a + b*x))]
+ Log[1 + 2*E^(c*(a + b*x)) - E^(2*c*(a + b*x))])/(2*b*c)
```

**fricas [B]** time = 0.46, size = 234, normalized size = 2.19

$$\frac{(\cosh(bcx+ac)+\sinh(bcx+ac))\log\left(-\frac{\sinh(bcx+ac)+1}{\sinh(bcx+ac)-1}\right)+\sqrt{2}\log\left(\frac{3\left(2\sqrt{2}+3\right)\cosh(bcx+ac)^2-4\left(3\sqrt{2}+4\right)\cosh(bcx+ac)\,\mathrm{si}}{\cosh(bcx+ac)^2+\mathrm{sinh}}\right.}{2\,bc}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(c*(b*x+a))*arccoth(csch(b*c*x+a*c)),x, algorithm="fricas")
```

```
[Out] 1/2*((cosh(b*c*x + a*c) + sinh(b*c*x + a*c))*log(-(sinh(b*c*x + a*c) + 1)/(
sinh(b*c*x + a*c) - 1)) + sqrt(2)*log((3*(2*sqrt(2) + 3)*cosh(b*c*x + a*c)^
2 - 4*(3*sqrt(2) + 4)*cosh(b*c*x + a*c)*sinh(b*c*x + a*c) + 3*(2*sqrt(2) +
3)*sinh(b*c*x + a*c)^2 - 2*sqrt(2) - 3)/(cosh(b*c*x + a*c)^2 + sinh(b*c*x +
 a*c)^2 - 3)) + log(2*(cosh(b*c*x + a*c)^2 + sinh(b*c*x + a*c)^2 - 3)/(cosh
(b*c*x + a*c)^2 - 2*cosh(b*c*x + a*c)*sinh(b*c*x + a*c) + sinh(b*c*x + a*c)
^2)))/(b*c)
```

**giac [F]** time = 0.00, size = 0, normalized size = 0.00

$$\int \operatorname{arcoth}\left(\operatorname{csch}\left(bcx + ac\right)\right)e^{\left((bx+a)c\right)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(c*(b*x+a))*arccoth(csch(b*c*x+a*c)),x, algorithm="giac")
```

```
[Out] integrate(arccoth(csch(b*c*x + a*c))*e^((b*x + a)*c), x)
```

**maple [C]** time = 0.65, size = 920, normalized size = 8.60

result too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(exp(c*(b*x+a))*arccoth(csch(b*c*x+a*c)),x)
```

```
[Out] 1/2/b/c*exp(c*(b*x+a))*ln(exp(2*c*(b*x+a))+2*exp(c*(b*x+a))-1)+1/4*I/b/c*Pi
*csgn(I*(exp(2*c*(b*x+a))+2*exp(c*(b*x+a))-1))*csgn(I/(exp(2*c*(b*x+a))-1)*
(exp(2*c*(b*x+a))+2*exp(c*(b*x+a))-1))^2*exp(c*(b*x+a))+1/2*I/b/c*Pi*csgn(I
*(-exp(2*c*(b*x+a))+2*exp(c*(b*x+a))+1)/(exp(2*c*(b*x+a))-1))^2*exp(c*(b*x+
a))+1/4*I/b/c*Pi*csgn(I*(-exp(2*c*(b*x+a))+2*exp(c*(b*x+a))+1))*csgn(I*(-ex
p(2*c*(b*x+a))+2*exp(c*(b*x+a))+1)/(exp(2*c*(b*x+a))-1))^2*exp(c*(b*x+a))-1
/4*I/b/c*Pi*csgn(I/(exp(2*c*(b*x+a))-1))*csgn(I*(-exp(2*c*(b*x+a))+2*exp(c*
(b*x+a))+1)/(exp(2*c*(b*x+a))-1))^2*exp(c*(b*x+a))+1/4*I/b/c*Pi*csgn(I*(-ex
p(2*c*(b*x+a))+2*exp(c*(b*x+a))+1))*csgn(I/(exp(2*c*(b*x+a))-1))*csgn(I*(-e
xp(2*c*(b*x+a))+2*exp(c*(b*x+a))+1)/(exp(2*c*(b*x+a))-1))*exp(c*(b*x+a))-1/
4*I/b/c*Pi*csgn(I*(exp(2*c*(b*x+a))+2*exp(c*(b*x+a))-1))*csgn(I/(exp(2*c*(b
*x+a))-1))*csgn(I/(exp(2*c*(b*x+a))-1)*(exp(2*c*(b*x+a))+2*exp(c*(b*x+a))-1
))*exp(c*(b*x+a))+1/4*I/b/c*Pi*csgn(I*(-exp(2*c*(b*x+a))+2*exp(c*(b*x+a))+1
)/(exp(2*c*(b*x+a))-1))^3*exp(c*(b*x+a))+1/4*I/b/c*Pi*csgn(I/(exp(2*c*(b*x+
a))-1))*csgn(I/(exp(2*c*(b*x+a))-1)*(exp(2*c*(b*x+a))+2*exp(c*(b*x+a))-1))^
2*exp(c*(b*x+a))-1/2*I/b/c*exp(c*(b*x+a))*Pi-1/4*I/b/c*Pi*csgn(I/(exp(2*c*(
b*x+a))-1)*(exp(2*c*(b*x+a))+2*exp(c*(b*x+a))-1))^3*exp(c*(b*x+a))-1/2/b/c*
exp(c*(b*x+a))*ln(exp(2*c*(b*x+a))-2*exp(c*(b*x+a))-1)+1/2/b/c*ln(exp(2*c*(
b*x+a))-(1+2^(1/2))^2)*2^(1/2)-1/2/b/c*ln(exp(2*c*(b*x+a))-(2^(1/2)-1)^2)*2
^(1/2)-2*a/b+1/2/b/c*ln(exp(2*c*(b*x+a))-(1+2^(1/2))^2)+1/2/b/c*ln(exp(2*c*
(b*x+a))-(2^(1/2)-1)^2)
```

**maxima [B]** time = 0.42, size = 184, normalized size = 1.72

$$\frac{\operatorname{arcoth}\left(\operatorname{csch}\left(bcx + ac\right)\right)e^{\left((bx+a)c\right)}}{bc} + \frac{\sqrt{2}\log\left(-\frac{\sqrt{2} - e^{(bcx+ac)} + 1}{\sqrt{2} + e^{(bcx+ac)} - 1}\right)}{2\,bc} - \frac{\sqrt{2}\log\left(-\frac{\sqrt{2} - e^{(bcx+ac)} - 1}{\sqrt{2} + e^{(bcx+ac)} + 1}\right)}{2\,bc} + \frac{\log\left(e^{(2\,bcx+2\,ac)} + 2\,e^{(bcx+a}\right.}{2\,bc}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(c*(b*x+a))*arccoth(csch(b*c*x+a*c)),x, algorithm="maxima")
```

```
[Out] arccoth(csch(b*c*x + a*c))*e^((b*x + a)*c)/(b*c) + 1/2*sqrt(2)*log(-(sqrt(2
) - e^(b*c*x + a*c) + 1)/(sqrt(2) + e^(b*c*x + a*c) - 1))/(b*c) - 1/2*sqrt(
2)*log(-(sqrt(2) - e^(b*c*x + a*c) - 1)/(sqrt(2) + e^(b*c*x + a*c) + 1))/(b
```

```
*c) + 1/2*log(e^(2*b*c*x + 2*a*c) + 2*e^(b*c*x + a*c) - 1)/(b*c) + 1/2*log(
e^(2*b*c*x + 2*a*c) - 2*e^(b*c*x + a*c) - 1)/(b*c)
```

**mupad [B]** time = 1.60, size = 179, normalized size = 1.67

$$\frac{e^{ac+bcx}\ln\left(\frac{e^{bcx}e^{ac}}{2}-\frac{e^{-bcx}e^{-ac}}{2}+1\right)}{2bc}-\frac{e^{ac+bcx}\ln\left(\frac{e^{-bcx}e^{-ac}}{2}-\frac{e^{bcx}e^{ac}}{2}+1\right)}{2bc}+\frac{\ln\left(6\sqrt{2}\,e^{2c(a+bx)}-2\sqrt{2}-8\,e^{2c(a}\right.}{2bc}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(acoth(1/sinh(a*c + b*c*x))*exp(c*(a + b*x)),x)
```

```
[Out] (exp(a*c + b*c*x)*log((exp(b*c*x)*exp(a*c))/2 - (exp(-b*c*x)*exp(-a*c))/2 +
 1))/(2*b*c) - (exp(a*c + b*c*x)*log((exp(-b*c*x)*exp(-a*c))/2 - (exp(b*c*x
)*exp(a*c))/2 + 1))/(2*b*c) + (log(6*2^(1/2)*exp(2*c*(a + b*x)) - 2*2^(1/2)
 - 8*exp(2*c*(a + b*x)))*(2^(1/2) + 1))/(2*b*c) - (log(2*2^(1/2) - 8*exp(2*
c*(a + b*x)) - 6*2^(1/2)*exp(2*c*(a + b*x)))*(2^(1/2) - 1))/(2*b*c)
```

**sympy [F]** time = 0.00, size = 0, normalized size = 0.00

$$e^{ac}\int e^{bcx}\operatorname{acoth}\left(\operatorname{csch}\left(ac+bcx\right)\right)dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(exp(c*(b*x+a))*acoth(csch(b*c*x+a*c)),x)
```

```
[Out] exp(a*c)*Integral(exp(b*c*x)*acoth(csch(a*c + b*c*x)), x)
```

# Chapter 4

# Listing of Grading functions

The following are the current version of the grading functions used for grading the quality of the antiderivative with reference to the optimal antiderivative included in the test suite.

There is a version for Maple and for Mathematica/Rubi. There is a version for grading Sympy and version for use with Sagemath.

The following are links to the current source code.

The following are the listings of source code of the grading functions.

### 4.0.1 Mathematica and Rubi grading function

```
(* Original version thanks to Albert Rich emailed on 03/21/2017 *)
(* ::Package:: *)

(* ::Subsection:: *)
(*GradeAntiderivative[result,optimal]*)


(* ::Text:: *)
(*If result and optimal are mathematical expressions, *)
(*          GradeAntiderivative[result,optimal] returns*)
(*  "F" if the result fails to integrate an expression that*)
(*      is integrable*)
(*  "C" if result involves higher level functions than necessary*)
(*  "B" if result is more than twice the size of the optimal*)
(*      antiderivative*)
(*  "A" if result can be considered optimal*)


GradeAntiderivative[result_,optimal_] :=
  If[ExpnType[result]<=ExpnType[optimal],
    If[FreeQ[result,Complex] || Not[FreeQ[optimal,Complex]],
      If[LeafCount[result]<=2*LeafCount[optimal],
        "A",
      "B"],
    "C"],
  If[FreeQ[result,Integrate] && FreeQ[result,Int],
    "C",
  "F"]]


(* ::Text:: *)
(*The following summarizes the type number assigned an *)
(*expression based on the functions it involves*)
(*1 = rational function*)
(*2 = algebraic function*)
```

```
(*3 = elementary function*)
(*4 = special function*)
(*5 = hyperpergeometric function*)
(*6 = appell function*)
(*7 = rootsum function*)
(*8 = integrate function*)
(*9 = unknown function*)


ExpnType[expn_] :=
  If[AtomQ[expn],
    1,
  If[ListQ[expn],
    Max[Map[ExpnType,expn]],
  If[Head[expn]===Power,
    If[IntegerQ[expn[[2]]],
      ExpnType[expn[[1]]],
    If[Head[expn[[2]]]===Rational,
      If[IntegerQ[expn[[1]]] || Head[expn[[1]]]===Rational,
        1,
      Max[ExpnType[expn[[1]]],2]],
    Max[ExpnType[expn[[1]]],ExpnType[expn[[2]]],3]]],
  If[Head[expn]===Plus || Head[expn]===Times,
    Max[ExpnType[First[expn]],ExpnType[Rest[expn]]],
  If[ElementaryFunctionQ[Head[expn]],
    Max[3,ExpnType[expn[[1]]]],
  If[SpecialFunctionQ[Head[expn]],
    Apply[Max,Append[Map[ExpnType,Apply[List,expn]],4]],
  If[HypergeometricFunctionQ[Head[expn]],
    Apply[Max,Append[Map[ExpnType,Apply[List,expn]],5]],
  If[AppellFunctionQ[Head[expn]],
    Apply[Max,Append[Map[ExpnType,Apply[List,expn]],6]],
  If[Head[expn]===RootSum,
    Apply[Max,Append[Map[ExpnType,Apply[List,expn]],7]],
  If[Head[expn]===Integrate || Head[expn]===Int,
    Apply[Max,Append[Map[ExpnType,Apply[List,expn]],8]],
  9]]]]]]]]]]


ElementaryFunctionQ[func_] :=
  MemberQ[{
        Exp,Log,
        Sin,Cos,Tan,Cot,Sec,Csc,
        ArcSin,ArcCos,ArcTan,ArcCot,ArcSec,ArcCsc,
        Sinh,Cosh,Tanh,Coth,Sech,Csch,
        ArcSinh,ArcCosh,ArcTanh,ArcCoth,ArcSech,ArcCsch
},func]


SpecialFunctionQ[func_] :=
  MemberQ[{
        Erf, Erfc, Erfi,
        FresnelS, FresnelC,
        ExpIntegralE, ExpIntegralEi, LogIntegral,
        SinIntegral, CosIntegral, SinhIntegral, CoshIntegral,
        Gamma, LogGamma, PolyGamma,
        Zeta, PolyLog, ProductLog,
        EllipticF, EllipticE, EllipticPi
},func]


HypergeometricFunctionQ[func_] :=
  MemberQ[{Hypergeometric1F1,Hypergeometric2F1,HypergeometricPFQ},func]
```

```
AppellFunctionQ[func_] :=
  MemberQ[{AppellF1},func]
```

### 4.0.2 Maple grading function

```
# File: GradeAntiderivative.mpl
# Original version thanks to Albert Rich emailed on 03/21/2017

#Nasser 03/22/2017  Use Maple leaf count instead since buildin
#Nasser 03/23/2017  missing 'ln' for ElementaryFunctionQ added
#Nasser 03/24/2017  corrected the check for complex result
#Nasser 10/27/2017  check for leafsize and do not call ExpnType()
#                   if leaf size is "too large". Set at 500,000
#Nasser 12/22/2019  Added debug flag, added 'dilog' to special functions
#                   see problem 156, file Apostol_Problems

GradeAntiderivative := proc(result,optimal)
local leaf_count_result, leaf_count_optimal,ExpnType_result,ExpnType_optimal,
   debug:=false;

      leaf_count_result:=leafcount(result);
      #do NOT call ExpnType() if leaf size is too large. Recursion problem
      if leaf_count_result > 500000 then
          return "B";
      fi;

      leaf_count_optimal:=leafcount(optimal);

      ExpnType_result:=ExpnType(result);
      ExpnType_optimal:=ExpnType(optimal);

      if debug then
         print("ExpnType_result",ExpnType_result," ExpnType_optimal=",
   ExpnType_optimal);
      fi;

# If result and optimal are mathematical expressions,
#  GradeAntiderivative[result,optimal] returns
#   "F" if the result fails to integrate an expression that
#       is integrable
#   "C" if result involves higher level functions than necessary
#   "B" if result is more than twice the size of the optimal
#       antiderivative
#   "A" if result can be considered optimal

  #This check below actually is not needed, since I only
  #call this grading only for passed integrals. i.e. I check
  #for "F" before calling this. But no harm of keeping it here.
  #just in case.


  if not type(result,freeof('int')) then
     return "F";
  end if;


  if ExpnType_result<=ExpnType_optimal then
      if debug then
          print("ExpnType_result<=ExpnType_optimal");
      fi;
```

```
      if is_contains_complex(result) then
         if is_contains_complex(optimal) then
            if debug then
               print("both result and optimal complex");
            fi;
            #both result and optimal complex
            if leaf_count_result<=2*leaf_count_optimal then
               return "A";
            else
               return "B";
            end if
         else #result contains complex but optimal is not
            if debug then
               print("result contains complex but optimal is not");
            fi;
            return "C";
         end if
      else # result do not contain complex
           # this assumes optimal do not as well
           if debug then
               print("result do not contain complex, this assumes optimal do
   not as well");
           fi;
           if leaf_count_result<=2*leaf_count_optimal then
              if debug then
                 print("leaf_count_result<=2*leaf_count_optimal");
              fi;
              return "A";
           else
              if debug then
                 print("leaf_count_result>2*leaf_count_optimal");
              fi;
              return "B";
           end if
      end if
  else #ExpnType(result) > ExpnType(optimal)
      if debug then
         print("ExpnType(result) > ExpnType(optimal)");
      fi;
      return "C";
  end if

end proc:

#
# is_contains_complex(result)
# takes expressions and returns true if it contains "I" else false
#
#Nasser 032417
is_contains_complex:= proc(expression)
  return (has(expression,I));
end proc:

# The following summarizes the type number assigned an expression
# based on the functions it involves
# 1 = rational function
# 2 = algebraic function
# 3 = elementary function
# 4 = special function
# 5 = hyperpergeometric function
# 6 = appell function
# 7 = rootsum function
# 8 = integrate function
```

```
# 9 = unknown function

ExpnType := proc(expn)
  if type(expn,'atomic') then
    1
  elif type(expn,'list') then
    apply(max,map(ExpnType,expn))
  elif type(expn,'sqrt') then
    if type(op(1,expn),'rational') then
       1
    else
       max(2,ExpnType(op(1,expn)))
    end if
  elif type(expn,'`^`') then
    if type(op(2,expn),'integer') then
      ExpnType(op(1,expn))
    elif type(op(2,expn),'rational') then
      if type(op(1,expn),'rational') then
         1
      else
         max(2,ExpnType(op(1,expn)))
      end if
    else
         max(3,ExpnType(op(1,expn)),ExpnType(op(2,expn)))
    end if
  elif type(expn,'`+`') or type(expn,'`*`') then
    max(ExpnType(op(1,expn)),max(ExpnType(rest(expn))))
  elif ElementaryFunctionQ(op(0,expn)) then
    max(3,ExpnType(op(1,expn)))
  elif SpecialFunctionQ(op(0,expn)) then
    max(4,apply(max,map(ExpnType,[op(expn)])))
  elif HypergeometricFunctionQ(op(0,expn)) then
    max(5,apply(max,map(ExpnType,[op(expn)])))
  elif AppellFunctionQ(op(0,expn)) then
    max(6,apply(max,map(ExpnType,[op(expn)])))
  elif op(0,expn)='int' then
    max(8,apply(max,map(ExpnType,[op(expn)]))) else
  9
  end if
end proc:


ElementaryFunctionQ := proc(func)
  member(func,[
        exp,log,ln,
        sin,cos,tan,cot,sec,csc,
        arcsin,arccos,arctan,arccot,arcsec,arccsc,
        sinh,cosh,tanh,coth,sech,csch,
        arcsinh,arccosh,arctanh,arccoth,arcsech,arccsch])
end proc:

SpecialFunctionQ := proc(func)
  member(func,[
        erf,erfc,erfi,
        FresnelS,FresnelC,
        Ei,Ei,Li,Si,Ci,Shi,Chi,
        GAMMA,lnGAMMA,Psi,Zeta,polylog,dilog,LambertW,
        EllipticF,EllipticE,EllipticPi])
end proc:

HypergeometricFunctionQ := proc(func)
  member(func,[Hypergeometric1F1,hypergeom,HypergeometricPFQ])
end proc:
```

```
AppellFunctionQ := proc(func)
  member(func,[AppellF1])
end proc:

# u is a sum or product.  rest(u) returns all but the
# first term or factor of u.
rest := proc(u) local v;
  if nops(u)=2 then
     op(2,u)
  else
     apply(op(0,u),op(2..nops(u),u))
  end if
end proc:

#leafcount(u) returns the number of nodes in u.
#Nasser 3/23/17  Replaced by build-in leafCount from package in Maple
leafcount := proc(u)
   MmaTranslator[Mma][LeafCount](u);
end proc:
```

### 4.0.3 Sympy grading function

```
#Dec 24, 2019. Nasser M. Abbasi:
#              Port of original Maple grading function by
#              Albert Rich to use with Sympy/Python
#Dec 27, 2019  Nasser. Added `RootSum`. See problem 177, Timofeev file
#              added 'exp_polar'
from sympy import *

def leaf_count(expr):
    #sympy do not have leaf count function. This is approximation
    return round(1.7*count_ops(expr))

def is_sqrt(expr):
    if isinstance(expr,Pow):
        if expr.args[1] == Rational(1,2):
            return True
        else:
            return False
    else:
        return False

def is_elementary_function(func):
    return func in [exp,log,ln,sin,cos,tan,cot,sec,csc,
            asin,acos,atan,acot,asec,acsc,sinh,cosh,tanh,coth,sech,csch,
            asinh,acosh,atanh,acoth,asech,acsch
        ]

def is_special_function(func):
    return func in [ erf,erfc,erfi,
             fresnels,fresnelc,Ei,Ei,Li,Si,Ci,Shi,Chi,
             gamma,loggamma,digamma,zeta,polylog,LambertW,
             elliptic_f,elliptic_e,elliptic_pi,exp_polar
         ]

def is_hypergeometric_function(func):
    return func in [hyper]

def is_appell_function(func):
    return func in [appellf1]
```

```
def is_atom(expn):
    try:
        if expn.isAtom or isinstance(expn,int) or isinstance(expn,float):
           return True
        else:
           return False

    except AttributeError as error:
        return False

def expnType(expn):
    debug=False
    if debug:
        print("expn=",expn,"type(expn)=",type(expn))

    if is_atom(expn):
      return 1
    elif isinstance(expn,list):
        return max(map(expnType, expn))   #apply(max,map(ExpnType,expn))
    elif  is_sqrt(expn):
        if isinstance(expn.args[0],Rational): #type(op(1,expn),'rational')
            return 1
        else:
            return max(2,expnType(expn.args[0]))  #max(2,ExpnType(op(1,expn)))
    elif isinstance(expn,Pow):   #type(expn,'`^`')
        if isinstance(expn.args[1],Integer):  #type(op(2,expn),'integer')
            return expnType(expn.args[0])   #ExpnType(op(1,expn))
        elif isinstance(expn.args[1],Rational):  #type(op(2,expn),'rational')
            if isinstance(expn.args[0],Rational): #type(op(1,expn),'rational')
                return 1
            else:
                return max(2,expnType(expn.args[0]))  #max(2,ExpnType(op(1,expn
   )))
        else:
            return max(3,expnType(expn.args[0]),expnType(expn.args[1])) #max(3,
   ExpnType(op(1,expn)),ExpnType(op(2,expn)))
    elif isinstance(expn,Add) or isinstance(expn,Mul): #type(expn,'`+`') or
   type(expn,'`*`')
        m1 = expnType(expn.args[0])
        m2 = expnType(list(expn.args[1:]))
        return max(m1,m2)  #max(ExpnType(op(1,expn)),max(ExpnType(rest(expn))))
    elif is_elementary_function(expn.func):  #ElementaryFunctionQ(op(0,expn))
        return max(3,expnType(expn.args[0]))  #max(3,ExpnType(op(1,expn)))
    elif is_special_function(expn.func): #SpecialFunctionQ(op(0,expn))
        m1 = max(map(expnType, list(expn.args)))
        return max(4,m1)   #max(4,apply(max,map(ExpnType,[op(expn)])))
    elif is_hypergeometric_function(expn.func): #HypergeometricFunctionQ(op(0,
   expn))
        m1 = max(map(expnType, list(expn.args)))
        return max(5,m1)   #max(5,apply(max,map(ExpnType,[op(expn)])))
    elif is_appell_function(expn.func):
        m1 = max(map(expnType, list(expn.args)))
        return max(6,m1)   #max(5,apply(max,map(ExpnType,[op(expn)])))
    elif isinstance(expn,RootSum):
        m1 = max(map(expnType, list(expn.args))) #Apply[Max,Append[Map[ExpnType
   ,Apply[List,expn]],7]],
        return max(7,m1)
    elif str(expn).find("Integral") != -1:
        m1 = max(map(expnType, list(expn.args)))
        return max(8,m1)   #max(5,apply(max,map(ExpnType,[op(expn)])))
    else:
        return 9
```

```
#main function
def grade_antiderivative(result,optimal):

    leaf_count_result  = leaf_count(result)
    leaf_count_optimal = leaf_count(optimal)

    expnType_result  = expnType(result)
    expnType_optimal = expnType(optimal)

    if str(result).find("Integral") != -1:
        return "F"

    if expnType_result <= expnType_optimal:
        if result.has(I):
            if optimal.has(I): #both result and optimal complex
                if leaf_count_result <= 2*leaf_count_optimal:
                    return "A"
                else:
                    return "B"
            else: #result contains complex but optimal is not
                return "C"
        else: # result do not contain complex, this assumes optimal do not as
   well
            if leaf_count_result <= 2*leaf_count_optimal:
                return "A"
            else:
                return "B"
    else:
        return "C"
```

### 4.0.4 SageMath grading function

```
#Dec 24, 2019. Nasser: Ported original Maple grading function by
#              Albert Rich to use with Sagemath. This is used to
#              grade Fricas, Giac and Maxima results.
#Dec 24, 2019. Nasser: Added 'exp_integral_e' and 'sng', 'sin_integral'
#              'arctan2','floor','abs','log_integral'

from sage.all import *
from sage.symbolic.operators import add_vararg, mul_vararg

debug=False;

def tree_size(expr):
    r"""
    Return the tree size of this expression.
    """
    if expr not in SR:
        # deal with lists, tuples, vectors
        return 1 + sum(tree_size(a) for a in expr)
    expr = SR(expr)
    x, aa = expr.operator(), expr.operands()
    if x is None:
        return 1
    else:
        return 1 + sum(tree_size(a) for a in aa)

def is_sqrt(expr):
    if expr.operator() == operator.pow:   #isinstance(expr,Pow):
        if expr.operands()[1]==1/2: #expr.args[1] == Rational(1,2):
            if debug: print ("expr is sqrt")
            return True
```

```
        else:
            return False
    else:
        return False

def is_elementary_function(func):
    debug=False
    m = func.name() in ['exp','log','ln',
            'sin','cos','tan','cot','sec','csc',
            'arcsin','arccos','arctan','arccot','arcsec','arccsc',
            'sinh','cosh','tanh','coth','sech','csch',
            'arcsinh','arccosh','arctanh','arccoth','arcsech','arccsch','sgn',
        'arctan2','floor','abs'
        ]
    if debug:
        if m:
            print ("func ", func , " is elementary_function")
        else:
            print ("func ", func , " is NOT elementary_function")


    return m

def is_special_function(func):
    debug=False
    if debug: print ("type(func)=", type(func))

    m= func.name() in ['erf','erfc','erfi','fresnel_sin','fresnel_cos','Ei',
           'Ei','Li','Si','sin_integral','Ci','cos_integral','Shi','
   sinh_integral'
           'Chi','cosh_integral','gamma','log_gamma','psi,zeta',
           'polylog','lambert_w','elliptic_f','elliptic_e',
           'elliptic_pi','exp_integral_e','log_integral']

    if debug:
        print ("m=",m)
        if m:
            print ("func ", func ," is special_function")
        else:
            print ("func ", func ," is NOT special_function")


    return m


def is_hypergeometric_function(func):
    return func.name() in ['hypergeometric','hypergeometric_M','
   hypergeometric_U']

def is_appell_function(func):
    return func.name() in ['hypergeometric']   #[appellf1] can't find this in
   sagemath

def is_atom(expn):

    debug=False
    if debug: print ("Enter is_atom")


    #thanks to answer at https://ask.sagemath.org/question/49179/what-is-
   sagemath-equivalent-to-atomic-type-in-maple/
    try:
        if expn.parent() is SR:
```

```
            return expn.operator() is None
        if expn.parent() in (ZZ, QQ, AA, QQbar):
            return expn in expn.parent() # Should always return True
        if hasattr(expn.parent(),"base_ring") and hasattr(expn.parent(),"gens")
    :
            return expn in expn.parent().base_ring() or expn in expn.parent().
    gens()
        return False

    except AttributeError as error:
        return False


def expnType(expn):

    if debug:
        print (">>>>>Enter expnType, expn=", expn)
        print (">>>>>is_atom(expn)=", is_atom(expn))

    if is_atom(expn):
        return 1
    elif type(expn)==list:   #isinstance(expn,list):
        return max(map(expnType, expn))   #apply(max,map(ExpnType,expn))
    elif  is_sqrt(expn):
        if  type(expn.operands()[0])==Rational: #type(isinstance(expn.args[0],
    Rational):
            return 1
        else:
            return max(2,expnType(expn.operands()[0]))  #max(2,expnType(expn.
    args[0]))
    elif expn.operator() == operator.pow:   #isinstance(expn,Pow)
        if type(expn.operands()[1])==Integer:  #isinstance(expn.args[1],Integer
    )
            return expnType(expn.operands()[0])   #expnType(expn.args[0])
        elif type(expn.operands()[1])==Rational:  #isinstance(expn.args[1],
    Rational)
            if type(expn.operands()[0])==Rational: #isinstance(expn.args[0],
    Rational)
                return 1
            else:
                return max(2,expnType(expn.operands()[0]))  #max(2,expnType(
    expn.args[0]))
        else:
            return max(3,expnType(expn.operands()[0]),expnType(expn.operands()
    [1])) #max(3,expnType(expn.operands()[0]),expnType(expn.operands()[1]))
    elif expn.operator() == add_vararg or expn.operator() == mul_vararg: #
    isinstance(expn,Add) or isinstance(expn,Mul)
        m1 = expnType(expn.operands()[0]) #expnType(expn.args[0])
        m2 = expnType(expn.operands()[1:]) #expnType(list(expn.args[1:]))
        return max(m1,m2)  #max(ExpnType(op(1,expn)),max(ExpnType(rest(expn))))
    elif is_elementary_function(expn.operator()):  #is_elementary_function(expn
    .func)
        return max(3,expnType(expn.operands()[0]))
    elif is_special_function(expn.operator()): #is_special_function(expn.func)
        m1 = max(map(expnType, expn.operands()))      #max(map(expnType, list(
    expn.args)))
        return max(4,m1)   #max(4,m1)
    elif is_hypergeometric_function(expn.operator()): #
    is_hypergeometric_function(expn.func)
        m1 = max(map(expnType, expn.operands()))       #max(map(expnType, list(
    expn.args)))
        return max(5,m1)   #max(5,m1)
    elif is_appell_function(expn.operator()):
```

```
        m1 = max(map(expnType, expn.operands()))       #max(map(expnType, list(
    expn.args)))
        return max(6,m1)   #max(6,m1)
    elif str(expn).find("Integral") != -1: #this will never happen, since it
                #is checked before calling the grading function that is passed.
                #but kept it here.
        m1 = max(map(expnType, expn.operands()))       #max(map(expnType, list(
    expn.args)))
        return max(8,m1)   #max(5,apply(max,map(ExpnType,[op(expn)])))
    else:
        return 9

#main function
def grade_antiderivative(result,optimal):

    if debug: print ("Enter grade_antiderivative for sagemath")

    leaf_count_result  = tree_size(result) #leaf_count(result)
    leaf_count_optimal = tree_size(optimal) #leaf_count(optimal)

    if debug: print ("leaf_count_result=", leaf_count_result, "
    leaf_count_optimal=",leaf_count_optimal)


    expnType_result  = expnType(result)
    expnType_optimal = expnType(optimal)

    if debug: print ("expnType_result=", expnType_result, "expnType_optimal=",
    expnType_optimal)

    if expnType_result <= expnType_optimal:
        if result.has(I):
            if optimal.has(I): #both result and optimal complex
                if leaf_count_result <= 2*leaf_count_optimal:
                    return "A"
                else:
                    return "B"
            else: #result contains complex but optimal is not
                return "C"
        else: # result do not contain complex, this assumes optimal do not as
    well
            if leaf_count_result <= 2*leaf_count_optimal:
                return "A"
            else:
                return "B"
    else:
        return "C"
```