# Computer algebra independent integration tests

## 7-Inverse-hyperbolic-functions/7.6-Inverse-hyperbolic-cosecant/7.6.1-u-a+b-arccsch-c-x-^n

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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 [ 178 ]. This is test number [ 202 ].

## 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 ( 178 ) | % 0.00 ( 0 ) |
| Mathematica | % 97.19 ( 173 ) | % 2.81 ( 5 ) |
| Maple | % 56.18 ( 100 ) | % 43.82 ( 78 ) |
| Maxima | % 47.19 ( 84 ) | % 52.81 ( 94 ) |
| Fricas | % 63.48 ( 113 ) | % 36.52 ( 65 ) |
| Sympy | % 17.98 ( 32 ) | % 82.02 ( 146 ) |
| Giac | % 25.84 ( 46 ) | % 74.16 ( 132 ) |
| Mupad | % 27.53 ( 49 ) | % 72.47 ( 129 ) |

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. |

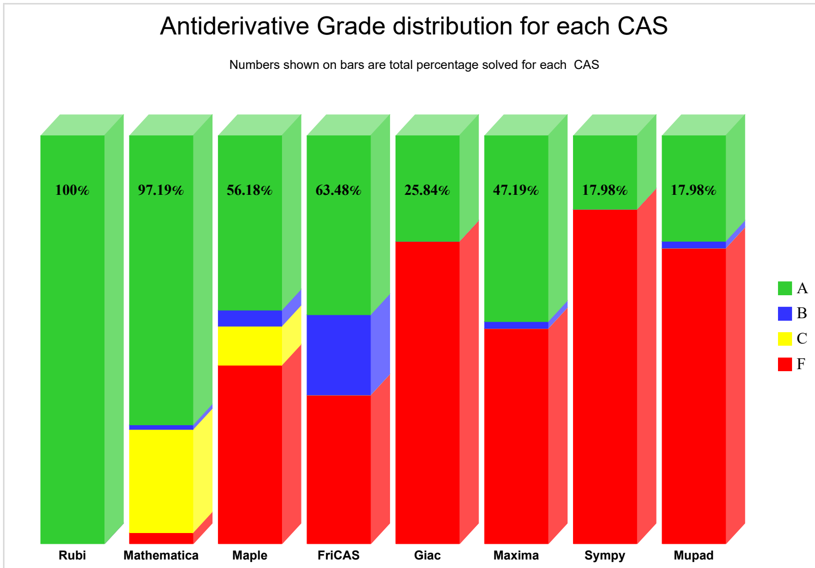
Table 1.2: Description of grading applied to integration result

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

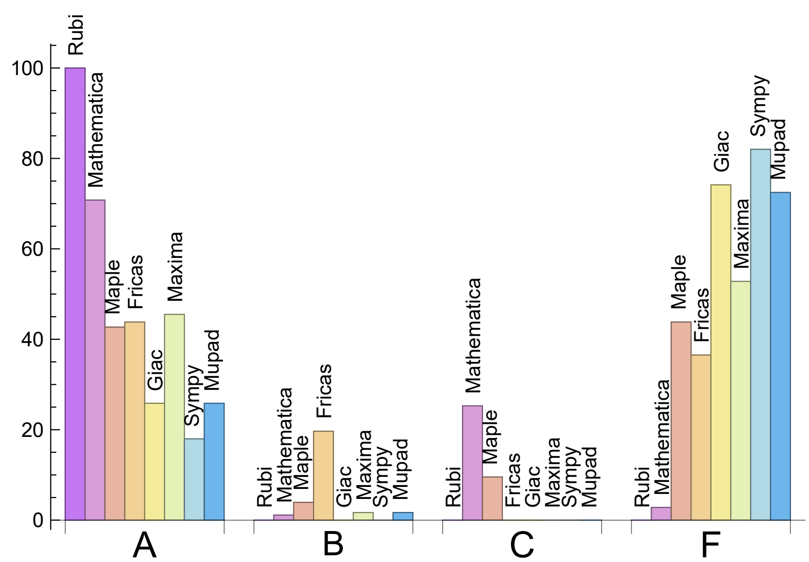
| System | % A grade | % B grade | % C grade | % F grade |
|---|---|---|---|---|
| Rubi | 100.00 | 0.00 | 0.00 | 0.00 |
| Mathematica | 70.79 | 1.12 | 25.28 | 2.81 |
| Maple | 42.70 | 3.93 | 9.55 | 43.82 |
| Maxima | 45.51 | 1.69 | 0.00 | 52.81 |
| Fricas | 43.82 | 19.66 | 0.00 | 36.52 |
| Sympy | 17.98 | 0.00 | 0.00 | 82.02 |
| Giac | 25.84 | 0.00 | 0.00 | 74.16 |
| Mupad | 25.84 | 1.69 | 0.00 | 72.47 |

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 | 5 | 100.00 % | 0.00 % | 0.00 % |
| Maple | 78 | 96.15 % | 0.00 % | 3.85 % |
| Maxima | 94 | 94.68 % | 4.26 % | 1.06 % |
| Fricas | 65 | 84.62 % | 15.38 % | 0.00 % |
| Sympy | 146 | 65.75 % | 34.25 % | 0.00 % |
| Giac | 132 | 98.48 % | 0.00 % | 1.52 % |
| Mupad | 129 | 100.00 % | 0.00 % | 0.00 % |

Table 1.4: Time and leaf size performance for each CAS

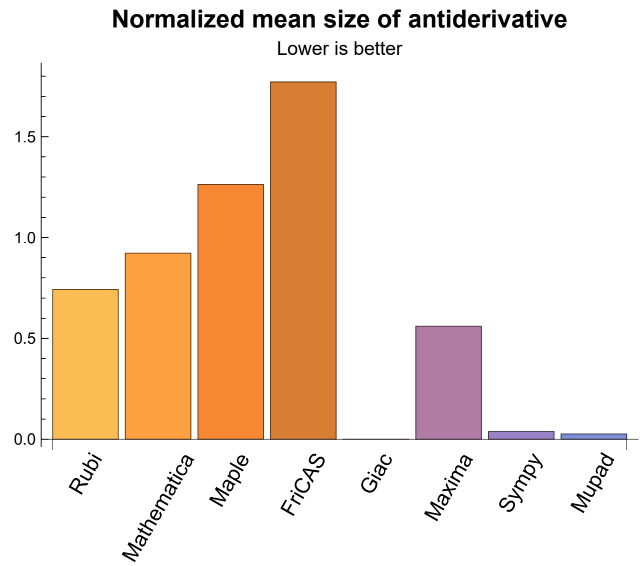
## 1.3 Performance

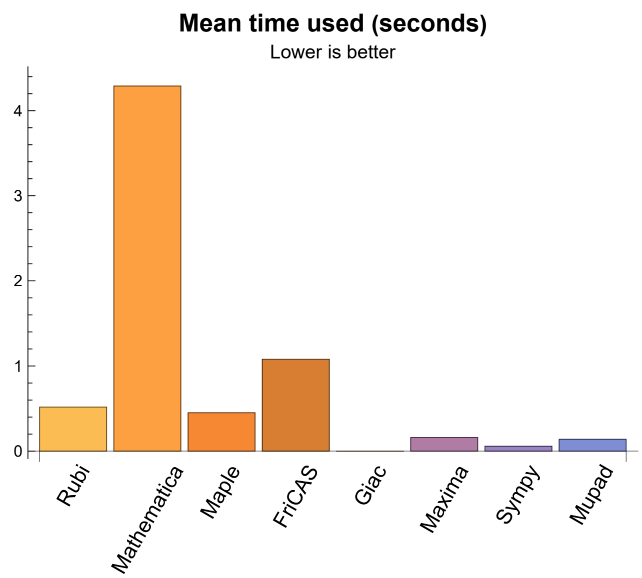
The table below summarizes the performance of each CAS system in terms of CPU time and leaf size of results.

| System | Mean time (sec) | Mean size | Normalized mean | Median size | Normalized median |
|---|---|---|---|---|---|
| Rubi | 0.52 | 217.70 | 0.74 | 132.50 | 1.00 |
| Mathematica | 4.29 | 294.37 | 0.92 | 123.00 | 0.90 |
| Maple | 0.45 | 401.64 | 1.26 | 83.00 | 0.90 |
| Maxima | 0.16 | 65.42 | 0.56 | 0.00 | 0.00 |
| Fricas | 1.08 | 301.39 | 1.77 | 123.00 | 0.97 |
| Sympy | 0.06 | 1.13 | 0.04 | 0.00 | 0.00 |
| Giac | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Mupad | 0.14 | 1.61 | 0.03 | -1.00 | -0.04 |

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

{33, 34, 35, 39, 40, 42, 43, 54, 55, 61, 62, 67, 68, 73, 74, 121, 122, 123, 124, 125, 130, 131, 132, 133, 134, 135, 141, 142, 143, 144, 150, 151, 152, 153, 159, 160, 161, 162, 168, 169, 170, 171, 172, 173, 177, 178}

## 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** $\{8, 99, 103, 104, 111\}$

**Mathematica** $\{8, 16, 18, 19, 24, 25, 26, 27, 28, 48, 51, 57, 75, 86, 87, 96, 97, 98, 99, 100, 101, 102, 103, 104, 107, 108, 109, 110, 111, 115, 116, 117, 118, 128\}$

**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.

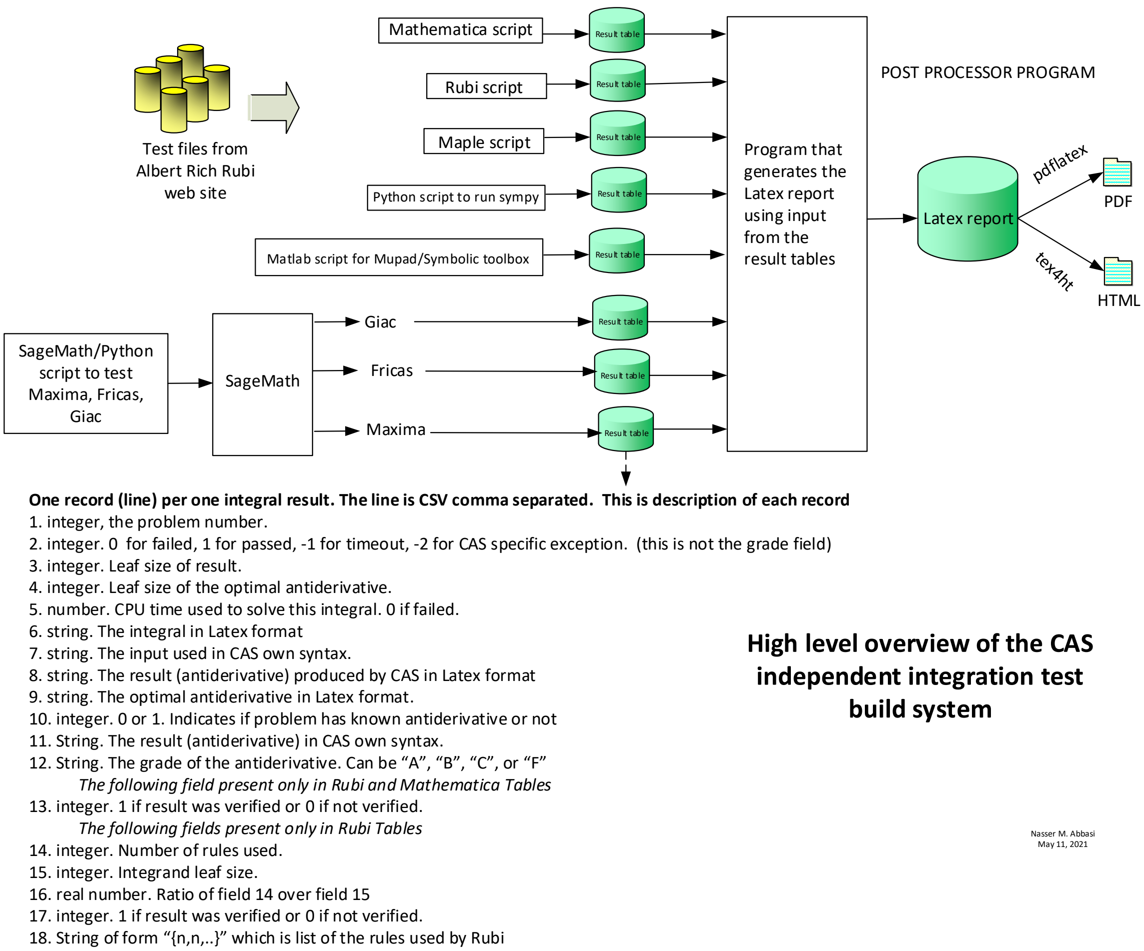
The following is an example of using Matlab's symbolic toolbox (Mupad) to solve an integral

```
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 }

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, 24, 26, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 49, 50, 54, 55, 61, 62, 67, 68, 73, 74, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 119, 120, 121, 122, 123, 124, 125, 129, 130, 131, 132, 133, 134, 135, 138, 139, 140, 141, 142, 143, 144, 145, 147, 148, 149, 150, 151, 152, 153, 154, 156, 157, 158, 159, 160, 161, 162, 163, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178 }

B grade: { 25, 27 }

C grade: { 48, 51, 52, 53, 56, 57, 58, 59, 60, 63, 64, 65, 66, 69, 70, 71, 72, 75, 98, 99, 100, 101, 102, 103, 104, 105, 107, 108, 109, 110, 111, 112, 113, 115, 116, 117, 118, 126, 127, 128, 136, 137, 146, 155, 164 }

F grade: { 106, 114, 165, 166, 167 }

### 2.1.3 Maple

A grade: { 1, 2, 3, 4, 5, 6, 7, 11, 12, 13, 14, 33, 34, 35, 39, 40, 42, 43, 44, 45, 46, 47, 54, 55, 61, 62, 67, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 88, 89, 90, 91, 92, 93, 94, 95, 121, 122, 123, 124, 125, 130, 131, 132, 133, 134, 135, 141, 142, 143, 144, 150, 151, 152, 153, 159, 160, 161, 162, 168, 169, 170, 171, 172, 173, 177, 178 }

B grade: { 9, 10, 49, 50, 105, 112, 113 }

C grade: { 51, 52, 53, 56, 57, 58, 59, 60, 63, 64, 65, 66, 69, 70, 71, 72, 75 }

F grade: { 8, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 36, 37, 38, 41, 48, 68, 73, 74, 86, 87, 96, 97, 98, 99, 100, 101, 102, 103, 104, 106, 107, 108, 109, 110, 111, 114, 115, 116, 117, 118, 119, 120, 126, 127, 128, 129, 136, 137, 138, 139, 140, 145, 146, 147, 148, 149, 154, 155, 156, 157, 158, 163, 164, 165, 166, 167, 174, 175, 176 }

### 2.1.4 Maxima

A grade: { 1, 2, 3, 4, 5, 6, 7, 9, 11, 13, 17, 20, 29, 33, 34, 35, 39, 40, 42, 43, 44, 45, 46, 47, 54, 55, 61, 62, 67, 68, 73, 74, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 88, 89, 90, 91, 92, 93, 94, 95, 121, 122, 123, 124, 125, 130, 131, 132, 133, 134, 135, 141, 142, 143, 144, 150, 151, 152, 153, 159, 160, 161, 162, 168, 169, 170, 171, 172, 173, 177, 178 }

B grade: { 10, 12, 14 }

C grade: { }

F grade: { 8, 15, 16, 18, 19, 21, 22, 23, 24, 25, 26, 27, 28, 30, 31, 32, 36, 37, 38, 41, 48, 49, 50, 51, 52, 53, 56, 57, 58, 59, 60, 63, 64, 65, 66, 69, 70, 71, 72, 75, 86, 87, 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, 126, 127, 128, 129, 136, 137, 138, 139, 140, 145, 146, 147, 148, 149, 154, 155, 156, 157, 158, 163, 164, 165, 166, 167, 174, 175, 176 }

### 2.1.5 FriCAS

A grade: { 2, 4, 10, 11, 12, 13, 14, 23, 32, 33, 34, 35, 39, 40, 42, 43, 54, 55, 61, 62, 67, 68, 73, 74, 76, 77, 80, 81, 82, 83, 84, 85, 88, 92, 93, 94, 95, 118, 119, 120, 121, 122, 123, 124, 125, 128, 129, 130, 131, 132, 133, 134, 135, 138, 139, 141, 142, 143, 144, 147, 150, 151, 152, 153, 159, 160, 161, 162, 168, 169, 170, 171, 172, 173, 174, 175, 177, 178 }

B grade: { 1, 3, 5, 6, 7, 9, 15, 17, 20, 21, 22, 29, 30, 31, 44, 45, 46, 47, 49, 50, 78, 79, 89, 90, 91, 105, 112, 113, 140, 148, 149, 156, 157, 158, 176 }

C grade: { }

F grade: { 8, 16, 18, 19, 24, 25, 26, 27, 28, 36, 37, 38, 41, 48, 51, 52, 53, 56, 57, 58, 59, 60, 63, 64, 65, 66, 69, 70, 71, 72, 75, 86, 87, 96, 97, 98, 99, 100, 101, 102, 103, 104, 106, 107, 108, 109, 110, 111, 114, 115, 116, 117, 126, 127, 136, 137, 145, 146, 154, 155, 163, 164, 165, 166, 167 }

### 2.1.6 Sympy

A grade: { 9, 33, 34, 35, 39, 40, 42, 43, 61, 62, 67, 68, 121, 122, 123, 124, 125, 130, 131, 133, 134, 135, 141, 142, 143, 144, 153, 168, 171, 172, 177, 178 }

B grade: { }

C grade: { }

F grade: { 1, 2, 3, 4, 5, 6, 7, 8, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 36, 37, 38, 41, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 63, 64, 65, 66, 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, 126, 127, 128, 129, 132, 136, 137, 138, 139, 140, 145, 146, 147, 148, 149, 150, 151, 152, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 169, 170, 173, 174, 175, 176 }

### 2.1.7 Giac

A grade: { 33, 34, 35, 39, 40, 42, 43, 54, 55, 61, 62, 67, 68, 73, 74, 121, 122, 123, 124, 125, 130, 131, 132, 133, 134, 135, 141, 142, 143, 144, 150, 151, 152, 153, 159, 160, 161, 162, 168, 169, 170, 171, 172, 173, 177, 178 }

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, 36, 37, 38, 41, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 56, 57, 58, 59, 60, 63, 64, 65, 66, 69, 70, 71, 72, 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, 126, 127, 128, 129, 136, 137, 138, 139, 140, 145, 146, 147, 148, 149, 154, 155, 156, 157, 158, 163, 164, 165, 166, 167, 174, 175, 176 }

### 2.1.8 Mupad

A grade: { 33, 34, 35, 39, 40, 42, 43, 54, 55, 61, 62, 67, 68, 73, 74, 121, 122, 123, 124, 125, 130, 131, 132, 133, 134, 135, 141, 142, 143, 144, 150, 151, 152, 153, 159, 160, 161, 162, 168, 169, 170, 171, 172, 173, 177, 178 }

B grade: { 6, 9, 10 }

C grade: { }

F grade: { 1, 2, 3, 4, 5, 7, 8, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 36, 37, 38, 41, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 56, 57, 58, 59, 60, 63, 64, 65, 66, 69, 70, 71, 72, 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, 126, 127, 128, 129, 136, 137, 138, 139, 140, 145, 146, 147, 148, 149, 154, 155, 156, 157, 158, 163, 164, 165, 166, 167, 174, 175, 176 }

## 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 | B | F | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 110 | 110 | 107 | 127 | 158 | 208 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.97 | 1.15 | 1.44 | 1.89 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.061 | 0.143 | 0.085 | 0.358 | 0.801 | 0.000 | 0.000 | 0.000 |

| Problem 2 | 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 | 86 | 86 | 72 | 83 | 77 | 97 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.84 | 0.97 | 0.90 | 1.13 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.044 | 0.135 | 0.051 | 0.309 | 2.011 | 0.000 | 0.000 | 0.000 |

| Problem 3 | 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 | 86 | 86 | 97 | 108 | 128 | 199 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 1.13 | 1.26 | 1.49 | 2.31 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.048 | 0.048 | 0.049 | 0.369 | 0.733 | 0.000 | 0.000 | 0.000 |

| Problem 4 | 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 | 62 | 62 | 62 | 74 | 57 | 87 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 1.00 | 1.19 | 0.92 | 1.40 | 0.00 | 0.00 | -0.02 |
| time (sec) | N/A | 0.027 | 0.102 | 0.045 | 0.316 | 3.314 | 0.000 | 0.000 | 0.000 |

| Problem 5 | 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 | 62 | 62 | 85 | 88 | 96 | 186 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 1.37 | 1.42 | 1.55 | 3.00 | 0.00 | 0.00 | -0.02 |
| time (sec) | N/A | 0.035 | 0.052 | 0.050 | 0.344 | 1.575 | 0.000 | 0.000 | 0.000 |

| Problem 6 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | A | A | B | F | F | B |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 38 | 38 | 50 | 65 | 35 | 70 | 0 | 0 | 39 |
| normalized size | 1 | 1.00 | 1.32 | 1.71 | 0.92 | 1.84 | 0.00 | 0.00 | 1.03 |
| time (sec) | N/A | 0.013 | 0.025 | 0.045 | 0.375 | 0.736 | 0.000 | 0.000 | 2.217 |

| Problem 7 | 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 | 30 | 30 | 44 | 36 | 49 | 143 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 1.47 | 1.20 | 1.63 | 4.77 | 0.00 | 0.00 | -0.03 |
| time (sec) | N/A | 0.021 | 0.060 | 0.043 | 0.328 | 0.725 | 0.000 | 0.000 | 0.000 |

| Problem 8 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | F | F | F | F | F | F |
| verified | N/A | NO | NO | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 56 | 56 | 47 | 0 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.84 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -0.02 |
| time (sec) | N/A | 0.090 | 0.045 | 0.068 | 0.000 | 2.073 | 0.000 | 0.000 | 0.000 |

| Problem 9 | 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 | 30 | 30 | 40 | 62 | 32 | 64 | 36 | 0 | 35 |
| normalized size | 1 | 1.00 | 1.33 | 2.07 | 1.07 | 2.13 | 1.20 | 0.00 | 1.17 |
| time (sec) | N/A | 0.024 | 0.031 | 0.046 | 0.351 | 0.775 | 1.823 | 0.000 | 2.323 |

| Problem 10 | 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 | 50 | 50 | 66 | 100 | 105 | 76 | 0 | 0 | 51 |
| normalized size | 1 | 1.00 | 1.32 | 2.00 | 2.10 | 1.52 | 0.00 | 0.00 | 1.02 |
| time (sec) | N/A | 0.037 | 0.036 | 0.048 | 0.389 | 0.980 | 0.000 | 0.000 | 2.265 |

| Problem 11 | 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 | 58 | 58 | 59 | 75 | 56 | 77 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 1.02 | 1.29 | 0.97 | 1.33 | 0.00 | 0.00 | -0.02 |
| time (sec) | N/A | 0.043 | 0.047 | 0.049 | 0.370 | 1.004 | 0.000 | 0.000 | 0.000 |

| Problem 12 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | A | B | A | F | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 74 | 74 | 78 | 120 | 147 | 89 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 1.05 | 1.62 | 1.99 | 1.20 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.048 | 0.043 | 0.046 | 0.329 | 1.025 | 0.000 | 0.000 | 0.000 |

| Problem 13 | 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 | 79 | 79 | 69 | 83 | 73 | 87 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.87 | 1.05 | 0.92 | 1.10 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.051 | 0.063 | 0.046 | 0.312 | 0.484 | 0.000 | 0.000 | 0.000 |

| Problem 14 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | A | B | A | F | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 98 | 98 | 88 | 139 | 185 | 99 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.90 | 1.42 | 1.89 | 1.01 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.064 | 0.074 | 0.056 | 0.307 | 1.122 | 0.000 | 0.000 | 0.000 |

| Problem 15 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | F | F | B | F | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 105 | 105 | 122 | 0 | 0 | 272 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 1.16 | 0.00 | 0.00 | 2.59 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.119 | 0.211 | 0.052 | 0.000 | 1.337 | 0.000 | 0.000 | 0.000 |

| Problem 16 | 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 | 122 | 122 | 211 | 0 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 1.73 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.132 | 1.427 | 0.052 | 0.000 | 1.370 | 0.000 | 0.000 | 0.000 |

| Problem 17 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | F | A | B | F | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 54 | 54 | 87 | 0 | 82 | 234 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 1.61 | 0.00 | 1.52 | 4.33 | 0.00 | 0.00 | -0.02 |
| time (sec) | N/A | 0.076 | 0.143 | 0.055 | 0.360 | 0.783 | 0.000 | 0.000 | 0.000 |

| Problem 18 | 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 | 68 | 68 | 121 | 0 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 1.78 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.068 | 0.236 | 0.050 | 0.000 | 2.257 | 0.000 | 0.000 | 0.000 |

| Problem 19 | 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 | 81 | 81 | 115 | 0 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 1.42 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.138 | 0.133 | 0.053 | 0.000 | 0.529 | 0.000 | 0.000 | 0.000 |

| Problem 20 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | F | A | B | F | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 49 | 49 | 70 | 0 | 78 | 139 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 1.43 | 0.00 | 1.59 | 2.84 | 0.00 | 0.00 | -0.02 |
| time (sec) | N/A | 0.070 | 0.168 | 0.066 | 0.334 | 1.075 | 0.000 | 0.000 | 0.000 |

| Problem 21 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | F | F | B | F | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 87 | 87 | 100 | 0 | 0 | 163 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 1.15 | 0.00 | 0.00 | 1.87 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.082 | 0.143 | 0.056 | 0.000 | 0.668 | 0.000 | 0.000 | 0.000 |

| Problem 22 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | F | F | B | F | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 100 | 100 | 106 | 0 | 0 | 178 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 1.06 | 0.00 | 0.00 | 1.78 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.108 | 0.194 | 0.047 | 0.000 | 0.819 | 0.000 | 0.000 | 0.000 |

| Problem 23 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | F | F | A | F | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 132 | 132 | 147 | 0 | 0 | 202 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 1.11 | 0.00 | 0.00 | 1.53 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.117 | 0.181 | 0.051 | 0.000 | 0.829 | 0.000 | 0.000 | 0.000 |

| Problem 24 | 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 | 195 | 195 | 271 | 0 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 1.39 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.232 | 1.019 | 0.050 | 0.000 | 0.627 | 0.000 | 0.000 | 0.000 |

| Problem 25 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | B | F | F | F | F | F | F |
| verified | N/A | Yes | NO | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 194 | 194 | 548 | 0 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 2.82 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.208 | 7.520 | 0.049 | 0.000 | 1.124 | 0.000 | 0.000 | 0.000 |

| Problem 26 | 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 | 117 | 117 | 171 | 0 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 1.46 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.160 | 0.471 | 0.049 | 0.000 | 1.391 | 0.000 | 0.000 | 0.000 |

| Problem 27 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | B | F | F | F | F | F | F |
| verified | N/A | Yes | NO | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 120 | 120 | 246 | 0 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 2.05 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.117 | 0.341 | 0.049 | 0.000 | 2.955 | 0.000 | 0.000 | 0.000 |

| Problem 28 | 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 | 110 | 110 | 198 | 0 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 1.80 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.154 | 0.227 | 0.055 | 0.000 | 0.410 | 0.000 | 0.000 | 0.000 |

| Problem 29 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | F | A | B | F | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 78 | 78 | 132 | 0 | 144 | 222 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 1.69 | 0.00 | 1.85 | 2.85 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.099 | 0.249 | 0.052 | 0.353 | 0.826 | 0.000 | 0.000 | 0.000 |

| Problem 30 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | F | F | B | F | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 123 | 123 | 182 | 0 | 0 | 267 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 1.48 | 0.00 | 0.00 | 2.17 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.106 | 0.326 | 0.052 | 0.000 | 0.404 | 0.000 | 0.000 | 0.000 |

| Problem 31 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | F | F | B | F | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 166 | 166 | 200 | 0 | 0 | 301 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 1.20 | 0.00 | 0.00 | 1.81 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.171 | 0.314 | 0.053 | 0.000 | 0.768 | 0.000 | 0.000 | 0.000 |

| Problem 32 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | F | F | A | F | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 204 | 204 | 277 | 0 | 0 | 346 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 1.36 | 0.00 | 0.00 | 1.70 | 0.00 | 0.00 | -0.00 |
| time (sec) | N/A | 0.181 | 0.368 | 0.053 | 0.000 | 0.982 | 0.000 | 0.000 | 0.000 |

| Problem 33 | 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 | 15 | 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 | -0.07 |
| time (sec) | N/A | 0.015 | 2.931 | 0.053 | 0.000 | 0.878 | 0.000 | 0.000 | 0.000 |

| Problem 34 | 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 | 13 | 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 | -0.08 |
| time (sec) | N/A | 0.006 | 2.821 | 0.054 | 0.000 | 0.975 | 0.000 | 0.000 | 0.000 |

| Problem 35 | 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 | 17 | 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 | 0.026 | 0.307 | 0.062 | 0.000 | 0.901 | 0.000 | 0.000 | 0.000 |

| Problem 36 | 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 | 46 | 46 | 44 | 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 | 0.104 | 0.076 | 0.049 | 0.000 | 1.590 | 0.000 | 0.000 | 0.000 |

| Problem 37 | 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 | 63 | 63 | 56 | 0 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.89 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -0.02 |
| time (sec) | N/A | 0.141 | 0.076 | 0.048 | 0.000 | 2.149 | 0.000 | 0.000 | 0.000 |

| Problem 38 | 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 | 117 | 117 | 91 | 0 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.78 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.240 | 0.165 | 0.052 | 0.000 | 2.138 | 0.000 | 0.000 | 0.000 |

| Problem 39 | 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 | 0.024 | 6.870 | 0.049 | 0.000 | 2.686 | 0.000 | 0.000 | 0.000 |

| Problem 40 | 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 | 0.025 | 4.489 | 0.050 | 0.000 | 0.782 | 0.000 | 0.000 | 0.000 |

| Problem 41 | 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 | 67 | 67 | 81 | 0 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 1.21 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.045 | 0.243 | 0.049 | 0.000 | 0.830 | 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 | 0.028 | 0.931 | 0.048 | 0.000 | 2.983 | 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 | 0.027 | 1.899 | 0.049 | 0.000 | 1.359 | 0.000 | 0.000 | 0.000 |

| Problem 44 | 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 | 167 | 167 | 165 | 269 | 261 | 419 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.99 | 1.61 | 1.56 | 2.51 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.384 | 0.294 | 0.059 | 0.322 | 1.161 | 0.000 | 0.000 | 0.000 |

| Problem 45 | 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 | 122 | 122 | 122 | 204 | 192 | 328 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 1.00 | 1.67 | 1.57 | 2.69 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.259 | 0.191 | 0.053 | 0.340 | 0.996 | 0.000 | 0.000 | 0.000 |

| Problem 46 | 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 | 81 | 81 | 99 | 115 | 87 | 207 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 1.22 | 1.42 | 1.07 | 2.56 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.161 | 0.203 | 0.051 | 0.390 | 1.696 | 0.000 | 0.000 | 0.000 |

| Problem 47 | 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 | 30 | 30 | 44 | 36 | 49 | 143 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 1.47 | 1.20 | 1.63 | 4.77 | 0.00 | 0.00 | -0.03 |
| time (sec) | N/A | 0.022 | 0.050 | 0.046 | 0.307 | 0.783 | 0.000 | 0.000 | 0.000 |

| Problem 48 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | C | F | F | F | F | F | F |
| verified | N/A | Yes | NO | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 215 | 215 | 506 | 0 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 2.35 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -0.00 |
| time (sec) | N/A | 0.390 | 0.664 | 0.492 | 0.000 | 0.682 | 0.000 | 0.000 | 0.000 |

| Problem 49 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | B | F | B | F | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 98 | 98 | 134 | 208 | 0 | 354 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 1.37 | 2.12 | 0.00 | 3.61 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.154 | 0.219 | 0.087 | 0.000 | 0.610 | 0.000 | 0.000 | 0.000 |

| Problem 50 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | B | F | B | F | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 163 | 163 | 204 | 963 | 0 | 745 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 1.25 | 5.91 | 0.00 | 4.57 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.292 | 0.478 | 0.070 | 0.000 | 1.337 | 0.000 | 0.000 | 0.000 |

| Problem 51 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | C | C | F(-1) | F(-1) | F(-1) | F | F |
| verified | N/A | Yes | NO | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 918 | 918 | 1094 | 2515 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 1.19 | 2.74 | 0.00 | 0.00 | 0.00 | 0.00 | -0.00 |
| time (sec) | N/A | 3.253 | 14.395 | 0.357 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |

| Problem 52 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | C | C | F(-1) | F(-1) | F(-1) | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 679 | 679 | 418 | 1964 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.62 | 2.89 | 0.00 | 0.00 | 0.00 | 0.00 | -0.00 |
| time (sec) | N/A | 2.519 | 1.678 | 0.085 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |

| Problem 53 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | C | C | F(-1) | F(-1) | F | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 429 | 429 | 926 | 840 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 2.16 | 1.96 | 0.00 | 0.00 | 0.00 | 0.00 | -0.00 |
| time (sec) | N/A | 0.708 | 14.077 | 0.079 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |

| Problem 54 | 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 | 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 | 0.076 | 19.511 | 6.871 | 0.000 | 0.573 | 0.000 | 0.000 | 0.000 |

| Problem 55 | 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 | 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 | 0.079 | 7.967 | 5.921 | 0.000 | 0.924 | 0.000 | 0.000 | 0.000 |

| Problem 56 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | C | C | F(-1) | F | F(-1) | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 486 | 486 | 380 | 1939 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.78 | 3.99 | 0.00 | 0.00 | 0.00 | 0.00 | -0.00 |
| time (sec) | N/A | 1.023 | 1.607 | 0.068 | 0.000 | 11.811 | 0.000 | 0.000 | 0.000 |

| Problem 57 | 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 | 939 | 939 | 1098 | 2543 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 1.17 | 2.71 | 0.00 | 0.00 | 0.00 | 0.00 | -0.00 |
| time (sec) | N/A | 2.871 | 14.302 | 0.078 | 0.000 | 15.322 | 0.000 | 0.000 | 0.000 |

| Problem 58 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | C | C | F | F(-1) | F | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 707 | 707 | 1012 | 1991 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 1.43 | 2.82 | 0.00 | 0.00 | 0.00 | 0.00 | -0.00 |
| time (sec) | N/A | 2.142 | 14.426 | 0.073 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |

| Problem 59 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | C | C | F | F(-1) | F | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 474 | 474 | 343 | 868 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.72 | 1.83 | 0.00 | 0.00 | 0.00 | 0.00 | -0.00 |
| time (sec) | N/A | 1.751 | 1.335 | 0.071 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |

| Problem 60 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | C | C | F | F(-1) | F | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 284 | 284 | 307 | 395 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 1.08 | 1.39 | 0.00 | 0.00 | 0.00 | 0.00 | -0.00 |
| time (sec) | N/A | 0.414 | 5.224 | 0.066 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |

| Problem 61 | 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 | 0.077 | 6.551 | 1.532 | 0.000 | 1.122 | 0.000 | 0.000 | 0.000 |

| Problem 62 | 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 | 0.082 | 9.214 | 5.263 | 0.000 | 0.833 | 0.000 | 0.000 | 0.000 |

| Problem 63 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | C | C | F | F | F | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 731 | 731 | 1042 | 2019 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 1.43 | 2.76 | 0.00 | 0.00 | 0.00 | 0.00 | -0.00 |
| time (sec) | N/A | 2.636 | 14.699 | 0.075 | 0.000 | 16.601 | 0.000 | 0.000 | 0.000 |

| Problem 64 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | C | C | F | F(-1) | F | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 499 | 499 | 979 | 896 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 1.96 | 1.80 | 0.00 | 0.00 | 0.00 | 0.00 | -0.00 |
| time (sec) | N/A | 2.010 | 14.494 | 0.073 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |

| Problem 65 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | C | C | F | F(-1) | F | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 318 | 318 | 264 | 418 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.83 | 1.31 | 0.00 | 0.00 | 0.00 | 0.00 | -0.00 |
| time (sec) | N/A | 1.691 | 1.585 | 0.071 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |

| Problem 66 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | C | C | F | F | F | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 149 | 149 | 166 | 328 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 1.11 | 2.20 | 0.00 | 0.00 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.284 | 0.682 | 0.072 | 0.000 | 9.003 | 0.000 | 0.000 | 0.000 |

| Problem 67 | 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 | 0.090 | 12.169 | 6.987 | 0.000 | 0.809 | 0.000 | 0.000 | 0.000 |

| Problem 68 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | N/A | A | A | F(-2) | 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 | 0.099 | 15.678 | 180.000 | 0.000 | 1.347 | 0.000 | 0.000 | 0.000 |

| Problem 69 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | C | C | F | F | F | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 777 | 777 | 1108 | 2726 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 1.43 | 3.51 | 0.00 | 0.00 | 0.00 | 0.00 | -0.00 |
| time (sec) | N/A | 3.186 | 14.487 | 0.089 | 0.000 | 16.418 | 0.000 | 0.000 | 0.000 |

| Problem 70 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | C | C | F | F(-1) | F | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 569 | 569 | 1076 | 2497 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 1.89 | 4.39 | 0.00 | 0.00 | 0.00 | 0.00 | -0.00 |
| time (sec) | N/A | 2.497 | 14.383 | 0.084 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |

| Problem 71 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | C | C | F | F | F | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 393 | 393 | 390 | 2107 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.99 | 5.36 | 0.00 | 0.00 | 0.00 | 0.00 | -0.00 |
| time (sec) | N/A | 2.191 | 2.514 | 0.075 | 0.000 | 8.178 | 0.000 | 0.000 | 0.000 |

| Problem 72 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | C | C | F | F(-1) | F | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 369 | 369 | 892 | 2079 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 2.42 | 5.63 | 0.00 | 0.00 | 0.00 | 0.00 | -0.00 |
| time (sec) | N/A | 0.567 | 14.102 | 0.073 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |

| Problem 73 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | N/A | A | A | F(-2) | A | A | F(-1) | 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 | 0.094 | 28.845 | 180.000 | 0.000 | 3.642 | 0.000 | 0.000 | 0.000 |

| Problem 74 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | N/A | A | A | F(-2) | A | A | F(-1) | 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 | 0.106 | 28.471 | 180.000 | 0.000 | 2.038 | 0.000 | 0.000 | 0.000 |

| Problem 75 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | C | C | F | F | F(-1) | F | F |
| verified | N/A | Yes | NO | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 648 | 785 | 1217 | 3782 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.21 | 1.88 | 5.84 | 0.00 | 0.00 | 0.00 | 0.00 | -0.00 |
| time (sec) | N/A | 1.035 | 14.494 | 0.107 | 0.000 | 9.390 | 0.000 | 0.000 | 0.000 |

| Problem 76 | 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 | 214 | 214 | 138 | 211 | 289 | 295 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.64 | 0.99 | 1.35 | 1.38 | 0.00 | 0.00 | -0.00 |
| time (sec) | N/A | 0.132 | 0.235 | 0.051 | 0.372 | 1.951 | 0.000 | 0.000 | 0.000 |

| Problem 77 | 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 | 167 | 167 | 119 | 171 | 227 | 273 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.71 | 1.02 | 1.36 | 1.63 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.109 | 0.170 | 0.051 | 0.380 | 3.015 | 0.000 | 0.000 | 0.000 |

| Problem 78 | 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 | 115 | 115 | 135 | 126 | 148 | 245 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 1.17 | 1.10 | 1.29 | 2.13 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.056 | 0.261 | 0.056 | 0.348 | 1.012 | 0.000 | 0.000 | 0.000 |

| Problem 79 | 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 | 91 | 91 | 89 | 107 | 84 | 222 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.98 | 1.18 | 0.92 | 2.44 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.068 | 0.132 | 0.066 | 0.369 | 0.799 | 0.000 | 0.000 | 0.000 |

| Problem 80 | 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 | 109 | 109 | 68 | 122 | 91 | 105 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.62 | 1.12 | 0.83 | 0.96 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.079 | 0.084 | 0.069 | 0.350 | 0.946 | 0.000 | 0.000 | 0.000 |

| Problem 81 | 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 | 158 | 158 | 93 | 140 | 132 | 127 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.59 | 0.89 | 0.84 | 0.80 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.103 | 0.124 | 0.065 | 0.315 | 0.950 | 0.000 | 0.000 | 0.000 |

| Problem 82 | 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 | 205 | 205 | 109 | 158 | 165 | 146 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.53 | 0.77 | 0.80 | 0.71 | 0.00 | 0.00 | -0.00 |
| time (sec) | N/A | 0.122 | 0.146 | 0.058 | 0.326 | 1.045 | 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 | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 204 | 204 | 114 | 152 | 176 | 165 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.56 | 0.75 | 0.86 | 0.81 | 0.00 | 0.00 | -0.00 |
| time (sec) | N/A | 0.161 | 0.249 | 0.055 | 0.336 | 0.822 | 0.000 | 0.000 | 0.000 |

| Problem 84 | 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 | 159 | 159 | 97 | 134 | 137 | 144 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.61 | 0.84 | 0.86 | 0.91 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.134 | 0.211 | 0.050 | 0.315 | 0.888 | 0.000 | 0.000 | 0.000 |

| Problem 85 | 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 | 146 | 146 | 77 | 115 | 95 | 123 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.53 | 0.79 | 0.65 | 0.84 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.106 | 0.101 | 0.049 | 0.343 | 1.126 | 0.000 | 0.000 | 0.000 |

| Problem 86 | 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 | 115 | 115 | 93 | 0 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.81 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.291 | 0.141 | 0.106 | 0.000 | 0.952 | 0.000 | 0.000 | 0.000 |

| Problem 87 | 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 | 128 | 128 | 138 | 0 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 1.08 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.300 | 0.567 | 0.107 | 0.000 | 2.671 | 0.000 | 0.000 | 0.000 |

| Problem 88 | 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 | 260 | 260 | 182 | 286 | 396 | 388 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.70 | 1.10 | 1.52 | 1.49 | 0.00 | 0.00 | -0.00 |
| time (sec) | N/A | 0.258 | 0.357 | 0.060 | 0.334 | 1.327 | 0.000 | 0.000 | 0.000 |

| Problem 89 | 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 | 197 | 197 | 149 | 217 | 287 | 353 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.76 | 1.10 | 1.46 | 1.79 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.128 | 0.228 | 0.049 | 0.356 | 1.152 | 0.000 | 0.000 | 0.000 |

| Problem 90 | 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 | 170 | 170 | 134 | 189 | 191 | 347 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.79 | 1.11 | 1.12 | 2.04 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.139 | 0.218 | 0.064 | 0.408 | 1.216 | 0.000 | 0.000 | 0.000 |

| Problem 91 | 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 | 164 | 164 | 123 | 190 | 152 | 334 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.75 | 1.16 | 0.93 | 2.04 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.143 | 0.270 | 0.065 | 0.327 | 0.919 | 0.000 | 0.000 | 0.000 |

| Problem 92 | 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 | 189 | 189 | 126 | 191 | 175 | 165 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.67 | 1.01 | 0.93 | 0.87 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.160 | 0.225 | 0.060 | 0.359 | 0.634 | 0.000 | 0.000 | 0.000 |

| Problem 93 | 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 | 249 | 249 | 152 | 223 | 232 | 197 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.61 | 0.90 | 0.93 | 0.79 | 0.00 | 0.00 | -0.00 |
| time (sec) | N/A | 0.197 | 0.262 | 0.062 | 0.450 | 1.008 | 0.000 | 0.000 | 0.000 |

| Problem 94 | 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 | 250 | 250 | 159 | 214 | 244 | 224 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.64 | 0.86 | 0.98 | 0.90 | 0.00 | 0.00 | -0.00 |
| time (sec) | N/A | 0.235 | 0.388 | 0.053 | 0.375 | 1.249 | 0.000 | 0.000 | 0.000 |

| Problem 95 | 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 | 203 | 203 | 123 | 182 | 183 | 189 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.61 | 0.90 | 0.90 | 0.93 | 0.00 | 0.00 | -0.00 |
| time (sec) | N/A | 0.156 | 0.311 | 0.050 | 0.368 | 1.163 | 0.000 | 0.000 | 0.000 |

| Problem 96 | 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 | 178 | 178 | 148 | 0 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.83 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.421 | 0.423 | 0.427 | 0.000 | 0.947 | 0.000 | 0.000 | 0.000 |

| Problem 97 | 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 | 178 | 178 | 187 | 0 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 1.05 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.424 | 0.907 | 0.457 | 0.000 | 0.663 | 0.000 | 0.000 | 0.000 |

| Problem 98 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | C | F | F | F | F | F | F |
| verified | N/A | Yes | NO | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 512 | 512 | 1221 | 0 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 2.38 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -0.00 |
| time (sec) | N/A | 1.198 | 1.666 | 3.395 | 0.000 | 0.614 | 0.000 | 0.000 | 0.000 |

| Problem 99 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | C | F | F | F | F | F | F |
| verified | N/A | NO | NO | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 467 | 449 | 1103 | 0 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 0.96 | 2.36 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -0.00 |
| time (sec) | N/A | 1.106 | 0.351 | 0.462 | 0.000 | 0.945 | 0.000 | 0.000 | 0.000 |

| Problem 100 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | C | F | F | F | F | F | F |
| verified | N/A | Yes | NO | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 477 | 477 | 1055 | 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 | 0.849 | 0.508 | 1.453 | 0.000 | 0.805 | 0.000 | 0.000 | 0.000 |

| Problem 101 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | C | F | F | F | F | F | F |
| verified | N/A | Yes | NO | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 425 | 425 | 387 | 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 | 0.862 | 0.978 | 0.444 | 0.000 | 0.715 | 0.000 | 0.000 | 0.000 |

| Problem 102 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | C | F | F | F | F | F | F |
| verified | N/A | Yes | NO | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 518 | 518 | 1211 | 0 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 2.34 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -0.00 |
| time (sec) | N/A | 1.060 | 1.687 | 2.759 | 0.000 | 1.042 | 0.000 | 0.000 | 0.000 |

| Problem 103 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | C | F | F | F | F(-1) | F | F |
| verified | N/A | NO | NO | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 591 | 571 | 1447 | 0 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 0.97 | 2.45 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -0.00 |
| time (sec) | N/A | 1.282 | 6.365 | 0.444 | 0.000 | 0.565 | 0.000 | 0.000 | 0.000 |

| Problem 104 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | C | F | F | F | F(-1) | F | F |
| verified | N/A | NO | NO | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 553 | 535 | 1410 | 0 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 0.97 | 2.55 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -0.00 |
| time (sec) | N/A | 1.249 | 2.414 | 0.440 | 0.000 | 1.947 | 0.000 | 0.000 | 0.000 |

| Problem 105 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | C | B | F | B | F(-1) | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 139 | 139 | 271 | 360 | 0 | 615 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 1.95 | 2.59 | 0.00 | 4.42 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.150 | 0.792 | 0.074 | 0.000 | 0.943 | 0.000 | 0.000 | 0.000 |

| Problem 106 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | F | F | F | F | F(-1) | F | F |
| verified | N/A | Yes | N/A | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 515 | 515 | 0 | 0 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -0.00 |
| time (sec) | N/A | 1.153 | 44.155 | 0.482 | 0.000 | 1.670 | 0.000 | 0.000 | 0.000 |

| Problem 107 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | C | F | F | F | F(-1) | F | F |
| verified | N/A | Yes | NO | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 756 | 756 | 1583 | 0 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 2.09 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -0.00 |
| time (sec) | N/A | 2.468 | 6.172 | 15.131 | 0.000 | 0.854 | 0.000 | 0.000 | 0.000 |

| Problem 108 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | C | F | F | F | F(-1) | F | F |
| verified | N/A | Yes | NO | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 719 | 719 | 1442 | 0 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 2.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -0.00 |
| time (sec) | N/A | 1.242 | 2.736 | 3.510 | 0.000 | 0.572 | 0.000 | 0.000 | 0.000 |

| Problem 109 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | C | F | F | F | F(-1) | F | F |
| verified | N/A | Yes | NO | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 713 | 713 | 1437 | 0 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 2.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -0.00 |
| time (sec) | N/A | 2.187 | 3.648 | 4.649 | 0.000 | 0.814 | 0.000 | 0.000 | 0.000 |

| Problem 110 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | C | F | F(-2) | F | F(-1) | F | F |
| verified | N/A | Yes | NO | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 758 | 758 | 1487 | 0 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 1.96 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -0.00 |
| time (sec) | N/A | 2.246 | 3.119 | 14.660 | 0.000 | 2.023 | 0.000 | 0.000 | 0.000 |

| Problem 111 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | C | F | F | F | F(-1) | F | F |
| verified | N/A | NO | NO | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 694 | 676 | 2023 | 0 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 0.97 | 2.91 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -0.00 |
| time (sec) | N/A | 1.408 | 7.854 | 0.490 | 0.000 | 2.920 | 0.000 | 0.000 | 0.000 |

| Problem 112 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | C | B | F | B | F(-1) | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 167 | 167 | 375 | 1922 | 0 | 1381 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 2.25 | 11.51 | 0.00 | 8.27 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.215 | 1.476 | 0.094 | 0.000 | 3.046 | 0.000 | 0.000 | 0.000 |

| Problem 113 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | C | B | F | B | F(-1) | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 205 | 205 | 368 | 1892 | 0 | 1256 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 1.80 | 9.23 | 0.00 | 6.13 | 0.00 | 0.00 | -0.00 |
| time (sec) | N/A | 0.205 | 0.957 | 0.079 | 0.000 | 1.430 | 0.000 | 0.000 | 0.000 |

| Problem 114 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | F | F | F | F | F(-1) | F | F |
| verified | N/A | Yes | N/A | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 657 | 657 | 0 | 0 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -0.00 |
| time (sec) | N/A | 1.322 | 70.345 | 0.444 | 0.000 | 0.841 | 0.000 | 0.000 | 0.000 |

| Problem 115 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | C | F | F | F | F(-1) | F | F |
| verified | N/A | Yes | NO | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 1106 | 1106 | 2045 | 0 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 1.85 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -0.00 |
| time (sec) | N/A | 1.741 | 6.214 | 3.803 | 0.000 | 0.956 | 0.000 | 0.000 | 0.000 |

| Problem 116 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | C | F | F | F | F(-1) | F | F |
| verified | N/A | Yes | NO | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 1106 | 1106 | 2053 | 0 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 1.86 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -0.00 |
| time (sec) | N/A | 3.046 | 6.148 | 5.009 | 0.000 | 0.657 | 0.000 | 0.000 | 0.000 |

| Problem 117 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | C | F | F | F | F(-1) | F | F |
| verified | N/A | Yes | NO | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 1096 | 1096 | 2038 | 0 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 1.86 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -0.00 |
| time (sec) | N/A | 3.743 | 6.066 | 3.774 | 0.000 | 0.876 | 0.000 | 0.000 | 0.000 |

| Problem 118 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | C | F | F | A | F(-1) | F | F |
| verified | N/A | Yes | NO | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 413 | 413 | 345 | 0 | 0 | 1951 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.84 | 0.00 | 0.00 | 4.72 | 0.00 | 0.00 | -0.00 |
| time (sec) | N/A | 1.412 | 0.705 | 0.434 | 0.000 | 5.103 | 0.000 | 0.000 | 0.000 |

| Problem 119 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | F | F | A | F | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 302 | 302 | 337 | 0 | 0 | 1625 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 1.12 | 0.00 | 0.00 | 5.38 | 0.00 | 0.00 | -0.00 |
| time (sec) | N/A | 0.434 | 0.752 | 0.440 | 0.000 | 1.798 | 0.000 | 0.000 | 0.000 |

| Problem 120 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | F | F | A | F | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 203 | 203 | 278 | 0 | 0 | 1342 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 1.37 | 0.00 | 0.00 | 6.61 | 0.00 | 0.00 | -0.00 |
| time (sec) | N/A | 0.206 | 0.511 | 0.479 | 0.000 | 1.105 | 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 | A | A | A |
| verified | N/A | N/A | N/A | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 26 | 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 | 0.100 | 5.625 | 0.449 | 0.000 | 0.524 | 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 | 26 | 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 | 0.106 | 5.399 | 0.450 | 0.000 | 0.644 | 0.000 | 0.000 | 0.000 |

| Problem 123 | 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 | 26 | 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 | 0.101 | 9.309 | 0.426 | 0.000 | 0.656 | 0.000 | 0.000 | 0.000 |

| Problem 124 | 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 | 0.037 | 2.656 | 0.422 | 0.000 | 0.426 | 0.000 | 0.000 | 0.000 |

| Problem 125 | 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 | 26 | 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 | 0.090 | 1.779 | 0.455 | 0.000 | 0.531 | 0.000 | 0.000 | 0.000 |

| Problem 126 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | C | F | F | F | F | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 389 | 389 | 237 | 0 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.61 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -0.00 |
| time (sec) | N/A | 0.427 | 0.619 | 0.438 | 0.000 | 0.656 | 0.000 | 0.000 | 0.000 |

| Problem 127 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | C | F | F | F | F | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 527 | 527 | 314 | 0 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.60 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -0.00 |
| time (sec) | N/A | 0.638 | 0.696 | 0.434 | 0.000 | 0.714 | 0.000 | 0.000 | 0.000 |

| Problem 128 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | C | F | F | A | F(-1) | F | F |
| verified | N/A | Yes | NO | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 384 | 384 | 318 | 0 | 0 | 1943 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.83 | 0.00 | 0.00 | 5.06 | 0.00 | 0.00 | -0.00 |
| time (sec) | N/A | 0.514 | 0.769 | 0.479 | 0.000 | 3.407 | 0.000 | 0.000 | 0.000 |

| Problem 129 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | F | F | A | F(-1) | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 270 | 270 | 314 | 0 | 0 | 1625 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 1.16 | 0.00 | 0.00 | 6.02 | 0.00 | 0.00 | -0.00 |
| time (sec) | N/A | 0.281 | 0.798 | 0.431 | 0.000 | 2.007 | 0.000 | 0.000 | 0.000 |

| Problem 130 | 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 | 26 | 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 | 0.117 | 6.559 | 0.433 | 0.000 | 0.653 | 0.000 | 0.000 | 0.000 |

| Problem 131 | 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 | 26 | 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 | 0.123 | 5.860 | 0.420 | 0.000 | 0.727 | 0.000 | 0.000 | 0.000 |

| Problem 132 | 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 | 26 | 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 | 0.120 | 9.669 | 0.613 | 0.000 | 0.704 | 0.000 | 0.000 | 0.000 |

| Problem 133 | 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 | 0.044 | 3.523 | 0.440 | 0.000 | 0.426 | 0.000 | 0.000 | 0.000 |

| Problem 134 | 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 | 26 | 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 | 0.106 | 5.794 | 0.447 | 0.000 | 0.651 | 0.000 | 0.000 | 0.000 |

| Problem 135 | 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 | 26 | 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 | 0.108 | 15.969 | 0.446 | 0.000 | 0.594 | 0.000 | 0.000 | 0.000 |

| Problem 136 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | C | F | F | F | F(-1) | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 492 | 492 | 291 | 0 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.59 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -0.00 |
| time (sec) | N/A | 0.575 | 0.703 | 0.427 | 0.000 | 0.580 | 0.000 | 0.000 | 0.000 |

| Problem 137 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | C | F | F | F | F(-1) | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 643 | 643 | 372 | 0 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.58 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -0.00 |
| time (sec) | N/A | 0.866 | 0.828 | 0.463 | 0.000 | 0.630 | 0.000 | 0.000 | 0.000 |

| Problem 138 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | F | F | A | F | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 329 | 329 | 339 | 0 | 0 | 1633 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 1.03 | 0.00 | 0.00 | 4.96 | 0.00 | 0.00 | -0.00 |
| time (sec) | N/A | 1.179 | 0.789 | 0.449 | 0.000 | 1.824 | 0.000 | 0.000 | 0.000 |

| Problem 139 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | F | F | A | F | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 229 | 229 | 280 | 0 | 0 | 1341 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 1.22 | 0.00 | 0.00 | 5.86 | 0.00 | 0.00 | -0.00 |
| time (sec) | N/A | 0.318 | 0.565 | 0.441 | 0.000 | 1.023 | 0.000 | 0.000 | 0.000 |

| Problem 140 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | F | F | B | F | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 135 | 135 | 223 | 0 | 0 | 1064 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 1.65 | 0.00 | 0.00 | 7.88 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.154 | 0.240 | 0.433 | 0.000 | 0.689 | 0.000 | 0.000 | 0.000 |

| Problem 141 | 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 | 26 | 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 | 0.096 | 1.745 | 0.422 | 0.000 | 0.665 | 0.000 | 0.000 | 0.000 |

| Problem 142 | 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 | 26 | 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 | 0.108 | 23.255 | 0.463 | 0.000 | 0.440 | 0.000 | 0.000 | 0.000 |

| Problem 143 | 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 | 26 | 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 | 0.092 | 6.333 | 0.437 | 0.000 | 0.497 | 0.000 | 0.000 | 0.000 |

| Problem 144 | 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 | 0.031 | 1.046 | 0.433 | 0.000 | 0.657 | 0.000 | 0.000 | 0.000 |

| Problem 145 | 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 | 294 | 294 | 139 | 0 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.47 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -0.00 |
| time (sec) | N/A | 0.251 | 0.207 | 0.506 | 0.000 | 0.613 | 0.000 | 0.000 | 0.000 |

| Problem 146 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | C | F | F | F | F | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 425 | 425 | 239 | 0 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.56 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -0.00 |
| time (sec) | N/A | 0.486 | 0.636 | 0.493 | 0.000 | 0.900 | 0.000 | 0.000 | 0.000 |

| Problem 147 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | F | F | A | F(-1) | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 256 | 256 | 311 | 0 | 0 | 1719 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 1.21 | 0.00 | 0.00 | 6.71 | 0.00 | 0.00 | -0.00 |
| time (sec) | N/A | 1.135 | 0.644 | 0.470 | 0.000 | 1.034 | 0.000 | 0.000 | 0.000 |

| Problem 148 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | F | F | B | F(-1) | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 160 | 160 | 233 | 0 | 0 | 1274 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 1.46 | 0.00 | 0.00 | 7.96 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.275 | 0.375 | 0.437 | 0.000 | 0.840 | 0.000 | 0.000 | 0.000 |

| Problem 149 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | F | F | B | F | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 82 | 82 | 122 | 0 | 0 | 368 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 1.49 | 0.00 | 0.00 | 4.49 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.111 | 0.165 | 0.443 | 0.000 | 0.690 | 0.000 | 0.000 | 0.000 |

| Problem 150 | 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 | 26 | 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 | 0.121 | 32.960 | 0.443 | 0.000 | 0.676 | 0.000 | 0.000 | 0.000 |

| Problem 151 | 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 | 26 | 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 | 0.133 | 38.594 | 0.457 | 0.000 | 0.563 | 0.000 | 0.000 | 0.000 |

| Problem 152 | 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 | 26 | 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 | 0.111 | 8.805 | 0.439 | 0.000 | 0.614 | 0.000 | 0.000 | 0.000 |

| Problem 153 | 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 | 26 | 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 | 0.107 | 5.019 | 0.429 | 0.000 | 0.500 | 0.000 | 0.000 | 0.000 |

| Problem 154 | 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 | 111 | 111 | 113 | 0 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 1.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.075 | 0.197 | 0.459 | 0.000 | 0.993 | 0.000 | 0.000 | 0.000 |

| Problem 155 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | C | F | F | F | F(-1) | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 321 | 321 | 201 | 0 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.63 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -0.00 |
| time (sec) | N/A | 0.320 | 0.457 | 0.448 | 0.000 | 0.612 | 0.000 | 0.000 | 0.000 |

| Problem 156 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | F | F | B | F(-1) | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 251 | 251 | 327 | 0 | 0 | 2421 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 1.30 | 0.00 | 0.00 | 9.65 | 0.00 | 0.00 | -0.00 |
| time (sec) | N/A | 1.229 | 0.562 | 0.440 | 0.000 | 1.106 | 0.000 | 0.000 | 0.000 |

| Problem 157 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | F | F | B | F(-1) | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 169 | 169 | 201 | 0 | 0 | 786 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 1.19 | 0.00 | 0.00 | 4.65 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.268 | 0.298 | 0.452 | 0.000 | 0.938 | 0.000 | 0.000 | 0.000 |

| Problem 158 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | F | F | B | F(-1) | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 144 | 144 | 185 | 0 | 0 | 698 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 1.28 | 0.00 | 0.00 | 4.85 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.144 | 0.234 | 0.430 | 0.000 | 0.658 | 0.000 | 0.000 | 0.000 |

| Problem 159 | 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 | 26 | 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 | 0.124 | 45.844 | 0.502 | 0.000 | 0.694 | 0.000 | 0.000 | 0.000 |

| Problem 160 | 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 | 26 | 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 | 0.152 | 59.836 | 0.509 | 0.000 | 0.761 | 0.000 | 0.000 | 0.000 |

| Problem 161 | 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 | 26 | 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 | 0.132 | 13.403 | 0.477 | 0.000 | 0.789 | 0.000 | 0.000 | 0.000 |

| Problem 162 | 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 | 26 | 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 | 0.110 | 12.602 | 0.442 | 0.000 | 0.615 | 0.000 | 0.000 | 0.000 |

| Problem 163 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | F | F | F | F(-1) | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 359 | 359 | 189 | 0 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.53 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -0.00 |
| time (sec) | N/A | 0.308 | 0.296 | 0.428 | 0.000 | 0.507 | 0.000 | 0.000 | 0.000 |

| Problem 164 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | C | F | F | F | F(-1) | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 278 | 278 | 248 | 0 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.89 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -0.00 |
| time (sec) | N/A | 0.177 | 0.560 | 0.436 | 0.000 | 0.522 | 0.000 | 0.000 | 0.000 |

| Problem 165 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | F | F | F | F | F(-1) | F | F |
| verified | N/A | Yes | N/A | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 596 | 577 | 0 | 0 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 0.97 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -0.00 |
| time (sec) | N/A | 2.575 | 0.228 | 0.425 | 0.000 | 0.776 | 0.000 | 0.000 | 0.000 |

| Problem 166 | 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 | 379 | 360 | 0 | 0 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 0.95 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -0.00 |
| time (sec) | N/A | 0.491 | 0.156 | 0.409 | 0.000 | 0.493 | 0.000 | 0.000 | 0.000 |

| Problem 167 | 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 | 220 | 208 | 0 | 0 | 0 | 0 | 0 | 0 | -1 |
| normalized size | 1 | 0.95 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -0.00 |
| time (sec) | N/A | 0.220 | 0.114 | 0.059 | 0.000 | 0.565 | 0.000 | 0.000 | 0.000 |

| Problem 168 | 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 | 26 | 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 | 0.079 | 1.867 | 0.445 | 0.000 | 0.634 | 0.000 | 0.000 | 0.000 |

| Problem 169 | 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 | 26 | 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 | 0.076 | 6.956 | 0.430 | 0.000 | 0.884 | 0.000 | 0.000 | 0.000 |

| Problem 170 | 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 | 28 | 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 | 0.116 | 1.145 | 0.450 | 0.000 | 0.559 | 0.000 | 0.000 | 0.000 |

| Problem 171 | 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 | 28 | 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 | 0.104 | 0.117 | 0.464 | 0.000 | 0.607 | 0.000 | 0.000 | 0.000 |

| Problem 172 | 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 | 28 | 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 | 0.103 | 1.459 | 0.443 | 0.000 | 0.711 | 0.000 | 0.000 | 0.000 |

| Problem 173 | 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 | 28 | 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 | 0.115 | 1.872 | 0.516 | 0.000 | 0.549 | 0.000 | 0.000 | 0.000 |

| Problem 174 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | F | F | A | F(-1) | F(-2) | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 395 | 395 | 214 | 0 | 0 | 382 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.54 | 0.00 | 0.00 | 0.97 | 0.00 | 0.00 | -0.00 |
| time (sec) | N/A | 2.344 | 0.314 | 0.547 | 0.000 | 0.609 | 0.000 | 0.000 | 0.000 |

| Problem 175 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | F | F | A | F(-1) | F(-2) | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 264 | 264 | 180 | 0 | 0 | 324 | 0 | 0 | -1 |
| normalized size | 1 | 1.00 | 0.68 | 0.00 | 0.00 | 1.23 | 0.00 | 0.00 | -0.00 |
| time (sec) | N/A | 1.916 | 0.418 | 0.477 | 0.000 | 0.590 | 0.000 | 0.000 | 0.000 |

| Problem 176 | Optimal | Rubi | Mathematica | Maple | Maxima | Fricas | Sympy | Giac | Mupad |
|---|---|---|---|---|---|---|---|---|---|
| grade | A | A | A | F | F | B | F | F | F |
| verified | N/A | Yes | Yes | TBD | TBD | TBD | TBD | TBD | TBD |
| size | 130 | 133 | 141 | 0 | 0 | 265 | 0 | 0 | -1 |
| normalized size | 1 | 1.02 | 1.08 | 0.00 | 0.00 | 2.04 | 0.00 | 0.00 | -0.01 |
| time (sec) | N/A | 0.214 | 0.337 | 0.464 | 0.000 | 0.680 | 0.000 | 0.000 | 0.000 |

| Problem 177 | 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 | 29 | 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 | -0.03 |
| time (sec) | N/A | 0.091 | 0.411 | 0.446 | 0.000 | 0.455 | 0.000 | 0.000 | 0.000 |

| Problem 178 | 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 | 29 | 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 | -0.03 |
| time (sec) | N/A | 0.104 | 3.487 | 0.456 | 0.000 | 0.747 | 0.000 | 0.000 | 0.000 |

## 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 [69] had the largest ratio of [.8571]

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 | 7 | 5 | 1.00 | 12 | 0.417 |
| 2 | A | 4 | 3 | 1.00 | 12 | 0.250 |
| 3 | A | 6 | 5 | 1.00 | 12 | 0.417 |
| 4 | A | 3 | 3 | 1.00 | 12 | 0.250 |
| 5 | A | 5 | 5 | 1.00 | 12 | 0.417 |
| 6 | A | 2 | 2 | 1.00 | 10 | 0.200 |
| 7 | A | 5 | 4 | 1.00 | 8 | 0.500 |
| 8 | A | 6 | 6 | 1.00 | 12 | 0.500 |
| 9 | A | 2 | 2 | 1.00 | 12 | 0.167 |
| 10 | A | 4 | 4 | 1.00 | 12 | 0.333 |
| 11 | A | 4 | 3 | 1.00 | 12 | 0.250 |
| 12 | A | 5 | 4 | 1.00 | 12 | 0.333 |
| 13 | A | 4 | 3 | 1.00 | 12 | 0.250 |
| 14 | A | 6 | 4 | 1.00 | 12 | 0.333 |
| 15 | A | 5 | 5 | 1.00 | 14 | 0.357 |

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| # | grade | number of steps used | number of unique rules | normalized antiderivative leaf size | integrand leaf size | $\frac{\text{number of rules}}{\text{integrand leaf size}}$ |
|---|---|---|---|---|---|---|
| 16 | A | 8 | 6 | 1.00 | 14 | 0.429 |
| 17 | A | 4 | 4 | 1.00 | 12 | 0.333 |
| 18 | A | 7 | 5 | 1.00 | 10 | 0.500 |
| 19 | A | 6 | 6 | 1.00 | 14 | 0.429 |
| 20 | A | 4 | 3 | 1.00 | 14 | 0.214 |
| 21 | A | 4 | 3 | 1.00 | 14 | 0.214 |
| 22 | A | 5 | 5 | 1.00 | 14 | 0.357 |
| 23 | A | 5 | 3 | 1.00 | 14 | 0.214 |
| 24 | A | 10 | 10 | 1.00 | 14 | 0.714 |
| 25 | A | 11 | 8 | 1.00 | 14 | 0.571 |
| 26 | A | 7 | 7 | 1.00 | 12 | 0.583 |
| 27 | A | 9 | 6 | 1.00 | 10 | 0.600 |
| 28 | A | 7 | 7 | 1.00 | 14 | 0.500 |
| 29 | A | 5 | 3 | 1.00 | 14 | 0.214 |
| 30 | A | 6 | 6 | 1.00 | 14 | 0.429 |
| 31 | A | 8 | 6 | 1.00 | 14 | 0.429 |
| 32 | A | 10 | 6 | 1.00 | 14 | 0.429 |
| 33 | A | 0 | 0 | 0.00 | 0 | 0.000 |
| 34 | A | 0 | 0 | 0.00 | 0 | 0.000 |
| 35 | A | 0 | 0 | 0.00 | 0 | 0.000 |
| 36 | A | 4 | 4 | 1.00 | 14 | 0.286 |
| 37 | A | 6 | 6 | 1.00 | 14 | 0.429 |
| 38 | A | 9 | 5 | 1.00 | 14 | 0.357 |
| 39 | A | 0 | 0 | 0.00 | 0 | 0.000 |
| 40 | A | 0 | 0 | 0.00 | 0 | 0.000 |
| 41 | A | 3 | 3 | 1.00 | 14 | 0.214 |

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| # | grade | number of steps used | number of unique rules | normalized antiderivative leaf size | integrand leaf size | $\frac{\text{number of rules}}{\text{integrand leaf size}}$ |
|---|---|---|---|---|---|---|
| 42 | A | 0 | 0 | 0.00 | 0 | 0.000 |
| 43 | A | 0 | 0 | 0.00 | 0 | 0.000 |
| 44 | A | 11 | 9 | 1.00 | 16 | 0.562 |
| 45 | A | 10 | 9 | 1.00 | 16 | 0.562 |
| 46 | A | 9 | 9 | 1.00 | 14 | 0.643 |
| 47 | A | 5 | 4 | 1.00 | 8 | 0.500 |
| 48 | A | 4 | 2 | 1.00 | 16 | 0.125 |
| 49 | A | 7 | 7 | 1.00 | 16 | 0.438 |
| 50 | A | 8 | 8 | 1.00 | 16 | 0.500 |
| 51 | A | 31 | 16 | 1.00 | 21 | 0.762 |
| 52 | A | 24 | 15 | 1.00 | 19 | 0.790 |
| 53 | A | 15 | 11 | 1.00 | 18 | 0.611 |
| 54 | A | 0 | 0 | 0.00 | 0 | 0.000 |
| 55 | A | 0 | 0 | 0.00 | 0 | 0.000 |
| 56 | A | 22 | 13 | 1.00 | 18 | 0.722 |
| 57 | A | 27 | 17 | 1.00 | 21 | 0.810 |
| 58 | A | 20 | 15 | 1.00 | 21 | 0.714 |
| 59 | A | 14 | 13 | 1.00 | 19 | 0.684 |
| 60 | A | 9 | 9 | 1.00 | 18 | 0.500 |
| 61 | A | 0 | 0 | 0.00 | 0 | 0.000 |
| 62 | A | 0 | 0 | 0.00 | 0 | 0.000 |
| 63 | A | 23 | 15 | 1.00 | 21 | 0.714 |
| 64 | A | 16 | 13 | 1.00 | 21 | 0.619 |
| 65 | A | 11 | 11 | 1.00 | 19 | 0.579 |
| 66 | A | 6 | 6 | 1.00 | 18 | 0.333 |
| 67 | A | 0 | 0 | 0.00 | 0 | 0.000 |

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| # | grade | number of steps used | number of unique rules | normalized antiderivative leaf size | integrand leaf size | $\frac{\text{number of rules}}{\text{integrand leaf size}}$ |
|---|---|---|---|---|---|---|
| 68 | A | 0 | 0 | 0.00 | 0 | 0.000 |
| 69 | A | 31 | 18 | 1.00 | 21 | 0.857 |
| 70 | A | 25 | 17 | 1.00 | 21 | 0.810 |
| 71 | A | 19 | 14 | 1.00 | 19 | 0.737 |
| 72 | A | 12 | 11 | 1.00 | 18 | 0.611 |
| 73 | A | 0 | 0 | 0.00 | 0 | 0.000 |
| 74 | A | 0 | 0 | 0.00 | 0 | 0.000 |
| 75 | A | 19 | 14 | 1.21 | 18 | 0.778 |
| 76 | A | 7 | 7 | 1.00 | 19 | 0.368 |
| 77 | A | 6 | 7 | 1.00 | 19 | 0.368 |
| 78 | A | 5 | 5 | 1.00 | 16 | 0.312 |
| 79 | A | 4 | 5 | 1.00 | 19 | 0.263 |
| 80 | A | 4 | 5 | 1.00 | 19 | 0.263 |
| 81 | A | 5 | 6 | 1.00 | 19 | 0.316 |
| 82 | A | 6 | 6 | 1.00 | 19 | 0.316 |
| 83 | A | 5 | 5 | 1.00 | 19 | 0.263 |
| 84 | A | 5 | 5 | 1.00 | 19 | 0.263 |
| 85 | A | 6 | 5 | 1.00 | 17 | 0.294 |
| 86 | A | 11 | 11 | 1.00 | 19 | 0.579 |
| 87 | A | 13 | 13 | 1.00 | 19 | 0.684 |
| 88 | A | 7 | 8 | 1.00 | 21 | 0.381 |
| 89 | A | 6 | 7 | 1.00 | 18 | 0.389 |
| 90 | A | 6 | 7 | 1.00 | 21 | 0.333 |
| 91 | A | 6 | 7 | 1.00 | 21 | 0.333 |
| 92 | A | 5 | 6 | 1.00 | 21 | 0.286 |
| 93 | A | 6 | 7 | 1.00 | 21 | 0.333 |

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| # | grade | number of steps used | number of unique rules | normalized antiderivative leaf size | integrand leaf size | number of rules / integrand leaf size |
|---|---|---|---|---|---|---|
| 94 | A | 5 | 6 | 1.00 | 21 | 0.286 |
| 95 | A | 6 | 5 | 1.00 | 19 | 0.263 |
| 96 | A | 12 | 13 | 1.00 | 21 | 0.619 |
| 97 | A | 14 | 15 | 1.00 | 21 | 0.714 |
| 98 | A | 25 | 12 | 1.00 | 21 | 0.571 |
| 99 | A | 26 | 9 | 0.96 | 19 | 0.474 |
| 100 | A | 19 | 7 | 1.00 | 18 | 0.389 |
| 101 | A | 19 | 7 | 1.00 | 21 | 0.333 |
| 102 | A | 24 | 10 | 1.00 | 21 | 0.476 |
| 103 | A | 31 | 14 | 0.97 | 21 | 0.667 |
| 104 | A | 29 | 12 | 0.97 | 21 | 0.571 |
| 105 | A | 7 | 6 | 1.00 | 19 | 0.316 |
| 106 | A | 24 | 10 | 1.00 | 21 | 0.476 |
| 107 | A | 51 | 15 | 1.00 | 21 | 0.714 |
| 108 | A | 27 | 10 | 1.00 | 21 | 0.476 |
| 109 | A | 47 | 11 | 1.00 | 18 | 0.611 |
| 110 | A | 50 | 13 | 1.00 | 21 | 0.619 |
| 111 | A | 33 | 13 | 0.97 | 21 | 0.619 |
| 112 | A | 6 | 7 | 1.00 | 21 | 0.333 |
| 113 | A | 8 | 7 | 1.00 | 19 | 0.368 |
| 114 | A | 28 | 11 | 1.00 | 21 | 0.524 |
| 115 | A | 35 | 11 | 1.00 | 21 | 0.524 |
| 116 | A | 63 | 12 | 1.00 | 21 | 0.571 |
| 117 | A | 81 | 12 | 1.00 | 18 | 0.667 |
| 118 | A | 12 | 12 | 1.00 | 23 | 0.522 |
| 119 | A | 11 | 12 | 1.00 | 23 | 0.522 |

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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 | $\frac{\text{number of rules}}{\text{integrand leaf size}}$ |
|---|---|---|---|---|---|---|
| 120 | A | 9 | 9 | 1.00 | 21 | 0.429 |
| 121 | A | 0 | 0 | 0.00 | 0 | 0.000 |
| 122 | A | 0 | 0 | 0.00 | 0 | 0.000 |
| 123 | A | 0 | 0 | 0.00 | 0 | 0.000 |
| 124 | A | 0 | 0 | 0.00 | 0 | 0.000 |
| 125 | A | 0 | 0 | 0.00 | 0 | 0.000 |
| 126 | A | 8 | 9 | 1.00 | 23 | 0.391 |
| 127 | A | 9 | 10 | 1.00 | 23 | 0.435 |
| 128 | A | 12 | 12 | 1.00 | 23 | 0.522 |
| 129 | A | 10 | 10 | 1.00 | 21 | 0.476 |
| 130 | A | 0 | 0 | 0.00 | 0 | 0.000 |
| 131 | A | 0 | 0 | 0.00 | 0 | 0.000 |
| 132 | A | 0 | 0 | 0.00 | 0 | 0.000 |
| 133 | A | 0 | 0 | 0.00 | 0 | 0.000 |
| 134 | A | 0 | 0 | 0.00 | 0 | 0.000 |
| 135 | A | 0 | 0 | 0.00 | 0 | 0.000 |
| 136 | A | 9 | 10 | 1.00 | 23 | 0.435 |
| 137 | A | 10 | 10 | 1.00 | 23 | 0.435 |
| 138 | A | 11 | 12 | 1.00 | 23 | 0.522 |
| 139 | A | 10 | 12 | 1.00 | 23 | 0.522 |
| 140 | A | 8 | 8 | 1.00 | 21 | 0.381 |
| 141 | A | 0 | 0 | 0.00 | 0 | 0.000 |
| 142 | A | 0 | 0 | 0.00 | 0 | 0.000 |
| 143 | A | 0 | 0 | 0.00 | 0 | 0.000 |
| 144 | A | 0 | 0 | 0.00 | 0 | 0.000 |
| 145 | A | 8 | 9 | 1.00 | 23 | 0.391 |

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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 | $\frac{\text{number of rules}}{\text{integrand leaf size}}$ |
|---|---|---|---|---|---|---|
| 146 | A | 8 | 10 | 1.00 | 23 | 0.435 |
| 147 | A | 10 | 11 | 1.00 | 23 | 0.478 |
| 148 | A | 9 | 11 | 1.00 | 23 | 0.478 |
| 149 | A | 4 | 4 | 1.00 | 21 | 0.190 |
| 150 | A | 0 | 0 | 0.00 | 0 | 0.000 |
| 151 | A | 0 | 0 | 0.00 | 0 | 0.000 |
| 152 | A | 0 | 0 | 0.00 | 0 | 0.000 |
| 153 | A | 0 | 0 | 0.00 | 0 | 0.000 |
| 154 | A | 3 | 4 | 1.00 | 20 | 0.200 |
| 155 | A | 7 | 9 | 1.00 | 23 | 0.391 |
| 156 | A | 10 | 11 | 1.00 | 23 | 0.478 |
| 157 | A | 7 | 8 | 1.00 | 23 | 0.348 |
| 158 | A | 5 | 5 | 1.00 | 21 | 0.238 |
| 159 | A | 0 | 0 | 0.00 | 0 | 0.000 |
| 160 | A | 0 | 0 | 0.00 | 0 | 0.000 |
| 161 | A | 0 | 0 | 0.00 | 0 | 0.000 |
| 162 | A | 0 | 0 | 0.00 | 0 | 0.000 |
| 163 | A | 7 | 8 | 1.00 | 23 | 0.348 |
| 164 | A | 5 | 7 | 1.00 | 20 | 0.350 |
| 165 | A | 6 | 7 | 0.97 | 23 | 0.304 |
| 166 | A | 6 | 7 | 0.95 | 23 | 0.304 |
| 167 | A | 5 | 6 | 0.95 | 21 | 0.286 |
| 168 | A | 0 | 0 | 0.00 | 0 | 0.000 |
| 169 | A | 0 | 0 | 0.00 | 0 | 0.000 |
| 170 | A | 0 | 0 | 0.00 | 0 | 0.000 |
| 171 | A | 0 | 0 | 0.00 | 0 | 0.000 |

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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 | $\frac{\text{number of rules}}{\text{integrand leaf size}}$ |
|---|---|---|---|---|---|---|
| 172 | A | 0 | 0 | 0.00 | 0 | 0.000 |
| 173 | A | 0 | 0 | 0.00 | 0 | 0.000 |
| 174 | A | 16 | 11 | 1.00 | 26 | 0.423 |
| 175 | A | 13 | 11 | 1.00 | 26 | 0.423 |
| 176 | A | 8 | 9 | 1.02 | 26 | 0.346 |
| 177 | A | 0 | 0 | 0.00 | 0 | 0.000 |
| 178 | A | 0 | 0 | 0.00 | 0 | 0.000 |

# Chapter 3

# Listing of integrals

## 3.1 $\int x^6 \left(a + b\text{csch}^{-1}(cx)\right) dx$

**Optimal**. Leaf size=110

$$\frac{1}{7}x^7 \left(a + b\text{csch}^{-1}(cx)\right)+\frac{bx^6\sqrt{\frac{1}{c^2x^2}+1}}{42c}-\frac{5b\tanh^{-1}\left(\sqrt{\frac{1}{c^2x^2}+1}\right)}{112c^7}+\frac{5bx^2\sqrt{\frac{1}{c^2x^2}+1}}{112c^5}-\frac{5bx^4\sqrt{\frac{1}{c^2x^2}+1}}{168c^3}$$

```
[Out] 1/7*x^7*(a+b*arccsch(c*x))-5/112*b*arctanh((1+1/c^2/x^2)^(1/2))/c^7+5/112*b
*x^2*(1+1/c^2/x^2)^(1/2)/c^5-5/168*b*x^4*(1+1/c^2/x^2)^(1/2)/c^3+1/42*b*x^6
*(1+1/c^2/x^2)^(1/2)/c
```

**Rubi** [A] time = 0.06, antiderivative size = 110, normalized size of antiderivative = 1.00, number of steps used = 7, number of rules used = 5, integrand size = 12, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.417, Rules used = {6284, 266, 51, 63, 208}

$$\frac{1}{7}x^7 \left(a + b\text{csch}^{-1}(cx)\right)+\frac{bx^6\sqrt{\frac{1}{c^2x^2}+1}}{42c}-\frac{5bx^4\sqrt{\frac{1}{c^2x^2}+1}}{168c^3}+\frac{5bx^2\sqrt{\frac{1}{c^2x^2}+1}}{112c^5}-\frac{5b\tanh^{-1}\left(\sqrt{\frac{1}{c^2x^2}+1}\right)}{112c^7}$$

Antiderivative was successfully verified.

```
[In] Int[x^6*(a + b*ArcCsch[c*x]),x]
```

```
[Out] (5*b*Sqrt[1 + 1/(c^2*x^2)]*x^2)/(112*c^5) - (5*b*Sqrt[1 + 1/(c^2*x^2)]*x^4)
/(168*c^3) + (b*Sqrt[1 + 1/(c^2*x^2)]*x^6)/(42*c) + (x^7*(a + b*ArcCsch[c*x
]))/7 - (5*b*ArcTanh[Sqrt[1 + 1/(c^2*x^2)]])/(112*c^7)
```

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 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 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 6284

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))*((d_.)*(x_))^(m_.), x_Symbol] :> Si
mp[((d*x)^(m + 1)*(a + b*ArcCsch[c*x]))/(d*(m + 1)), x] + Dist[(b*d)/(c*(m
+ 1)), Int[(d*x)^(m - 1)/Sqrt[1 + 1/(c^2*x^2)], x], x] /; FreeQ[{a, b, c, d
, m}, x] && NeQ[m, -1]
```

Rubi steps

$$\int x^6\left(a+b\text{csch}^{-1}(cx)\right)dx=\frac{1}{7}x^7\left(a+b\text{csch}^{-1}(cx)\right)+\frac{b\int\frac{x^5}{\sqrt{1+\frac{1}{c^2x^2}}}dx}{7c}$$

$$=\frac{1}{7}x^7\left(a+b\text{csch}^{-1}(cx)\right)-\frac{b\,\text{Subst}\left(\int\frac{1}{x^4\sqrt{1+\frac{x}{c^2}}}dx,x,\frac{1}{x^2}\right)}{14c}$$

$$=\frac{b\sqrt{1+\frac{1}{c^2x^2}}\,x^6}{42c}+\frac{1}{7}x^7\left(a+b\text{csch}^{-1}(cx)\right)+\frac{(5b)\,\text{Subst}\left(\int\frac{1}{x^3\sqrt{1+\frac{x}{c^2}}}dx,x,\frac{1}{x^2}\right)}{84c^3}$$

$$=-\frac{5b\sqrt{1+\frac{1}{c^2x^2}}\,x^4}{168c^3}+\frac{b\sqrt{1+\frac{1}{c^2x^2}}\,x^6}{42c}+\frac{1}{7}x^7\left(a+b\text{csch}^{-1}(cx)\right)-\frac{(5b)\,\text{Subst}\left(\int\frac{1}{x^2\sqrt{1+\cdots}}\right.}{112c^5}$$

$$=\frac{5b\sqrt{1+\frac{1}{c^2x^2}}\,x^2}{112c^5}-\frac{5b\sqrt{1+\frac{1}{c^2x^2}}\,x^4}{168c^3}+\frac{b\sqrt{1+\frac{1}{c^2x^2}}\,x^6}{42c}+\frac{1}{7}x^7\left(a+b\text{csch}^{-1}(cx)\right)+\frac{(5b\cdots}{\cdots}$$

$$=\frac{5b\sqrt{1+\frac{1}{c^2x^2}}\,x^2}{112c^5}-\frac{5b\sqrt{1+\frac{1}{c^2x^2}}\,x^4}{168c^3}+\frac{b\sqrt{1+\frac{1}{c^2x^2}}\,x^6}{42c}+\frac{1}{7}x^7\left(a+b\text{csch}^{-1}(cx)\right)+\frac{(5b\cdots}{\cdots}$$

$$=\frac{5b\sqrt{1+\frac{1}{c^2x^2}}\,x^2}{112c^5}-\frac{5b\sqrt{1+\frac{1}{c^2x^2}}\,x^4}{168c^3}+\frac{b\sqrt{1+\frac{1}{c^2x^2}}\,x^6}{42c}+\frac{1}{7}x^7\left(a+b\text{csch}^{-1}(cx)\right)-\frac{5b\cdots}{\cdots}$$

**Mathematica [A]** time = 0.14, size = 107, normalized size = 0.97

$$\frac{ax^7}{7}-\frac{5b\log\left(x\left(\sqrt{\frac{c^2x^2+1}{c^2x^2}}+1\right)\right)}{112c^7}+b\sqrt{\frac{c^2x^2+1}{c^2x^2}}\left(\frac{5x^2}{112c^5}-\frac{5x^4}{168c^3}+\frac{x^6}{42c}\right)+\frac{1}{7}bx^7\text{csch}^{-1}(cx)$$

Antiderivative was successfully verified.

```
[In] Integrate[x^6*(a + b*ArcCsch[c*x]),x]
```

```
[Out] (a*x^7)/7 + b*Sqrt[(1 + c^2*x^2)/(c^2*x^2)]*((5*x^2)/(112*c^5) - (5*x^4)/(1
68*c^3) + x^6/(42*c)) + (b*x^7*ArcCsch[c*x])/7 - (5*b*Log[x*(1 + Sqrt[(1 +
c^2*x^2)/(c^2*x^2)])])/(112*c^7)
```

**fricas [B]** time = 0.80, size = 208, normalized size = 1.89

$$\frac{48\,ac^{7}x^{7}+48\,bc^{7}\log\left(cx\sqrt{\frac{c^{2}x^{2}+1}{c^{2}x^{2}}}-cx+1\right)-48\,bc^{7}\log\left(cx\sqrt{\frac{c^{2}x^{2}+1}{c^{2}x^{2}}}-cx-1\right)+15\,b\log\left(cx\sqrt{\frac{c^{2}x^{2}+1}{c^{2}x^{2}}}-cx\right)+48}{336\,c^{7}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^6*(a+b*arccsch(c*x)),x, algorithm="fricas")
```

```
[Out] 1/336*(48*a*c^7*x^7 + 48*b*c^7*log(c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) - c*x
+ 1) - 48*b*c^7*log(c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) - c*x - 1) + 15*b*log
(c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) - c*x) + 48*(b*c^7*x^7 - b*c^7)*log((c*x
*sqrt((c^2*x^2 + 1)/(c^2*x^2)) + 1)/(c*x)) + (8*b*c^6*x^6 - 10*b*c^4*x^4 +
15*b*c^2*x^2)*sqrt((c^2*x^2 + 1)/(c^2*x^2)))/c^7
```

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

$$\int (b\operatorname{arcsch}(cx)+a)x^{6}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^6*(a+b*arccsch(c*x)),x, algorithm="giac")
```

```
[Out] integrate((b*arccsch(c*x) + a)*x^6, x)
```

**maple [A]** time = 0.08, size = 127, normalized size = 1.15

$$\frac{\frac{c^{7}x^{7}a}{7}+b\left(\frac{c^{7}x^{7}\operatorname{arccsch}(cx)}{7}+\frac{\sqrt{c^{2}x^{2}+1}\,\left(8c^{5}x^{5}\sqrt{c^{2}x^{2}+1}-10c^{3}x^{3}\sqrt{c^{2}x^{2}+1}+15cx\sqrt{c^{2}x^{2}+1}-15\,\operatorname{arcsinh}(cx)\right)}{336\sqrt{\frac{c^{2}x^{2}+1}{c^{2}x^{2}}}\,cx}\right)}{c^{7}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^6*(a+b*arccsch(c*x)),x)
```

```
[Out] 1/c^7*(1/7*c^7*x^7*a+b*(1/7*c^7*x^7*arccsch(c*x)+1/336*(c^2*x^2+1)^(1/2)*(8
*c^5*x^5*(c^2*x^2+1)^(1/2)-10*c^3*x^3*(c^2*x^2+1)^(1/2)+15*c*x*(c^2*x^2+1)^
(1/2)-15*arcsinh(c*x))/((c^2*x^2+1)/c^2/x^2)^(1/2)/c/x))
```

**maxima** [A] time = 0.36, size = 158, normalized size = 1.44

$$\frac{1}{7}ax^7+\frac{1}{672}\left(96\,x^7\operatorname{arcsch}(cx)+\frac{\frac{2\left(15\left(\frac{1}{c^2x^2}+1\right)^{\frac{5}{2}}-40\left(\frac{1}{c^2x^2}+1\right)^{\frac{3}{2}}+33\sqrt{\frac{1}{c^2x^2}+1}\right)}{c^6\left(\frac{1}{c^2x^2}+1\right)^3-3\,c^6\left(\frac{1}{c^2x^2}+1\right)^2+3\,c^6\left(\frac{1}{c^2x^2}+1\right)-c^6}-\frac{15\,\log\left(\sqrt{\frac{1}{c^2x^2}+1}+1\right)}{c^6}+\frac{15\,\log\left(\sqrt{\frac{1}{c^2x^2}+1}-1\right)}{c^6}}{c}\right)b$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^6*(a+b*arccsch(c*x)),x, algorithm="maxima")
```

```
[Out] 1/7*a*x^7 + 1/672*(96*x^7*arccsch(c*x) + (2*(15*(1/(c^2*x^2) + 1)^(5/2) - 4
0*(1/(c^2*x^2) + 1)^(3/2) + 33*sqrt(1/(c^2*x^2) + 1))/(c^6*(1/(c^2*x^2) + 1
)^3 - 3*c^6*(1/(c^2*x^2) + 1)^2 + 3*c^6*(1/(c^2*x^2) + 1) - c^6) - 15*log(s
qrt(1/(c^2*x^2) + 1) + 1)/c^6 + 15*log(sqrt(1/(c^2*x^2) + 1) - 1)/c^6)/c)*b
```

**mupad** [F] time = 0.00, size = -1, normalized size = -0.01

$$\int x^6\left(a+b\,\operatorname{asinh}\left(\frac{1}{c\,x}\right)\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^6*(a + b*asinh(1/(c*x))),x)
```

```
[Out] int(x^6*(a + b*asinh(1/(c*x))), x)
```

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

$$\int x^6\left(a+b\,\operatorname{acsch}(cx)\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**6*(a+b*acsch(c*x)),x)
```

```
[Out] Integral(x**6*(a + b*acsch(c*x)), x)
```

## 3.2 $\int x^5 \left(a + b\,\mathbf{csch}^{-1}(cx)\right) dx$

**Optimal**. Leaf size=86

$$\frac{1}{6}x^6\left(a+b\text{csch}^{-1}(cx)\right)+\frac{bx^5\sqrt{\frac{1}{c^2x^2}+1}}{30c}+\frac{4bx\sqrt{\frac{1}{c^2x^2}+1}}{45c^5}-\frac{2bx^3\sqrt{\frac{1}{c^2x^2}+1}}{45c^3}$$

```
[Out] 1/6*x^6*(a+b*arccsch(c*x))+4/45*b*x*(1+1/c^2/x^2)^(1/2)/c^5-2/45*b*x^3*(1+1
/c^2/x^2)^(1/2)/c^3+1/30*b*x^5*(1+1/c^2/x^2)^(1/2)/c
```

**Rubi [A]** time = 0.04, antiderivative size = 86, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 3, integrand size = 12, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.250, Rules used = {6284, 271, 191}

$$\frac{1}{6}x^6\left(a+b\text{csch}^{-1}(cx)\right)+\frac{bx^5\sqrt{\frac{1}{c^2x^2}+1}}{30c}-\frac{2bx^3\sqrt{\frac{1}{c^2x^2}+1}}{45c^3}+\frac{4bx\sqrt{\frac{1}{c^2x^2}+1}}{45c^5}$$

Antiderivative was successfully verified.

```
[In] Int[x^5*(a + b*ArcCsch[c*x]),x]
```

```
[Out] (4*b*Sqrt[1 + 1/(c^2*x^2)]*x)/(45*c^5) - (2*b*Sqrt[1 + 1/(c^2*x^2)]*x^3)/(4
5*c^3) + (b*Sqrt[1 + 1/(c^2*x^2)]*x^5)/(30*c) + (x^6*(a + b*ArcCsch[c*x]))/
6
```

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 271

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

Rule 6284

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))*((d_.)*(x_))^(m_.), x_Symbol] :> Si
mp[((d*x)^(m + 1)*(a + b*ArcCsch[c*x]))/(d*(m + 1)), x] + Dist[(b*d)/(c*(m
+ 1)), Int[(d*x)^(m - 1)/Sqrt[1 + 1/(c^2*x^2)], x], x] /; FreeQ[{a, b, c, d
, m}, x] && NeQ[m, -1]
```

Rubi steps

$$\int x^5\left(a+b\text{csch}^{-1}(cx)\right)dx=\frac{1}{6}x^6\left(a+b\text{csch}^{-1}(cx)\right)+\frac{b\int\frac{x^4}{\sqrt{1+\frac{1}{c^2x^2}}}\,dx}{6c}$$

$$=\frac{b\sqrt{1+\frac{1}{c^2x^2}}\,x^5}{30c}+\frac{1}{6}x^6\left(a+b\text{csch}^{-1}(cx)\right)-\frac{(2b)\int\frac{x^2}{\sqrt{1+\frac{1}{c^2x^2}}}\,dx}{15c^3}$$

$$=-\frac{2b\sqrt{1+\frac{1}{c^2x^2}}\,x^3}{45c^3}+\frac{b\sqrt{1+\frac{1}{c^2x^2}}\,x^5}{30c}+\frac{1}{6}x^6\left(a+b\text{csch}^{-1}(cx)\right)+\frac{(4b)\int\frac{1}{\sqrt{1+\frac{1}{c^2x^2}}}\,dx}{45c^5}$$

$$=\frac{4b\sqrt{1+\frac{1}{c^2x^2}}\,x}{45c^5}-\frac{2b\sqrt{1+\frac{1}{c^2x^2}}\,x^3}{45c^3}+\frac{b\sqrt{1+\frac{1}{c^2x^2}}\,x^5}{30c}+\frac{1}{6}x^6\left(a+b\text{csch}^{-1}(cx)\right)$$

**Mathematica [A]** time = 0.14, size = 72, normalized size = 0.84

$$\frac{ax^6}{6}+b\sqrt{\frac{c^2x^2+1}{c^2x^2}}\left(\frac{4x}{45c^5}-\frac{2x^3}{45c^3}+\frac{x^5}{30c}\right)+\frac{1}{6}bx^6\text{csch}^{-1}(cx)$$

Antiderivative was successfully verified.

```
[In] Integrate[x^5*(a + b*ArcCsch[c*x]),x]
```

```
[Out] (a*x^6)/6 + b*Sqrt[(1 + c^2*x^2)/(c^2*x^2)]*((4*x)/(45*c^5) - (2*x^3)/(45*c
^3) + x^5/(30*c)) + (b*x^6*ArcCsch[c*x])/6
```

**fricas [A]** time = 2.01, size = 97, normalized size = 1.13

$$\frac{15\,bc^5x^6\log\left(\frac{cx\sqrt{\frac{c^2x^2+1}{c^2x^2}}+1}{cx}\right)+15\,ac^5x^6+\left(3\,bc^4x^5-4\,bc^2x^3+8\,bx\right)\sqrt{\frac{c^2x^2+1}{c^2x^2}}}{90\,c^5}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^5*(a+b*arccsch(c*x)),x, algorithm="fricas")
```

```
[Out] 1/90*(15*b*c^5*x^6*log((c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) + 1)/(c*x)) + 15*
a*c^5*x^6 + (3*b*c^4*x^5 - 4*b*c^2*x^3 + 8*b*x)*sqrt((c^2*x^2 + 1)/(c^2*x^2
)))/c^5
```

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

$$\int (b \operatorname{arcsch}(cx) + a)x^5 \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^5*(a+b*arccsch(c*x)),x, algorithm="giac")
```

```
[Out] integrate((b*arccsch(c*x) + a)*x^5, x)
```

**maple [A]** time = 0.05, size = 83, normalized size = 0.97

$$\frac{\frac{c^6x^6a}{6} + b\left(\frac{c^6x^6 \operatorname{arccsch}(cx)}{6} + \frac{(c^2x^2+1)(3c^4x^4-4c^2x^2+8)}{90\sqrt{\frac{c^2x^2+1}{c^2x^2}}\, cx}\right)}{c^6}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^5*(a+b*arccsch(c*x)),x)
```

```
[Out] 1/c^6*(1/6*c^6*x^6*a+b*(1/6*c^6*x^6*arccsch(c*x)+1/90*(c^2*x^2+1)*(3*c^4*x^
4-4*c^2*x^2+8)/((c^2*x^2+1)/c^2/x^2)^(1/2)/c/x))
```

**maxima [A]** time = 0.31, size = 77, normalized size = 0.90

$$\frac{1}{6}ax^6 + \frac{1}{90}\left(15x^6 \operatorname{arcsch}(cx) + \frac{3c^4x^5\left(\frac{1}{c^2x^2}+1\right)^{\frac{5}{2}} - 10c^2x^3\left(\frac{1}{c^2x^2}+1\right)^{\frac{3}{2}} + 15x\sqrt{\frac{1}{c^2x^2}+1}}{c^5}\right)b$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^5*(a+b*arccsch(c*x)),x, algorithm="maxima")
```

```
[Out] 1/6*a*x^6 + 1/90*(15*x^6*arccsch(c*x) + (3*c^4*x^5*(1/(c^2*x^2) + 1)^(5/2)
- 10*c^2*x^3*(1/(c^2*x^2) + 1)^(3/2) + 15*x*sqrt(1/(c^2*x^2) + 1))/c^5)*b
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.01

$$\int x^5 \left(a + b \operatorname{asinh}\left(\frac{1}{c\,x}\right)\right) dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^5*(a + b*asinh(1/(c*x))),x)
```

```
[Out] int(x^5*(a + b*asinh(1/(c*x))), x)
```

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

$$\int x^5 \left(a + b\,\mathrm{acsch}\left(cx\right)\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**5*(a+b*acsch(c*x)),x)
```

```
[Out] Integral(x**5*(a + b*acsch(c*x)), x)
```

## 3.3 $\int x^4 \left(a + b\,\mathbf{csch}^{-1}(cx)\right) dx$

**Optimal**. Leaf size=86

$$\frac{1}{5}x^5\left(a+b\text{csch}^{-1}(cx)\right)+\frac{bx^4\sqrt{\frac{1}{c^2x^2}+1}}{20c}+\frac{3b\tanh^{-1}\left(\sqrt{\frac{1}{c^2x^2}+1}\right)}{40c^5}-\frac{3bx^2\sqrt{\frac{1}{c^2x^2}+1}}{40c^3}$$

```
[Out] 1/5*x^5*(a+b*arccsch(c*x))+3/40*b*arctanh((1+1/c^2/x^2)^(1/2))/c^5-3/40*b*x
^2*(1+1/c^2/x^2)^(1/2)/c^3+1/20*b*x^4*(1+1/c^2/x^2)^(1/2)/c
```

**Rubi [A]** time = 0.05, antiderivative size = 86, normalized size of antiderivative = 1.00, number of steps used = 6, number of rules used = 5, integrand size = 12, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.417, Rules used = {6284, 266, 51, 63, 208}

$$\frac{1}{5}x^5\left(a+b\text{csch}^{-1}(cx)\right)+\frac{bx^4\sqrt{\frac{1}{c^2x^2}+1}}{20c}-\frac{3bx^2\sqrt{\frac{1}{c^2x^2}+1}}{40c^3}+\frac{3b\tanh^{-1}\left(\sqrt{\frac{1}{c^2x^2}+1}\right)}{40c^5}$$

Antiderivative was successfully verified.

```
[In] Int[x^4*(a + b*ArcCsch[c*x]),x]
```

```
[Out] (-3*b*Sqrt[1 + 1/(c^2*x^2)]*x^2)/(40*c^3) + (b*Sqrt[1 + 1/(c^2*x^2)]*x^4)/(
20*c) + (x^5*(a + b*ArcCsch[c*x]))/5 + (3*b*ArcTanh[Sqrt[1 + 1/(c^2*x^2)]])
/(40*c^5)
```

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 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 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 6284

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))*((d_.)*(x_))^(m_.), x_Symbol] :> Si
mp[((d*x)^(m + 1)*(a + b*ArcCsch[c*x]))/(d*(m + 1)), x] + Dist[(b*d)/(c*(m
+ 1)), Int[(d*x)^(m - 1)/Sqrt[1 + 1/(c^2*x^2)], x], x] /; FreeQ[{a, b, c, d
, m}, x] && NeQ[m, -1]
```

Rubi steps

$$\int x^4\left(a+b\operatorname{csch}^{-1}(cx)\right)dx=\frac{1}{5}x^5\left(a+b\operatorname{csch}^{-1}(cx)\right)+\frac{b\int\frac{x^3}{\sqrt{1+\frac{1}{c^2x^2}}}\,dx}{5c}$$

$$=\frac{1}{5}x^5\left(a+b\operatorname{csch}^{-1}(cx)\right)-\frac{b\,\mathrm{Subst}\left(\int\frac{1}{x^3\sqrt{1+\frac{x}{c^2}}}\,dx,x,\frac{1}{x^2}\right)}{10c}$$

$$=\frac{b\sqrt{1+\frac{1}{c^2x^2}}\,x^4}{20c}+\frac{1}{5}x^5\left(a+b\operatorname{csch}^{-1}(cx)\right)+\frac{(3b)\,\mathrm{Subst}\left(\int\frac{1}{x^2\sqrt{1+\frac{x}{c^2}}}\,dx,x,\frac{1}{x^2}\right)}{40c^3}$$

$$=-\frac{3b\sqrt{1+\frac{1}{c^2x^2}}\,x^2}{40c^3}+\frac{b\sqrt{1+\frac{1}{c^2x^2}}\,x^4}{20c}+\frac{1}{5}x^5\left(a+b\operatorname{csch}^{-1}(cx)\right)-\frac{(3b)\,\mathrm{Subst}\left(\int\frac{1}{x\sqrt{1+\cdots}}\cdots\right.}{80c^5}$$

$$=-\frac{3b\sqrt{1+\frac{1}{c^2x^2}}\,x^2}{40c^3}+\frac{b\sqrt{1+\frac{1}{c^2x^2}}\,x^4}{20c}+\frac{1}{5}x^5\left(a+b\operatorname{csch}^{-1}(cx)\right)-\frac{(3b)\,\mathrm{Subst}\left(\int\frac{1}{-c^2+c^2\cdots}\cdots\right.}{40\cdots}$$

$$=-\frac{3b\sqrt{1+\frac{1}{c^2x^2}}\,x^2}{40c^3}+\frac{b\sqrt{1+\frac{1}{c^2x^2}}\,x^4}{20c}+\frac{1}{5}x^5\left(a+b\operatorname{csch}^{-1}(cx)\right)+\frac{3b\tanh^{-1}\left(\sqrt{1+\frac{1}{c^2\cdots}}\cdots\right.}{40c^5}$$

**Mathematica [A]** time = 0.05, size = 97, normalized size = 1.13

$$\frac{ax^5}{5}+\frac{3b\log\left(x\left(\sqrt{\frac{c^2x^2+1}{c^2x^2}}+1\right)\right)}{40c^5}+b\sqrt{\frac{c^2x^2+1}{c^2x^2}}\left(\frac{x^4}{20c}-\frac{3x^2}{40c^3}\right)+\frac{1}{5}bx^5\text{csch}^{-1}(cx)$$

Antiderivative was successfully verified.

```
[In] Integrate[x^4*(a + b*ArcCsch[c*x]),x]
```

```
[Out] (a*x^5)/5 + b*Sqrt[(1 + c^2*x^2)/(c^2*x^2)]*((-3*x^2)/(40*c^3) + x^4/(20*c)
) + (b*x^5*ArcCsch[c*x])/5 + (3*b*Log[x*(1 + Sqrt[(1 + c^2*x^2)/(c^2*x^2)])
])/(40*c^5)
```

**fricas [B]** time = 0.73, size = 199, normalized size = 2.31

$$\frac{8\,ac^5x^5+8\,bc^5\log\left(cx\sqrt{\frac{c^2x^2+1}{c^2x^2}}-cx+1\right)-8\,bc^5\log\left(cx\sqrt{\frac{c^2x^2+1}{c^2x^2}}-cx-1\right)-3\,b\log\left(cx\sqrt{\frac{c^2x^2+1}{c^2x^2}}-cx\right)+8\left(bc^5x^5\right.}{40\,c^5}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^4*(a+b*arccsch(c*x)),x, algorithm="fricas")
```

```
[Out] 1/40*(8*a*c^5*x^5 + 8*b*c^5*log(c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) - c*x + 1
) - 8*b*c^5*log(c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) - c*x - 1) - 3*b*log(c*x*
sqrt((c^2*x^2 + 1)/(c^2*x^2)) - c*x) + 8*(b*c^5*x^5 - b*c^5)*log((c*x*sqrt(
(c^2*x^2 + 1)/(c^2*x^2)) + 1)/(c*x)) + (2*b*c^4*x^4 - 3*b*c^2*x^2)*sqrt((c^
2*x^2 + 1)/(c^2*x^2)))/c^5
```

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

$$\int (b\,\text{arcsch}\,(cx)+a)x^4\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^4*(a+b*arccsch(c*x)),x, algorithm="giac")
```

```
[Out] integrate((b*arccsch(c*x) + a)*x^4, x)
```

**maple [A]** time = 0.05, size = 108, normalized size = 1.26

$$\frac{\frac{c^5x^5a}{5}+b\left(\frac{c^5x^5\,\text{arccsch}(cx)}{5}+\frac{\sqrt{c^2x^2+1}\left(2c^3x^3\sqrt{c^2x^2+1}-3cx\sqrt{c^2x^2+1}+3\,\text{arcsinh}(cx)\right)}{40\sqrt{\frac{c^2x^2+1}{c^2x^2}}\,cx}\right)}{c^5}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^4*(a+b*arccsch(c*x)),x)
```

```
[Out] 1/c^5*(1/5*c^5*x^5*a+b*(1/5*c^5*x^5*arccsch(c*x)+1/40*(c^2*x^2+1)^(1/2)*(2*
c^3*x^3*(c^2*x^2+1)^(1/2)-3*c*x*(c^2*x^2+1)^(1/2)+3*arcsinh(c*x))/((c^2*x^2
+1)/c^2/x^2)^(1/2)/c/x))
```

**maxima [A]** time = 0.37, size = 128, normalized size = 1.49

$$\frac{1}{5}ax^5 + \frac{1}{80}\left(16x^5\operatorname{arcsch}(cx) - \frac{\frac{2\left(3\left(\frac{1}{c^2x^2}+1\right)^{\frac{3}{2}}-5\sqrt{\frac{1}{c^2x^2}+1}\right)}{c^4\left(\frac{1}{c^2x^2}+1\right)^2-2c^4\left(\frac{1}{c^2x^2}+1\right)+c^4} - \frac{3\log\left(\sqrt{\frac{1}{c^2x^2}+1}+1\right)}{c^4} + \frac{3\log\left(\sqrt{\frac{1}{c^2x^2}+1}-1\right)}{c^4}}{c}\right)b$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^4*(a+b*arccsch(c*x)),x, algorithm="maxima")
```

```
[Out] 1/5*a*x^5 + 1/80*(16*x^5*arccsch(c*x) - (2*(3*(1/(c^2*x^2) + 1)^(3/2) - 5*s
qrt(1/(c^2*x^2) + 1))/(c^4*(1/(c^2*x^2) + 1)^2 - 2*c^4*(1/(c^2*x^2) + 1) +
c^4) - 3*log(sqrt(1/(c^2*x^2) + 1) + 1)/c^4 + 3*log(sqrt(1/(c^2*x^2) + 1) -
 1)/c^4)/c)*b
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.01

$$\int x^4\left(a+b\operatorname{asinh}\left(\frac{1}{c\,x}\right)\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^4*(a + b*asinh(1/(c*x))),x)
```

```
[Out] int(x^4*(a + b*asinh(1/(c*x))), x)
```

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

$$\int x^4\left(a+b\operatorname{acsch}(cx)\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**4*(a+b*acsch(c*x)),x)
```

```
[Out] Integral(x**4*(a + b*acsch(c*x)), x)
```

## 3.4 $\int x^3 \left(a + b\,\mathbf{csch}^{-1}(cx)\right) dx$

**Optimal**. Leaf size=62

$$\frac{1}{4}x^4\left(a + b\text{csch}^{-1}(cx)\right) + \frac{bx^3\sqrt{\frac{1}{c^2x^2}+1}}{12c} - \frac{bx\sqrt{\frac{1}{c^2x^2}+1}}{6c^3}$$

```
[Out] 1/4*x^4*(a+b*arccsch(c*x))-1/6*b*x*(1+1/c^2/x^2)^(1/2)/c^3+1/12*b*x^3*(1+1/
c^2/x^2)^(1/2)/c
```

**Rubi [A]** time = 0.03, antiderivative size = 62, 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 = {6284, 271, 191}

$$\frac{1}{4}x^4\left(a + b\text{csch}^{-1}(cx)\right) + \frac{bx^3\sqrt{\frac{1}{c^2x^2}+1}}{12c} - \frac{bx\sqrt{\frac{1}{c^2x^2}+1}}{6c^3}$$

Antiderivative was successfully verified.

```
[In] Int[x^3*(a + b*ArcCsch[c*x]),x]
```

```
[Out] -(b*Sqrt[1 + 1/(c^2*x^2)]*x)/(6*c^3) + (b*Sqrt[1 + 1/(c^2*x^2)]*x^3)/(12*c)
 + (x^4*(a + b*ArcCsch[c*x]))/4
```

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 271

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

Rule 6284

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))*((d_.)*(x_))^(m_.), x_Symbol] :> Si
mp[((d*x)^(m + 1)*(a + b*ArcCsch[c*x]))/(d*(m + 1)), x] + Dist[(b*d)/(c*(m
+ 1)), Int[(d*x)^(m - 1)/Sqrt[1 + 1/(c^2*x^2)], x], x] /; FreeQ[{a, b, c, d
, m}, x] && NeQ[m, -1]
```

Rubi steps

$$\int x^3 \left(a + b\text{csch}^{-1}(cx)\right) dx = \frac{1}{4}x^4 \left(a + b\text{csch}^{-1}(cx)\right) + \frac{b\int \frac{x^2}{\sqrt{1+\frac{1}{c^2x^2}}} dx}{4c}$$
$$= \frac{b\sqrt{1+\frac{1}{c^2x^2}}\, x^3}{12c} + \frac{1}{4}x^4 \left(a + b\text{csch}^{-1}(cx)\right) - \frac{b\int \frac{1}{\sqrt{1+\frac{1}{c^2x^2}}} dx}{6c^3}$$
$$= -\frac{b\sqrt{1+\frac{1}{c^2x^2}}\, x}{6c^3} + \frac{b\sqrt{1+\frac{1}{c^2x^2}}\, x^3}{12c} + \frac{1}{4}x^4 \left(a + b\text{csch}^{-1}(cx)\right)$$

**Mathematica [A]** time = 0.10, size = 62, normalized size = 1.00

$$\frac{ax^4}{4} + b\sqrt{\frac{c^2x^2+1}{c^2x^2}}\left(\frac{x^3}{12c} - \frac{x}{6c^3}\right) + \frac{1}{4}bx^4\text{csch}^{-1}(cx)$$

Antiderivative was successfully verified.

```
[In] Integrate[x^3*(a + b*ArcCsch[c*x]),x]
```

```
[Out] (a*x^4)/4 + b*Sqrt[(1 + c^2*x^2)/(c^2*x^2)]*(-1/6*x/c^3 + x^3/(12*c)) + (b*
x^4*ArcCsch[c*x])/4
```

**fricas [A]** time = 3.31, size = 87, normalized size = 1.40

$$\frac{3\,bc^3x^4\log\left(\frac{cx\sqrt{\frac{c^2x^2+1}{c^2x^2}}+1}{cx}\right) + 3\,ac^3x^4 + \left(bc^2x^3 - 2\,bx\right)\sqrt{\frac{c^2x^2+1}{c^2x^2}}}{12\,c^3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^3*(a+b*arccsch(c*x)),x, algorithm="fricas")
```

```
[Out] 1/12*(3*b*c^3*x^4*log((c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) + 1)/(c*x)) + 3*a*
c^3*x^4 + (b*c^2*x^3 - 2*b*x)*sqrt((c^2*x^2 + 1)/(c^2*x^2)))/c^3
```

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

$$\int (b\,\text{arcsch}\,(cx) + a)x^3\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^3*(a+b*arccsch(c*x)),x, algorithm="giac")
```

```
[Out] integrate((b*arccsch(c*x) + a)*x^3, x)
```

**maple [A]** time = 0.04, size = 74, normalized size = 1.19

$$\frac{\frac{c^4x^4a}{4}+b\left(\frac{c^4x^4\operatorname{arccsch}(cx)}{4}+\frac{(c^2x^2+1)(c^2x^2-2)}{12\sqrt{\frac{c^2x^2+1}{c^2x^2}}\,cx}\right)}{c^4}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^3*(a+b*arccsch(c*x)),x)
```

```
[Out] 1/c^4*(1/4*c^4*x^4*a+b*(1/4*c^4*x^4*arccsch(c*x)+1/12*(c^2*x^2+1)*(c^2*x^2-
2)/((c^2*x^2+1)/c^2/x^2)^(1/2)/c/x))
```

**maxima [A]** time = 0.32, size = 57, normalized size = 0.92

$$\frac{1}{4}\,ax^4+\frac{1}{12}\left(3\,x^4\operatorname{arcsch}\left(cx\right)+\frac{c^2x^3\left(\frac{1}{c^2x^2}+1\right)^{\frac{3}{2}}-3\,x\sqrt{\frac{1}{c^2x^2}+1}}{c^3}\right)b$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^3*(a+b*arccsch(c*x)),x, algorithm="maxima")
```

```
[Out] 1/4*a*x^4 + 1/12*(3*x^4*arccsch(c*x) + (c^2*x^3*(1/(c^2*x^2) + 1)^(3/2) - 3
*x*sqrt(1/(c^2*x^2) + 1))/c^3)*b
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.02

$$\int x^3\left(a+b\,\operatorname{asinh}\left(\frac{1}{c\,x}\right)\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^3*(a + b*asinh(1/(c*x))),x)
```

```
[Out] int(x^3*(a + b*asinh(1/(c*x))), x)
```

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

$$\int x^3\left(a+b\operatorname{acsch}\left(cx\right)\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**3*(a+b*acsch(c*x)),x)
```

```
[Out] Integral(x**3*(a + b*acsch(c*x)), x)
```

## 3.5 $\int x^2 \left(a+b\,\text{csch}^{-1}(cx)\right)\,dx$

**Optimal**. Leaf size=62

$$\frac{1}{3}x^3\left(a+b\text{csch}^{-1}(cx)\right)+\frac{bx^2\sqrt{\frac{1}{c^2x^2}+1}}{6c}-\frac{b\tanh^{-1}\left(\sqrt{\frac{1}{c^2x^2}+1}\right)}{6c^3}$$

```
[Out] 1/3*x^3*(a+b*arccsch(c*x))-1/6*b*arctanh((1+1/c^2/x^2)^(1/2))/c^3+1/6*b*x^2
*(1+1/c^2/x^2)^(1/2)/c
```

**Rubi** [A] time = 0.04, antiderivative size = 62, 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 = {6284, 266, 51, 63, 208}

$$\frac{1}{3}x^3\left(a+b\text{csch}^{-1}(cx)\right)+\frac{bx^2\sqrt{\frac{1}{c^2x^2}+1}}{6c}-\frac{b\tanh^{-1}\left(\sqrt{\frac{1}{c^2x^2}+1}\right)}{6c^3}$$

Antiderivative was successfully verified.

```
[In] Int[x^2*(a + b*ArcCsch[c*x]),x]
```

```
[Out] (b*Sqrt[1 + 1/(c^2*x^2)]*x^2)/(6*c) + (x^3*(a + b*ArcCsch[c*x]))/3 - (b*Arc
Tanh[Sqrt[1 + 1/(c^2*x^2)]])/(6*c^3)
```

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 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 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 6284

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))*((d_.)*(x_))^(m_.), x_Symbol] :> Si
mp[((d*x)^(m + 1)*(a + b*ArcCsch[c*x]))/(d*(m + 1)), x] + Dist[(b*d)/(c*(m
+ 1)), Int[(d*x)^(m - 1)/Sqrt[1 + 1/(c^2*x^2)], x], x] /; FreeQ[{a, b, c, d
, m}, x] && NeQ[m, -1]
```

Rubi steps

$$\begin{aligned}
\int x^2\left(a+b\operatorname{csch}^{-1}(cx)\right)dx &= \frac{1}{3}x^3\left(a+b\operatorname{csch}^{-1}(cx)\right)+\frac{b\int\frac{x}{\sqrt{1+\frac{1}{c^2x^2}}}\,dx}{3c}\\
&= \frac{1}{3}x^3\left(a+b\operatorname{csch}^{-1}(cx)\right)-\frac{b\,\text{Subst}\left(\int\frac{1}{x^2\sqrt{1+\frac{x}{c^2}}}\,dx,x,\frac{1}{x^2}\right)}{6c}\\
&= \frac{b\sqrt{1+\frac{1}{c^2x^2}}\,x^2}{6c}+\frac{1}{3}x^3\left(a+b\operatorname{csch}^{-1}(cx)\right)+\frac{b\,\text{Subst}\left(\int\frac{1}{x\sqrt{1+\frac{x}{c^2}}}\,dx,x,\frac{1}{x^2}\right)}{12c^3}\\
&= \frac{b\sqrt{1+\frac{1}{c^2x^2}}\,x^2}{6c}+\frac{1}{3}x^3\left(a+b\operatorname{csch}^{-1}(cx)\right)+\frac{b\,\text{Subst}\left(\int\frac{1}{-c^2+c^2x^2}\,dx,x,\sqrt{1+\frac{1}{c^2x^2}}\right)}{6c}\\
&= \frac{b\sqrt{1+\frac{1}{c^2x^2}}\,x^2}{6c}+\frac{1}{3}x^3\left(a+b\operatorname{csch}^{-1}(cx)\right)-\frac{b\tanh^{-1}\left(\sqrt{1+\frac{1}{c^2x^2}}\right)}{6c^3}
\end{aligned}$$

**Mathematica [A]** time = 0.05, size = 85, normalized size = 1.37

$$\frac{ax^3}{3}+\frac{bx^2\sqrt{\frac{c^2x^2+1}{c^2x^2}}}{6c}-\frac{b\log\left(x\left(\sqrt{\frac{c^2x^2+1}{c^2x^2}}+1\right)\right)}{6c^3}+\frac{1}{3}bx^3\operatorname{csch}^{-1}(cx)$$

Antiderivative was successfully verified.

```
[In] Integrate[x^2*(a + b*ArcCsch[c*x]),x]
```

```
[Out] (a*x^3)/3 + (b*x^2*Sqrt[(1 + c^2*x^2)/(c^2*x^2)])/(6*c) + (b*x^3*ArcCsch[c*
x])/3 - (b*Log[x*(1 + Sqrt[(1 + c^2*x^2)/(c^2*x^2)])])/(6*c^3)
```

**fricas [B]** time = 1.58, size = 186, normalized size = 3.00

$$\frac{2\,ac^3x^3 + bc^2x^2\sqrt{\frac{c^2x^2+1}{c^2x^2}} + 2\,bc^3\log\left(cx\sqrt{\frac{c^2x^2+1}{c^2x^2}} - cx + 1\right) - 2\,bc^3\log\left(cx\sqrt{\frac{c^2x^2+1}{c^2x^2}} - cx - 1\right) + b\log\left(cx\sqrt{\frac{c^2x^2+1}{c^2x^2}} - \right.}{6\,c^3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*(a+b*arccsch(c*x)),x, algorithm="fricas")
```

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

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

$$\int (b\,\mathrm{arcsch}\,(cx) + a)x^2\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*(a+b*arccsch(c*x)),x, algorithm="giac")
```

```
[Out] integrate((b*arccsch(c*x) + a)*x^2, x)
```

**maple [A]** time = 0.05, size = 88, normalized size = 1.42

$$\frac{\frac{a\,c^3x^3}{3} + b\left(\frac{c^3x^3\mathrm{arccsch}(cx)}{3} + \frac{\sqrt{c^2x^2+1}\,\left(cx\sqrt{c^2x^2+1} - \mathrm{arcsinh}(cx)\right)}{6\sqrt{\frac{c^2x^2+1}{c^2x^2}}\,cx}\right)}{c^3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^2*(a+b*arccsch(c*x)),x)
```

```
[Out] 1/c^3*(1/3*a*c^3*x^3+b*(1/3*c^3*x^3*arccsch(c*x)+1/6*(c^2*x^2+1)^(1/2)*(c*x
*(c^2*x^2+1)^(1/2)-arcsinh(c*x))/((c^2*x^2+1)/c^2/x^2)^(1/2)/c/x))
```

**maxima** [A] time = 0.34, size = 96, normalized size = 1.55

$$\frac{1}{3}ax^3 + \frac{1}{12}\left(4x^3 \operatorname{arcsch}(cx) + \frac{\frac{2\sqrt{\frac{1}{c^2x^2}+1}}{c^2\left(\frac{1}{c^2x^2}+1\right)-c^2} - \frac{\log\left(\sqrt{\frac{1}{c^2x^2}+1}+1\right)}{c^2} + \frac{\log\left(\sqrt{\frac{1}{c^2x^2}+1}-1\right)}{c^2}}{c}\right)b$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*(a+b*arccsch(c*x)),x, algorithm="maxima")
```

```
[Out] 1/3*a*x^3 + 1/12*(4*x^3*arccsch(c*x) + (2*sqrt(1/(c^2*x^2) + 1)/(c^2*(1/(c^
2*x^2) + 1) - c^2) - log(sqrt(1/(c^2*x^2) + 1) + 1)/c^2 + log(sqrt(1/(c^2*x
^2) + 1) - 1)/c^2)/c)*b
```

**mupad** [F] time = 0.00, size = -1, normalized size = -0.02

$$\int x^2 \left(a + b \operatorname{asinh}\left(\frac{1}{c\,x}\right)\right) dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^2*(a + b*asinh(1/(c*x))),x)
```

```
[Out] int(x^2*(a + b*asinh(1/(c*x))), x)
```

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

$$\int x^2 (a + b \operatorname{acsch}(cx))\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**2*(a+b*acsch(c*x)),x)
```

```
[Out] Integral(x**2*(a + b*acsch(c*x)), x)
```

## 3.6 $\int x\left(a+b\,\mathbf{csch}^{-1}(cx)\right)\,dx$

**Optimal**. Leaf size=38

$$\frac{1}{2}x^2\left(a+b\text{csch}^{-1}(cx)\right)+\frac{bx\sqrt{\frac{1}{c^2x^2}+1}}{2c}$$

```
[Out] 1/2*x^2*(a+b*arccsch(c*x))+1/2*b*x*(1+1/c^2/x^2)^(1/2)/c
```

**Rubi [A]** time = 0.01, 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 = {6284, 191}

$$\frac{1}{2}x^2\left(a+b\text{csch}^{-1}(cx)\right)+\frac{bx\sqrt{\frac{1}{c^2x^2}+1}}{2c}$$

Antiderivative was successfully verified.

```
[In] Int[x*(a + b*ArcCsch[c*x]),x]
```

```
[Out] (b*Sqrt[1 + 1/(c^2*x^2)]*x)/(2*c) + (x^2*(a + b*ArcCsch[c*x]))/2
```

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 6284

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))*((d_.)*(x_))^(m_.), x_Symbol] :> Si
mp[((d*x)^(m + 1)*(a + b*ArcCsch[c*x]))/(d*(m + 1)), x] + Dist[(b*d)/(c*(m
+ 1)), Int[(d*x)^(m - 1)/Sqrt[1 + 1/(c^2*x^2)], x], x] /; FreeQ[{a, b, c, d
, m}, x] && NeQ[m, -1]
```

Rubi steps

$$\begin{aligned}\int x\left(a+b\text{csch}^{-1}(cx)\right)\,dx&=\frac{1}{2}x^2\left(a+b\text{csch}^{-1}(cx)\right)+\frac{b\int\frac{1}{\sqrt{1+\frac{1}{c^2x^2}}}\,dx}{2c}\\&=\frac{b\sqrt{1+\frac{1}{c^2x^2}}\,x}{2c}+\frac{1}{2}x^2\left(a+b\text{csch}^{-1}(cx)\right)\end{aligned}$$

**Mathematica** [A] time = 0.02, size = 50, normalized size = 1.32

$$\frac{ax^2}{2}+\frac{bx\sqrt{\frac{c^2x^2+1}{c^2x^2}}}{2c}+\frac{1}{2}bx^2\operatorname{csch}^{-1}(cx)$$

Antiderivative was successfully verified.

```
[In] Integrate[x*(a + b*ArcCsch[c*x]),x]
```

```
[Out] (a*x^2)/2 + (b*x*Sqrt[(1 + c^2*x^2)/(c^2*x^2)])/(2*c) + (b*x^2*ArcCsch[c*x]
)/2
```

**fricas** [B] time = 0.74, size = 70, normalized size = 1.84

$$\frac{bcx^2\log\left(\frac{cx\sqrt{\frac{c^2x^2+1}{c^2x^2}}+1}{cx}\right)+acx^2+bx\sqrt{\frac{c^2x^2+1}{c^2x^2}}}{2\,c}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*(a+b*arccsch(c*x)),x, algorithm="fricas")
```

```
[Out] 1/2*(b*c*x^2*log((c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) + 1)/(c*x)) + a*c*x^2 +
 b*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)))/c
```

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

$$\int (b\operatorname{arcsch}(cx)+a)x\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*(a+b*arccsch(c*x)),x, algorithm="giac")
```

```
[Out] integrate((b*arccsch(c*x) + a)*x, x)
```

**maple** [A] time = 0.04, size = 65, normalized size = 1.71

$$\frac{\frac{c^2x^2a}{2}+b\left(\frac{c^2x^2\operatorname{arccsch}(cx)}{2}+\frac{c^2x^2+1}{2\sqrt{\frac{c^2x^2+1}{c^2x^2}}\,cx}\right)}{c^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x*(a+b*arccsch(c*x)),x)
```

```
[Out] 1/c^2*(1/2*c^2*x^2*a+b*(1/2*c^2*x^2*arccsch(c*x)+1/2/((c^2*x^2+1)/c^2/x^2)^
(1/2)/c/x*(c^2*x^2+1)))
```

**maxima [A]** time = 0.38, size = 35, normalized size = 0.92

$$\frac{1}{2}ax^2 + \frac{1}{2}\left(x^2 \operatorname{arcsch}(cx) + \frac{x\sqrt{\frac{1}{c^2x^2}+1}}{c}\right)b$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*(a+b*arccsch(c*x)),x, algorithm="maxima")
```

```
[Out] 1/2*a*x^2 + 1/2*(x^2*arccsch(c*x) + x*sqrt(1/(c^2*x^2) + 1)/c)*b
```

**mupad [B]** time = 2.22, size = 39, normalized size = 1.03

$$\frac{a\,x^2}{2} + \frac{b\,x^2\,\operatorname{asinh}\left(\frac{1}{c\,x}\right)}{2} + \frac{b\,x\,\sqrt{\frac{1}{c^2\,x^2}+1}}{2\,c}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x*(a + b*asinh(1/(c*x))),x)
```

```
[Out] (a*x^2)/2 + (b*x^2*asinh(1/(c*x)))/2 + (b*x*(1/(c^2*x^2) + 1)^(1/2))/(2*c)
```

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

$$\int x\left(a + b\operatorname{acsch}(cx)\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*(a+b*acsch(c*x)),x)
```

```
[Out] Integral(x*(a + b*acsch(c*x)), x)
```

## 3.7 $\int \left(a + b\,\mathbf{csch}^{-1}(cx)\right)\,dx$

**Optimal**. Leaf size=30

$$ax + \frac{b\tanh^{-1}\left(\sqrt{\frac{1}{c^2x^2}+1}\right)}{c} + bx\text{csch}^{-1}(cx)$$

```
[Out] a*x+b*x*arccsch(c*x)+b*arctanh((1+1/c^2/x^2)^(1/2))/c
```

**Rubi** [A] time = 0.02, antiderivative size = 30, 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 = {6278, 266, 63, 208}

$$ax + \frac{b\tanh^{-1}\left(\sqrt{\frac{1}{c^2x^2}+1}\right)}{c} + bx\text{csch}^{-1}(cx)$$

Antiderivative was successfully verified.

```
[In] Int[a + b*ArcCsch[c*x],x]
```

```
[Out] a*x + b*x*ArcCsch[c*x] + (b*ArcTanh[Sqrt[1 + 1/(c^2*x^2)]])/c
```

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 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 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 6278

```
Int[ArcCsch[(c_.)*(x_)], x_Symbol] :> Simp[x*ArcCsch[c*x], x] + Dist[1/c, I
nt[1/(x*Sqrt[1 + 1/(c^2*x^2)]), x], x] /; FreeQ[c, x]
```

Rubi steps

$$\begin{aligned}
\int \left(a + b\operatorname{csch}^{-1}(cx)\right) dx &= ax + b\int \operatorname{csch}^{-1}(cx)\,dx \\
&= ax + bx\operatorname{csch}^{-1}(cx) + \frac{b\int \frac{1}{\sqrt{1+\frac{1}{c^2x^2}}\,x}\,dx}{c} \\
&= ax + bx\operatorname{csch}^{-1}(cx) - \frac{b\,\text{Subst}\left(\int \frac{1}{x\sqrt{1+\frac{x}{c^2}}}\,dx, x, \frac{1}{x^2}\right)}{2c} \\
&= ax + bx\operatorname{csch}^{-1}(cx) - (bc)\,\text{Subst}\left(\int \frac{1}{-c^2 + c^2x^2}\,dx, x, \sqrt{1 + \frac{1}{c^2x^2}}\right) \\
&= ax + bx\operatorname{csch}^{-1}(cx) + \frac{b\tanh^{-1}\left(\sqrt{1 + \frac{1}{c^2x^2}}\right)}{c}
\end{aligned}$$

**Mathematica [A]** time = 0.06, size = 44, normalized size = 1.47

$$ax + \frac{bx\sqrt{\frac{1}{c^2x^2} + 1}\,\sinh^{-1}(cx)}{\sqrt{c^2x^2 + 1}} + bx\operatorname{csch}^{-1}(cx)$$

Antiderivative was successfully verified.

```
[In] Integrate[a + b*ArcCsch[c*x],x]
```

```
[Out] a*x + b*x*ArcCsch[c*x] + (b*Sqrt[1 + 1/(c^2*x^2)]*x*ArcSinh[c*x])/Sqrt[1 +
c^2*x^2]
```

**fricas [B]** time = 0.73, size = 143, normalized size = 4.77

$$\frac{acx + bc\log\left(cx\sqrt{\frac{c^2x^2+1}{c^2x^2}} - cx + 1\right) - bc\log\left(cx\sqrt{\frac{c^2x^2+1}{c^2x^2}} - cx - 1\right) - b\log\left(cx\sqrt{\frac{c^2x^2+1}{c^2x^2}} - cx\right) + (bcx - bc)\log\left(\frac{cx\sqrt{\vphantom{x}}\cdots}{\cdots}\right.}{c}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(a+b*arccsch(c*x),x, algorithm="fricas")
```

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

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

$$\int b \operatorname{arcsch}(cx) + a\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(a+b*arccsch(c*x),x, algorithm="giac")
```

```
[Out] integrate(b*arccsch(c*x) + a, x)
```

**maple [A]** time = 0.04, size = 36, normalized size = 1.20

$$ax + bx \operatorname{arccsch}(cx) + \frac{b \ln\left(cx + cx\sqrt{1 + \frac{1}{c^2x^2}}\right)}{c}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(a+b*arccsch(c*x),x)
```

```
[Out] a*x+b*x*arccsch(c*x)+b/c*ln(c*x+c*x*(1+1/c^2/x^2)^(1/2))
```

**maxima [A]** time = 0.33, size = 49, normalized size = 1.63

$$ax + \frac{\left(2\,cx \operatorname{arcsch}(cx) + \log\left(\sqrt{\frac{1}{c^2x^2} + 1} + 1\right) - \log\left(\sqrt{\frac{1}{c^2x^2} + 1} - 1\right)\right)b}{2\,c}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(a+b*arccsch(c*x),x, algorithm="maxima")
```

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

**mupad [F]** time = 0.00, size = -1, normalized size = -0.03

$$\int a + b \operatorname{asinh}\left(\frac{1}{c\,x}\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(a + b*asinh(1/(c*x)),x)
```

```
[Out] int(a + b*asinh(1/(c*x)), x)
```

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

$$\int (a + b\,\mathrm{acsch}\,(cx))\ dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(a+b*acsch(c*x),x)
```

```
[Out] Integral(a + b*acsch(c*x), x)
```

## 3.8 $\int \frac{a+b\mathbf{csch}^{-1}(cx)}{x}\,dx$

**Optimal**. Leaf size=56

$$-\frac{\left(a+b\operatorname{csch}^{-1}(cx)\right)^2}{2b}-\log\left(1-e^{-2\operatorname{csch}^{-1}(cx)}\right)\left(a+b\operatorname{csch}^{-1}(cx)\right)+\frac{1}{2}b\operatorname{Li}_2\left(e^{-2\operatorname{csch}^{-1}(cx)}\right)$$

```
[Out] -1/2*(a+b*arccsch(c*x))^2/b-(a+b*arccsch(c*x))*ln(1-1/(1/c/x+(1+1/c^2/x^2)^
(1/2))^2)+1/2*b*polylog(2,1/(1/c/x+(1+1/c^2/x^2)^(1/2))^2)
```

**Rubi [A]** time = 0.09, antiderivative size = 56, 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 = {6282, 5659, 3716, 2190, 2279, 2391}

$$-\frac{1}{2}b\text{PolyLog}\left(2,e^{2\operatorname{csch}^{-1}(cx)}\right)+\frac{\left(a+b\operatorname{csch}^{-1}(cx)\right)^2}{2b}-\log\left(1-e^{2\operatorname{csch}^{-1}(cx)}\right)\left(a+b\operatorname{csch}^{-1}(cx)\right)$$

Warning: Unable to verify antiderivative.

```
[In] Int[(a + b*ArcCsch[c*x])/x,x]
```

```
[Out] (a + b*ArcCsch[c*x])^2/(2*b) - (a + b*ArcCsch[c*x])*Log[1 - E^(2*ArcCsch[c*
x])] - (b*PolyLog[2, E^(2*ArcCsch[c*x])])/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 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 3716

```
Int[((c_.) + (d_.)*(x_))^(m_.)*tan[(e_.) + Pi*(k_.) + (Complex[0, fz_])*(f_
.)*(x_)], x_Symbol] :> -Simp[(I*(c + d*x)^(m + 1))/(d*(m + 1)), x] + Dist[2
*I, Int[((c + d*x)^m*E^(2*(-(I*e) + f*fz*x)))/(E^(2*I*k*Pi)*(1 + E^(2*(-(I*
e) + f*fz*x))/E^(2*I*k*Pi))), x], x] /; FreeQ[{c, d, e, f, fz}, x] && Integ
erQ[4*k] && IGtQ[m, 0]
```

Rule 5659

```
Int[((a_.) + ArcSinh[(c_.)*(x_)]*(b_.))^(n_.)/(x_), x_Symbol] :> Subst[Int[
(a + b*x)^n/Tanh[x], x], x, ArcSinh[c*x]] /; FreeQ[{a, b, c}, x] && IGtQ[n,
 0]
```

Rule 6282

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))/(x_), x_Symbol] :> -Subst[Int[(a +
b*ArcSinh[x/c])/x, x], x, 1/x] /; FreeQ[{a, b, c}, x]
```

Rubi steps

$$\begin{aligned}
\int \frac{a+b\text{csch}^{-1}(cx)}{x}\,dx &= -\text{Subst}\left(\int \frac{a+b\sinh^{-1}\left(\frac{x}{c}\right)}{x}\,dx, x, \frac{1}{x}\right)\\
&= -\text{Subst}\left(\int (a+bx)\coth(x)\,dx, x, \text{csch}^{-1}(cx)\right)\\
&= \frac{\left(a+b\text{csch}^{-1}(cx)\right)^2}{2b} + 2\,\text{Subst}\left(\int \frac{e^{2x}(a+bx)}{1-e^{2x}}\,dx, x, \text{csch}^{-1}(cx)\right)\\
&= \frac{\left(a+b\text{csch}^{-1}(cx)\right)^2}{2b} - \left(a+b\text{csch}^{-1}(cx)\right)\log\left(1-e^{2\text{csch}^{-1}(cx)}\right) + b\,\text{Subst}\left(\int \log\left(1-e^{2x}\right)\right.\\
&= \frac{\left(a+b\text{csch}^{-1}(cx)\right)^2}{2b} - \left(a+b\text{csch}^{-1}(cx)\right)\log\left(1-e^{2\text{csch}^{-1}(cx)}\right) + \frac{1}{2}b\,\text{Subst}\left(\int \frac{\log(1-x)}{x}\right.\\
&= \frac{\left(a+b\text{csch}^{-1}(cx)\right)^2}{2b} - \left(a+b\text{csch}^{-1}(cx)\right)\log\left(1-e^{2\text{csch}^{-1}(cx)}\right) - \frac{1}{2}b\text{Li}_2\left(e^{2\text{csch}^{-1}(cx)}\right)
\end{aligned}$$

**Mathematica [A]** time = 0.04, size = 47, normalized size = 0.84

$$a\log(x) + \frac{1}{2}b\left(\text{Li}_2\left(e^{-2\text{csch}^{-1}(cx)}\right) - \text{csch}^{-1}(cx)\left(\text{csch}^{-1}(cx) + 2\log\left(1-e^{-2\text{csch}^{-1}(cx)}\right)\right)\right)$$

Warning: Unable to verify antiderivative.

```
[In] Integrate[(a + b*ArcCsch[c*x])/x,x]
```

```
[Out] a*Log[x] + (b*(-(ArcCsch[c*x]*(ArcCsch[c*x] + 2*Log[1 - E^(-2*ArcCsch[c*x])
])) + PolyLog[2, E^(-2*ArcCsch[c*x])]))/2
```

**fricas [F]** time = 2.07, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{b\,\text{arcsch}\,(cx)+a}{x},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))/x,x, algorithm="fricas")
```

```
[Out] integral((b*arccsch(c*x) + a)/x, x)
```

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

$$\int \frac{b\,\text{arcsch}\,(cx)+a}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))/x,x, algorithm="giac")
```

```
[Out] integrate((b*arccsch(c*x) + a)/x, x)
```

**maple [F]** time = 0.07, size = 0, normalized size = 0.00

$$\int \frac{a+b\,\text{arccsch}\,(cx)}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a+b*arccsch(c*x))/x,x)
```

```
[Out] int((a+b*arccsch(c*x))/x,x)
```

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

$$-\frac{1}{2}\left(4\,c^2\int\frac{x^2\log(x)}{c^2x^3+x}\,dx-2\,c^2\int\frac{x\log(x)}{c^2x^2+\left(c^2x^2+1\right)^{\frac{3}{2}}+1}\,dx-\left(\log\left(c^2x^2+1\right)-2\,\log(x)\right)\log(c)+\log\left(c^2x^2+1\right.\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))/x,x, algorithm="maxima")
```

```
[Out] -1/2*(4*c^2*integrate(x^2*log(x)/(c^2*x^3 + x), x) - 2*c^2*integrate(x*log(
x)/(c^2*x^2 + (c^2*x^2 + 1)^(3/2) + 1), x) - (log(c^2*x^2 + 1) - 2*log(x))*
log(c) + log(c^2*x^2 + 1)*log(c) - 2*log(x)*log(sqrt(c^2*x^2 + 1) + 1) + 2*
integrate(log(x)/(c^2*x^3 + x), x))*b + a*log(x)
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.02

$$\int \frac{a+b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a + b*asinh(1/(c*x)))/x,x)
```

```
[Out] int((a + b*asinh(1/(c*x)))/x, x)
```

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

$$\int \frac{a+b\,\mathrm{acsch}\,(cx)}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*acsch(c*x))/x,x)
```

```
[Out] Integral((a + b*acsch(c*x))/x, x)
```

## 3.9 $\int \frac{a+b\text{csch}^{-1}(cx)}{x^2}\,dx$

**Optimal**. Leaf size=30

$$bc\sqrt{\frac{1}{c^2x^2}+1}-\frac{a+b\text{csch}^{-1}(cx)}{x}$$

```
[Out] (-a-b*arccsch(c*x))/x+b*c*(1+1/c^2/x^2)^(1/2)
```

**Rubi [A]** time = 0.02, antiderivative size = 30, 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 = {6284, 261}

$$bc\sqrt{\frac{1}{c^2x^2}+1}-\frac{a+b\text{csch}^{-1}(cx)}{x}$$

Antiderivative was successfully verified.

```
[In] Int[(a + b*ArcCsch[c*x])/x^2,x]
```

```
[Out] b*c*Sqrt[1 + 1/(c^2*x^2)] - (a + b*ArcCsch[c*x])/x
```

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 6284

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))*((d_.)*(x_))^(m_.), x_Symbol] :> Si
mp[((d*x)^(m + 1)*(a + b*ArcCsch[c*x]))/(d*(m + 1)), x] + Dist[(b*d)/(c*(m
+ 1)), Int[(d*x)^(m - 1)/Sqrt[1 + 1/(c^2*x^2)], x], x] /; FreeQ[{a, b, c, d
, m}, x] && NeQ[m, -1]
```

Rubi steps

$$\begin{aligned}\int \frac{a+b\text{csch}^{-1}(cx)}{x^2}\,dx &= -\frac{a+b\text{csch}^{-1}(cx)}{x}-\frac{b\int \frac{1}{\sqrt{1+\frac{1}{c^2x^2}}\,x^3}\,dx}{c}\\ &= bc\sqrt{1+\frac{1}{c^2x^2}}-\frac{a+b\text{csch}^{-1}(cx)}{x}\end{aligned}$$

**Mathematica** [A] time = 0.03, size = 40, normalized size = 1.33

$$-\frac{a}{x}+bc\sqrt{\frac{c^2x^2+1}{c^2x^2}}-\frac{b\operatorname{csch}^{-1}(cx)}{x}$$

Antiderivative was successfully verified.

```
[In] Integrate[(a + b*ArcCsch[c*x])/x^2,x]
```

```
[Out] -(a/x) + b*c*Sqrt[(1 + c^2*x^2)/(c^2*x^2)] - (b*ArcCsch[c*x])/x
```

**fricas** [B] time = 0.78, size = 64, normalized size = 2.13

$$\frac{bcx\sqrt{\frac{c^2x^2+1}{c^2x^2}}-b\log\left(\frac{cx\sqrt{\frac{c^2x^2+1}{c^2x^2}}+1}{cx}\right)-a}{x}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))/x^2,x, algorithm="fricas")
```

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

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

$$\int\frac{b\operatorname{arcsch}(cx)+a}{x^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))/x^2,x, algorithm="giac")
```

```
[Out] integrate((b*arccsch(c*x) + a)/x^2, x)
```

**maple** [B] time = 0.05, size = 62, normalized size = 2.07

$$c\left(-\frac{a}{cx}+b\left(-\frac{\operatorname{arccsch}(cx)}{cx}+\frac{c^2x^2+1}{\sqrt{\frac{c^2x^2+1}{c^2x^2}}\,c^2x^2}\right)\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a+b*arccsch(c*x))/x^2,x)
```

```
[Out] c*(-a/c/x+b*(-1/c/x*arccsch(c*x)+1/((c^2*x^2+1)/c^2/x^2)^(1/2)/c^2/x^2*(c^2
*x^2+1)))
```

**maxima** [A] time = 0.35, size = 32, normalized size = 1.07

$$\left(c\sqrt{\frac{1}{c^2x^2}+1}-\frac{\operatorname{arcsch}(cx)}{x}\right)b-\frac{a}{x}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))/x^2,x, algorithm="maxima")
```

```
[Out] (c*sqrt(1/(c^2*x^2) + 1) - arccsch(c*x)/x)*b - a/x
```

**mupad** [B] time = 2.32, size = 35, normalized size = 1.17

$$b\,c\,\sqrt{\frac{1}{c^2\,x^2}+1}-\frac{a}{x}-\frac{b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)}{x}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a + b*asinh(1/(c*x)))/x^2,x)
```

```
[Out] b*c*(1/(c^2*x^2) + 1)^(1/2) - a/x - (b*asinh(1/(c*x)))/x
```

**sympy** [A] time = 1.82, size = 36, normalized size = 1.20

$$\begin{cases} -\frac{a}{x}+bc\sqrt{1+\frac{1}{c^2x^2}}-\frac{b\operatorname{acsch}(cx)}{x} & \text{for } c\neq 0 \\ -\frac{a+\tilde{\infty}b}{x} & \text{otherwise} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*acsch(c*x))/x**2,x)
```

```
[Out] Piecewise((-a/x + b*c*sqrt(1 + 1/(c**2*x**2)) - b*acsch(c*x)/x, Ne(c, 0)),
(-(a + zoo*b)/x, True))
```

# 3.10 $\int \frac{a+b\textbf{csch}^{-1}(cx)}{x^3} dx$

**Optimal**. Leaf size=50

$$-\frac{a+b\operatorname{csch}^{-1}(cx)}{2x^2}+\frac{bc\sqrt{\frac{1}{c^2x^2}+1}}{4x}-\frac{1}{4}bc^2\operatorname{csch}^{-1}(cx)$$

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

**Rubi** [A] time = 0.04, antiderivative size = 50, 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 = {6284, 335, 321, 215}

$$-\frac{a+b\operatorname{csch}^{-1}(cx)}{2x^2}+\frac{bc\sqrt{\frac{1}{c^2x^2}+1}}{4x}-\frac{1}{4}bc^2\operatorname{csch}^{-1}(cx)$$

Antiderivative was successfully verified.

```
[In] Int[(a + b*ArcCsch[c*x])/x^3,x]
```

```
[Out] (b*c*Sqrt[1 + 1/(c^2*x^2)])/(4*x) - (b*c^2*ArcCsch[c*x])/4 - (a + b*ArcCsch
[c*x])/(2*x^2)
```

Rule 215

```
Int[1/Sqrt[(a_) + (b_.)*(x_)^2], x_Symbol] :> Simp[ArcSinh[(Rt[b, 2]*x)/Sqr
t[a]]/Rt[b, 2], x] /; FreeQ[{a, b}, x] && GtQ[a, 0] && PosQ[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 335

```
Int[(x_)^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> -Subst[Int[(a +
b/x^n)^p/x^(m + 2), x], x, 1/x] /; FreeQ[{a, b, p}, x] && ILtQ[n, 0] && Int
egerQ[m]
```

Rule 6284

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))*((d_.)*(x_))^(m_.), x_Symbol] :> Si
mp[((d*x)^(m + 1)*(a + b*ArcCsch[c*x]))/(d*(m + 1)), x] + Dist[(b*d)/(c*(m
+ 1)), Int[(d*x)^(m - 1)/Sqrt[1 + 1/(c^2*x^2)], x], x] /; FreeQ[{a, b, c, d
, m}, x] && NeQ[m, -1]
```

Rubi steps

$$\begin{aligned}
\int \frac{a+b\operatorname{csch}^{-1}(cx)}{x^3}\,dx &= -\frac{a+b\operatorname{csch}^{-1}(cx)}{2x^2}-\frac{b\int \frac{1}{\sqrt{1+\frac{1}{c^2x^2}}\,x^4}\,dx}{2c}\\
&= -\frac{a+b\operatorname{csch}^{-1}(cx)}{2x^2}+\frac{b\,\text{Subst}\left(\int \frac{x^2}{\sqrt{1+\frac{x^2}{c^2}}}\,dx,x,\frac{1}{x}\right)}{2c}\\
&= \frac{bc\sqrt{1+\frac{1}{c^2x^2}}}{4x}-\frac{a+b\operatorname{csch}^{-1}(cx)}{2x^2}-\frac{1}{4}(bc)\,\text{Subst}\left(\int \frac{1}{\sqrt{1+\frac{x^2}{c^2}}}\,dx,x,\frac{1}{x}\right)\\
&= \frac{bc\sqrt{1+\frac{1}{c^2x^2}}}{4x}-\frac{1}{4}bc^2\operatorname{csch}^{-1}(cx)-\frac{a+b\operatorname{csch}^{-1}(cx)}{2x^2}
\end{aligned}$$

**Mathematica [A]** time = 0.04, size = 66, normalized size = 1.32

$$-\frac{a}{2x^2}+\frac{bc\sqrt{\frac{c^2x^2+1}{c^2x^2}}}{4x}-\frac{1}{4}bc^2\sinh^{-1}\left(\frac{1}{cx}\right)-\frac{b\operatorname{csch}^{-1}(cx)}{2x^2}$$

Antiderivative was successfully verified.

```
[In] Integrate[(a + b*ArcCsch[c*x])/x^3,x]
```

```
[Out] -1/2*a/x^2 + (b*c*Sqrt[(1 + c^2*x^2)/(c^2*x^2)])/(4*x) - (b*ArcCsch[c*x])/(
2*x^2) - (b*c^2*ArcSinh[1/(c*x)])/4
```

**fricas [A]** time = 0.98, size = 76, normalized size = 1.52

$$\frac{bcx\sqrt{\frac{c^2x^2+1}{c^2x^2}}-\left(bc^2x^2+2\,b\right)\log\left(\frac{cx\sqrt{\frac{c^2x^2+1}{c^2x^2}}+1}{cx}\right)-2\,a}{4\,x^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))/x^3,x, algorithm="fricas")
```

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

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

$$\int \frac{b\,\mathrm{arcsch}\,(cx) + a}{x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))/x^3,x, algorithm="giac")
```

```
[Out] integrate((b*arccsch(c*x) + a)/x^3, x)
```

**maple [B]** time = 0.05, size = 100, normalized size = 2.00

$$c^2\left(-\frac{a}{2c^2x^2}+b\left(-\frac{\mathrm{arccsch}\,(cx)}{2c^2x^2}-\frac{\sqrt{c^2x^2+1}\,\left(\mathrm{arctanh}\left(\frac{1}{\sqrt{c^2x^2+1}}\right)c^2x^2-\sqrt{c^2x^2+1}\right)}{4\sqrt{\frac{c^2x^2+1}{c^2x^2}}\,c^3x^3}\right)\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a+b*arccsch(c*x))/x^3,x)
```

```
[Out] c^2*(-1/2*a/c^2/x^2+b*(-1/2/c^2/x^2*arccsch(c*x)-1/4*(c^2*x^2+1)^(1/2)*(arc
tanh(1/(c^2*x^2+1)^(1/2))*c^2*x^2-(c^2*x^2+1)^(1/2))/((c^2*x^2+1)/c^2/x^2)^
(1/2)/c^3/x^3))
```

**maxima [B]** time = 0.39, size = 105, normalized size = 2.10

$$\frac{1}{8}\,b\left(\frac{\frac{2\,c^4x\sqrt{\frac{1}{c^2x^2}+1}}{c^2x^2\left(\frac{1}{c^2x^2}+1\right)-1}-c^3\log\left(cx\sqrt{\frac{1}{c^2x^2}+1}+1\right)+c^3\log\left(cx\sqrt{\frac{1}{c^2x^2}+1}-1\right)}{c}-\frac{4\,\mathrm{arcsch}\,(cx)}{x^2}\right)-\frac{a}{2\,x^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))/x^3,x, algorithm="maxima")
```

```
[Out] 1/8*b*((2*c^4*x*sqrt(1/(c^2*x^2) + 1)/(c^2*x^2*(1/(c^2*x^2) + 1) - 1) - c^3
*log(c*x*sqrt(1/(c^2*x^2) + 1) + 1) + c^3*log(c*x*sqrt(1/(c^2*x^2) + 1) - 1
))/c - 4*arccsch(c*x)/x^2) - 1/2*a/x^2
```

**mupad [B]** time = 2.27, size = 51, normalized size = 1.02

$$\frac{b\,c\,\sqrt{\frac{1}{c^2\,x^2}+1}}{4\,x}-\frac{b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)\,\left(\frac{c^2\,x}{4}+\frac{1}{2\,x}\right)}{x}-\frac{a}{2\,x^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a + b*asinh(1/(c*x)))/x^3,x)
```

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

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

$$\int \frac{a+b\,\mathrm{acsch}\,(cx)}{x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*acsch(c*x))/x**3,x)
```

```
[Out] Integral((a + b*acsch(c*x))/x**3, x)
```

## 3.11 $\int \frac{a+b\mathbf{csch}^{-1}(cx)}{x^4}\,dx$

**Optimal**. Leaf size=58

$$-\frac{a+b\text{csch}^{-1}(cx)}{3x^3}+\frac{1}{9}bc^3\left(\frac{1}{c^2x^2}+1\right)^{3/2}-\frac{1}{3}bc^3\sqrt{\frac{1}{c^2x^2}+1}$$

```
[Out] 1/9*b*c^3*(1+1/c^2/x^2)^(3/2)+1/3*(-a-b*arccsch(c*x))/x^3-1/3*b*c^3*(1+1/c^
2/x^2)^(1/2)
```

**Rubi [A]** time = 0.04, antiderivative size = 58, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 3, integrand size = 12, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.250, Rules used = {6284, 266, 43}

$$-\frac{a+b\text{csch}^{-1}(cx)}{3x^3}+\frac{1}{9}bc^3\left(\frac{1}{c^2x^2}+1\right)^{3/2}-\frac{1}{3}bc^3\sqrt{\frac{1}{c^2x^2}+1}$$

Antiderivative was successfully verified.

```
[In] Int[(a + b*ArcCsch[c*x])/x^4,x]
```

```
[Out] -(b*c^3*Sqrt[1 + 1/(c^2*x^2)])/3 + (b*c^3*(1 + 1/(c^2*x^2))^(3/2))/9 - (a +
 b*ArcCsch[c*x])/(3*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 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 6284

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))*((d_.)*(x_))^(m_.), x_Symbol] :> Si
mp[((d*x)^(m + 1)*(a + b*ArcCsch[c*x]))/(d*(m + 1)), x] + Dist[(b*d)/(c*(m
+ 1)), Int[(d*x)^(m - 1)/Sqrt[1 + 1/(c^2*x^2)], x], x] /; FreeQ[{a, b, c, d
, m}, x] && NeQ[m, -1]
```

Rubi steps

$$\int \frac{a+b\operatorname{csch}^{-1}(cx)}{x^4}\,dx = -\frac{a+b\operatorname{csch}^{-1}(cx)}{3x^3} - \frac{b\int \frac{1}{\sqrt{1+\frac{1}{c^2x^2}}\,x^5}\,dx}{3c}$$
$$= -\frac{a+b\operatorname{csch}^{-1}(cx)}{3x^3} + \frac{b\,\text{Subst}\left(\int \frac{x}{\sqrt{1+\frac{x}{c^2}}}\,dx, x, \frac{1}{x^2}\right)}{6c}$$
$$= -\frac{a+b\operatorname{csch}^{-1}(cx)}{3x^3} + \frac{b\,\text{Subst}\left(\int \left(-\frac{c^2}{\sqrt{1+\frac{x}{c^2}}} + c^2\sqrt{1+\frac{x}{c^2}}\right)dx, x, \frac{1}{x^2}\right)}{6c}$$
$$= -\frac{1}{3}bc^3\sqrt{1+\frac{1}{c^2x^2}} + \frac{1}{9}bc^3\left(1+\frac{1}{c^2x^2}\right)^{3/2} - \frac{a+b\operatorname{csch}^{-1}(cx)}{3x^3}$$

**Mathematica [A]** time = 0.05, size = 59, normalized size = 1.02

$$-\frac{a}{3x^3} + b\left(\frac{c}{9x^2} - \frac{2c^3}{9}\right)\sqrt{\frac{c^2x^2+1}{c^2x^2}} - \frac{b\operatorname{csch}^{-1}(cx)}{3x^3}$$

Antiderivative was successfully verified.

```
[In] Integrate[(a + b*ArcCsch[c*x])/x^4,x]
```

```
[Out] -1/3*a/x^3 + b*((-2*c^3)/9 + c/(9*x^2))*Sqrt[(1 + c^2*x^2)/(c^2*x^2)] - (b*
ArcCsch[c*x])/(3*x^3)
```

**fricas [A]** time = 1.00, size = 77, normalized size = 1.33

$$-\frac{3\,b\log\left(\frac{cx\sqrt{\frac{c^2x^2+1}{c^2x^2}}+1}{cx}\right) + \left(2\,bc^3x^3 - bcx\right)\sqrt{\frac{c^2x^2+1}{c^2x^2}} + 3\,a}{9\,x^3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))/x^4,x, algorithm="fricas")
```

```
[Out] -1/9*(3*b*log((c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) + 1)/(c*x)) + (2*b*c^3*x^3
 - b*c*x)*sqrt((c^2*x^2 + 1)/(c^2*x^2)) + 3*a)/x^3
```

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

$$\int \frac{b \operatorname{arcsch}(cx) + a}{x^4}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))/x^4,x, algorithm="giac")
```

```
[Out] integrate((b*arccsch(c*x) + a)/x^4, x)
```

**maple [A]** time = 0.05, size = 75, normalized size = 1.29

$$c^3\left(-\frac{a}{3c^3x^3} + b\left(-\frac{\operatorname{arccsch}(cx)}{3c^3x^3} - \frac{\left(c^2x^2+1\right)\left(2c^2x^2-1\right)}{9\sqrt{\frac{c^2x^2+1}{c^2x^2}}\; c^4x^4}\right)\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a+b*arccsch(c*x))/x^4,x)
```

```
[Out] c^3*(-1/3/c^3/x^3*a+b*(-1/3/c^3/x^3*arccsch(c*x)-1/9*(c^2*x^2+1)*(2*c^2*x^2
-1)/((c^2*x^2+1)/c^2/x^2)^(1/2)/c^4/x^4))
```

**maxima [A]** time = 0.37, size = 56, normalized size = 0.97

$$\frac{1}{9}b\left(\frac{c^4\left(\frac{1}{c^2x^2}+1\right)^{\frac{3}{2}} - 3\,c^4\sqrt{\frac{1}{c^2x^2}+1}}{c} - \frac{3\operatorname{arcsch}(cx)}{x^3}\right) - \frac{a}{3\,x^3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))/x^4,x, algorithm="maxima")
```

```
[Out] 1/9*b*((c^4*(1/(c^2*x^2) + 1)^(3/2) - 3*c^4*sqrt(1/(c^2*x^2) + 1))/c - 3*ar
ccsch(c*x)/x^3) - 1/3*a/x^3
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.02

$$\int \frac{a + b \operatorname{asinh}\left(\frac{1}{c\,x}\right)}{x^4}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a + b*asinh(1/(c*x)))/x^4,x)
```

```
[Out] int((a + b*asinh(1/(c*x)))/x^4, x)
```

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

$$\int \frac{a + b\operatorname{acsch}(cx)}{x^4}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*acsch(c*x))/x**4,x)
```

```
[Out] Integral((a + b*acsch(c*x))/x**4, x)
```

## 3.12 $\int \frac{a+b\mathbf{csch}^{-1}(cx)}{x^5}\,dx$

**Optimal**. Leaf size=74

$$-\frac{a+b\text{csch}^{-1}(cx)}{4x^4}+\frac{3}{32}bc^4\text{csch}^{-1}(cx)+\frac{bc\sqrt{\frac{1}{c^2x^2}+1}}{16x^3}-\frac{3bc^3\sqrt{\frac{1}{c^2x^2}+1}}{32x}$$

```
[Out] 3/32*b*c^4*arccsch(c*x)+1/4*(-a-b*arccsch(c*x))/x^4+1/16*b*c*(1+1/c^2/x^2)^
(1/2)/x^3-3/32*b*c^3*(1+1/c^2/x^2)^(1/2)/x
```

**Rubi** [A] time = 0.05, antiderivative size = 74, 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 = {6284, 335, 321, 215}

$$-\frac{a+b\text{csch}^{-1}(cx)}{4x^4}-\frac{3bc^3\sqrt{\frac{1}{c^2x^2}+1}}{32x}+\frac{bc\sqrt{\frac{1}{c^2x^2}+1}}{16x^3}+\frac{3}{32}bc^4\text{csch}^{-1}(cx)$$

Antiderivative was successfully verified.

```
[In] Int[(a + b*ArcCsch[c*x])/x^5,x]
```

```
[Out] (b*c*Sqrt[1 + 1/(c^2*x^2)])/(16*x^3) - (3*b*c^3*Sqrt[1 + 1/(c^2*x^2)])/(32*
x) + (3*b*c^4*ArcCsch[c*x])/32 - (a + b*ArcCsch[c*x])/(4*x^4)
```

Rule 215

```
Int[1/Sqrt[(a_) + (b_.)*(x_)^2], x_Symbol] :> Simp[ArcSinh[(Rt[b, 2]*x)/Sqr
t[a]]/Rt[b, 2], x] /; FreeQ[{a, b}, x] && GtQ[a, 0] && PosQ[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 335

```
Int[(x_)^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> -Subst[Int[(a +
b/x^n)^p/x^(m + 2), x], x, 1/x] /; FreeQ[{a, b, p}, x] && ILtQ[n, 0] && Int
egerQ[m]
```

Rule 6284

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))*((d_.)*(x_))^(m_.), x_Symbol] :> Si
mp[((d*x)^(m + 1)*(a + b*ArcCsch[c*x]))/(d*(m + 1)), x] + Dist[(b*d)/(c*(m
+ 1)), Int[(d*x)^(m - 1)/Sqrt[1 + 1/(c^2*x^2)], x], x] /; FreeQ[{a, b, c, d
, m}, x] && NeQ[m, -1]
```

Rubi steps

$$\begin{aligned}
\int \frac{a+b\text{csch}^{-1}(cx)}{x^5}\,dx &= -\frac{a+b\text{csch}^{-1}(cx)}{4x^4}-\frac{b\int \frac{1}{\sqrt{1+\frac{1}{c^2x^2}}\,x^6}\,dx}{4c}\\
&= -\frac{a+b\text{csch}^{-1}(cx)}{4x^4}+\frac{b\,\text{Subst}\left(\int \frac{x^4}{\sqrt{1+\frac{x^2}{c^2}}}\,dx,x,\frac{1}{x}\right)}{4c}\\
&= \frac{bc\sqrt{1+\frac{1}{c^2x^2}}}{16x^3}-\frac{a+b\text{csch}^{-1}(cx)}{4x^4}-\frac{1}{16}(3bc)\,\text{Subst}\left(\int \frac{x^2}{\sqrt{1+\frac{x^2}{c^2}}}\,dx,x,\frac{1}{x}\right)\\
&= \frac{bc\sqrt{1+\frac{1}{c^2x^2}}}{16x^3}-\frac{3bc^3\sqrt{1+\frac{1}{c^2x^2}}}{32x}-\frac{a+b\text{csch}^{-1}(cx)}{4x^4}+\frac{1}{32}\left(3bc^3\right)\text{Subst}\left(\int \frac{1}{\sqrt{1+\frac{x^2}{c^2}}}\,dx,\right.\\
&= \frac{bc\sqrt{1+\frac{1}{c^2x^2}}}{16x^3}-\frac{3bc^3\sqrt{1+\frac{1}{c^2x^2}}}{32x}+\frac{3}{32}bc^4\text{csch}^{-1}(cx)-\frac{a+b\text{csch}^{-1}(cx)}{4x^4}
\end{aligned}$$

**Mathematica [A]** time = 0.04, size = 78, normalized size = 1.05

$$-\frac{a}{4x^4}+\frac{3}{32}bc^4\sinh^{-1}\left(\frac{1}{cx}\right)+b\left(\frac{c}{16x^3}-\frac{3c^3}{32x}\right)\sqrt{\frac{c^2x^2+1}{c^2x^2}}-\frac{b\text{csch}^{-1}(cx)}{4x^4}$$

Antiderivative was successfully verified.

```
[In] Integrate[(a + b*ArcCsch[c*x])/x^5,x]
```

```
[Out] -1/4*a/x^4 + b*(c/(16*x^3) - (3*c^3)/(32*x))*Sqrt[(1 + c^2*x^2)/(c^2*x^2)]
- (b*ArcCsch[c*x])/(4*x^4) + (3*b*c^4*ArcSinh[1/(c*x)])/32
```

**fricas [A]** time = 1.02, size = 89, normalized size = 1.20

$$\frac{\left(3\,bc^4x^4-8\,b\right)\log\left(\frac{cx\sqrt{\frac{c^2x^2+1}{c^2x^2}}+1}{cx}\right)-\left(3\,bc^3x^3-2\,bcx\right)\sqrt{\frac{c^2x^2+1}{c^2x^2}}-8\,a}{32\,x^4}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))/x^5,x, algorithm="fricas")
```

```
[Out] 1/32*((3*b*c^4*x^4 - 8*b)*log((c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) + 1)/(c*x)
) - (3*b*c^3*x^3 - 2*b*c*x)*sqrt((c^2*x^2 + 1)/(c^2*x^2)) - 8*a)/x^4
```

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

$$\int \frac{b \operatorname{arcsch}(cx) + a}{x^5} \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))/x^5,x, algorithm="giac")
```

```
[Out] integrate((b*arccsch(c*x) + a)/x^5, x)
```

**maple [A]** time = 0.05, size = 120, normalized size = 1.62

$$c^4 \left( -\frac{a}{4c^4x^4} + b \left( -\frac{\operatorname{arccsch}(cx)}{4c^4x^4} + \frac{\sqrt{c^2x^2+1}\, \left( 3 \operatorname{arctanh}\left( \frac{1}{\sqrt{c^2x^2+1}} \right) c^4x^4 - 3c^2x^2\sqrt{c^2x^2+1} + 2\sqrt{c^2x^2+1} \right)}{32\sqrt{\frac{c^2x^2+1}{c^2x^2}}\, c^5x^5} \right) \right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a+b*arccsch(c*x))/x^5,x)
```

```
[Out] c^4*(-1/4*a/c^4/x^4+b*(-1/4/c^4/x^4*arccsch(c*x)+1/32*(c^2*x^2+1)^(1/2)*(3*
arctanh(1/(c^2*x^2+1)^(1/2))*c^4*x^4-3*c^2*x^2*(c^2*x^2+1)^(1/2)+2*(c^2*x^2
+1)^(1/2))/((c^2*x^2+1)/c^2/x^2)^(1/2)/c^5/x^5))
```

**maxima [B]** time = 0.33, size = 147, normalized size = 1.99

$$\frac{1}{64} b \left( \frac{3\,c^5 \log\left(cx\sqrt{\frac{1}{c^2x^2}+1}+1\right) - 3\,c^5 \log\left(cx\sqrt{\frac{1}{c^2x^2}+1}-1\right) - \frac{2\left(3\,c^8x^3\left(\frac{1}{c^2x^2}+1\right)^{\frac{3}{2}} - 5\,c^6x\sqrt{\frac{1}{c^2x^2}+1}\right)}{c^4x^4\left(\frac{1}{c^2x^2}+1\right)^2 - 2\,c^2x^2\left(\frac{1}{c^2x^2}+1\right)+1}}{c} - \frac{16 \operatorname{arcsch}(cx)}{x^4} \right) -$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))/x^5,x, algorithm="maxima")
```

```
[Out] 1/64*b*((3*c^5*log(c*x*sqrt(1/(c^2*x^2) + 1) + 1) - 3*c^5*log(c*x*sqrt(1/(c
^2*x^2) + 1) - 1) - 2*(3*c^8*x^3*(1/(c^2*x^2) + 1)^(3/2) - 5*c^6*x*sqrt(1/(
c^2*x^2) + 1))/(c^4*x^4*(1/(c^2*x^2) + 1)^2 - 2*c^2*x^2*(1/(c^2*x^2) + 1) +
 1))/c - 16*arccsch(c*x)/x^4) - 1/4*a/x^4
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.01

$$\int \frac{a+b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)}{x^5}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a + b*asinh(1/(c*x)))/x^5,x)
```

```
[Out] int((a + b*asinh(1/(c*x)))/x^5, x)
```

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

$$\int \frac{a+b\,\mathrm{acsch}\,(cx)}{x^5}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*acsch(c*x))/x**5,x)
```

```
[Out] Integral((a + b*acsch(c*x))/x**5, x)
```

## 3.13 $\int \frac{a+b\,\text{csch}^{-1}(cx)}{x^6}\,dx$

**Optimal**. Leaf size=79

$$-\frac{a+b\text{csch}^{-1}(cx)}{5x^5}+\frac{1}{25}bc^5\left(\frac{1}{c^2x^2}+1\right)^{5/2}-\frac{2}{15}bc^5\left(\frac{1}{c^2x^2}+1\right)^{3/2}+\frac{1}{5}bc^5\sqrt{\frac{1}{c^2x^2}+1}$$

```
[Out] -2/15*b*c^5*(1+1/c^2/x^2)^(3/2)+1/25*b*c^5*(1+1/c^2/x^2)^(5/2)+1/5*(-a-b*ar
ccsch(c*x))/x^5+1/5*b*c^5*(1+1/c^2/x^2)^(1/2)
```

**Rubi** [A] time = 0.05, antiderivative size = 79, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 3, integrand size = 12, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.250, Rules used = {6284, 266, 43}

$$-\frac{a+b\text{csch}^{-1}(cx)}{5x^5}+\frac{1}{25}bc^5\left(\frac{1}{c^2x^2}+1\right)^{5/2}-\frac{2}{15}bc^5\left(\frac{1}{c^2x^2}+1\right)^{3/2}+\frac{1}{5}bc^5\sqrt{\frac{1}{c^2x^2}+1}$$

Antiderivative was successfully verified.

```
[In] Int[(a + b*ArcCsch[c*x])/x^6,x]
```

```
[Out] (b*c^5*Sqrt[1 + 1/(c^2*x^2)])/5 - (2*b*c^5*(1 + 1/(c^2*x^2))^(3/2))/15 + (b
*c^5*(1 + 1/(c^2*x^2))^(5/2))/25 - (a + b*ArcCsch[c*x])/(5*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 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 6284

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))*((d_.)*(x_))^(m_.), x_Symbol] :> Si
mp[((d*x)^(m + 1)*(a + b*ArcCsch[c*x]))/(d*(m + 1)), x] + Dist[(b*d)/(c*(m
+ 1)), Int[(d*x)^(m - 1)/Sqrt[1 + 1/(c^2*x^2)], x], x] /; FreeQ[{a, b, c, d
, m}, x] && NeQ[m, -1]
```

Rubi steps

$$\int \frac{a+b\text{csch}^{-1}(cx)}{x^6}\,dx = -\frac{a+b\text{csch}^{-1}(cx)}{5x^5} - \frac{b\int \frac{1}{\sqrt{1+\frac{1}{c^2x^2}}\,x^7}\,dx}{5c}$$
$$= -\frac{a+b\text{csch}^{-1}(cx)}{5x^5} + \frac{b\,\text{Subst}\left(\int \frac{x^2}{\sqrt{1+\frac{x}{c^2}}}\,dx, x, \frac{1}{x^2}\right)}{10c}$$
$$= -\frac{a+b\text{csch}^{-1}(cx)}{5x^5} + \frac{b\,\text{Subst}\left(\int \left(\frac{c^4}{\sqrt{1+\frac{x}{c^2}}} - 2c^4\sqrt{1+\frac{x}{c^2}} + c^4\left(1+\frac{x}{c^2}\right)^{3/2}\right)dx, x, \frac{1}{x^2}\right)}{10c}$$
$$= \frac{1}{5}bc^5\sqrt{1+\frac{1}{c^2x^2}} - \frac{2}{15}bc^5\left(1+\frac{1}{c^2x^2}\right)^{3/2} + \frac{1}{25}bc^5\left(1+\frac{1}{c^2x^2}\right)^{5/2} - \frac{a+b\text{csch}^{-1}(cx)}{5x^5}$$

**Mathematica [A]** time = 0.06, size = 69, normalized size = 0.87

$$-\frac{a}{5x^5} + b\left(\frac{8c^5}{75} - \frac{4c^3}{75x^2} + \frac{c}{25x^4}\right)\sqrt{\frac{c^2x^2+1}{c^2x^2}} - \frac{b\text{csch}^{-1}(cx)}{5x^5}$$

Antiderivative was successfully verified.

```
[In] Integrate[(a + b*ArcCsch[c*x])/x^6,x]
```

```
[Out] -1/5*a/x^5 + b*((8*c^5)/75 + c/(25*x^4) - (4*c^3)/(75*x^2))*Sqrt[(1 + c^2*x
^2)/(c^2*x^2)] - (b*ArcCsch[c*x])/(5*x^5)
```

**fricas [A]** time = 0.48, size = 87, normalized size = 1.10

$$-\frac{15\,b\log\left(\frac{cx\sqrt{\frac{c^2x^2+1}{c^2x^2}}+1}{cx}\right) - \left(8\,bc^5x^5 - 4\,bc^3x^3 + 3\,bcx\right)\sqrt{\frac{c^2x^2+1}{c^2x^2}} + 15\,a}{75\,x^5}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))/x^6,x, algorithm="fricas")
```

```
[Out] -1/75*(15*b*log((c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) + 1)/(c*x)) - (8*b*c^5*x
^5 - 4*b*c^3*x^3 + 3*b*c*x)*sqrt((c^2*x^2 + 1)/(c^2*x^2)) + 15*a)/x^5
```

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

$$\int \frac{b\,\mathrm{arcsch}\,(cx) + a}{x^6}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))/x^6,x, algorithm="giac")
```

```
[Out] integrate((b*arccsch(c*x) + a)/x^6, x)
```

**maple [A]** time = 0.05, size = 83, normalized size = 1.05

$$c^5\left(-\frac{a}{5c^5x^5} + b\left(-\frac{\mathrm{arccsch}\,(cx)}{5c^5x^5} + \frac{\left(c^2x^2+1\right)\left(8c^4x^4-4c^2x^2+3\right)}{75\sqrt{\frac{c^2x^2+1}{c^2x^2}}\;c^6x^6}\right)\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a+b*arccsch(c*x))/x^6,x)
```

```
[Out] c^5*(-1/5*a/c^5/x^5+b*(-1/5/c^5/x^5*arccsch(c*x)+1/75*(c^2*x^2+1)*(8*c^4*x^
4-4*c^2*x^2+3)/((c^2*x^2+1)/c^2/x^2)^(1/2)/c^6/x^6))
```

**maxima [A]** time = 0.31, size = 73, normalized size = 0.92

$$\frac{1}{75}\,b\left(\frac{3\,c^6\left(\frac{1}{c^2x^2}+1\right)^{\frac{5}{2}} - 10\,c^6\left(\frac{1}{c^2x^2}+1\right)^{\frac{3}{2}} + 15\,c^6\sqrt{\frac{1}{c^2x^2}+1}}{c} - \frac{15\,\mathrm{arcsch}\,(cx)}{x^5}\right) - \frac{a}{5\,x^5}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))/x^6,x, algorithm="maxima")
```

```
[Out] 1/75*b*((3*c^6*(1/(c^2*x^2) + 1)^(5/2) - 10*c^6*(1/(c^2*x^2) + 1)^(3/2) + 1
5*c^6*sqrt(1/(c^2*x^2) + 1))/c - 15*arccsch(c*x)/x^5) - 1/5*a/x^5
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.01

$$\int \frac{a + b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)}{x^6}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a + b*asinh(1/(c*x)))/x^6,x)
```

```
[Out] int((a + b*asinh(1/(c*x)))/x^6, x)
```

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

$$\int \frac{a + b \operatorname{acsch}(cx)}{x^6} \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*acsch(c*x))/x**6,x)
```

```
[Out] Integral((a + b*acsch(c*x))/x**6, x)
```

# 3.14 $\int \frac{a+b\,\mathrm{csch}^{-1}(cx)}{x^7}\,dx$

**Optimal**. Leaf size=98

$$-\frac{a+b\,\mathrm{csch}^{-1}(cx)}{6x^6}-\frac{5}{96}bc^6\,\mathrm{csch}^{-1}(cx)+\frac{bc\sqrt{\frac{1}{c^2x^2}+1}}{36x^5}+\frac{5bc^5\sqrt{\frac{1}{c^2x^2}+1}}{96x}-\frac{5bc^3\sqrt{\frac{1}{c^2x^2}+1}}{144x^3}$$

```
[Out] -5/96*b*c^6*arccsch(c*x)+1/6*(-a-b*arccsch(c*x))/x^6+1/36*b*c*(1+1/c^2/x^2)
^(1/2)/x^5-5/144*b*c^3*(1+1/c^2/x^2)^(1/2)/x^3+5/96*b*c^5*(1+1/c^2/x^2)^(1/
2)/x
```

**Rubi [A]** time = 0.06, antiderivative size = 98, normalized size of antiderivative = 1.00, number of steps used = 6, number of rules used = 4, integrand size = 12, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.333, Rules used = {6284, 335, 321, 215}

$$-\frac{a+b\,\mathrm{csch}^{-1}(cx)}{6x^6}+\frac{5bc^5\sqrt{\frac{1}{c^2x^2}+1}}{96x}-\frac{5bc^3\sqrt{\frac{1}{c^2x^2}+1}}{144x^3}+\frac{bc\sqrt{\frac{1}{c^2x^2}+1}}{36x^5}-\frac{5}{96}bc^6\,\mathrm{csch}^{-1}(cx)$$

Antiderivative was successfully verified.

```
[In] Int[(a + b*ArcCsch[c*x])/x^7,x]
```

```
[Out] (b*c*Sqrt[1 + 1/(c^2*x^2)])/(36*x^5) - (5*b*c^3*Sqrt[1 + 1/(c^2*x^2)])/(144
*x^3) + (5*b*c^5*Sqrt[1 + 1/(c^2*x^2)])/(96*x) - (5*b*c^6*ArcCsch[c*x])/96
- (a + b*ArcCsch[c*x])/(6*x^6)
```

Rule 215

```
Int[1/Sqrt[(a_) + (b_.)*(x_)^2], x_Symbol] :> Simp[ArcSinh[(Rt[b, 2]*x)/Sqr
t[a]]/Rt[b, 2], x] /; FreeQ[{a, b}, x] && GtQ[a, 0] && PosQ[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 335

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

```
egerQ[m]
```

Rule 6284

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))*((d_.)*(x_))^(m_.), x_Symbol] :> Si
mp[((d*x)^(m + 1)*(a + b*ArcCsch[c*x]))/(d*(m + 1)), x] + Dist[(b*d)/(c*(m
+ 1)), Int[(d*x)^(m - 1)/Sqrt[1 + 1/(c^2*x^2)], x], x] /; FreeQ[{a, b, c, d
, m}, x] && NeQ[m, -1]
```

Rubi steps

$$\int \frac{a+b\text{csch}^{-1}(cx)}{x^7}\,dx = -\frac{a+b\text{csch}^{-1}(cx)}{6x^6} - \frac{b\int \frac{1}{\sqrt{1+\frac{1}{c^2x^2}}\,x^8}\,dx}{6c}$$

$$= -\frac{a+b\text{csch}^{-1}(cx)}{6x^6} + \frac{b\,\text{Subst}\left(\int \frac{x^6}{\sqrt{1+\frac{x^2}{c^2}}}\,dx, x, \frac{1}{x}\right)}{6c}$$

$$= \frac{bc\sqrt{1+\frac{1}{c^2x^2}}}{36x^5} - \frac{a+b\text{csch}^{-1}(cx)}{6x^6} - \frac{1}{36}(5bc)\,\text{Subst}\left(\int \frac{x^4}{\sqrt{1+\frac{x^2}{c^2}}}\,dx, x, \frac{1}{x}\right)$$

$$= \frac{bc\sqrt{1+\frac{1}{c^2x^2}}}{36x^5} - \frac{5bc^3\sqrt{1+\frac{1}{c^2x^2}}}{144x^3} - \frac{a+b\text{csch}^{-1}(cx)}{6x^6} + \frac{1}{48}\left(5bc^3\right)\text{Subst}\left(\int \frac{x^2}{\sqrt{1+\frac{x^2}{c^2}}}\,dx,\right.$$

$$= \frac{bc\sqrt{1+\frac{1}{c^2x^2}}}{36x^5} - \frac{5bc^3\sqrt{1+\frac{1}{c^2x^2}}}{144x^3} + \frac{5bc^5\sqrt{1+\frac{1}{c^2x^2}}}{96x} - \frac{a+b\text{csch}^{-1}(cx)}{6x^6} - \frac{1}{96}\left(5bc^5\right)\text{Subs}$$

$$= \frac{bc\sqrt{1+\frac{1}{c^2x^2}}}{36x^5} - \frac{5bc^3\sqrt{1+\frac{1}{c^2x^2}}}{144x^3} + \frac{5bc^5\sqrt{1+\frac{1}{c^2x^2}}}{96x} - \frac{5}{96}bc^6\text{csch}^{-1}(cx) - \frac{a+b\text{csch}^{-1}(cx}{6x^6}$$

**Mathematica [A]** time = 0.07, size = 88, normalized size = 0.90

$$-\frac{a}{6x^6} - \frac{5}{96}bc^6\sinh^{-1}\left(\frac{1}{cx}\right) + b\left(\frac{5c^5}{96x} - \frac{5c^3}{144x^3} + \frac{c}{36x^5}\right)\sqrt{\frac{c^2x^2+1}{c^2x^2}} - \frac{b\text{csch}^{-1}(cx)}{6x^6}$$

Antiderivative was successfully verified.

```
[In] Integrate[(a + b*ArcCsch[c*x])/x^7,x]
```

```
[Out] -1/6*a/x^6 + b*(c/(36*x^5) - (5*c^3)/(144*x^3) + (5*c^5)/(96*x))*Sqrt[(1 +
c^2*x^2)/(c^2*x^2)] - (b*ArcCsch[c*x])/(6*x^6) - (5*b*c^6*ArcSinh[1/(c*x)])
/96
```

**fricas [A]** time = 1.12, size = 99, normalized size = 1.01

$$-\frac{3\left(5\,bc^{6}x^{6}+16\,b\right)\log\left(\frac{cx\sqrt{\frac{c^{2}x^{2}+1}{c^{2}x^{2}}}+1}{cx}\right)-\left(15\,bc^{5}x^{5}-10\,bc^{3}x^{3}+8\,bcx\right)\sqrt{\frac{c^{2}x^{2}+1}{c^{2}x^{2}}}+48\,a}{288\,x^{6}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))/x^7,x, algorithm="fricas")
```

```
[Out] -1/288*(3*(5*b*c^6*x^6 + 16*b)*log((c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) + 1)/
(c*x)) - (15*b*c^5*x^5 - 10*b*c^3*x^3 + 8*b*c*x)*sqrt((c^2*x^2 + 1)/(c^2*x^
2)) + 48*a)/x^6
```

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

$$\int \frac{b\,\mathrm{arcsch}\left(cx\right)+a}{x^{7}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))/x^7,x, algorithm="giac")
```

```
[Out] integrate((b*arccsch(c*x) + a)/x^7, x)
```

**maple [A]** time = 0.06, size = 139, normalized size = 1.42

$$c^{6}\left(-\frac{a}{6c^{6}x^{6}}+b\left(-\frac{\mathrm{arccsch}\left(cx\right)}{6c^{6}x^{6}}-\frac{\sqrt{c^{2}x^{2}+1}\,\left(15\,\mathrm{arctanh}\left(\frac{1}{\sqrt{c^{2}x^{2}+1}}\right)c^{6}x^{6}-15c^{4}x^{4}\sqrt{c^{2}x^{2}+1}+10c^{2}x^{2}\sqrt{c^{2}x^{2}+1}-\right.}{288\sqrt{\frac{c^{2}x^{2}+1}{c^{2}x^{2}}}\,c^{7}x^{7}}\right.\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a+b*arccsch(c*x))/x^7,x)
```

```
[Out] c^6*(-1/6*a/c^6/x^6+b*(-1/6/c^6/x^6*arccsch(c*x)-1/288*(c^2*x^2+1)^(1/2)*(1
5*arctanh(1/(c^2*x^2+1)^(1/2))*c^6*x^6-15*c^4*x^4*(c^2*x^2+1)^(1/2)+10*c^2*
x^2*(c^2*x^2+1)^(1/2)-8*(c^2*x^2+1)^(1/2))/((c^2*x^2+1)/c^2/x^2)^(1/2)/c^7/
x^7))
```

**maxima [B]** time = 0.31, size = 185, normalized size = 1.89

$$-\frac{1}{576}\,b\left(\frac{15\,c^{7}\log\left(cx\sqrt{\frac{1}{c^{2}x^{2}}+1}+1\right)-15\,c^{7}\log\left(cx\sqrt{\frac{1}{c^{2}x^{2}}+1}-1\right)-\frac{2\left(15\,c^{12}x^{5}\left(\frac{1}{c^{2}x^{2}}+1\right)^{\frac{5}{2}}-40\,c^{10}x^{3}\left(\frac{1}{c^{2}x^{2}}+1\right)^{\frac{3}{2}}+33\,c^{8}x\sqrt{\frac{1}{c^{2}x^{2}}+1}\right)}{c^{6}x^{6}\left(\frac{1}{c^{2}x^{2}}+1\right)^{3}-3\,c^{4}x^{4}\left(\frac{1}{c^{2}x^{2}}+1\right)^{2}+3\,c^{2}x^{2}\left(\frac{1}{c^{2}x^{2}}+1\right)-1}}{c}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))/x^7,x, algorithm="maxima")
```

```
[Out] -1/576*b*((15*c^7*log(c*x*sqrt(1/(c^2*x^2) + 1) + 1) - 15*c^7*log(c*x*sqrt(
1/(c^2*x^2) + 1) - 1) - 2*(15*c^12*x^5*(1/(c^2*x^2) + 1)^(5/2) - 40*c^10*x^
3*(1/(c^2*x^2) + 1)^(3/2) + 33*c^8*x*sqrt(1/(c^2*x^2) + 1))/(c^6*x^6*(1/(c^
2*x^2) + 1)^3 - 3*c^4*x^4*(1/(c^2*x^2) + 1)^2 + 3*c^2*x^2*(1/(c^2*x^2) + 1)
 - 1))/c + 96*arccsch(c*x)/x^6) - 1/6*a/x^6
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.01

$$\int \frac{a+b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)}{x^{7}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a + b*asinh(1/(c*x)))/x^7,x)
```

```
[Out] int((a + b*asinh(1/(c*x)))/x^7, x)
```

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

$$\int \frac{a+b\,\mathrm{acsch}\,(cx)}{x^{7}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*acsch(c*x))/x**7,x)
```

```
[Out] Integral((a + b*acsch(c*x))/x**7, x)
```

## 3.15 $\int x^3 \left(a+b\,\text{csch}^{-1}(cx)\right)^2\,dx$

**Optimal**. Leaf size=105

$$\frac{bx^3\sqrt{\frac{1}{c^2x^2}+1}\,\left(a+b\text{csch}^{-1}(cx)\right)}{6c}-\frac{bx\sqrt{\frac{1}{c^2x^2}+1}\,\left(a+b\text{csch}^{-1}(cx)\right)}{3c^3}+\frac{1}{4}x^4\left(a+b\text{csch}^{-1}(cx)\right)^2-\frac{b^2\log(x)}{3c^4}+\frac{b^2x^2}{12c^2}$$

```
[Out] 1/12*b^2*x^2/c^2+1/4*x^4*(a+b*arccsch(c*x))^2-1/3*b^2*ln(x)/c^4-1/3*b*x*(a+
b*arccsch(c*x))*(1+1/c^2/x^2)^(1/2)/c^3+1/6*b*x^3*(a+b*arccsch(c*x))*(1+1/c
^2/x^2)^(1/2)/c
```

**Rubi [A]** time = 0.12, antiderivative size = 105, 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 = {6286, 5452, 4185, 4184, 3475}

$$\frac{bx^3\sqrt{\frac{1}{c^2x^2}+1}\,\left(a+b\text{csch}^{-1}(cx)\right)}{6c}-\frac{bx\sqrt{\frac{1}{c^2x^2}+1}\,\left(a+b\text{csch}^{-1}(cx)\right)}{3c^3}+\frac{1}{4}x^4\left(a+b\text{csch}^{-1}(cx)\right)^2+\frac{b^2x^2}{12c^2}-\frac{b^2\log(x)}{3c^4}$$

Antiderivative was successfully verified.

```
[In] Int[x^3*(a + b*ArcCsch[c*x])^2,x]
```

```
[Out] (b^2*x^2)/(12*c^2) - (b*Sqrt[1 + 1/(c^2*x^2)]*x*(a + b*ArcCsch[c*x]))/(3*c^
3) + (b*Sqrt[1 + 1/(c^2*x^2)]*x^3*(a + b*ArcCsch[c*x]))/(6*c) + (x^4*(a + b
*ArcCsch[c*x])^2)/4 - (b^2*Log[x])/(3*c^4)
```

Rule 3475

```
Int[tan[(c_.) + (d_.)*(x_)], x_Symbol] :> -Simp[Log[RemoveContent[Cos[c + d
*x], x]]/d, x] /; FreeQ[{c, d}, x]
```

Rule 4184

```
Int[csc[(e_.) + (f_.)*(x_)]^2*((c_.) + (d_.)*(x_))^(m_.), x_Symbol] :> -Sim
p[((c + d*x)^m*Cot[e + f*x])/f, x] + Dist[(d*m)/f, Int[(c + d*x)^(m - 1)*Co
t[e + f*x], x], x] /; FreeQ[{c, d, e, f}, x] && GtQ[m, 0]
```

Rule 4185

```
Int[(csc[(e_.) + (f_.)*(x_)]*(b_.))^(n_)*((c_.) + (d_.)*(x_)), x_Symbol] :>
 -Simp[(b^2*(c + d*x)*Cot[e + f*x]*(b*Csc[e + f*x])^(n - 2))/(f*(n - 1)), x
] + (Dist[(b^2*(n - 2))/(n - 1), Int[(c + d*x)*(b*Csc[e + f*x])^(n - 2), x]
, x] - Simp[(b^2*d*(b*Csc[e + f*x])^(n - 2))/(f^2*(n - 1)*(n - 2)), x]) /;
FreeQ[{b, c, d, e, f}, x] && GtQ[n, 1] && NeQ[n, 2]
```

Rule 5452

```
Int[Coth[(a_.) + (b_.)*(x_)]^(p_.)*Csch[(a_.) + (b_.)*(x_)]^(n_.)*((c_.) +
(d_.)*(x_))^(m_.), x_Symbol] :> -Simp[((c + d*x)^m*Csch[a + b*x]^n)/(b*n),
x] + Dist[(d*m)/(b*n), Int[(c + d*x)^(m - 1)*Csch[a + b*x]^n, x], x] /; Fre
eQ[{a, b, c, d, n}, x] && EqQ[p, 1] && GtQ[m, 0]
```

Rule 6286

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))^(n_)*(x_)^(m_.), x_Symbol] :> -Dist
[(c^(m + 1))^(-1), Subst[Int[(a + b*x)^n*Csch[x]^(m + 1)*Coth[x], x], x, Ar
cCsch[c*x]], x] /; FreeQ[{a, b, c}, x] && IntegerQ[n] && IntegerQ[m] && (Gt
Q[n, 0] || LtQ[m, -1])
```

Rubi steps

$$\int x^3 \left(a+b\text{csch}^{-1}(cx)\right)^2 dx = -\frac{\text{Subst}\left(\int (a+bx)^2 \coth(x)\text{csch}^4(x)\, dx, x, \text{csch}^{-1}(cx)\right)}{c^4}$$

$$= \frac{1}{4}x^4 \left(a+b\text{csch}^{-1}(cx)\right)^2 - \frac{b\,\text{Subst}\left(\int (a+bx)\text{csch}^4(x)\, dx, x, \text{csch}^{-1}(cx)\right)}{2c^4}$$

$$= \frac{b^2x^2}{12c^2} + \frac{b\sqrt{1+\frac{1}{c^2x^2}}\, x^3 \left(a+b\text{csch}^{-1}(cx)\right)}{6c} + \frac{1}{4}x^4 \left(a+b\text{csch}^{-1}(cx)\right)^2 + \frac{b\,\text{Subst}\left(\int (\right.}{}$$

$$= \frac{b^2x^2}{12c^2} - \frac{b\sqrt{1+\frac{1}{c^2x^2}}\, x \left(a+b\text{csch}^{-1}(cx)\right)}{3c^3} + \frac{b\sqrt{1+\frac{1}{c^2x^2}}\, x^3 \left(a+b\text{csch}^{-1}(cx)\right)}{6c} + \frac{1}{4}x^4$$

$$= \frac{b^2x^2}{12c^2} - \frac{b\sqrt{1+\frac{1}{c^2x^2}}\, x \left(a+b\text{csch}^{-1}(cx)\right)}{3c^3} + \frac{b\sqrt{1+\frac{1}{c^2x^2}}\, x^3 \left(a+b\text{csch}^{-1}(cx)\right)}{6c} + \frac{1}{4}x^4$$

**Mathematica [A]** time = 0.21, size = 122, normalized size = 1.16

$$\frac{cx\left(3a^2c^3x^3 + 2ab\sqrt{\frac{1}{c^2x^2}+1}\left(c^2x^2-2\right) + b^2cx\right) + 2bcx\text{csch}^{-1}(cx)\left(3ac^3x^3 + b\sqrt{\frac{1}{c^2x^2}+1}\left(c^2x^2-2\right)\right) + 3b^2c^4x^4\text{cs}}{12c^4}$$

Antiderivative was successfully verified.

```
[In] Integrate[x^3*(a + b*ArcCsch[c*x])^2,x]
```

```
[Out] (c*x*(b^2*c*x + 3*a^2*c^3*x^3 + 2*a*b*Sqrt[1 + 1/(c^2*x^2)]*(-2 + c^2*x^2))
 + 2*b*c*x*(3*a*c^3*x^3 + b*Sqrt[1 + 1/(c^2*x^2)]*(-2 + c^2*x^2))*ArcCsch[c
*x] + 3*b^2*c^4*x^4*ArcCsch[c*x]^2 - 4*b^2*Log[x])/(12*c^4)
```

**fricas [B]** time = 1.34, size = 272, normalized size = 2.59

$$\frac{3\,b^{2}c^{4}x^{4}\log\left(\frac{cx\sqrt{\frac{c^{2}x^{2}+1}{c^{2}x^{2}}}+1}{cx}\right)^{2}+3\,a^{2}c^{4}x^{4}+6\,abc^{4}\log\left(cx\sqrt{\frac{c^{2}x^{2}+1}{c^{2}x^{2}}}-cx+1\right)-6\,abc^{4}\log\left(cx\sqrt{\frac{c^{2}x^{2}+1}{c^{2}x^{2}}}-cx-1\right)+b^{2}}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^3*(a+b*arccsch(c*x))^2,x, algorithm="fricas")
```

```
[Out] 1/12*(3*b^2*c^4*x^4*log((c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) + 1)/(c*x))^2 +
3*a^2*c^4*x^4 + 6*a*b*c^4*log(c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) - c*x + 1)
- 6*a*b*c^4*log(c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) - c*x - 1) + b^2*c^2*x^2
- 4*b^2*log(x) + 2*(3*a*b*c^4*x^4 - 3*a*b*c^4 + (b^2*c^3*x^3 - 2*b^2*c*x)*s
qrt((c^2*x^2 + 1)/(c^2*x^2)))*log((c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) + 1)/(
c*x)) + 2*(a*b*c^3*x^3 - 2*a*b*c*x)*sqrt((c^2*x^2 + 1)/(c^2*x^2)))/c^4
```

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

$$\int (b\operatorname{arcsch}(cx)+a)^{2}x^{3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^3*(a+b*arccsch(c*x))^2,x, algorithm="giac")
```

```
[Out] integrate((b*arccsch(c*x) + a)^2*x^3, x)
```

**maple [F]** time = 0.05, size = 0, normalized size = 0.00

$$\int x^{3}\left(a+b\operatorname{arccsch}(cx)\right)^{2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^3*(a+b*arccsch(c*x))^2,x)
```

```
[Out] int(x^3*(a+b*arccsch(c*x))^2,x)
```

**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(x^3*(a+b*arccsch(c*x))^2,x, algorithm="maxima")
```

```
[Out] 1/4*a^2*x^4 + 1/6*(3*x^4*arccsch(c*x) + (c^2*x^3*(1/(c^2*x^2) + 1)^(3/2) -
3*x*sqrt(1/(c^2*x^2) + 1))/c^3)*a*b + 1/288*(72*x^4*log(sqrt(c^2*x^2 + 1) +
 1)^2 + 1152*c^2*integrate(1/2*x^5*log(x)/(sqrt(c^2*x^2 + 1)*c^2*x^2 + c^2*
x^2 + sqrt(c^2*x^2 + 1) + 1), x)*log(c) - 1152*c^2*integrate(1/2*x^5*log(sq
rt(c^2*x^2 + 1) + 1)/(sqrt(c^2*x^2 + 1)*c^2*x^2 + c^2*x^2 + sqrt(c^2*x^2 +
1) + 1), x)*log(c) + 576*c^2*integrate(1/2*sqrt(c^2*x^2 + 1)*x^5*log(x)^2/(
sqrt(c^2*x^2 + 1)*c^2*x^2 + c^2*x^2 + sqrt(c^2*x^2 + 1) + 1), x) - 1152*c^2
*integrate(1/2*sqrt(c^2*x^2 + 1)*x^5*log(x)*log(sqrt(c^2*x^2 + 1) + 1)/(sqr
t(c^2*x^2 + 1)*c^2*x^2 + c^2*x^2 + sqrt(c^2*x^2 + 1) + 1), x) + 576*c^2*int
egrate(1/2*x^5*log(x)^2/(sqrt(c^2*x^2 + 1)*c^2*x^2 + c^2*x^2 + sqrt(c^2*x^2
 + 1) + 1), x) - 1152*c^2*integrate(1/2*x^5*log(x)*log(sqrt(c^2*x^2 + 1) +
1)/(sqrt(c^2*x^2 + 1)*c^2*x^2 + c^2*x^2 + sqrt(c^2*x^2 + 1) + 1), x) + 1152
*integrate(1/2*x^3*log(x)/(sqrt(c^2*x^2 + 1)*c^2*x^2 + c^2*x^2 + sqrt(c^2*x
^2 + 1) + 1), x)*log(c) - 1152*integrate(1/2*x^3*log(sqrt(c^2*x^2 + 1) + 1)
/(sqrt(c^2*x^2 + 1)*c^2*x^2 + c^2*x^2 + sqrt(c^2*x^2 + 1) + 1), x)*log(c) -
 24*(6*c^2*x^2 - 3*(c^2*x^2 + 1)^2 + 4*(c^2*x^2 + 1)^(3/2) - 12*sqrt(c^2*x^
2 + 1) + 6)*log(c)^2/c^4 - 48*(3*c^2*x^2 - 2*(c^2*x^2 + 1)^(3/2) + 6*sqrt(c
^2*x^2 + 1) - 3*log(c^2*x^2 + 1) + 3)*log(c)^2/c^4 + 144*(c^2*x^2 - 2*sqrt(
c^2*x^2 + 1) + 1)*log(c)^2/c^4 + 144*(2*sqrt(c^2*x^2 + 1) - log(c^2*x^2 + 1
))*log(c)^2/c^4 - 48*(6*c^2*x^2 - 3*(c^2*x^2 + 1)^2 + 4*(c^2*x^2 + 1)^(3/2)
 - 12*sqrt(c^2*x^2 + 1) + 6)*log(c)*log(x)/c^4 + 288*(c^2*x^2 - 2*sqrt(c^2*
x^2 + 1) + 1)*log(c)*log(x)/c^4 + 48*(6*c^2*x^2 - 3*(c^2*x^2 + 1)^2 + 4*(c^
2*x^2 + 1)^(3/2) - 12*sqrt(c^2*x^2 + 1) + 6)*log(c)*log(sqrt(c^2*x^2 + 1) +
 1)/c^4 - 288*(c^2*x^2 - 2*sqrt(c^2*x^2 + 1) + 1)*log(c)*log(sqrt(c^2*x^2 +
 1) + 1)/c^4 + 4*(18*c^2*x^2 - 9*(c^2*x^2 + 1)^2 + 16*(c^2*x^2 + 1)^(3/2) -
 96*sqrt(c^2*x^2 + 1) + 66*log(sqrt(c^2*x^2 + 1) + 1) - 30*log(sqrt(c^2*x^2
 + 1) - 1) + 18)*log(c)/c^4 + 4*(6*c^2*x^2 + 9*(c^2*x^2 + 1)^2 - 28*(c^2*x^
2 + 1)^(3/2) + 132*sqrt(c^2*x^2 + 1) - 132*log(sqrt(c^2*x^2 + 1) + 1) + 6)*
log(c)/c^4 - 144*(c^2*x^2 - 4*sqrt(c^2*x^2 + 1) + 3*log(sqrt(c^2*x^2 + 1) +
 1) - log(sqrt(c^2*x^2 + 1) - 1) + 1)*log(c)/c^4 + 144*(c^2*x^2 - 6*sqrt(c^
2*x^2 + 1) + 6*log(sqrt(c^2*x^2 + 1) + 1) + 1)*log(c)/c^4 + 12*(6*c^2*x^2 -
 3*(c^2*x^2 + 1)^2 + 4*(c^2*x^2 + 1)^(3/2) - 12*sqrt(c^2*x^2 + 1) + 6)*log(
sqrt(c^2*x^2 + 1) + 1)/c^4 + (6*c^2*x^2 + 9*(c^2*x^2 + 1)^2 - 28*(c^2*x^2 +
 1)^(3/2) + 132*sqrt(c^2*x^2 + 1) - 132*log(sqrt(c^2*x^2 + 1) + 1) + 6)/c^4
 + 576*integrate(1/2*sqrt(c^2*x^2 + 1)*x^3*log(x)^2/(sqrt(c^2*x^2 + 1)*c^2*
x^2 + c^2*x^2 + sqrt(c^2*x^2 + 1) + 1), x) - 1152*integrate(1/2*sqrt(c^2*x^
2 + 1)*x^3*log(x)*log(sqrt(c^2*x^2 + 1) + 1)/(sqrt(c^2*x^2 + 1)*c^2*x^2 + c
^2*x^2 + sqrt(c^2*x^2 + 1) + 1), x) + 576*integrate(1/2*x^3*log(x)^2/(sqrt(
c^2*x^2 + 1)*c^2*x^2 + c^2*x^2 + sqrt(c^2*x^2 + 1) + 1), x) - 1152*integrat
e(1/2*x^3*log(x)*log(sqrt(c^2*x^2 + 1) + 1)/(sqrt(c^2*x^2 + 1)*c^2*x^2 + c^
2*x^2 + sqrt(c^2*x^2 + 1) + 1), x))*b^2
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.01

$$\int x^3 \left(a+b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)\right)^2\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^3*(a + b*asinh(1/(c*x)))^2,x)
```

```
[Out] int(x^3*(a + b*asinh(1/(c*x)))^2, x)
```

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

$$\int x^3 \left(a+b\,\mathrm{acsch}\,(cx)\right)^2\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**3*(a+b*acsch(c*x))**2,x)
```

```
[Out] Integral(x**3*(a + b*acsch(c*x))**2, x)
```

# 3.16 $\int x^2 \left(a+b\,\mathrm{csch}^{-1}(cx)\right)^2\,dx$

**Optimal**. Leaf size=122

$$-\frac{2b\tanh^{-1}\left(e^{\mathrm{csch}^{-1}(cx)}\right)\left(a+b\,\mathrm{csch}^{-1}(cx)\right)}{3c^3}+\frac{bx^2\sqrt{\frac{1}{c^2x^2}+1}\left(a+b\,\mathrm{csch}^{-1}(cx)\right)}{3c}+\frac{1}{3}x^3\left(a+b\,\mathrm{csch}^{-1}(cx)\right)^2-\frac{b^2\mathrm{Li}_2\left(-\right.}{3}$$

```
[Out] 1/3*b^2*x/c^2+1/3*x^3*(a+b*arccsch(c*x))^2-2/3*b*(a+b*arccsch(c*x))*arctanh
(1/c/x+(1+1/c^2/x^2)^(1/2))/c^3-1/3*b^2*polylog(2,-1/c/x-(1+1/c^2/x^2)^(1/2
))/c^3+1/3*b^2*polylog(2,1/c/x+(1+1/c^2/x^2)^(1/2))/c^3+1/3*b*x^2*(a+b*arcc
sch(c*x))*(1+1/c^2/x^2)^(1/2)/c
```

**Rubi [A]** time = 0.13, antiderivative size = 122, normalized size of antiderivative = 1.00, number of steps used = 8, number of rules used = 6, integrand size = 14, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.429, Rules used = {6286, 5452, 4185, 4182, 2279, 2391}

$$-\frac{b^2\mathrm{PolyLog}\left(2,-e^{\mathrm{csch}^{-1}(cx)}\right)}{3c^3}+\frac{b^2\mathrm{PolyLog}\left(2,e^{\mathrm{csch}^{-1}(cx)}\right)}{3c^3}+\frac{bx^2\sqrt{\frac{1}{c^2x^2}+1}\left(a+b\,\mathrm{csch}^{-1}(cx)\right)}{3c}-\frac{2b\tanh^{-1}\left(e^{\mathrm{csch}^{-1}(cx)}\right.}{3}$$

Antiderivative was successfully verified.

```
[In] Int[x^2*(a + b*ArcCsch[c*x])^2,x]
```

```
[Out] (b^2*x)/(3*c^2) + (b*Sqrt[1 + 1/(c^2*x^2)]*x^2*(a + b*ArcCsch[c*x]))/(3*c)
+ (x^3*(a + b*ArcCsch[c*x])^2)/3 - (2*b*(a + b*ArcCsch[c*x])*ArcTanh[E^ArcC
sch[c*x]])/(3*c^3) - (b^2*PolyLog[2, -E^ArcCsch[c*x]])/(3*c^3) + (b^2*PolyL
og[2, E^ArcCsch[c*x]])/(3*c^3)
```

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 4185

```
Int[(csc[(e_.) + (f_.)*(x_)]*(b_.))^(n_)*((c_.) + (d_.)*(x_)), x_Symbol] :>
 -Simp[(b^2*(c + d*x)*Cot[e + f*x]*(b*Csc[e + f*x])^(n - 2))/(f*(n - 1)), x
] + (Dist[(b^2*(n - 2))/(n - 1), Int[(c + d*x)*(b*Csc[e + f*x])^(n - 2), x]
, x] - Simp[(b^2*d*(b*Csc[e + f*x])^(n - 2))/(f^2*(n - 1)*(n - 2)), x]) /;
FreeQ[{b, c, d, e, f}, x] && GtQ[n, 1] && NeQ[n, 2]
```

Rule 5452

```
Int[Coth[(a_.) + (b_.)*(x_)]^(p_.)*Csch[(a_.) + (b_.)*(x_)]^(n_.)*((c_.) +
(d_.)*(x_))^(m_.), x_Symbol] :> -Simp[((c + d*x)^m*Csch[a + b*x]^n)/(b*n),
x] + Dist[(d*m)/(b*n), Int[(c + d*x)^(m - 1)*Csch[a + b*x]^n, x], x] /; Fre
eQ[{a, b, c, d, n}, x] && EqQ[p, 1] && GtQ[m, 0]
```

Rule 6286

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))^(n_)*(x_)^(m_.), x_Symbol] :> -Dist
[(c^(m + 1))^(-1), Subst[Int[(a + b*x)^n*Csch[x]^(m + 1)*Coth[x], x], x, Ar
cCsch[c*x]], x] /; FreeQ[{a, b, c}, x] && IntegerQ[n] && IntegerQ[m] && (Gt
Q[n, 0] || LtQ[m, -1])
```

Rubi steps

$$\int x^2\left(a+b\text{csch}^{-1}(cx)\right)^2\,dx = -\frac{\text{Subst}\left(\int(a+bx)^2\coth(x)\text{csch}^3(x)\,dx,x,\text{csch}^{-1}(cx)\right)}{c^3}$$
$$= \frac{1}{3}x^3\left(a+b\text{csch}^{-1}(cx)\right)^2 - \frac{(2b)\,\text{Subst}\left(\int(a+bx)\text{csch}^3(x)\,dx,x,\text{csch}^{-1}(cx)\right)}{3c^3}$$
$$= \frac{b^2x}{3c^2} + \frac{b\sqrt{1+\frac{1}{c^2x^2}}\,x^2\left(a+b\text{csch}^{-1}(cx)\right)}{3c} + \frac{1}{3}x^3\left(a+b\text{csch}^{-1}(cx)\right)^2 + \frac{b\,\text{Subst}\left(\int(a\right.}{}$$
$$= \frac{b^2x}{3c^2} + \frac{b\sqrt{1+\frac{1}{c^2x^2}}\,x^2\left(a+b\text{csch}^{-1}(cx)\right)}{3c} + \frac{1}{3}x^3\left(a+b\text{csch}^{-1}(cx)\right)^2 - \frac{2b\left(a+b\text{csc}\right.}{}$$
$$= \frac{b^2x}{3c^2} + \frac{b\sqrt{1+\frac{1}{c^2x^2}}\,x^2\left(a+b\text{csch}^{-1}(cx)\right)}{3c} + \frac{1}{3}x^3\left(a+b\text{csch}^{-1}(cx)\right)^2 - \frac{2b\left(a+b\text{csc}\right.}{}$$
$$= \frac{b^2x}{3c^2} + \frac{b\sqrt{1+\frac{1}{c^2x^2}}\,x^2\left(a+b\text{csch}^{-1}(cx)\right)}{3c} + \frac{1}{3}x^3\left(a+b\text{csch}^{-1}(cx)\right)^2 - \frac{2b\left(a+b\text{csc}\right.}{}$$

**Mathematica [A]** time = 1.43, size = 211, normalized size = 1.73

$$\frac{a^2c^3x^3 + 2abc^3x^3\text{csch}^{-1}(cx) + abc^2x^2\sqrt{\frac{1}{c^2x^2}+1} - \frac{abcx\sqrt{\frac{1}{c^2x^2}+1}\,\sinh^{-1}(cx)}{\sqrt{c^2x^2+1}} + b^2c^3x^3\text{csch}^{-1}(cx)^2 + b^2c^2x^2\sqrt{\frac{1}{c^2x^2}+1}\,c}{}$$

Warning: Unable to verify antiderivative.

```
[In] Integrate[x^2*(a + b*ArcCsch[c*x])^2,x]
```

```
[Out] (b^2*c*x + a*b*c^2*Sqrt[1 + 1/(c^2*x^2)]*x^2 + a^2*c^3*x^3 + b^2*c^2*Sqrt[1
 + 1/(c^2*x^2)]*x^2*ArcCsch[c*x] + 2*a*b*c^3*x^3*ArcCsch[c*x] + b^2*c^3*x^3
*ArcCsch[c*x]^2 - (a*b*c*Sqrt[1 + 1/(c^2*x^2)]*x*ArcSinh[c*x])/Sqrt[1 + c^2
*x^2] + b^2*ArcCsch[c*x]*Log[1 - E^(-ArcCsch[c*x])] - b^2*ArcCsch[c*x]*Log[
1 + E^(-ArcCsch[c*x])] + b^2*PolyLog[2, -E^(-ArcCsch[c*x])] - b^2*PolyLog[2
, E^(-ArcCsch[c*x])])/(3*c^3)
```

**fricas [F]** time = 1.37, size = 0, normalized size = 0.00

$$\text{integral}\left(b^2x^2\,\text{arcsch}\,(cx)^2 + 2\,abx^2\,\text{arcsch}\,(cx) + a^2x^2, x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*(a+b*arccsch(c*x))^2,x, algorithm="fricas")
```

```
[Out] integral(b^2*x^2*arccsch(c*x)^2 + 2*a*b*x^2*arccsch(c*x) + a^2*x^2, x)
```

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

$$\int (b\,\mathrm{arcsch}\,(cx) + a)^2 x^2\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*(a+b*arccsch(c*x))^2,x, algorithm="giac")
[Out] integrate((b*arccsch(c*x) + a)^2*x^2, x)
```

**maple [F]** time = 0.05, size = 0, normalized size = 0.00

$$\int x^2 (a + b\,\mathrm{arccsch}\,(cx))^2\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^2*(a+b*arccsch(c*x))^2,x)
[Out] int(x^2*(a+b*arccsch(c*x))^2,x)
```

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

$$\frac{1}{3}a^2x^3 + \frac{1}{6}\left(4\,x^3\,\mathrm{arcsch}\,(cx) + \frac{\frac{2\sqrt{\frac{1}{c^2x^2}+1}}{c^2\left(\frac{1}{c^2x^2}+1\right)-c^2} - \frac{\log\left(\sqrt{\frac{1}{c^2x^2}+1}+1\right)}{c^2} + \frac{\log\left(\sqrt{\frac{1}{c^2x^2}+1}-1\right)}{c^2}}{c}\right)ab + \frac{1}{3}\left(x^3\log\left(\sqrt{c^2x^2+1}+1\right)^2 - 3\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*(a+b*arccsch(c*x))^2,x, algorithm="maxima")
[Out] 1/3*a^2*x^3 + 1/6*(4*x^3*arccsch(c*x) + (2*sqrt(1/(c^2*x^2) + 1)/(c^2*(1/(c
^2*x^2) + 1) - c^2) - log(sqrt(1/(c^2*x^2) + 1) + 1)/c^2 + log(sqrt(1/(c^2*
x^2) + 1) - 1)/c^2)/c)*a*b + 1/3*(x^3*log(sqrt(c^2*x^2 + 1) + 1)^2 - 3*inte
grate(-1/3*(3*c^2*x^4*log(c)^2 + 3*x^2*log(c)^2 + 3*(c^2*x^4 + x^2)*log(x)^
2 + 6*(c^2*x^4*log(c) + x^2*log(c))*log(x) - 2*(3*c^2*x^4*log(c) + 3*x^2*lo
g(c) + 3*(c^2*x^4 + x^2)*log(x) + (c^2*x^4*(3*log(c) + 1) + 3*x^2*log(c) +
3*(c^2*x^4 + x^2)*log(x))*sqrt(c^2*x^2 + 1))*log(sqrt(c^2*x^2 + 1) + 1) + 3
*(c^2*x^4*log(c)^2 + x^2*log(c)^2 + (c^2*x^4 + x^2)*log(x)^2 + 2*(c^2*x^4*l
og(c) + x^2*log(c))*log(x))*sqrt(c^2*x^2 + 1))/(c^2*x^2 + (c^2*x^2 + 1)^(3/
2) + 1), x))*b^2
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.01

$$\int x^2 \left(a + b \operatorname{asinh}\left(\frac{1}{c\,x}\right)\right)^2 \,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^2*(a + b*asinh(1/(c*x)))^2,x)
```

```
[Out] int(x^2*(a + b*asinh(1/(c*x)))^2, x)
```

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

$$\int x^2 \left(a + b \operatorname{acsch}{\left(cx \right)}\right)^2 \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**2*(a+b*acsch(c*x))**2,x)
```

```
[Out] Integral(x**2*(a + b*acsch(c*x))**2, x)
```

## 3.17 $\int x \left(a + b\,\mathrm{csch}^{-1}(cx)\right)^2 \, dx$

**Optimal**. Leaf size=54

$$\frac{bx\sqrt{\frac{1}{c^2x^2}+1}\left(a+b\,\mathrm{csch}^{-1}(cx)\right)}{c}+\frac{1}{2}x^2\left(a+b\,\mathrm{csch}^{-1}(cx)\right)^2+\frac{b^2\log(x)}{c^2}$$

```
[Out] 1/2*x^2*(a+b*arccsch(c*x))^2+b^2*ln(x)/c^2+b*x*(a+b*arccsch(c*x))*(1+1/c^2/
x^2)^(1/2)/c
```

**Rubi [A]** time = 0.08, antiderivative size = 54, 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 = {6286, 5452, 4184, 3475}

$$\frac{bx\sqrt{\frac{1}{c^2x^2}+1}\left(a+b\,\mathrm{csch}^{-1}(cx)\right)}{c}+\frac{1}{2}x^2\left(a+b\,\mathrm{csch}^{-1}(cx)\right)^2+\frac{b^2\log(x)}{c^2}$$

Antiderivative was successfully verified.

```
[In] Int[x*(a + b*ArcCsch[c*x])^2,x]
```

```
[Out] (b*Sqrt[1 + 1/(c^2*x^2)]*x*(a + b*ArcCsch[c*x]))/c + (x^2*(a + b*ArcCsch[c*
x])^2)/2 + (b^2*Log[x])/c^2
```

Rule 3475

```
Int[tan[(c_.) + (d_.)*(x_)], x_Symbol] :> -Simp[Log[RemoveContent[Cos[c + d
*x], x]]/d, x] /; FreeQ[{c, d}, x]
```

Rule 4184

```
Int[csc[(e_.) + (f_.)*(x_)]^2*((c_.) + (d_.)*(x_))^(m_.), x_Symbol] :> -Sim
p[((c + d*x)^m*Cot[e + f*x])/f, x] + Dist[(d*m)/f, Int[(c + d*x)^(m - 1)*Co
t[e + f*x], x], x] /; FreeQ[{c, d, e, f}, x] && GtQ[m, 0]
```

Rule 5452

```
Int[Coth[(a_.) + (b_.)*(x_)]^(p_.)*Csch[(a_.) + (b_.)*(x_)]^(n_.)*((c_.) +
(d_.)*(x_))^(m_.), x_Symbol] :> -Simp[((c + d*x)^m*Csch[a + b*x]^n)/(b*n),
x] + Dist[(d*m)/(b*n), Int[(c + d*x)^(m - 1)*Csch[a + b*x]^n, x], x] /; Fre
eQ[{a, b, c, d, n}, x] && EqQ[p, 1] && GtQ[m, 0]
```

Rule 6286

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))^(n_)*(x_)^(m_.), x_Symbol] :> -Dist
[(c^(m + 1))^(-1), Subst[Int[(a + b*x)^n*Csch[x]^(m + 1)*Coth[x], x], x, Ar
cCsch[c*x]], x] /; FreeQ[{a, b, c}, x] && IntegerQ[n] && IntegerQ[m] && (Gt
Q[n, 0] || LtQ[m, -1])
```

Rubi steps

$$\int x\left(a+b\text{csch}^{-1}(cx)\right)^2\,dx=-\frac{\text{Subst}\left(\int(a+bx)^2\coth(x)\text{csch}^2(x)\,dx,x,\text{csch}^{-1}(cx)\right)}{c^2}$$
$$=\frac{1}{2}x^2\left(a+b\text{csch}^{-1}(cx)\right)^2-\frac{b\,\text{Subst}\left(\int(a+bx)\text{csch}^2(x)\,dx,x,\text{csch}^{-1}(cx)\right)}{c^2}$$
$$=\frac{b\sqrt{1+\frac{1}{c^2x^2}}\,x\left(a+b\text{csch}^{-1}(cx)\right)}{c}+\frac{1}{2}x^2\left(a+b\text{csch}^{-1}(cx)\right)^2-\frac{b^2\,\text{Subst}\left(\int\coth(x)\,d\right.}{c^2}$$
$$=\frac{b\sqrt{1+\frac{1}{c^2x^2}}\,x\left(a+b\text{csch}^{-1}(cx)\right)}{c}+\frac{1}{2}x^2\left(a+b\text{csch}^{-1}(cx)\right)^2+\frac{b^2\log(x)}{c^2}$$

**Mathematica [A]** time = 0.14, size = 87, normalized size = 1.61

$$\frac{acx\left(acx+2b\sqrt{\frac{1}{c^2x^2}+1}\right)+2bcx\text{csch}^{-1}(cx)\left(acx+b\sqrt{\frac{1}{c^2x^2}+1}\right)+b^2c^2x^2\text{csch}^{-1}(cx)^2+2b^2\log(cx)}{2c^2}$$

Antiderivative was successfully verified.

```
[In] Integrate[x*(a + b*ArcCsch[c*x])^2,x]
```

```
[Out] (a*c*x*(2*b*Sqrt[1 + 1/(c^2*x^2)] + a*c*x) + 2*b*c*x*(b*Sqrt[1 + 1/(c^2*x^2
)] + a*c*x)*ArcCsch[c*x] + b^2*c^2*x^2*ArcCsch[c*x]^2 + 2*b^2*Log[c*x])/(2*
c^2)
```

**fricas [B]** time = 0.78, size = 234, normalized size = 4.33

$$\frac{b^2c^2x^2\log\left(\frac{cx\sqrt{\frac{c^2x^2+1}{c^2x^2}}+1}{cx}\right)^2+a^2c^2x^2+2\,abc^2\log\left(cx\sqrt{\frac{c^2x^2+1}{c^2x^2}}-cx+1\right)-2\,abc^2\log\left(cx\sqrt{\frac{c^2x^2+1}{c^2x^2}}-cx-1\right)+2\,ab}{2\,c^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*(a+b*arccsch(c*x))^2,x, algorithm="fricas")
```

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

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

$$\int (b \operatorname{arcsch}(cx) + a)^2 x \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*(a+b*arccsch(c*x))^2,x, algorithm="giac")
```

```
[Out] integrate((b*arccsch(c*x) + a)^2*x, x)
```

**maple [F]** time = 0.06, size = 0, normalized size = 0.00

$$\int x (a + b \operatorname{arccsch}(cx))^2 \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x*(a+b*arccsch(c*x))^2,x)
```

```
[Out] int(x*(a+b*arccsch(c*x))^2,x)
```

**maxima [A]** time = 0.36, size = 82, normalized size = 1.52

$$\frac{1}{2} b^2 x^2 \operatorname{arcsch}(cx)^2 + \frac{1}{2} a^2 x^2 + \left( x^2 \operatorname{arcsch}(cx) + \frac{x\sqrt{\frac{1}{c^2x^2} + 1}}{c} \right) ab + \left( \frac{x\sqrt{\frac{1}{c^2x^2} + 1} \operatorname{arcsch}(cx)}{c} + \frac{\log(x)}{c^2} \right) b^2$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*(a+b*arccsch(c*x))^2,x, algorithm="maxima")
```

```
[Out] 1/2*b^2*x^2*arccsch(c*x)^2 + 1/2*a^2*x^2 + (x^2*arccsch(c*x) + x*sqrt(1/(c^
2*x^2) + 1)/c)*a*b + (x*sqrt(1/(c^2*x^2) + 1)*arccsch(c*x)/c + log(x)/c^2)*
b^2
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.02

$$\int x \left( a + b \operatorname{asinh}\left( \frac{1}{c\,x} \right) \right)^2 dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x*(a + b*asinh(1/(c*x)))^2,x)
[Out] int(x*(a + b*asinh(1/(c*x)))^2, x)
```

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

$$\int x (a + b \operatorname{acsch}(cx))^2 \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*(a+b*acsch(c*x))**2,x)
[Out] Integral(x*(a + b*acsch(c*x))**2, x)
```

# 3.18 $\int \left(a+b\,\text{csch}^{-1}(cx)\right)^2\,dx$

**Optimal**. Leaf size=68

$$x\left(a+b\,\text{csch}^{-1}(cx)\right)^2+\frac{4b\tanh^{-1}\left(e^{\text{csch}^{-1}(cx)}\right)\left(a+b\,\text{csch}^{-1}(cx)\right)}{c}+\frac{2b^2\text{Li}_2\left(-e^{\text{csch}^{-1}(cx)}\right)}{c}-\frac{2b^2\text{Li}_2\left(e^{\text{csch}^{-1}(cx)}\right)}{c}$$

```
[Out] x*(a+b*arccsch(c*x))^2+4*b*(a+b*arccsch(c*x))*arctanh(1/c/x+(1+1/c^2/x^2)^(
1/2))/c+2*b^2*polylog(2,-1/c/x-(1+1/c^2/x^2)^(1/2))/c-2*b^2*polylog(2,1/c/x
+(1+1/c^2/x^2)^(1/2))/c
```

**Rubi** [A] time = 0.07, antiderivative size = 68, 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 = {6280, 5452, 4182, 2279, 2391}

$$\frac{2b^2\text{PolyLog}\left(2,-e^{\text{csch}^{-1}(cx)}\right)}{c}-\frac{2b^2\text{PolyLog}\left(2,e^{\text{csch}^{-1}(cx)}\right)}{c}+x\left(a+b\,\text{csch}^{-1}(cx)\right)^2+\frac{4b\tanh^{-1}\left(e^{\text{csch}^{-1}(cx)}\right)\left(a+b\text{csc}\right.}{c}$$

Antiderivative was successfully verified.

```
[In] Int[(a + b*ArcCsch[c*x])^2,x]
```

```
[Out] x*(a + b*ArcCsch[c*x])^2 + (4*b*(a + b*ArcCsch[c*x])*ArcTanh[E^ArcCsch[c*x]
])/c + (2*b^2*PolyLog[2, -E^ArcCsch[c*x]])/c - (2*b^2*PolyLog[2, E^ArcCsch[
c*x]])/c
```

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 5452

```
Int[Coth[(a_.) + (b_.)*(x_)]^(p_.)*Csch[(a_.) + (b_.)*(x_)]^(n_.)*((c_.) +
(d_.)*(x_))^(m_.), x_Symbol] :> -Simp[((c + d*x)^m*Csch[a + b*x]^n)/(b*n),
x] + Dist[(d*m)/(b*n), Int[(c + d*x)^(m - 1)*Csch[a + b*x]^n, x], x] /; Fre
eQ[{a, b, c, d, n}, x] && EqQ[p, 1] && GtQ[m, 0]
```

Rule 6280

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))^(n_), x_Symbol] :> -Dist[c^(-1), Su
bst[Int[(a + b*x)^n*Csch[x]*Coth[x], x], x, ArcCsch[c*x]], x] /; FreeQ[{a,
b, c, n}, x] && IGtQ[n, 0]
```

Rubi steps

$$\int \left(a+b\text{csch}^{-1}(cx)\right)^2\,dx=-\frac{\text{Subst}\left(\int (a+bx)^2\coth(x)\text{csch}(x)\,dx,x,\text{csch}^{-1}(cx)\right)}{c}$$

$$=x\left(a+b\text{csch}^{-1}(cx)\right)^2-\frac{(2b)\,\text{Subst}\left(\int (a+bx)\text{csch}(x)\,dx,x,\text{csch}^{-1}(cx)\right)}{c}$$

$$=x\left(a+b\text{csch}^{-1}(cx)\right)^2+\frac{4b\left(a+b\text{csch}^{-1}(cx)\right)\tanh^{-1}\left(e^{\text{csch}^{-1}(cx)}\right)}{c}+\frac{\left(2b^2\right)\text{Subst}\left(\int \text{l}\right.}{}$$

$$=x\left(a+b\text{csch}^{-1}(cx)\right)^2+\frac{4b\left(a+b\text{csch}^{-1}(cx)\right)\tanh^{-1}\left(e^{\text{csch}^{-1}(cx)}\right)}{c}+\frac{\left(2b^2\right)\text{Subst}\left(\int \right.}{}$$

$$=x\left(a+b\text{csch}^{-1}(cx)\right)^2+\frac{4b\left(a+b\text{csch}^{-1}(cx)\right)\tanh^{-1}\left(e^{\text{csch}^{-1}(cx)}\right)}{c}+\frac{2b^2\text{Li}_2\left(-e^{\text{csch}^{-1}(\right.}{c}$$

**Mathematica [A]** time = 0.24, size = 121, normalized size = 1.78

$$\frac{a^2cx+2abcx\text{csch}^{-1}(cx)-2ab\log\left(\tanh\left(\frac{1}{2}\text{csch}^{-1}(cx)\right)\right)-2b^2\text{Li}_2\left(-e^{-\text{csch}^{-1}(cx)}\right)+2b^2\text{Li}_2\left(e^{-\text{csch}^{-1}(cx)}\right)+b^2cx\text{cs}}{c}$$

Warning: Unable to verify antiderivative.

```
[In] Integrate[(a + b*ArcCsch[c*x])^2,x]
```

```
[Out] (a^2*c*x + 2*a*b*c*x*ArcCsch[c*x] + b^2*c*x*ArcCsch[c*x]^2 - 2*b^2*ArcCsch[
c*x]*Log[1 - E^(-ArcCsch[c*x])] + 2*b^2*ArcCsch[c*x]*Log[1 + E^(-ArcCsch[c*
x])] - 2*a*b*Log[Tanh[ArcCsch[c*x]/2]] - 2*b^2*PolyLog[2, -E^(-ArcCsch[c*x]
)] + 2*b^2*PolyLog[2, E^(-ArcCsch[c*x])])/c
```

**fricas [F]** time = 2.26, size = 0, normalized size = 0.00

$$\text{integral}\left(b^2 \operatorname{arcsch}(cx)^2 + 2\,ab \operatorname{arcsch}(cx) + a^2, x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))^2,x, algorithm="fricas")
[Out] integral(b^2*arccsch(c*x)^2 + 2*a*b*arccsch(c*x) + a^2, x)
```

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

$$\int (b \operatorname{arcsch}(cx) + a)^2\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))^2,x, algorithm="giac")
[Out] integrate((b*arccsch(c*x) + a)^2, x)
```

**maple [F]** time = 0.05, size = 0, normalized size = 0.00

$$\int (a + b \operatorname{arccsch}(cx))^2\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a+b*arccsch(c*x))^2,x)
[Out] int((a+b*arccsch(c*x))^2,x)
```

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

$$\left(x\log\left(\sqrt{c^2x^2+1}+1\right)^2 - \int -\frac{c^2x^2\log(c)^2 + \left(c^2x^2+1\right)\log(x)^2 + \log(c)^2 + 2\left(c^2x^2\log(c)+\log(c)\right)\log(x) - 2\left(c\right.}{}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))^2,x, algorithm="maxima")
[Out] (x*log(sqrt(c^2*x^2 + 1) + 1)^2 - integrate(-(c^2*x^2*log(c)^2 + (c^2*x^2 +
 1)*log(x)^2 + log(c)^2 + 2*(c^2*x^2*log(c) + log(c))*log(x) - 2*(c^2*x^2*l
og(c) + (c^2*x^2 + 1)*log(x) + (c^2*x^2*(log(c) + 1) + (c^2*x^2 + 1)*log(x)
 + log(c))*sqrt(c^2*x^2 + 1) + log(c))*log(sqrt(c^2*x^2 + 1) + 1) + (c^2*x^
2*log(c)^2 + (c^2*x^2 + 1)*log(x)^2 + log(c)^2 + 2*(c^2*x^2*log(c) + log(c)
```

```
)*log(x))*sqrt(c^2*x^2 + 1))/(c^2*x^2 + (c^2*x^2 + 1)^(3/2) + 1), x))*b^2 +
 a^2*x + (2*c*x*arccsch(c*x) + log(sqrt(1/(c^2*x^2) + 1) + 1) - log(sqrt(1/
(c^2*x^2) + 1) - 1))*a*b/c
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.01

$$\int \left(a+b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)\right)^2\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a + b*asinh(1/(c*x)))^2,x)
```

```
[Out] int((a + b*asinh(1/(c*x)))^2, x)
```

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

$$\int \left(a+b\,\mathrm{acsch}\,(cx)\right)^2\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*acsch(c*x))**2,x)
```

```
[Out] Integral((a + b*acsch(c*x))**2, x)
```

# 3.19 $\int \frac{\left(a+b\,\mathrm{csch}^{-1}(cx)\right)^2}{x}\,dx$

**Optimal**. Leaf size=81

$$-b\mathrm{Li}_2\left(e^{2\mathrm{csch}^{-1}(cx)}\right)\left(a+b\mathrm{csch}^{-1}(cx)\right)+\frac{\left(a+b\mathrm{csch}^{-1}(cx)\right)^3}{3b}-\log\left(1-e^{2\mathrm{csch}^{-1}(cx)}\right)\left(a+b\mathrm{csch}^{-1}(cx)\right)^2+\frac{1}{2}b^2\mathrm{Li}_3\left(e^{2\mathrm{csc}}\right.$$

```
[Out] 1/3*(a+b*arccsch(c*x))^3/b-(a+b*arccsch(c*x))^2*ln(1-(1/c/x+(1+1/c^2/x^2)^(
1/2))^2)-b*(a+b*arccsch(c*x))*polylog(2,(1/c/x+(1+1/c^2/x^2)^(1/2))^2)+1/2*
b^2*polylog(3,(1/c/x+(1+1/c^2/x^2)^(1/2))^2)
```

**Rubi [A]** time = 0.14, antiderivative size = 81, 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 = {6286, 3716, 2190, 2531, 2282, 6589}

$$-b\mathrm{PolyLog}\left(2,e^{2\mathrm{csch}^{-1}(cx)}\right)\left(a+b\mathrm{csch}^{-1}(cx)\right)+\frac{1}{2}b^2\mathrm{PolyLog}\left(3,e^{2\mathrm{csch}^{-1}(cx)}\right)+\frac{\left(a+b\mathrm{csch}^{-1}(cx)\right)^3}{3b}-\log\left(1-e^{2\mathrm{csch}^{-1}}\right.$$

Antiderivative was successfully verified.

```
[In] Int[(a + b*ArcCsch[c*x])^2/x,x]
```

```
[Out] (a + b*ArcCsch[c*x])^3/(3*b) - (a + b*ArcCsch[c*x])^2*Log[1 - E^(2*ArcCsch[
c*x])] - b*(a + b*ArcCsch[c*x])*PolyLog[2, E^(2*ArcCsch[c*x])] + (b^2*PolyL
og[3, E^(2*ArcCsch[c*x])])/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 3716

```
Int[((c_.) + (d_.)*(x_))^(m_.)*tan[(e_.) + Pi*(k_.) + (Complex[0, fz_])*(f_
.)*(x_)], x_Symbol] :> -Simp[(I*(c + d*x)^(m + 1))/(d*(m + 1)), x] + Dist[2
*I, Int[((c + d*x)^m*E^(2*(-(I*e) + f*fz*x)))/(E^(2*I*k*Pi)*(1 + E^(2*(-(I*
e) + f*fz*x))/E^(2*I*k*Pi))), x], x] /; FreeQ[{c, d, e, f, fz}, x] && Integ
erQ[4*k] && IGtQ[m, 0]
```

Rule 6286

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))^(n_)*(x_)^(m_.), x_Symbol] :> -Dist
[(c^(m + 1))^(-1), Subst[Int[(a + b*x)^n*Csch[x]^(m + 1)*Coth[x], x], x, Ar
cCsch[c*x]], x] /; FreeQ[{a, b, c}, x] && IntegerQ[n] && IntegerQ[m] && (Gt
Q[n, 0] || LtQ[m, -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

$$\int \frac{\left(a+b\operatorname{csch}^{-1}(cx)\right)^2}{x}\,dx = -\operatorname{Subst}\left(\int (a+bx)^2\coth(x)\,dx, x, \operatorname{csch}^{-1}(cx)\right)$$
$$= \frac{\left(a+b\operatorname{csch}^{-1}(cx)\right)^3}{3b} + 2\operatorname{Subst}\left(\int \frac{e^{2x}(a+bx)^2}{1-e^{2x}}\,dx, x, \operatorname{csch}^{-1}(cx)\right)$$
$$= \frac{\left(a+b\operatorname{csch}^{-1}(cx)\right)^3}{3b} - \left(a+b\operatorname{csch}^{-1}(cx)\right)^2\log\left(1-e^{2\operatorname{csch}^{-1}(cx)}\right) + (2b)\operatorname{Subst}\left(\int (a+b$$
$$= \frac{\left(a+b\operatorname{csch}^{-1}(cx)\right)^3}{3b} - \left(a+b\operatorname{csch}^{-1}(cx)\right)^2\log\left(1-e^{2\operatorname{csch}^{-1}(cx)}\right) - b\left(a+b\operatorname{csch}^{-1}(cx)\right)\mathrm{L}$$
$$= \frac{\left(a+b\operatorname{csch}^{-1}(cx)\right)^3}{3b} - \left(a+b\operatorname{csch}^{-1}(cx)\right)^2\log\left(1-e^{2\operatorname{csch}^{-1}(cx)}\right) - b\left(a+b\operatorname{csch}^{-1}(cx)\right)\mathrm{L}$$
$$= \frac{\left(a+b\operatorname{csch}^{-1}(cx)\right)^3}{3b} - \left(a+b\operatorname{csch}^{-1}(cx)\right)^2\log\left(1-e^{2\operatorname{csch}^{-1}(cx)}\right) - b\left(a+b\operatorname{csch}^{-1}(cx)\right)\mathrm{L}$$

**Mathematica [A]** time = 0.13, size = 115, normalized size = 1.42

$$a^2\log(cx)+ab\left(\operatorname{Li}_2\left(e^{-2\operatorname{csch}^{-1}(cx)}\right)-\operatorname{csch}^{-1}(cx)\left(\operatorname{csch}^{-1}(cx)+2\log\left(1-e^{-2\operatorname{csch}^{-1}(cx)}\right)\right)\right)+b^2\left(-\operatorname{csch}^{-1}(cx)\operatorname{Li}_2\left(e^{2\operatorname{csch}}\right.\right.$$

Warning: Unable to verify antiderivative.

```
[In] Integrate[(a + b*ArcCsch[c*x])^2/x,x]
```

```
[Out] a^2*Log[c*x] + a*b*(-(ArcCsch[c*x]*(ArcCsch[c*x] + 2*Log[1 - E^(-2*ArcCsch[
c*x])])) + PolyLog[2, E^(-2*ArcCsch[c*x])]) + b^2*(ArcCsch[c*x]^3/3 - ArcCs
ch[c*x]^2*Log[1 - E^(2*ArcCsch[c*x])] - ArcCsch[c*x]*PolyLog[2, E^(2*ArcCsc
h[c*x])] + PolyLog[3, E^(2*ArcCsch[c*x])]/2)
```

**fricas [F]** time = 0.53, size = 0, normalized size = 0.00

$$\operatorname{integral}\left(\frac{b^2\operatorname{arcsch}(cx)^2+2\,ab\operatorname{arcsch}(cx)+a^2}{x}, x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))^2/x,x, algorithm="fricas")
```

```
[Out] integral((b^2*arccsch(c*x)^2 + 2*a*b*arccsch(c*x) + a^2)/x, x)
```

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

$$\int \frac{(b \operatorname{arcsch}(cx) + a)^2}{x}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))^2/x,x, algorithm="giac")
```

```
[Out] integrate((b*arccsch(c*x) + a)^2/x, x)
```

**maple [F]** time = 0.05, size = 0, normalized size = 0.00

$$\int \frac{(a + b \operatorname{arccsch}(cx))^2}{x}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a+b*arccsch(c*x))^2/x,x)
```

```
[Out] int((a+b*arccsch(c*x))^2/x,x)
```

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

$$b^2 \log(x) \log\left(\sqrt{c^2x^2+1}+1\right)^2 + a^2 \log(x) - \int -\frac{b^2 \log(c)^2 + \left(b^2c^2 \log(c)^2 - 2\,abc^2 \log(c)\right)x^2 - 2\,ab \log(c) + \left(b^2c\right.}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))^2/x,x, algorithm="maxima")
```

```
[Out] b^2*log(x)*log(sqrt(c^2*x^2 + 1) + 1)^2 + a^2*log(x) - integrate(-(b^2*log(
c)^2 + (b^2*c^2*log(c)^2 - 2*a*b*c^2*log(c))*x^2 - 2*a*b*log(c) + (b^2*c^2*
x^2 + b^2)*log(x)^2 + 2*((b^2*c^2*log(c) - a*b*c^2)*x^2 + b^2*log(c) - a*b)
*log(x) - 2*((b^2*c^2*log(c) - a*b*c^2)*x^2 + b^2*log(c) - a*b + (b^2*c^2*x
^2 + b^2)*log(x) + sqrt(c^2*x^2 + 1)*((b^2*c^2*log(c) - a*b*c^2)*x^2 + b^2*
log(c) - a*b + (2*b^2*c^2*x^2 + b^2)*log(x)))*log(sqrt(c^2*x^2 + 1) + 1) +
sqrt(c^2*x^2 + 1)*(b^2*log(c)^2 + (b^2*c^2*log(c)^2 - 2*a*b*c^2*log(c))*x^2
 - 2*a*b*log(c) + (b^2*c^2*x^2 + b^2)*log(x)^2 + 2*((b^2*c^2*log(c) - a*b*c
^2)*x^2 + b^2*log(c) - a*b)*log(x)))/(c^2*x^3 + (c^2*x^3 + x)*sqrt(c^2*x^2
+ 1) + x), x)
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.01

$$\int \frac{\left(a + b \operatorname{asinh}\left(\frac{1}{c\,x}\right)\right)^2}{x}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a + b*asinh(1/(c*x)))^2/x,x)
```

```
[Out] int((a + b*asinh(1/(c*x)))^2/x, x)
```

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

$$\int \frac{(a + b\operatorname{acsch}(cx))^2}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*acsch(c*x))**2/x,x)
```

```
[Out] Integral((a + b*acsch(c*x))**2/x, x)
```

## 3.20 $\int \frac{\left(a+b\,\mathrm{csch}^{-1}(cx)\right)^2}{x^2}\,dx$

**Optimal**. Leaf size=49

$$2bc\sqrt{\frac{1}{c^2x^2}+1}\left(a+b\,\mathrm{csch}^{-1}(cx)\right)-\frac{\left(a+b\,\mathrm{csch}^{-1}(cx)\right)^2}{x}-\frac{2b^2}{x}$$

```
[Out] -2*b^2/x-(a+b*arccsch(c*x))^2/x+2*b*c*(a+b*arccsch(c*x))*(1+1/c^2/x^2)^(1/2
)
```

**Rubi [A]** time = 0.07, antiderivative size = 49, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 3, integrand size = 14, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.214, Rules used = {6286, 3296, 2637}

$$2bc\sqrt{\frac{1}{c^2x^2}+1}\left(a+b\,\mathrm{csch}^{-1}(cx)\right)-\frac{\left(a+b\,\mathrm{csch}^{-1}(cx)\right)^2}{x}-\frac{2b^2}{x}$$

Antiderivative was successfully verified.

```
[In] Int[(a + b*ArcCsch[c*x])^2/x^2,x]
```

```
[Out] (-2*b^2)/x + 2*b*c*Sqrt[1 + 1/(c^2*x^2)]*(a + b*ArcCsch[c*x]) - (a + b*ArcC
sch[c*x])^2/x
```

Rule 2637

```
Int[sin[Pi/2 + (c_.) + (d_.)*(x_)], x_Symbol] :> Simp[Sin[c + d*x]/d, x] /;
 FreeQ[{c, d}, x]
```

Rule 3296

```
Int[((c_.) + (d_.)*(x_))^(m_.)*sin[(e_.) + (f_.)*(x_)], x_Symbol] :> -Simp[
((c + d*x)^m*Cos[e + f*x])/f, x] + Dist[(d*m)/f, Int[(c + d*x)^(m - 1)*Cos[
e + f*x], x], x] /; FreeQ[{c, d, e, f}, x] && GtQ[m, 0]
```

Rule 6286

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))^(n_)*(x_)^(m_.), x_Symbol] :> -Dist
[(c^(m + 1))^(-1), Subst[Int[(a + b*x)^n*Csch[x]^(m + 1)*Coth[x], x], x, Ar
cCsch[c*x]], x] /; FreeQ[{a, b, c}, x] && IntegerQ[n] && IntegerQ[m] && (Gt
Q[n, 0] || LtQ[m, -1])
```

Rubi steps

$$\int \frac{\left(a+b\text{csch}^{-1}(cx)\right)^2}{x^2}\,dx = -\left(c\,\text{Subst}\left(\int (a+bx)^2\cosh(x)\,dx, x, \text{csch}^{-1}(cx)\right)\right)$$
$$= -\frac{\left(a+b\text{csch}^{-1}(cx)\right)^2}{x} + (2bc)\,\text{Subst}\left(\int (a+bx)\sinh(x)\,dx, x, \text{csch}^{-1}(cx)\right)$$
$$= 2bc\sqrt{1+\frac{1}{c^2x^2}}\left(a+b\text{csch}^{-1}(cx)\right) - \frac{\left(a+b\text{csch}^{-1}(cx)\right)^2}{x} - \left(2b^2c\right)\text{Subst}\left(\int \cosh(x)\,d$$
$$= -\frac{2b^2}{x} + 2bc\sqrt{1+\frac{1}{c^2x^2}}\left(a+b\text{csch}^{-1}(cx)\right) - \frac{\left(a+b\text{csch}^{-1}(cx)\right)^2}{x}$$

**Mathematica [A]** time = 0.17, size = 70, normalized size = 1.43

$$-\frac{a^2 - 2abcx\sqrt{\frac{1}{c^2x^2}+1} + 2b\text{csch}^{-1}(cx)\left(a - bcx\sqrt{\frac{1}{c^2x^2}+1}\right) + b^2\text{csch}^{-1}(cx)^2 + 2b^2}{x}$$

Antiderivative was successfully verified.

```
[In] Integrate[(a + b*ArcCsch[c*x])^2/x^2,x]
```

```
[Out] -((a^2 + 2*b^2 - 2*a*b*c*Sqrt[1 + 1/(c^2*x^2)]*x + 2*b*(a - b*c*Sqrt[1 + 1/
(c^2*x^2)]*x)*ArcCsch[c*x] + b^2*ArcCsch[c*x]^2)/x)
```

**fricas [B]** time = 1.07, size = 139, normalized size = 2.84

$$\frac{2\,abcx\sqrt{\frac{c^2x^2+1}{c^2x^2}} - b^2\log\left(\frac{cx\sqrt{\frac{c^2x^2+1}{c^2x^2}}+1}{cx}\right)^2 - a^2 - 2\,b^2 + 2\left(b^2cx\sqrt{\frac{c^2x^2+1}{c^2x^2}} - ab\right)\log\left(\frac{cx\sqrt{\frac{c^2x^2+1}{c^2x^2}}+1}{cx}\right)}{x}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))^2/x^2,x, algorithm="fricas")
```

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

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

$$\int \frac{\left(b\,\text{arcsch}\left(cx\right)+a\right)^2}{x^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))^2/x^2,x, algorithm="giac")
[Out] integrate((b*arccsch(c*x) + a)^2/x^2, x)
```

**maple [F]** time = 0.07, size = 0, normalized size = 0.00

$$\int \frac{(a + b \operatorname{arccsch}(cx))^2}{x^2}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a+b*arccsch(c*x))^2/x^2,x)
[Out] int((a+b*arccsch(c*x))^2/x^2,x)
```

**maxima [A]** time = 0.33, size = 78, normalized size = 1.59

$$2\left(c\sqrt{\frac{1}{c^2x^2}+1} - \frac{\operatorname{arcsch}(cx)}{x}\right)ab + 2\left(c\sqrt{\frac{1}{c^2x^2}+1}\operatorname{arcsch}(cx) - \frac{1}{x}\right)b^2 - \frac{b^2\operatorname{arcsch}(cx)^2}{x} - \frac{a^2}{x}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))^2/x^2,x, algorithm="maxima")
[Out] 2*(c*sqrt(1/(c^2*x^2) + 1) - arccsch(c*x)/x)*a*b + 2*(c*sqrt(1/(c^2*x^2) +
1)*arccsch(c*x) - 1/x)*b^2 - b^2*arccsch(c*x)^2/x - a^2/x
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.02

$$\int \frac{\left(a + b\operatorname{asinh}\left(\frac{1}{c\,x}\right)\right)^2}{x^2}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a + b*asinh(1/(c*x)))^2/x^2,x)
[Out] int((a + b*asinh(1/(c*x)))^2/x^2, x)
```

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

$$\int \frac{(a + b\operatorname{acsch}(cx))^2}{x^2}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*acsch(c*x))**2/x**2,x)
[Out] Integral((a + b*acsch(c*x))**2/x**2, x)
```

# 3.21 $\int \frac{\left(a+b\,\text{csch}^{-1}(cx)\right)^2}{x^3}\,dx$

**Optimal**. Leaf size=87

$$\frac{bc\sqrt{\frac{1}{c^2x^2}+1}\left(a+b\,\text{csch}^{-1}(cx)\right)}{2x}-\frac{1}{2}abc^2\text{csch}^{-1}(cx)-\frac{\left(a+b\,\text{csch}^{-1}(cx)\right)^2}{2x^2}-\frac{1}{4}b^2c^2\text{csch}^{-1}(cx)^2-\frac{b^2}{4x^2}$$

```
[Out] -1/4*b^2/x^2-1/2*a*b*c^2*arccsch(c*x)-1/4*b^2*c^2*arccsch(c*x)^2-1/2*(a+b*a
rccsch(c*x))^2/x^2+1/2*b*c*(a+b*arccsch(c*x))*(1+1/c^2/x^2)^(1/2)/x
```

**Rubi [A]** time = 0.08, antiderivative size = 87, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 3, integrand size = 14, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.214, Rules used = {6286, 5446, 3310}

$$\frac{bc\sqrt{\frac{1}{c^2x^2}+1}\left(a+b\,\text{csch}^{-1}(cx)\right)}{2x}-\frac{1}{2}abc^2\text{csch}^{-1}(cx)-\frac{\left(a+b\,\text{csch}^{-1}(cx)\right)^2}{2x^2}-\frac{1}{4}b^2c^2\text{csch}^{-1}(cx)^2-\frac{b^2}{4x^2}$$

Antiderivative was successfully verified.

```
[In] Int[(a + b*ArcCsch[c*x])^2/x^3,x]
```

```
[Out] -b^2/(4*x^2) - (a*b*c^2*ArcCsch[c*x])/2 - (b^2*c^2*ArcCsch[c*x]^2)/4 + (b*c
*Sqrt[1 + 1/(c^2*x^2)]*(a + b*ArcCsch[c*x]))/(2*x) - (a + b*ArcCsch[c*x])^2
/(2*x^2)
```

Rule 3310

```
Int[((c_.) + (d_.)*(x_))*((b_.)*sin[(e_.) + (f_.)*(x_)])^(n_), x_Symbol] :>
 Simp[(d*(b*Sin[e + f*x])^n)/(f^2*n^2), x] + (Dist[(b^2*(n - 1))/n, Int[(c
+ d*x)*(b*Sin[e + f*x])^(n - 2), x], x] - Simp[(b*(c + d*x)*Cos[e + f*x]*(b
*Sin[e + f*x])^(n - 1))/(f*n), x]) /; FreeQ[{b, c, d, e, f}, x] && GtQ[n, 1
]
```

Rule 5446

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

Rule 6286

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))^(n_)*(x_)^(m_.), x_Symbol] :> -Dist
[(c^(m + 1))^(-1), Subst[Int[(a + b*x)^n*Csch[x]^(m + 1)*Coth[x], x], x, Ar
```

```
cCsch[c*x]], x] /; FreeQ[{a, b, c}, x] && IntegerQ[n] && IntegerQ[m] && (Gt
Q[n, 0] || LtQ[m, -1])
```

Rubi steps

$$\int \frac{\left(a+b\text{csch}^{-1}(cx)\right)^2}{x^3}\,dx = -\left(c^2\,\text{Subst}\left(\int (a+bx)^2\cosh(x)\sinh(x)\,dx, x, \text{csch}^{-1}(cx)\right)\right)$$
$$= -\frac{\left(a+b\text{csch}^{-1}(cx)\right)^2}{2x^2} + \left(bc^2\right)\text{Subst}\left(\int (a+bx)\sinh^2(x)\,dx, x, \text{csch}^{-1}(cx)\right)$$
$$= -\frac{b^2}{4x^2} + \frac{bc\sqrt{1+\frac{1}{c^2x^2}}\left(a+b\text{csch}^{-1}(cx)\right)}{2x} - \frac{\left(a+b\text{csch}^{-1}(cx)\right)^2}{2x^2} - \frac{1}{2}\left(bc^2\right)\text{Subst}\left(\int (\right.$$
$$= -\frac{b^2}{4x^2} - \frac{1}{2}abc^2\text{csch}^{-1}(cx) - \frac{1}{4}b^2c^2\text{csch}^{-1}(cx)^2 + \frac{bc\sqrt{1+\frac{1}{c^2x^2}}\left(a+b\text{csch}^{-1}(cx)\right)}{2x} - \frac{(}{}$$

**Mathematica [A]** time = 0.14, size = 100, normalized size = 1.15

$$-\frac{2a^2 - 2abcx\sqrt{\frac{1}{c^2x^2}+1} + 2abc^2x^2\sinh^{-1}\left(\frac{1}{cx}\right) - 2b\text{csch}^{-1}(cx)\left(bcx\sqrt{\frac{1}{c^2x^2}+1} - 2a\right) + b^2\left(c^2x^2+2\right)\text{csch}^{-1}(cx)^2}{4x^2}$$

Antiderivative was successfully verified.

```
[In] Integrate[(a + b*ArcCsch[c*x])^2/x^3,x]
```

```
[Out] -1/4*(2*a^2 + b^2 - 2*a*b*c*Sqrt[1 + 1/(c^2*x^2)]*x - 2*b*(-2*a + b*c*Sqrt[
1 + 1/(c^2*x^2)]*x)*ArcCsch[c*x] + b^2*(2 + c^2*x^2)*ArcCsch[c*x]^2 + 2*a*b
*c^2*x^2*ArcSinh[1/(c*x)])/x^2
```

**fricas [B]** time = 0.67, size = 163, normalized size = 1.87

$$\frac{2\,abcx\sqrt{\frac{c^2x^2+1}{c^2x^2}} - \left(b^2c^2x^2+2\,b^2\right)\log\left(\frac{cx\sqrt{\frac{c^2x^2+1}{c^2x^2}}+1}{cx}\right)^2 - 2\,a^2 - b^2 - 2\left(abc^2x^2 - b^2cx\sqrt{\frac{c^2x^2+1}{c^2x^2}} + 2\,ab\right)\log\left(\frac{cx\sqrt{\frac{c^2x^2+}{c^2x}}}{cx}\right.}{4\,x^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))^2/x^3,x, algorithm="fricas")
```

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

```
^2 - b^2*c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) + 2*a*b)*log((c*x*sqrt((c^2*x^2
+ 1)/(c^2*x^2)) + 1)/(c*x)))/x^2
```

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

$$\int \frac{(b\operatorname{arcsch}(cx) + a)^2}{x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))^2/x^3,x, algorithm="giac")
```

```
[Out] integrate((b*arccsch(c*x) + a)^2/x^3, x)
```

**maple [F]** time = 0.06, size = 0, normalized size = 0.00

$$\int \frac{(a + b\operatorname{arccsch}(cx))^2}{x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a+b*arccsch(c*x))^2/x^3,x)
```

```
[Out] int((a+b*arccsch(c*x))^2/x^3,x)
```

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

$$\frac{1}{4}ab\left(\frac{\frac{2c^4x\sqrt{\frac{1}{c^2x^2}+1}}{c^2x^2\left(\frac{1}{c^2x^2}+1\right)-1} - c^3\log\left(cx\sqrt{\frac{1}{c^2x^2}+1}+1\right) + c^3\log\left(cx\sqrt{\frac{1}{c^2x^2}+1}-1\right)}{c} - \frac{4\operatorname{arcsch}(cx)}{x^2}\right) - \frac{1}{2}b^2\left(\frac{\log\left(\sqrt{c^2x^2+\cdots}\right.}{x^2}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))^2/x^3,x, algorithm="maxima")
```

```
[Out] 1/4*a*b*((2*c^4*x*sqrt(1/(c^2*x^2) + 1)/(c^2*x^2*(1/(c^2*x^2) + 1) - 1) - c
^3*log(c*x*sqrt(1/(c^2*x^2) + 1) + 1) + c^3*log(c*x*sqrt(1/(c^2*x^2) + 1) -
 1))/c - 4*arccsch(c*x)/x^2) - 1/2*b^2*(log(sqrt(c^2*x^2 + 1) + 1)^2/x^2 +
2*integrate(-(c^2*x^2*log(c)^2 + (c^2*x^2 + 1)*log(x)^2 + log(c)^2 + 2*(c^2
*x^2*log(c) + log(c))*log(x) - (2*c^2*x^2*log(c) + 2*(c^2*x^2 + 1)*log(x) +
 (c^2*x^2*(2*log(c) - 1) + 2*(c^2*x^2 + 1)*log(x) + 2*log(c))*sqrt(c^2*x^2
+ 1) + 2*log(c))*log(sqrt(c^2*x^2 + 1) + 1) + (c^2*x^2*log(c)^2 + (c^2*x^2
+ 1)*log(x)^2 + log(c)^2 + 2*(c^2*x^2*log(c) + log(c))*log(x))*sqrt(c^2*x^2
```

```
 + 1))/(c^2*x^5 + x^3 + (c^2*x^5 + x^3)*sqrt(c^2*x^2 + 1)), x)) - 1/2*a^2/x
^2
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.01

$$\int \frac{\left(a + b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)\right)^2}{x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a + b*asinh(1/(c*x)))^2/x^3,x)
[Out] int((a + b*asinh(1/(c*x)))^2/x^3, x)
```

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

$$\int \frac{(a + b\,\mathrm{acsch}\,(cx))^2}{x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*acsch(c*x))**2/x**3,x)
[Out] Integral((a + b*acsch(c*x))**2/x**3, x)
```

## 3.22 $\int \frac{\left(a+b\,\mathrm{csch}^{-1}(cx)\right)^2}{x^4}\,dx$

**Optimal**. Leaf size=100

$$\frac{2bc\sqrt{\frac{1}{c^2x^2}+1}\left(a+b\,\mathrm{csch}^{-1}(cx)\right)}{9x^2}-\frac{4}{9}bc^3\sqrt{\frac{1}{c^2x^2}+1}\left(a+b\,\mathrm{csch}^{-1}(cx)\right)-\frac{\left(a+b\,\mathrm{csch}^{-1}(cx)\right)^2}{3x^3}+\frac{4b^2c^2}{9x}-\frac{2b^2}{27x^3}$$

```
[Out] -2/27*b^2/x^3+4/9*b^2*c^2/x-1/3*(a+b*arccsch(c*x))^2/x^3-4/9*b*c^3*(a+b*arc
csch(c*x))*(1+1/c^2/x^2)^(1/2)+2/9*b*c*(a+b*arccsch(c*x))*(1+1/c^2/x^2)^(1/
2)/x^2
```

**Rubi [A]** time = 0.11, antiderivative size = 100, 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 = {6286, 5446, 3310, 3296, 2637}

$$-\frac{4}{9}bc^3\sqrt{\frac{1}{c^2x^2}+1}\left(a+b\,\mathrm{csch}^{-1}(cx)\right)+\frac{2bc\sqrt{\frac{1}{c^2x^2}+1}\left(a+b\,\mathrm{csch}^{-1}(cx)\right)}{9x^2}-\frac{\left(a+b\,\mathrm{csch}^{-1}(cx)\right)^2}{3x^3}+\frac{4b^2c^2}{9x}-\frac{2b^2}{27x^3}$$

Antiderivative was successfully verified.

```
[In] Int[(a + b*ArcCsch[c*x])^2/x^4,x]
```

```
[Out] (-2*b^2)/(27*x^3) + (4*b^2*c^2)/(9*x) - (4*b*c^3*Sqrt[1 + 1/(c^2*x^2)]*(a +
 b*ArcCsch[c*x]))/9 + (2*b*c*Sqrt[1 + 1/(c^2*x^2)]*(a + b*ArcCsch[c*x]))/(9
*x^2) - (a + b*ArcCsch[c*x])^2/(3*x^3)
```

Rule 2637

```
Int[sin[Pi/2 + (c_.) + (d_.)*(x_)], x_Symbol] :> Simp[Sin[c + d*x]/d, x] /;
 FreeQ[{c, d}, x]
```

Rule 3296

```
Int[((c_.) + (d_.)*(x_))^(m_.)*sin[(e_.) + (f_.)*(x_)], x_Symbol] :> -Simp[
((c + d*x)^m*Cos[e + f*x])/f, x] + Dist[(d*m)/f, Int[(c + d*x)^(m - 1)*Cos[
e + f*x], x], x] /; FreeQ[{c, d, e, f}, x] && GtQ[m, 0]
```

Rule 3310

```
Int[((c_.) + (d_.)*(x_))*((b_.)*sin[(e_.) + (f_.)*(x_)])^(n_), x_Symbol] :>
 Simp[(d*(b*Sin[e + f*x])^n)/(f^2*n^2), x] + (Dist[(b^2*(n - 1))/n, Int[(c
+ d*x)*(b*Sin[e + f*x])^(n - 2), x], x] - Simp[(b*(c + d*x)*Cos[e + f*x]*(b
*Sin[e + f*x])^(n - 1))/(f*n), x]) /; FreeQ[{b, c, d, e, f}, x] && GtQ[n, 1
```

```
]
```

Rule 5446

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

Rule 6286

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))^(n_)*(x_)^(m_.), x_Symbol] :> -Dist
[(c^(m + 1))^(-1), Subst[Int[(a + b*x)^n*Csch[x]^(m + 1)*Coth[x], x], x, Ar
cCsch[c*x]], x] /; FreeQ[{a, b, c}, x] && IntegerQ[n] && IntegerQ[m] && (Gt
Q[n, 0] || LtQ[m, -1])
```

Rubi steps

$$\begin{aligned}
\int \frac{\left(a+b\operatorname{csch}^{-1}(cx)\right)^2}{x^4}\,dx &= -\left(c^3\operatorname{Subst}\left(\int (a+bx)^2\cosh(x)\sinh^2(x)\,dx,x,\operatorname{csch}^{-1}(cx)\right)\right)\\
&= -\frac{\left(a+b\operatorname{csch}^{-1}(cx)\right)^2}{3x^3}+\frac{1}{3}\left(2bc^3\right)\operatorname{Subst}\left(\int (a+bx)\sinh^3(x)\,dx,x,\operatorname{csch}^{-1}(cx)\right)\\
&= -\frac{2b^2}{27x^3}+\frac{2bc\sqrt{1+\frac{1}{c^2x^2}}\left(a+b\operatorname{csch}^{-1}(cx)\right)}{9x^2}-\frac{\left(a+b\operatorname{csch}^{-1}(cx)\right)^2}{3x^3}-\frac{1}{9}\left(4bc^3\right)\operatorname{Subst}\Big(\\
&= -\frac{2b^2}{27x^3}-\frac{4}{9}bc^3\sqrt{1+\frac{1}{c^2x^2}}\left(a+b\operatorname{csch}^{-1}(cx)\right)+\frac{2bc\sqrt{1+\frac{1}{c^2x^2}}\left(a+b\operatorname{csch}^{-1}(cx)\right)}{9x^2}-\\
&= -\frac{2b^2}{27x^3}+\frac{4b^2c^2}{9x}-\frac{4}{9}bc^3\sqrt{1+\frac{1}{c^2x^2}}\left(a+b\operatorname{csch}^{-1}(cx)\right)+\frac{2bc\sqrt{1+\frac{1}{c^2x^2}}\left(a+b\operatorname{csch}^{-1}\right.}{9x^2}
\end{aligned}$$

**Mathematica [A]** time = 0.19, size = 106, normalized size = 1.06

$$\frac{-9a^2+6abcx\sqrt{\frac{1}{c^2x^2}+1}\left(1-2c^2x^2\right)-6b\operatorname{csch}^{-1}(cx)\left(3a+bcx\sqrt{\frac{1}{c^2x^2}+1}\left(2c^2x^2-1\right)\right)+2b^2\left(6c^2x^2-1\right)-9b^2\operatorname{csc}}{27x^3}$$

Antiderivative was successfully verified.

```
[In] Integrate[(a + b*ArcCsch[c*x])^2/x^4,x]
```

```
[Out] (-9*a^2 + 6*a*b*c*Sqrt[1 + 1/(c^2*x^2)]*x*(1 - 2*c^2*x^2) + 2*b^2*(-1 + 6*c
^2*x^2) - 6*b*(3*a + b*c*Sqrt[1 + 1/(c^2*x^2)]*x*(-1 + 2*c^2*x^2))*ArcCsch[
c*x] - 9*b^2*ArcCsch[c*x]^2)/(27*x^3)
```

**fricas [B]** time = 0.82, size = 178, normalized size = 1.78

$$\frac{12\,b^2c^2x^2 - 9\,b^2\log\left(\frac{cx\sqrt{\frac{c^2x^2+1}{c^2x^2}}+1}{cx}\right)^2 - 9\,a^2 - 2\,b^2 - 6\left(3\,ab + \left(2\,b^2c^3x^3 - b^2cx\right)\sqrt{\frac{c^2x^2+1}{c^2x^2}}\right)\log\left(\frac{cx\sqrt{\frac{c^2x^2+1}{c^2x^2}}+1}{cx}\right) - 6\left(2\,a\right.}{27\,x^3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))^2/x^4,x, algorithm="fricas")
```

```
[Out] 1/27*(12*b^2*c^2*x^2 - 9*b^2*log((c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) + 1)/(c
*x))^2 - 9*a^2 - 2*b^2 - 6*(3*a*b + (2*b^2*c^3*x^3 - b^2*c*x)*sqrt((c^2*x^2
 + 1)/(c^2*x^2)))*log((c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) + 1)/(c*x)) - 6*(2
*a*b*c^3*x^3 - a*b*c*x)*sqrt((c^2*x^2 + 1)/(c^2*x^2)))/x^3
```

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

$$\int \frac{(b\,\mathrm{arcsch}\,(cx) + a)^2}{x^4}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))^2/x^4,x, algorithm="giac")
```

```
[Out] integrate((b*arccsch(c*x) + a)^2/x^4, x)
```

**maple [F]** time = 0.05, size = 0, normalized size = 0.00

$$\int \frac{(a + b\,\mathrm{arccsch}\,(cx))^2}{x^4}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a+b*arccsch(c*x))^2/x^4,x)
```

```
[Out] int((a+b*arccsch(c*x))^2/x^4,x)
```

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

$$\frac{2}{9}\,ab\left(\frac{c^4\left(\frac{1}{c^2x^2}+1\right)^{\frac{3}{2}} - 3\,c^4\sqrt{\frac{1}{c^2x^2}+1}}{c} - \frac{3\,\mathrm{arcsch}\,(cx)}{x^3}\right) - \frac{1}{3}\,b^2\left(\frac{\log\left(\sqrt{c^2x^2+1}+1\right)^2}{x^3} + 3\int -\frac{3\,c^2x^2\log(c)^2 + 3\,(c^2\right.}{}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))^2/x^4,x, algorithm="maxima")
```

```
[Out] 2/9*a*b*((c^4*(1/(c^2*x^2) + 1)^(3/2) - 3*c^4*sqrt(1/(c^2*x^2) + 1))/c - 3*
arccsch(c*x)/x^3) - 1/3*b^2*(log(sqrt(c^2*x^2 + 1) + 1)^2/x^3 + 3*integrate
(-1/3*(3*c^2*x^2*log(c)^2 + 3*(c^2*x^2 + 1)*log(x)^2 + 3*log(c)^2 + 6*(c^2*
x^2*log(c) + log(c))*log(x) - 2*(3*c^2*x^2*log(c) + 3*(c^2*x^2 + 1)*log(x)
+ (c^2*x^2*(3*log(c) - 1) + 3*(c^2*x^2 + 1)*log(x) + 3*log(c))*sqrt(c^2*x^2
 + 1) + 3*log(c))*log(sqrt(c^2*x^2 + 1) + 1) + 3*(c^2*x^2*log(c)^2 + (c^2*x
^2 + 1)*log(x)^2 + log(c)^2 + 2*(c^2*x^2*log(c) + log(c))*log(x))*sqrt(c^2*
x^2 + 1))/(c^2*x^6 + x^4 + (c^2*x^6 + x^4)*sqrt(c^2*x^2 + 1)), x)) - 1/3*a^
2/x^3
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.01

$$\int \frac{\left(a+b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)\right)^2}{x^4}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a + b*asinh(1/(c*x)))^2/x^4,x)
```

```
[Out] int((a + b*asinh(1/(c*x)))^2/x^4, x)
```

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

$$\int \frac{(a+b\,\mathrm{acsch}\,(cx))^2}{x^4}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*acsch(c*x))**2/x**4,x)
```

```
[Out] Integral((a + b*acsch(c*x))**2/x**4, x)
```

# 3.23 $\int \frac{\left(a+b\,\mathbf{csch}^{-1}(cx)\right)^2}{x^5}\,dx$

**Optimal**. Leaf size=132

$$\frac{3}{16}abc^4\text{csch}^{-1}(cx)+\frac{bc\sqrt{\frac{1}{c^2x^2}+1}\left(a+b\text{csch}^{-1}(cx)\right)}{8x^3}-\frac{3bc^3\sqrt{\frac{1}{c^2x^2}+1}\left(a+b\text{csch}^{-1}(cx)\right)}{16x}-\frac{\left(a+b\text{csch}^{-1}(cx)\right)^2}{4x^4}+\frac{3}{32}b^2$$

```
[Out] -1/32*b^2/x^4+3/32*b^2*c^2/x^2+3/16*a*b*c^4*arccsch(c*x)+3/32*b^2*c^4*arccs
ch(c*x)^2-1/4*(a+b*arccsch(c*x))^2/x^4+1/8*b*c*(a+b*arccsch(c*x))*(1+1/c^2/
x^2)^(1/2)/x^3-3/16*b*c^3*(a+b*arccsch(c*x))*(1+1/c^2/x^2)^(1/2)/x
```

**Rubi [A]** time = 0.12, antiderivative size = 132, normalized size of antiderivative = 1.00, number of steps used = 5, number of rules used = 3, integrand size = 14, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.214, Rules used = {6286, 5446, 3310}

$$-\frac{3bc^3\sqrt{\frac{1}{c^2x^2}+1}\left(a+b\text{csch}^{-1}(cx)\right)}{16x}+\frac{bc\sqrt{\frac{1}{c^2x^2}+1}\left(a+b\text{csch}^{-1}(cx)\right)}{8x^3}+\frac{3}{16}abc^4\text{csch}^{-1}(cx)-\frac{\left(a+b\text{csch}^{-1}(cx)\right)^2}{4x^4}+\frac{3b}{32}$$

Antiderivative was successfully verified.

```
[In] Int[(a + b*ArcCsch[c*x])^2/x^5,x]
```

```
[Out] -b^2/(32*x^4) + (3*b^2*c^2)/(32*x^2) + (3*a*b*c^4*ArcCsch[c*x])/16 + (3*b^2
*c^4*ArcCsch[c*x]^2)/32 + (b*c*Sqrt[1 + 1/(c^2*x^2)]*(a + b*ArcCsch[c*x]))/
(8*x^3) - (3*b*c^3*Sqrt[1 + 1/(c^2*x^2)]*(a + b*ArcCsch[c*x]))/(16*x) - (a
+ b*ArcCsch[c*x])^2/(4*x^4)
```

Rule 3310

```
Int[((c_.) + (d_.)*(x_))*((b_.)*sin[(e_.) + (f_.)*(x_)])^(n_), x_Symbol] :>
 Simp[(d*(b*Sin[e + f*x])^n)/(f^2*n^2), x] + (Dist[(b^2*(n - 1))/n, Int[(c
+ d*x)*(b*Sin[e + f*x])^(n - 2), x], x] - Simp[(b*(c + d*x)*Cos[e + f*x]*(b
*Sin[e + f*x])^(n - 1))/(f*n), x]) /; FreeQ[{b, c, d, e, f}, x] && GtQ[n, 1
]
```

Rule 5446

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

Rule 6286

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))^(n_)*(x_)^(m_.), x_Symbol] :> -Dist
[(c^(m + 1))^(-1), Subst[Int[(a + b*x)^n*Csch[x]^(m + 1)*Coth[x], x], x, Ar
cCsch[c*x]], x] /; FreeQ[{a, b, c}, x] && IntegerQ[n] && IntegerQ[m] && (Gt
Q[n, 0] || LtQ[m, -1])
```

Rubi steps

$$\int \frac{\left(a+b\operatorname{csch}^{-1}(cx)\right)^2}{x^5}\,dx = -\left(c^4\operatorname{Subst}\left(\int (a+bx)^2\cosh(x)\sinh^3(x)\,dx, x, \operatorname{csch}^{-1}(cx)\right)\right)$$
$$= -\frac{\left(a+b\operatorname{csch}^{-1}(cx)\right)^2}{4x^4} + \frac{1}{2}\left(bc^4\right)\operatorname{Subst}\left(\int (a+bx)\sinh^4(x)\,dx, x, \operatorname{csch}^{-1}(cx)\right)$$
$$= -\frac{b^2}{32x^4} + \frac{bc\sqrt{1+\frac{1}{c^2x^2}}\left(a+b\operatorname{csch}^{-1}(cx)\right)}{8x^3} - \frac{\left(a+b\operatorname{csch}^{-1}(cx)\right)^2}{4x^4} - \frac{1}{8}\left(3bc^4\right)\operatorname{Subst}\Big(\int$$
$$= -\frac{b^2}{32x^4} + \frac{3b^2c^2}{32x^2} + \frac{bc\sqrt{1+\frac{1}{c^2x^2}}\left(a+b\operatorname{csch}^{-1}(cx)\right)}{8x^3} - \frac{3bc^3\sqrt{1+\frac{1}{c^2x^2}}\left(a+b\operatorname{csch}^{-1}(cx\right.}{16x}$$
$$= -\frac{b^2}{32x^4} + \frac{3b^2c^2}{32x^2} + \frac{3}{16}abc^4\operatorname{csch}^{-1}(cx) + \frac{3}{32}b^2c^4\operatorname{csch}^{-1}(cx)^2 + \frac{bc\sqrt{1+\frac{1}{c^2x^2}}\left(a+b\operatorname{csc}\right.}{8x^3}$$

**Mathematica [A]** time = 0.18, size = 147, normalized size = 1.11

$$\frac{-8a^2+6abc^4x^4\sinh^{-1}\left(\frac{1}{cx}\right)+4abcx\sqrt{\frac{1}{c^2x^2}+1}-2b\operatorname{csch}^{-1}(cx)\left(8a+bcx\sqrt{\frac{1}{c^2x^2}+1}\left(3c^2x^2-2\right)\right)-6abc^3x^3\sqrt{\frac{1}{c^2x^2}}}{32x^4}$$

Antiderivative was successfully verified.

```
[In] Integrate[(a + b*ArcCsch[c*x])^2/x^5,x]
```

```
[Out] (-8*a^2 - b^2 + 4*a*b*c*Sqrt[1 + 1/(c^2*x^2)]*x + 3*b^2*c^2*x^2 - 6*a*b*c^3
*Sqrt[1 + 1/(c^2*x^2)]*x^3 - 2*b*(8*a + b*c*Sqrt[1 + 1/(c^2*x^2)]*x*(-2 + 3
*c^2*x^2))*ArcCsch[c*x] + b^2*(-8 + 3*c^4*x^4)*ArcCsch[c*x]^2 + 6*a*b*c^4*x
^4*ArcSinh[1/(c*x)])/(32*x^4)
```

**fricas [A]** time = 0.83, size = 202, normalized size = 1.53

$$\frac{3\,b^2c^2x^2+\left(3\,b^2c^4x^4-8\,b^2\right)\log\left(\frac{cx\sqrt{\frac{c^2x^2+1}{c^2x^2}}+1}{cx}\right)^2-8\,a^2-b^2+2\left(3\,abc^4x^4-8\,ab-\left(3\,b^2c^3x^3-2\,b^2cx\right)\sqrt{\frac{c^2x^2+1}{c^2x^2}}\right)\mathrm{lo}}{32\,x^4}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))^2/x^5,x, algorithm="fricas")
```

```
[Out] 1/32*(3*b^2*c^2*x^2 + (3*b^2*c^4*x^4 - 8*b^2)*log((c*x*sqrt((c^2*x^2 + 1)/(
c^2*x^2)) + 1)/(c*x))^2 - 8*a^2 - b^2 + 2*(3*a*b*c^4*x^4 - 8*a*b - (3*b^2*c
^3*x^3 - 2*b^2*c*x)*sqrt((c^2*x^2 + 1)/(c^2*x^2)))*log((c*x*sqrt((c^2*x^2 +
 1)/(c^2*x^2)) + 1)/(c*x)) - 2*(3*a*b*c^3*x^3 - 2*a*b*c*x)*sqrt((c^2*x^2 +
1)/(c^2*x^2)))/x^4
```

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

$$\int \frac{(b \operatorname{arcsch}(cx) + a)^2}{x^5} \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))^2/x^5,x, algorithm="giac")
```

```
[Out] integrate((b*arccsch(c*x) + a)^2/x^5, x)
```

**maple [F]** time = 0.05, size = 0, normalized size = 0.00

$$\int \frac{(a + b \operatorname{arccsch}(cx))^2}{x^5} \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a+b*arccsch(c*x))^2/x^5,x)
```

```
[Out] int((a+b*arccsch(c*x))^2/x^5,x)
```

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

$$\frac{1}{32} ab \left( \frac{3 c^5 \log\left(cx\sqrt{\frac{1}{c^2x^2} + 1} + 1\right) - 3 c^5 \log\left(cx\sqrt{\frac{1}{c^2x^2} + 1} - 1\right) - \frac{2\left(3 c^8x^3\left(\frac{1}{c^2x^2}+1\right)^{\frac{3}{2}} - 5 c^6x\sqrt{\frac{1}{c^2x^2}+1}\right)}{c^4x^4\left(\frac{1}{c^2x^2}+1\right)^2 - 2 c^2x^2\left(\frac{1}{c^2x^2}+1\right)+1}}{c} - \frac{16 \operatorname{arcsch}(cx)}{x^4} \right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))^2/x^5,x, algorithm="maxima")
```

```
[Out] 1/32*a*b*((3*c^5*log(c*x*sqrt(1/(c^2*x^2) + 1) + 1) - 3*c^5*log(c*x*sqrt(1/
(c^2*x^2) + 1) - 1) - 2*(3*c^8*x^3*(1/(c^2*x^2) + 1)^(3/2) - 5*c^6*x*sqrt(1
/(c^2*x^2) + 1))/(c^4*x^4*(1/(c^2*x^2) + 1)^2 - 2*c^2*x^2*(1/(c^2*x^2) + 1)
 + 1))/c - 16*arccsch(c*x)/x^4) - 1/4*b^2*(log(sqrt(c^2*x^2 + 1) + 1)^2/x^4
 + 4*integrate(-1/2*(2*c^2*x^2*log(c)^2 + 2*(c^2*x^2 + 1)*log(x)^2 + 2*log(
c)^2 + 4*(c^2*x^2*log(c) + log(c))*log(x) - (4*c^2*x^2*log(c) + 4*(c^2*x^2
+ 1)*log(x) + (c^2*x^2*(4*log(c) - 1) + 4*(c^2*x^2 + 1)*log(x) + 4*log(c))*
sqrt(c^2*x^2 + 1) + 4*log(c))*log(sqrt(c^2*x^2 + 1) + 1) + 2*(c^2*x^2*log(c
)^2 + (c^2*x^2 + 1)*log(x)^2 + log(c)^2 + 2*(c^2*x^2*log(c) + log(c))*log(x
))*sqrt(c^2*x^2 + 1))/(c^2*x^7 + x^5 + (c^2*x^7 + x^5)*sqrt(c^2*x^2 + 1)),
x)) - 1/4*a^2/x^4
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.01

$$\int \frac{\left(a+b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)\right)^2}{x^5}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a + b*asinh(1/(c*x)))^2/x^5,x)
[Out] int((a + b*asinh(1/(c*x)))^2/x^5, x)
```

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

$$\int \frac{\left(a+b\,\mathrm{acsch}\,(cx)\right)^2}{x^5}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*acsch(c*x))**2/x**5,x)
[Out] Integral((a + b*acsch(c*x))**2/x**5, x)
```

## 3.24 $\int x^3 \left(a+b\,\mathrm{csch}^{-1}(cx)\right)^3 dx$

**Optimal**. Leaf size=195

$$\frac{b^2\log\left(1-e^{2\mathrm{csch}^{-1}(cx)}\right)\left(a+b\mathrm{csch}^{-1}(cx)\right)}{c^4}+\frac{b^2x^2\left(a+b\mathrm{csch}^{-1}(cx)\right)}{4c^2}-\frac{b\left(a+b\mathrm{csch}^{-1}(cx)\right)^2}{2c^4}+\frac{bx^3\sqrt{\frac{1}{c^2x^2}+1}\left(a+b\mathrm{cs\ldots}\right.}{4c}$$

[Out] 1/4*b^2*x^2*(a+b*arccsch(c*x))/c^2-1/2*b*(a+b*arccsch(c*x))^2/c^4+1/4*x^4*(a+b*arccsch(c*x))^3+b^2*(a+b*arccsch(c*x))*ln(1-(1/c/x+(1+1/c^2/x^2)^(1/2))^2)/c^4+1/2*b^3*polylog(2,(1/c/x+(1+1/c^2/x^2)^(1/2))^2)/c^4+1/4*b^3*x*(1+1/c^2/x^2)^(1/2)/c^3-1/2*b*x*(a+b*arccsch(c*x))^2*(1+1/c^2/x^2)^(1/2)/c^3+1/4*b*x^3*(a+b*arccsch(c*x))^2*(1+1/c^2/x^2)^(1/2)/c

**Rubi [A]** time = 0.23, antiderivative size = 195, normalized size of antiderivative = 1.00, number of steps used = 10, number of rules used = 10, integrand size = 14, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.714, Rules used = {6286, 5452, 4186, 3767, 8, 4184, 3716, 2190, 2279, 2391}

$$\frac{b^3\mathrm{PolyLog}\left(2,e^{2\mathrm{csch}^{-1}(cx)}\right)}{2c^4}+\frac{b^2x^2\left(a+b\mathrm{csch}^{-1}(cx)\right)}{4c^2}+\frac{b^2\log\left(1-e^{2\mathrm{csch}^{-1}(cx)}\right)\left(a+b\mathrm{csch}^{-1}(cx)\right)}{c^4}+\frac{bx^3\sqrt{\frac{1}{c^2x^2}+1}\left(a\ldots\right.}{4\ldots}$$

Antiderivative was successfully verified.

```
[In] Int[x^3*(a + b*ArcCsch[c*x])^3,x]
```

```
[Out] (b^3*Sqrt[1 + 1/(c^2*x^2)]*x)/(4*c^3) + (b^2*x^2*(a + b*ArcCsch[c*x]))/(4*c^2) - (b*(a + b*ArcCsch[c*x])^2)/(2*c^4) - (b*Sqrt[1 + 1/(c^2*x^2)]*x*(a + b*ArcCsch[c*x])^2)/(2*c^3) + (b*Sqrt[1 + 1/(c^2*x^2)]*x^3*(a + b*ArcCsch[c*x])^2)/(4*c) + (x^4*(a + b*ArcCsch[c*x])^3)/4 + (b^2*(a + b*ArcCsch[c*x])*Log[1 - E^(2*ArcCsch[c*x])])/c^4 + (b^3*PolyLog[2, E^(2*ArcCsch[c*x])])/(2*c^4)
```

Rule 8

```
Int[a_, x_Symbol] :> Simp[a*x, x] /; FreeQ[a, 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] - Dist[(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 3716

```
Int[((c_.) + (d_.)*(x_))^(m_.)*tan[(e_.) + Pi*(k_.) + (Complex[0, fz_])*(f_
.)*(x_)], x_Symbol] :> -Simp[(I*(c + d*x)^(m + 1))/(d*(m + 1)), x] + Dist[2
*I, Int[((c + d*x)^m*E^(2*(-(I*e) + f*fz*x)))/(E^(2*I*k*Pi)*(1 + E^(2*(-(I*
e) + f*fz*x))/E^(2*I*k*Pi))), x], x] /; FreeQ[{c, d, e, f, fz}, x] && Integ
erQ[4*k] && IGtQ[m, 0]
```

Rule 3767

```
Int[csc[(c_.) + (d_.)*(x_)]^(n_), x_Symbol] :> -Dist[d^(-1), Subst[Int[Expa
ndIntegrand[(1 + x^2)^(n/2 - 1), x], x], x, Cot[c + d*x]], x] /; FreeQ[{c,
d}, x] && IGtQ[n/2, 0]
```

Rule 4184

```
Int[csc[(e_.) + (f_.)*(x_)]^2*((c_.) + (d_.)*(x_))^(m_.), x_Symbol] :> -Sim
p[((c + d*x)^m*Cot[e + f*x])/f, x] + Dist[(d*m)/f, Int[(c + d*x)^(m - 1)*Co
t[e + f*x], x], x] /; FreeQ[{c, d, e, f}, x] && GtQ[m, 0]
```

Rule 4186

```
Int[(csc[(e_.) + (f_.)*(x_)]*(b_.))^(n_)*((c_.) + (d_.)*(x_))^(m_), x_Symbo
l] :> -Simp[(b^2*(c + d*x)^m*Cot[e + f*x]*(b*Csc[e + f*x])^(n - 2))/(f*(n -
 1)), x] + (Dist[(b^2*d^2*m*(m - 1))/(f^2*(n - 1)*(n - 2)), Int[(c + d*x)^(
m - 2)*(b*Csc[e + f*x])^(n - 2), x], x] + Dist[(b^2*(n - 2))/(n - 1), Int[(
c + d*x)^m*(b*Csc[e + f*x])^(n - 2), x], x] - Simp[(b^2*d*m*(c + d*x)^(m -
1)*(b*Csc[e + f*x])^(n - 2))/(f^2*(n - 1)*(n - 2)), x]) /; FreeQ[{b, c, d,
e, f}, x] && GtQ[n, 1] && NeQ[n, 2] && GtQ[m, 1]
```

Rule 5452

```
Int[Coth[(a_.) + (b_.)*(x_)]^(p_.)*Csch[(a_.) + (b_.)*(x_)]^(n_.)*((c_.) +
(d_.)*(x_))^(m_.), x_Symbol] :> -Simp[((c + d*x)^m*Csch[a + b*x]^n)/(b*n),
x] + Dist[(d*m)/(b*n), Int[(c + d*x)^(m - 1)*Csch[a + b*x]^n, x], x] /; Fre
```

```
eQ[{a, b, c, d, n}, x] && EqQ[p, 1] && GtQ[m, 0]
```

Rule 6286

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))^(n_)*(x_)^(m_.), x_Symbol] :> -Dist
[(c^(m + 1))^(-1), Subst[Int[(a + b*x)^n*Csch[x]^(m + 1)*Coth[x], x], x, Ar
cCsch[c*x]], x] /; FreeQ[{a, b, c}, x] && IntegerQ[n] && IntegerQ[m] && (Gt
Q[n, 0] || LtQ[m, -1])
```

Rubi steps

$$\int x^3 \left(a+b\text{csch}^{-1}(cx)\right)^3 \, dx = -\frac{\text{Subst}\left(\int (a+bx)^3 \coth(x)\text{csch}^4(x) \, dx, x, \text{csch}^{-1}(cx)\right)}{c^4}$$

$$= \frac{1}{4}x^4 \left(a+b\text{csch}^{-1}(cx)\right)^3 - \frac{(3b)\,\text{Subst}\left(\int (a+bx)^2\text{csch}^4(x) \, dx, x, \text{csch}^{-1}(cx)\right)}{4c^4}$$

$$= \frac{b^2x^2 \left(a+b\text{csch}^{-1}(cx)\right)}{4c^2} + \frac{b\sqrt{1+\frac{1}{c^2x^2}}\, x^3 \left(a+b\text{csch}^{-1}(cx)\right)^2}{4c} + \frac{1}{4}x^4 \left(a+b\text{csch}^{-1}(c\right.$$

$$= \frac{b^2x^2 \left(a+b\text{csch}^{-1}(cx)\right)}{4c^2} - \frac{b\sqrt{1+\frac{1}{c^2x^2}}\, x \left(a+b\text{csch}^{-1}(cx)\right)^2}{2c^3} + \frac{b\sqrt{1+\frac{1}{c^2x^2}}\, x^3 \left(a+b\right.}{4c}$$

$$= \frac{b^3\sqrt{1+\frac{1}{c^2x^2}}\, x}{4c^3} + \frac{b^2x^2 \left(a+b\text{csch}^{-1}(cx)\right)}{4c^2} - \frac{b\left(a+b\text{csch}^{-1}(cx)\right)^2}{2c^4} - \frac{b\sqrt{1+\frac{1}{c^2x^2}}\, x \left(a\right.}{2}$$

$$= \frac{b^3\sqrt{1+\frac{1}{c^2x^2}}\, x}{4c^3} + \frac{b^2x^2 \left(a+b\text{csch}^{-1}(cx)\right)}{4c^2} - \frac{b\left(a+b\text{csch}^{-1}(cx)\right)^2}{2c^4} - \frac{b\sqrt{1+\frac{1}{c^2x^2}}\, x \left(a\right.}{2}$$

$$= \frac{b^3\sqrt{1+\frac{1}{c^2x^2}}\, x}{4c^3} + \frac{b^2x^2 \left(a+b\text{csch}^{-1}(cx)\right)}{4c^2} - \frac{b\left(a+b\text{csch}^{-1}(cx)\right)^2}{2c^4} - \frac{b\sqrt{1+\frac{1}{c^2x^2}}\, x \left(a\right.}{2}$$

$$= \frac{b^3\sqrt{1+\frac{1}{c^2x^2}}\, x}{4c^3} + \frac{b^2x^2 \left(a+b\text{csch}^{-1}(cx)\right)}{4c^2} - \frac{b\left(a+b\text{csch}^{-1}(cx)\right)^2}{2c^4} - \frac{b\sqrt{1+\frac{1}{c^2x^2}}\, x \left(a\right.}{2}$$

**Mathematica [A]** time = 1.02, size = 271, normalized size = 1.39

$$\frac{a^3c^4x^4 + b\text{csch}^{-1}(cx)\left(cx\left(3a^2c^3x^3 + 2ab\sqrt{\frac{1}{c^2x^2}+1}\left(c^2x^2-2\right) + b^2cx\right) + 4b^2\log\left(1-e^{-2\text{csch}^{-1}(cx)}\right)\right) - 2a^2bcx\sqrt{\frac{1}{c^2x\ldots}}}{\ldots}$$

Warning: Unable to verify antiderivative.

```
[In] Integrate[x^3*(a + b*ArcCsch[c*x])^3,x]
```

```
[Out] (-2*a^2*b*c*Sqrt[1 + 1/(c^2*x^2)]*x + b^3*c*Sqrt[1 + 1/(c^2*x^2)]*x + a*b^2
*c^2*x^2 + a^2*b*c^3*Sqrt[1 + 1/(c^2*x^2)]*x^3 + a^3*c^4*x^4 + b^2*(3*a*c^4
*x^4 + b*(2 - 2*c*Sqrt[1 + 1/(c^2*x^2)]*x + c^3*Sqrt[1 + 1/(c^2*x^2)]*x^3))
*ArcCsch[c*x]^2 + b^3*c^4*x^4*ArcCsch[c*x]^3 + b*ArcCsch[c*x]*(c*x*(b^2*c*x
 + 3*a^2*c^3*x^3 + 2*a*b*Sqrt[1 + 1/(c^2*x^2)]*(-2 + c^2*x^2)) + 4*b^2*Log[
1 - E^(-2*ArcCsch[c*x])]) + 4*a*b^2*Log[1/(c*x)] - 2*b^3*PolyLog[2, E^(-2*A
rcCsch[c*x])])/(4*c^4)
```

**fricas [F]** time = 0.63, size = 0, normalized size = 0.00

$$\text{integral}\left(b^3x^3\,\text{arcsch}\,(cx)^3 + 3\,ab^2x^3\,\text{arcsch}\,(cx)^2 + 3\,a^2bx^3\,\text{arcsch}\,(cx) + a^3x^3, x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^3*(a+b*arccsch(c*x))^3,x, algorithm="fricas")
```

```
[Out] integral(b^3*x^3*arccsch(c*x)^3 + 3*a*b^2*x^3*arccsch(c*x)^2 + 3*a^2*b*x^3*
arccsch(c*x) + a^3*x^3, x)
```

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

$$\int (b\,\text{arcsch}\,(cx) + a)^3x^3\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^3*(a+b*arccsch(c*x))^3,x, algorithm="giac")
```

```
[Out] integrate((b*arccsch(c*x) + a)^3*x^3, x)
```

**maple [F]** time = 0.05, size = 0, normalized size = 0.00

$$\int x^3\left(a + b\,\text{arccsch}\,(cx)\right)^3\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^3*(a+b*arccsch(c*x))^3,x)
```

```
[Out] int(x^3*(a+b*arccsch(c*x))^3,x)
```

**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(x^3*(a+b*arccsch(c*x))^3,x, algorithm="maxima")
```

```
[Out] 1/4*b^3*x^4*log(sqrt(c^2*x^2 + 1) + 1)^3 - 12*b^3*c^2*integrate(1/4*x^5*log
(x)/(sqrt(c^2*x^2 + 1)*c^2*x^2 + c^2*x^2 + sqrt(c^2*x^2 + 1) + 1), x)*log(c
)^2 + 12*b^3*c^2*integrate(1/4*x^5*log(sqrt(c^2*x^2 + 1) + 1)/(sqrt(c^2*x^2
 + 1)*c^2*x^2 + c^2*x^2 + sqrt(c^2*x^2 + 1) + 1), x)*log(c)^2 + 1/4*a^3*x^4
 - 12*b^3*c^2*integrate(1/4*sqrt(c^2*x^2 + 1)*x^5*log(x)^2/(sqrt(c^2*x^2 +
1)*c^2*x^2 + c^2*x^2 + sqrt(c^2*x^2 + 1) + 1), x)*log(c) + 24*b^3*c^2*integ
rate(1/4*sqrt(c^2*x^2 + 1)*x^5*log(x)*log(sqrt(c^2*x^2 + 1) + 1)/(sqrt(c^2*
x^2 + 1)*c^2*x^2 + c^2*x^2 + sqrt(c^2*x^2 + 1) + 1), x)*log(c) - 12*b^3*c^2
*integrate(1/4*sqrt(c^2*x^2 + 1)*x^5*log(sqrt(c^2*x^2 + 1) + 1)^2/(sqrt(c^2
*x^2 + 1)*c^2*x^2 + c^2*x^2 + sqrt(c^2*x^2 + 1) + 1), x)*log(c) - 12*b^3*c^
2*integrate(1/4*x^5*log(x)^2/(sqrt(c^2*x^2 + 1)*c^2*x^2 + c^2*x^2 + sqrt(c^
2*x^2 + 1) + 1), x)*log(c) + 24*b^3*c^2*integrate(1/4*x^5*log(x)*log(sqrt(c
^2*x^2 + 1) + 1)/(sqrt(c^2*x^2 + 1)*c^2*x^2 + c^2*x^2 + sqrt(c^2*x^2 + 1) +
 1), x)*log(c) - 12*b^3*c^2*integrate(1/4*x^5*log(sqrt(c^2*x^2 + 1) + 1)^2/
(sqrt(c^2*x^2 + 1)*c^2*x^2 + c^2*x^2 + sqrt(c^2*x^2 + 1) + 1), x)*log(c) +
24*a*b^2*c^2*integrate(1/4*x^5*log(x)/(sqrt(c^2*x^2 + 1)*c^2*x^2 + c^2*x^2
+ sqrt(c^2*x^2 + 1) + 1), x)*log(c) - 24*a*b^2*c^2*integrate(1/4*x^5*log(sq
rt(c^2*x^2 + 1) + 1)/(sqrt(c^2*x^2 + 1)*c^2*x^2 + c^2*x^2 + sqrt(c^2*x^2 +
1) + 1), x)*log(c) - 4*b^3*c^2*integrate(1/4*sqrt(c^2*x^2 + 1)*x^5*log(x)^3
/(sqrt(c^2*x^2 + 1)*c^2*x^2 + c^2*x^2 + sqrt(c^2*x^2 + 1) + 1), x) + 12*b^3
*c^2*integrate(1/4*sqrt(c^2*x^2 + 1)*x^5*log(x)^2*log(sqrt(c^2*x^2 + 1) + 1
)/(sqrt(c^2*x^2 + 1)*c^2*x^2 + c^2*x^2 + sqrt(c^2*x^2 + 1) + 1), x) - 12*b^
3*c^2*integrate(1/4*sqrt(c^2*x^2 + 1)*x^5*log(x)*log(sqrt(c^2*x^2 + 1) + 1)
^2/(sqrt(c^2*x^2 + 1)*c^2*x^2 + c^2*x^2 + sqrt(c^2*x^2 + 1) + 1), x) - 4*b^
3*c^2*integrate(1/4*x^5*log(x)^3/(sqrt(c^2*x^2 + 1)*c^2*x^2 + c^2*x^2 + sqr
t(c^2*x^2 + 1) + 1), x) + 12*b^3*c^2*integrate(1/4*x^5*log(x)^2*log(sqrt(c^
2*x^2 + 1) + 1)/(sqrt(c^2*x^2 + 1)*c^2*x^2 + c^2*x^2 + sqrt(c^2*x^2 + 1) +
1), x) - 12*b^3*c^2*integrate(1/4*x^5*log(x)*log(sqrt(c^2*x^2 + 1) + 1)^2/(
sqrt(c^2*x^2 + 1)*c^2*x^2 + c^2*x^2 + sqrt(c^2*x^2 + 1) + 1), x) + 12*a*b^2
*c^2*integrate(1/4*sqrt(c^2*x^2 + 1)*x^5*log(x)^2/(sqrt(c^2*x^2 + 1)*c^2*x^
2 + c^2*x^2 + sqrt(c^2*x^2 + 1) + 1), x) - 24*a*b^2*c^2*integrate(1/4*sqrt(
c^2*x^2 + 1)*x^5*log(x)*log(sqrt(c^2*x^2 + 1) + 1)/(sqrt(c^2*x^2 + 1)*c^2*x
^2 + c^2*x^2 + sqrt(c^2*x^2 + 1) + 1), x) + 12*a*b^2*c^2*integrate(1/4*sqrt
(c^2*x^2 + 1)*x^5*log(sqrt(c^2*x^2 + 1) + 1)^2/(sqrt(c^2*x^2 + 1)*c^2*x^2 +
 c^2*x^2 + sqrt(c^2*x^2 + 1) + 1), x) - 3*b^3*c^2*integrate(1/4*sqrt(c^2*x^
2 + 1)*x^5*log(sqrt(c^2*x^2 + 1) + 1)^2/(sqrt(c^2*x^2 + 1)*c^2*x^2 + c^2*x^
2 + sqrt(c^2*x^2 + 1) + 1), x) + 12*a*b^2*c^2*integrate(1/4*x^5*log(x)^2/(s
qrt(c^2*x^2 + 1)*c^2*x^2 + c^2*x^2 + sqrt(c^2*x^2 + 1) + 1), x) - 24*a*b^2*
c^2*integrate(1/4*x^5*log(x)*log(sqrt(c^2*x^2 + 1) + 1)/(sqrt(c^2*x^2 + 1)*
c^2*x^2 + c^2*x^2 + sqrt(c^2*x^2 + 1) + 1), x) + 12*a*b^2*c^2*integrate(1/4
*x^5*log(sqrt(c^2*x^2 + 1) + 1)^2/(sqrt(c^2*x^2 + 1)*c^2*x^2 + c^2*x^2 + sq
rt(c^2*x^2 + 1) + 1), x) - 12*b^3*integrate(1/4*x^3*log(x)/(sqrt(c^2*x^2 +
1)*c^2*x^2 + c^2*x^2 + sqrt(c^2*x^2 + 1) + 1), x)*log(c)^2 + 12*b^3*integra
```

```
te(1/4*x^3*log(sqrt(c^2*x^2 + 1) + 1)/(sqrt(c^2*x^2 + 1)*c^2*x^2 + c^2*x^2
+ sqrt(c^2*x^2 + 1) + 1), x)*log(c)^2 - 12*b^3*integrate(1/4*sqrt(c^2*x^2 +
 1)*x^3*log(x)^2/(sqrt(c^2*x^2 + 1)*c^2*x^2 + c^2*x^2 + sqrt(c^2*x^2 + 1) +
 1), x)*log(c) + 24*b^3*integrate(1/4*sqrt(c^2*x^2 + 1)*x^3*log(x)*log(sqrt
(c^2*x^2 + 1) + 1)/(sqrt(c^2*x^2 + 1)*c^2*x^2 + c^2*x^2 + sqrt(c^2*x^2 + 1)
 + 1), x)*log(c) - 12*b^3*integrate(1/4*sqrt(c^2*x^2 + 1)*x^3*log(sqrt(c^2*
x^2 + 1) + 1)^2/(sqrt(c^2*x^2 + 1)*c^2*x^2 + c^2*x^2 + sqrt(c^2*x^2 + 1) +
1), x)*log(c) - 12*b^3*integrate(1/4*x^3*log(x)^2/(sqrt(c^2*x^2 + 1)*c^2*x^
2 + c^2*x^2 + sqrt(c^2*x^2 + 1) + 1), x)*log(c) + 24*b^3*integrate(1/4*x^3*
log(x)*log(sqrt(c^2*x^2 + 1) + 1)/(sqrt(c^2*x^2 + 1)*c^2*x^2 + c^2*x^2 + sq
rt(c^2*x^2 + 1) + 1), x)*log(c) - 12*b^3*integrate(1/4*x^3*log(sqrt(c^2*x^2
 + 1) + 1)^2/(sqrt(c^2*x^2 + 1)*c^2*x^2 + c^2*x^2 + sqrt(c^2*x^2 + 1) + 1),
 x)*log(c) + 24*a*b^2*integrate(1/4*x^3*log(x)/(sqrt(c^2*x^2 + 1)*c^2*x^2 +
 c^2*x^2 + sqrt(c^2*x^2 + 1) + 1), x)*log(c) - 24*a*b^2*integrate(1/4*x^3*l
og(sqrt(c^2*x^2 + 1) + 1)/(sqrt(c^2*x^2 + 1)*c^2*x^2 + c^2*x^2 + sqrt(c^2*x
^2 + 1) + 1), x)*log(c) + 1/4*(3*x^4*arccsch(c*x) + (c^2*x^3*(1/(c^2*x^2) +
 1)^(3/2) - 3*x*sqrt(1/(c^2*x^2) + 1))/c^3)*a^2*b - 4*b^3*integrate(1/4*sqr
t(c^2*x^2 + 1)*x^3*log(x)^3/(sqrt(c^2*x^2 + 1)*c^2*x^2 + c^2*x^2 + sqrt(c^2
*x^2 + 1) + 1), x) + 12*b^3*integrate(1/4*sqrt(c^2*x^2 + 1)*x^3*log(x)^2*lo
g(sqrt(c^2*x^2 + 1) + 1)/(sqrt(c^2*x^2 + 1)*c^2*x^2 + c^2*x^2 + sqrt(c^2*x^
2 + 1) + 1), x) - 12*b^3*integrate(1/4*sqrt(c^2*x^2 + 1)*x^3*log(x)*log(sqr
t(c^2*x^2 + 1) + 1)^2/(sqrt(c^2*x^2 + 1)*c^2*x^2 + c^2*x^2 + sqrt(c^2*x^2 +
 1) + 1), x) - 4*b^3*integrate(1/4*x^3*log(x)^3/(sqrt(c^2*x^2 + 1)*c^2*x^2
+ c^2*x^2 + sqrt(c^2*x^2 + 1) + 1), x) + 12*b^3*integrate(1/4*x^3*log(x)^2*
log(sqrt(c^2*x^2 + 1) + 1)/(sqrt(c^2*x^2 + 1)*c^2*x^2 + c^2*x^2 + sqrt(c^2*
x^2 + 1) + 1), x) - 12*b^3*integrate(1/4*x^3*log(x)*log(sqrt(c^2*x^2 + 1) +
 1)^2/(sqrt(c^2*x^2 + 1)*c^2*x^2 + c^2*x^2 + sqrt(c^2*x^2 + 1) + 1), x) + 1
2*a*b^2*integrate(1/4*sqrt(c^2*x^2 + 1)*x^3*log(x)^2/(sqrt(c^2*x^2 + 1)*c^2
*x^2 + c^2*x^2 + sqrt(c^2*x^2 + 1) + 1), x) - 24*a*b^2*integrate(1/4*sqrt(c
^2*x^2 + 1)*x^3*log(x)*log(sqrt(c^2*x^2 + 1) + 1)/(sqrt(c^2*x^2 + 1)*c^2*x^
2 + c^2*x^2 + sqrt(c^2*x^2 + 1) + 1), x) + 12*a*b^2*integrate(1/4*sqrt(c^2*
x^2 + 1)*x^3*log(sqrt(c^2*x^2 + 1) + 1)^2/(sqrt(c^2*x^2 + 1)*c^2*x^2 + c^2*
x^2 + sqrt(c^2*x^2 + 1) + 1), x) + 12*a*b^2*integrate(1/4*x^3*log(x)^2/(sqr
t(c^2*x^2 + 1)*c^2*x^2 + c^2*x^2 + sqrt(c^2*x^2 + 1) + 1), x) - 24*a*b^2*in
tegrate(1/4*x^3*log(x)*log(sqrt(c^2*x^2 + 1) + 1)/(sqrt(c^2*x^2 + 1)*c^2*x^
2 + c^2*x^2 + sqrt(c^2*x^2 + 1) + 1), x) + 12*a*b^2*integrate(1/4*x^3*log(s
qrt(c^2*x^2 + 1) + 1)^2/(sqrt(c^2*x^2 + 1)*c^2*x^2 + c^2*x^2 + sqrt(c^2*x^2
 + 1) + 1), x) + 1/12*(6*c^2*x^2 - 3*(c^2*x^2 + 1)^2 + 4*(c^2*x^2 + 1)^(3/2
) - 12*sqrt(c^2*x^2 + 1) + 6)*b^3*log(c)^3/c^4 + 1/6*(3*c^2*x^2 - 2*(c^2*x^
2 + 1)^(3/2) + 6*sqrt(c^2*x^2 + 1) - 3*log(c^2*x^2 + 1) + 3)*b^3*log(c)^3/c
^4 - 1/2*(c^2*x^2 - 2*sqrt(c^2*x^2 + 1) + 1)*b^3*log(c)^3/c^4 - 1/2*b^3*(2*
sqrt(c^2*x^2 + 1) - log(c^2*x^2 + 1))*log(c)^3/c^4 + 1/4*(6*c^2*x^2 - 3*(c^
2*x^2 + 1)^2 + 4*(c^2*x^2 + 1)^(3/2) - 12*sqrt(c^2*x^2 + 1) + 6)*b^3*log(c)
^2*log(x)/c^4 - 3/2*(c^2*x^2 - 2*sqrt(c^2*x^2 + 1) + 1)*b^3*log(c)^2*log(x)
/c^4 - 1/4*(6*c^2*x^2 - 3*(c^2*x^2 + 1)^2 + 4*(c^2*x^2 + 1)^(3/2) - 12*sqrt
```

```
(c^2*x^2 + 1) + 6)*b^3*log(c)^2*log(sqrt(c^2*x^2 + 1) + 1)/c^4 + 3/2*(c^2*x
^2 - 2*sqrt(c^2*x^2 + 1) + 1)*b^3*log(c)^2*log(sqrt(c^2*x^2 + 1) + 1)/c^4 -
 1/4*(6*c^2*x^2 - 3*(c^2*x^2 + 1)^2 + 4*(c^2*x^2 + 1)^(3/2) - 12*sqrt(c^2*x
^2 + 1) + 6)*a*b^2*log(c)^2/c^4 - 1/2*(3*c^2*x^2 - 2*(c^2*x^2 + 1)^(3/2) +
6*sqrt(c^2*x^2 + 1) - 3*log(c^2*x^2 + 1) + 3)*a*b^2*log(c)^2/c^4 + 3/2*(c^2
*x^2 - 2*sqrt(c^2*x^2 + 1) + 1)*a*b^2*log(c)^2/c^4 - 1/48*(18*c^2*x^2 - 9*(
c^2*x^2 + 1)^2 + 16*(c^2*x^2 + 1)^(3/2) - 96*sqrt(c^2*x^2 + 1) + 66*log(sqr
t(c^2*x^2 + 1) + 1) - 30*log(sqrt(c^2*x^2 + 1) - 1) + 18)*b^3*log(c)^2/c^4
- 1/48*(6*c^2*x^2 + 9*(c^2*x^2 + 1)^2 - 28*(c^2*x^2 + 1)^(3/2) + 132*sqrt(c
^2*x^2 + 1) - 132*log(sqrt(c^2*x^2 + 1) + 1) + 6)*b^3*log(c)^2/c^4 + 3/4*(c
^2*x^2 - 4*sqrt(c^2*x^2 + 1) + 3*log(sqrt(c^2*x^2 + 1) + 1) - log(sqrt(c^2*
x^2 + 1) - 1) + 1)*b^3*log(c)^2/c^4 - 3/4*(c^2*x^2 - 6*sqrt(c^2*x^2 + 1) +
6*log(sqrt(c^2*x^2 + 1) + 1) + 1)*b^3*log(c)^2/c^4 + 3/2*a*b^2*(2*sqrt(c^2*
x^2 + 1) - log(c^2*x^2 + 1))*log(c)^2/c^4 - 1/2*(6*c^2*x^2 - 3*(c^2*x^2 + 1
)^2 + 4*(c^2*x^2 + 1)^(3/2) - 12*sqrt(c^2*x^2 + 1) + 6)*a*b^2*log(c)*log(x)
/c^4 + 3*(c^2*x^2 - 2*sqrt(c^2*x^2 + 1) + 1)*a*b^2*log(c)*log(x)/c^4 + 1/2*
(6*c^2*x^2 - 3*(c^2*x^2 + 1)^2 + 4*(c^2*x^2 + 1)^(3/2) - 12*sqrt(c^2*x^2 +
1) + 6)*a*b^2*log(c)*log(sqrt(c^2*x^2 + 1) + 1)/c^4 - 3*(c^2*x^2 - 2*sqrt(c
^2*x^2 + 1) + 1)*a*b^2*log(c)*log(sqrt(c^2*x^2 + 1) + 1)/c^4 + 1/24*(18*c^2
*x^2 - 9*(c^2*x^2 + 1)^2 + 16*(c^2*x^2 + 1)^(3/2) - 96*sqrt(c^2*x^2 + 1) +
66*log(sqrt(c^2*x^2 + 1) + 1) - 30*log(sqrt(c^2*x^2 + 1) - 1) + 18)*a*b^2*l
og(c)/c^4 + 1/24*(6*c^2*x^2 + 9*(c^2*x^2 + 1)^2 - 28*(c^2*x^2 + 1)^(3/2) +
132*sqrt(c^2*x^2 + 1) - 132*log(sqrt(c^2*x^2 + 1) + 1) + 6)*a*b^2*log(c)/c^
4 - 3/2*(c^2*x^2 - 4*sqrt(c^2*x^2 + 1) + 3*log(sqrt(c^2*x^2 + 1) + 1) - log
(sqrt(c^2*x^2 + 1) - 1) + 1)*a*b^2*log(c)/c^4 + 3/2*(c^2*x^2 - 6*sqrt(c^2*x
^2 + 1) + 6*log(sqrt(c^2*x^2 + 1) + 1) + 1)*a*b^2*log(c)/c^4
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.01

$$\int x^3\left(a+b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)\right)^3\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^3*(a + b*asinh(1/(c*x)))^3,x)
```

```
[Out] int(x^3*(a + b*asinh(1/(c*x)))^3, x)
```

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

$$\int x^{3}\left(a+b\,\mathrm{acsch}\,(cx)\right)^{3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**3*(a+b*acsch(c*x))**3,x)
```

```
[Out] Integral(x**3*(a + b*acsch(c*x))**3, x)
```

# 3.25 $\int x^2 \left(a + b\text{csch}^{-1}(cx)\right)^3 \, dx$

**Optimal**. Leaf size=194

$$-\frac{b^2\text{Li}_2\left(-e^{\text{csch}^{-1}(cx)}\right)\left(a+b\text{csch}^{-1}(cx)\right)}{c^3}+\frac{b^2\text{Li}_2\left(e^{\text{csch}^{-1}(cx)}\right)\left(a+b\text{csch}^{-1}(cx)\right)}{c^3}+\frac{b^2x\left(a+b\text{csch}^{-1}(cx)\right)}{c^2}-\frac{b\tanh^{-1}}{}$$

```
[Out] b^2*x*(a+b*arccsch(c*x))/c^2+1/3*x^3*(a+b*arccsch(c*x))^3-b*(a+b*arccsch(c*
x))^2*arctanh(1/c/x+(1+1/c^2/x^2)^(1/2))/c^3+b^3*arctanh((1+1/c^2/x^2)^(1/2
))/c^3-b^2*(a+b*arccsch(c*x))*polylog(2,-1/c/x-(1+1/c^2/x^2)^(1/2))/c^3+b^2
*(a+b*arccsch(c*x))*polylog(2,1/c/x+(1+1/c^2/x^2)^(1/2))/c^3+b^3*polylog(3,
-1/c/x-(1+1/c^2/x^2)^(1/2))/c^3-b^3*polylog(3,1/c/x+(1+1/c^2/x^2)^(1/2))/c^
3+1/2*b*x^2*(a+b*arccsch(c*x))^2*(1+1/c^2/x^2)^(1/2)/c
```

**Rubi [A]** time = 0.21, antiderivative size = 194, normalized size of antiderivative = 1.00, number of steps used = 11, number of rules used = 8, integrand size = 14, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.571, Rules used = {6286, 5452, 4186, 3770, 4182, 2531, 2282, 6589}

$$-\frac{b^2\text{PolyLog}\left(2,-e^{\text{csch}^{-1}(cx)}\right)\left(a+b\text{csch}^{-1}(cx)\right)}{c^3}+\frac{b^2\text{PolyLog}\left(2,e^{\text{csch}^{-1}(cx)}\right)\left(a+b\text{csch}^{-1}(cx)\right)}{c^3}+\frac{b^3\text{PolyLog}\left(3,-e\right.}{c^3}$$

Antiderivative was successfully verified.

```
[In] Int[x^2*(a + b*ArcCsch[c*x])^3,x]
```

```
[Out] (b^2*x*(a + b*ArcCsch[c*x]))/c^2 + (b*Sqrt[1 + 1/(c^2*x^2)]*x^2*(a + b*ArcC
sch[c*x])^2)/(2*c) + (x^3*(a + b*ArcCsch[c*x])^3)/3 - (b*(a + b*ArcCsch[c*x
])^2*ArcTanh[E^ArcCsch[c*x]])/c^3 + (b^3*ArcTanh[Sqrt[1 + 1/(c^2*x^2)]])/c^
3 - (b^2*(a + b*ArcCsch[c*x])*PolyLog[2, -E^ArcCsch[c*x]])/c^3 + (b^2*(a +
b*ArcCsch[c*x])*PolyLog[2, E^ArcCsch[c*x]])/c^3 + (b^3*PolyLog[3, -E^ArcCsc
h[c*x]])/c^3 - (b^3*PolyLog[3, E^ArcCsch[c*x]])/c^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 3770

```
Int[csc[(c_.) + (d_.)*(x_)], x_Symbol] :> -Simp[ArcTanh[Cos[c + d*x]]/d, x]
 /; FreeQ[{c, d}, x]
```

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 4186

```
Int[(csc[(e_.) + (f_.)*(x_)]*(b_.))^(n_)*((c_.) + (d_.)*(x_))^(m_), x_Symbo
l] :> -Simp[(b^2*(c + d*x)^m*Cot[e + f*x]*(b*Csc[e + f*x])^(n - 2))/(f*(n -
 1)), x] + (Dist[(b^2*d^2*m*(m - 1))/(f^2*(n - 1)*(n - 2)), Int[(c + d*x)^(
m - 2)*(b*Csc[e + f*x])^(n - 2), x], x] + Dist[(b^2*(n - 2))/(n - 1), Int[(
c + d*x)^m*(b*Csc[e + f*x])^(n - 2), x], x] - Simp[(b^2*d*m*(c + d*x)^(m -
1)*(b*Csc[e + f*x])^(n - 2))/(f^2*(n - 1)*(n - 2)), x]) /; FreeQ[{b, c, d,
e, f}, x] && GtQ[n, 1] && NeQ[n, 2] && GtQ[m, 1]
```

Rule 5452

```
Int[Coth[(a_.) + (b_.)*(x_)]^(p_.)*Csch[(a_.) + (b_.)*(x_)]^(n_.)*((c_.) +
(d_.)*(x_))^(m_.), x_Symbol] :> -Simp[((c + d*x)^m*Csch[a + b*x]^n)/(b*n),
x] + Dist[(d*m)/(b*n), Int[(c + d*x)^(m - 1)*Csch[a + b*x]^n, x], x] /; Fre
eQ[{a, b, c, d, n}, x] && EqQ[p, 1] && GtQ[m, 0]
```

Rule 6286

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))^(n_)*(x_)^(m_.), x_Symbol] :> -Dist
[(c^(m + 1))^(-1), Subst[Int[(a + b*x)^n*Csch[x]^(m + 1)*Coth[x], x], x, Ar
cCsch[c*x]], x] /; FreeQ[{a, b, c}, x] && IntegerQ[n] && IntegerQ[m] && (Gt
Q[n, 0] || LtQ[m, -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

$$\int x^2\left(a+b\text{csch}^{-1}(cx)\right)^3\,dx=-\frac{\text{Subst}\left(\int(a+bx)^3\coth(x)\text{csch}^3(x)\,dx,x,\text{csch}^{-1}(cx)\right)}{c^3}$$
$$=\frac{1}{3}x^3\left(a+b\text{csch}^{-1}(cx)\right)^3-\frac{b\,\text{Subst}\left(\int(a+bx)^2\text{csch}^3(x)\,dx,x,\text{csch}^{-1}(cx)\right)}{c^3}$$
$$=\frac{b^2x\left(a+b\text{csch}^{-1}(cx)\right)}{c^2}+\frac{b\sqrt{1+\frac{1}{c^2x^2}}\,x^2\left(a+b\text{csch}^{-1}(cx)\right)^2}{2c}+\frac{1}{3}x^3\left(a+b\text{csch}^{-1}(c\right.$$
$$=\frac{b^2x\left(a+b\text{csch}^{-1}(cx)\right)}{c^2}+\frac{b\sqrt{1+\frac{1}{c^2x^2}}\,x^2\left(a+b\text{csch}^{-1}(cx)\right)^2}{2c}+\frac{1}{3}x^3\left(a+b\text{csch}^{-1}(c\right.$$
$$=\frac{b^2x\left(a+b\text{csch}^{-1}(cx)\right)}{c^2}+\frac{b\sqrt{1+\frac{1}{c^2x^2}}\,x^2\left(a+b\text{csch}^{-1}(cx)\right)^2}{2c}+\frac{1}{3}x^3\left(a+b\text{csch}^{-1}(c\right.$$
$$=\frac{b^2x\left(a+b\text{csch}^{-1}(cx)\right)}{c^2}+\frac{b\sqrt{1+\frac{1}{c^2x^2}}\,x^2\left(a+b\text{csch}^{-1}(cx)\right)^2}{2c}+\frac{1}{3}x^3\left(a+b\text{csch}^{-1}(c\right.$$
$$=\frac{b^2x\left(a+b\text{csch}^{-1}(cx)\right)}{c^2}+\frac{b\sqrt{1+\frac{1}{c^2x^2}}\,x^2\left(a+b\text{csch}^{-1}(cx)\right)^2}{2c}+\frac{1}{3}x^3\left(a+b\text{csch}^{-1}(c\right.$$

**Mathematica [B]** time = 7.52, size = 548, normalized size = 2.82

$$\frac{a^3x^3}{3}+\frac{a^2bx^2\sqrt{\frac{c^2x^2+1}{c^2x^2}}}{2c}-\frac{a^2b\log\left(x\left(\sqrt{\frac{c^2x^2+1}{c^2x^2}}+1\right)\right)}{2c^3}+a^2bx^3\text{csch}^{-1}(cx)+\frac{ab^2\left(2c^3x^3\left(-\frac{4\text{Li}_2\left(e^{-\text{csch}^{-1}(cx)}\right)}{c^3x^3}+4\text{csch}^{-1}(cx)\right.\right.}{}$$

Warning: Unable to verify antiderivative.

```
[In] Integrate[x^2*(a + b*ArcCsch[c*x])^3,x]
```

```
[Out] (a^3*x^3)/3 + (a^2*b*x^2*Sqrt[(1 + c^2*x^2)/(c^2*x^2)])/(2*c) + a^2*b*x^3*A
rcCsch[c*x] - (a^2*b*Log[x*(1 + Sqrt[(1 + c^2*x^2)/(c^2*x^2)])])/(2*c^3) +
(a*b^2*(8*PolyLog[2, -E^(-ArcCsch[c*x])] + 2*c^3*x^3*(-2 + 4*ArcCsch[c*x]^2
 + 2*Cosh[2*ArcCsch[c*x]] - (3*ArcCsch[c*x]*Log[1 - E^(-ArcCsch[c*x])])/(c*
x) + (3*ArcCsch[c*x]*Log[1 + E^(-ArcCsch[c*x])])/(c*x) - (4*PolyLog[2, E^(-
ArcCsch[c*x])])/(c^3*x^3) + 2*ArcCsch[c*x]*Sinh[2*ArcCsch[c*x]] + ArcCsch[c
*x]*Log[1 - E^(-ArcCsch[c*x])]*Sinh[3*ArcCsch[c*x]] - ArcCsch[c*x]*Log[1 +
```

```
E^(-ArcCsch[c*x])]*Sinh[3*ArcCsch[c*x]])))/(8*c^3) + (b^3*(24*ArcCsch[c*x]*
Coth[ArcCsch[c*x]/2] - 4*ArcCsch[c*x]^3*Coth[ArcCsch[c*x]/2] + 6*ArcCsch[c*
x]^2*Csch[ArcCsch[c*x]/2]^2 + (ArcCsch[c*x]^3*Csch[ArcCsch[c*x]/2]^4)/(c*x)
 + 24*ArcCsch[c*x]^2*Log[1 - E^(-ArcCsch[c*x])] - 24*ArcCsch[c*x]^2*Log[1 +
 E^(-ArcCsch[c*x])] - 48*Log[Tanh[ArcCsch[c*x]/2]] + 48*ArcCsch[c*x]*PolyLo
g[2, -E^(-ArcCsch[c*x])] - 48*ArcCsch[c*x]*PolyLog[2, E^(-ArcCsch[c*x])] +
48*PolyLog[3, -E^(-ArcCsch[c*x])] - 48*PolyLog[3, E^(-ArcCsch[c*x])] + 6*Ar
cCsch[c*x]^2*Sech[ArcCsch[c*x]/2]^2 + 16*c^3*x^3*ArcCsch[c*x]^3*Sinh[ArcCsc
h[c*x]/2]^4 - 24*ArcCsch[c*x]*Tanh[ArcCsch[c*x]/2] + 4*ArcCsch[c*x]^3*Tanh[
ArcCsch[c*x]/2]))/(48*c^3)
```

**fricas [F]** time = 1.12, size = 0, normalized size = 0.00

$$\text{integral}\left(b^3x^2\operatorname{arcsch}(cx)^3 + 3\,ab^2x^2\operatorname{arcsch}(cx)^2 + 3\,a^2bx^2\operatorname{arcsch}(cx) + a^3x^2, x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*(a+b*arccsch(c*x))^3,x, algorithm="fricas")
```

```
[Out] integral(b^3*x^2*arccsch(c*x)^3 + 3*a*b^2*x^2*arccsch(c*x)^2 + 3*a^2*b*x^2*
arccsch(c*x) + a^3*x^2, x)
```

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

$$\int (b\operatorname{arcsch}(cx) + a)^3x^2\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*(a+b*arccsch(c*x))^3,x, algorithm="giac")
```

```
[Out] integrate((b*arccsch(c*x) + a)^3*x^2, x)
```

**maple [F]** time = 0.05, size = 0, normalized size = 0.00

$$\int x^2\left(a + b\operatorname{arccsch}(cx)\right)^3\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^2*(a+b*arccsch(c*x))^3,x)
```

```
[Out] int(x^2*(a+b*arccsch(c*x))^3,x)
```

**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(x^2*(a+b*arccsch(c*x))^3,x, algorithm="maxima")
```

```
[Out] 1/3*b^3*x^3*log(sqrt(c^2*x^2 + 1) + 1)^3 + 1/3*a^3*x^3 + 1/4*(4*x^3*arccsch
(c*x) + (2*sqrt(1/(c^2*x^2) + 1)/(c^2*(1/(c^2*x^2) + 1) - c^2) - log(sqrt(1
/(c^2*x^2) + 1) + 1)/c^2 + log(sqrt(1/(c^2*x^2) + 1) - 1)/c^2)/c)*a^2*b - i
ntegrate(((b^3*c^2*log(c)^3 - 3*a*b^2*c^2*log(c)^2)*x^4 + (b^3*c^2*x^4 + b^
3*x^2)*log(x)^3 + (b^3*log(c)^3 - 3*a*b^2*log(c)^2)*x^2 + 3*((b^3*c^2*log(c
) - a*b^2*c^2)*x^4 + (b^3*log(c) - a*b^2)*x^2)*log(x)^2 + (3*(b^3*c^2*log(c
) - a*b^2*c^2)*x^4 + 3*(b^3*log(c) - a*b^2)*x^2 + 3*(b^3*c^2*x^4 + b^3*x^2)
*log(x) + ((b^3*c^2*(3*log(c) + 1) - 3*a*b^2*c^2)*x^4 + 3*(b^3*log(c) - a*b
^2)*x^2 + 3*(b^3*c^2*x^4 + b^3*x^2)*log(x))*sqrt(c^2*x^2 + 1))*log(sqrt(c^2
*x^2 + 1) + 1)^2 + 3*((b^3*c^2*log(c)^2 - 2*a*b^2*c^2*log(c))*x^4 + (b^3*lo
g(c)^2 - 2*a*b^2*log(c))*x^2)*log(x) - 3*((b^3*c^2*log(c)^2 - 2*a*b^2*c^2*l
og(c))*x^4 + (b^3*log(c)^2 - 2*a*b^2*log(c))*x^2 + (b^3*c^2*x^4 + b^3*x^2)*
log(x)^2 + 2*((b^3*c^2*log(c) - a*b^2*c^2)*x^4 + (b^3*log(c) - a*b^2)*x^2)*
log(x) + ((b^3*c^2*log(c)^2 - 2*a*b^2*c^2*log(c))*x^4 + (b^3*log(c)^2 - 2*a
*b^2*log(c))*x^2 + (b^3*c^2*x^4 + b^3*x^2)*log(x)^2 + 2*((b^3*c^2*log(c) -
a*b^2*c^2)*x^4 + (b^3*log(c) - a*b^2)*x^2)*log(x))*sqrt(c^2*x^2 + 1))*log(s
qrt(c^2*x^2 + 1) + 1) + ((b^3*c^2*log(c)^3 - 3*a*b^2*c^2*log(c)^2)*x^4 + (b
^3*c^2*x^4 + b^3*x^2)*log(x)^3 + (b^3*log(c)^3 - 3*a*b^2*log(c)^2)*x^2 + 3*
((b^3*c^2*log(c) - a*b^2*c^2)*x^4 + (b^3*log(c) - a*b^2)*x^2)*log(x)^2 + 3*
((b^3*c^2*log(c)^2 - 2*a*b^2*c^2*log(c))*x^4 + (b^3*log(c)^2 - 2*a*b^2*log(
c))*x^2)*log(x))*sqrt(c^2*x^2 + 1))/(c^2*x^2 + (c^2*x^2 + 1)^(3/2) + 1), x)
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.01

$$\int x^2 \left(a + b \operatorname{asinh}\left(\frac{1}{c\,x}\right)\right)^3 dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^2*(a + b*asinh(1/(c*x)))^3,x)
```

```
[Out] int(x^2*(a + b*asinh(1/(c*x)))^3, x)
```

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

$$\int x^2 \left(a + b \operatorname{acsch}(cx)\right)^3 \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**2*(a+b*acsch(c*x))**3,x)
```

```
[Out] Integral(x**2*(a + b*acsch(c*x))**3, x)
```

## 3.26 $\int x\left(a+b\,\mathrm{csch}^{-1}(cx)\right)^3\,dx$

**Optimal**. Leaf size=117

$$-\frac{3b^2\log\left(1-e^{2\mathrm{csch}^{-1}(cx)}\right)\left(a+b\mathrm{csch}^{-1}(cx)\right)}{c^2}+\frac{3bx\sqrt{\frac{1}{c^2x^2}+1}\left(a+b\mathrm{csch}^{-1}(cx)\right)^2}{2c}+\frac{3b\left(a+b\mathrm{csch}^{-1}(cx)\right)^2}{2c^2}+\frac{1}{2}x^2\left(a+\right.$$

```
[Out] 3/2*b*(a+b*arccsch(c*x))^2/c^2+1/2*x^2*(a+b*arccsch(c*x))^3-3*b^2*(a+b*arcc
sch(c*x))*ln(1-(1/c/x+(1+1/c^2/x^2)^(1/2))^2)/c^2-3/2*b^3*polylog(2,(1/c/x+
(1+1/c^2/x^2)^(1/2))^2)/c^2+3/2*b*x*(a+b*arccsch(c*x))^2*(1+1/c^2/x^2)^(1/2
)/c
```

**Rubi [A]** time = 0.16, antiderivative size = 117, normalized size of antiderivative = 1.00, number of steps used = 7, number of rules used = 7, integrand size = 12, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.583, Rules used = {6286, 5452, 4184, 3716, 2190, 2279, 2391}

$$-\frac{3b^3\mathrm{PolyLog}\left(2,e^{2\mathrm{csch}^{-1}(cx)}\right)}{2c^2}-\frac{3b^2\log\left(1-e^{2\mathrm{csch}^{-1}(cx)}\right)\left(a+b\mathrm{csch}^{-1}(cx)\right)}{c^2}+\frac{3bx\sqrt{\frac{1}{c^2x^2}+1}\left(a+b\mathrm{csch}^{-1}(cx)\right)^2}{2c}+\frac{3b}{}$$

Antiderivative was successfully verified.

```
[In] Int[x*(a + b*ArcCsch[c*x])^3,x]
```

```
[Out] (3*b*(a + b*ArcCsch[c*x])^2)/(2*c^2) + (3*b*Sqrt[1 + 1/(c^2*x^2)]*x*(a + b*
ArcCsch[c*x])^2)/(2*c) + (x^2*(a + b*ArcCsch[c*x])^3)/2 - (3*b^2*(a + b*Arc
Csch[c*x])*Log[1 - E^(2*ArcCsch[c*x])])/c^2 - (3*b^3*PolyLog[2, E^(2*ArcCsc
h[c*x])])/(2*c^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 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 3716

```
Int[((c_.) + (d_.)*(x_))^(m_.)*tan[(e_.) + Pi*(k_.) + (Complex[0, fz_])*(f_
.)*(x_)], x_Symbol] :> -Simp[(I*(c + d*x)^(m + 1))/(d*(m + 1)), x] + Dist[2
*I, Int[((c + d*x)^m*E^(2*(-(I*e) + f*fz*x)))/(E^(2*I*k*Pi)*(1 + E^(2*(-(I*
e) + f*fz*x))/E^(2*I*k*Pi))), x], x] /; FreeQ[{c, d, e, f, fz}, x] && Integ
erQ[4*k] && IGtQ[m, 0]
```

Rule 4184

```
Int[csc[(e_.) + (f_.)*(x_)]^2*((c_.) + (d_.)*(x_))^(m_.), x_Symbol] :> -Sim
p[((c + d*x)^m*Cot[e + f*x])/f, x] + Dist[(d*m)/f, Int[(c + d*x)^(m - 1)*Co
t[e + f*x], x], x] /; FreeQ[{c, d, e, f}, x] && GtQ[m, 0]
```

Rule 5452

```
Int[Coth[(a_.) + (b_.)*(x_)]^(p_.)*Csch[(a_.) + (b_.)*(x_)]^(n_.)*((c_.) +
(d_.)*(x_))^(m_.), x_Symbol] :> -Simp[((c + d*x)^m*Csch[a + b*x]^n)/(b*n),
x] + Dist[(d*m)/(b*n), Int[(c + d*x)^(m - 1)*Csch[a + b*x]^n, x], x] /; Fre
eQ[{a, b, c, d, n}, x] && EqQ[p, 1] && GtQ[m, 0]
```

Rule 6286

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))^(n_)*(x_)^(m_.), x_Symbol] :> -Dist
[(c^(m + 1))^(-1), Subst[Int[(a + b*x)^n*Csch[x]^(m + 1)*Coth[x], x], x, Ar
cCsch[c*x]], x] /; FreeQ[{a, b, c}, x] && IntegerQ[n] && IntegerQ[m] && (Gt
Q[n, 0] || LtQ[m, -1])
```

Rubi steps

$$\int x\left(a+b\text{csch}^{-1}(cx)\right)^3\,dx = -\frac{\text{Subst}\left(\int (a+bx)^3\coth(x)\text{csch}^2(x)\,dx, x, \text{csch}^{-1}(cx)\right)}{c^2}$$
$$= \frac{1}{2}x^2\left(a+b\text{csch}^{-1}(cx)\right)^3 - \frac{(3b)\,\text{Subst}\left(\int (a+bx)^2\text{csch}^2(x)\,dx, x, \text{csch}^{-1}(cx)\right)}{2c^2}$$
$$= \frac{3b\sqrt{1+\frac{1}{c^2x^2}}\,x\left(a+b\text{csch}^{-1}(cx)\right)^2}{2c} + \frac{1}{2}x^2\left(a+b\text{csch}^{-1}(cx)\right)^3 - \frac{\left(3b^2\right)\text{Subst}\left(\int (a+b\right.}{}$$
$$= \frac{3b\left(a+b\text{csch}^{-1}(cx)\right)^2}{2c^2} + \frac{3b\sqrt{1+\frac{1}{c^2x^2}}\,x\left(a+b\text{csch}^{-1}(cx)\right)^2}{2c} + \frac{1}{2}x^2\left(a+b\text{csch}^{-1}(cx)\right.$$
$$= \frac{3b\left(a+b\text{csch}^{-1}(cx)\right)^2}{2c^2} + \frac{3b\sqrt{1+\frac{1}{c^2x^2}}\,x\left(a+b\text{csch}^{-1}(cx)\right)^2}{2c} + \frac{1}{2}x^2\left(a+b\text{csch}^{-1}(cx)\right.$$
$$= \frac{3b\left(a+b\text{csch}^{-1}(cx)\right)^2}{2c^2} + \frac{3b\sqrt{1+\frac{1}{c^2x^2}}\,x\left(a+b\text{csch}^{-1}(cx)\right)^2}{2c} + \frac{1}{2}x^2\left(a+b\text{csch}^{-1}(cx)\right.$$
$$= \frac{3b\left(a+b\text{csch}^{-1}(cx)\right)^2}{2c^2} + \frac{3b\sqrt{1+\frac{1}{c^2x^2}}\,x\left(a+b\text{csch}^{-1}(cx)\right)^2}{2c} + \frac{1}{2}x^2\left(a+b\text{csch}^{-1}(cx)\right.$$

**Mathematica [A]** time = 0.47, size = 171, normalized size = 1.46

$$\frac{a\left(acx\left(acx+3b\sqrt{\frac{1}{c^2x^2}+1}\right)-6b^2\log\left(\frac{1}{cx}\right)\right)+3b^2\text{csch}^{-1}(cx)^2\left(ac^2x^2+b\left(cx\sqrt{\frac{1}{c^2x^2}+1}-1\right)\right)+3b\text{csch}^{-1}(cx)\left(acx\right.}{2c^2}$$

Warning: Unable to verify antiderivative.

```
[In] Integrate[x*(a + b*ArcCsch[c*x])^3,x]
```

```
[Out] (3*b^2*(a*c^2*x^2 + b*(-1 + c*Sqrt[1 + 1/(c^2*x^2)]*x))*ArcCsch[c*x]^2 + b^
3*c^2*x^2*ArcCsch[c*x]^3 + 3*b*ArcCsch[c*x]*(a*c*x*(2*b*Sqrt[1 + 1/(c^2*x^2
)] + a*c*x) - 2*b^2*Log[1 - E^(-2*ArcCsch[c*x])]) + a*(a*c*x*(3*b*Sqrt[1 +
1/(c^2*x^2)] + a*c*x) - 6*b^2*Log[1/(c*x)]) + 3*b^3*PolyLog[2, E^(-2*ArcCsc
h[c*x])])/(2*c^2)
```

**fricas [F]** time = 1.39, size = 0, normalized size = 0.00

$$\text{integral}\left(b^3x\,\text{arcsch}\,(cx)^3+3\,ab^2x\,\text{arcsch}\,(cx)^2+3\,a^2bx\,\text{arcsch}\,(cx)+a^3x, x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*(a+b*arccsch(c*x))^3,x, algorithm="fricas")
```

```
[Out] integral(b^3*x*arccsch(c*x)^3 + 3*a*b^2*x*arccsch(c*x)^2 + 3*a^2*b*x*arccsc
h(c*x) + a^3*x, x)
```

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

$$\int (b \operatorname{arcsch}(cx) + a)^3 x \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*(a+b*arccsch(c*x))^3,x, algorithm="giac")
```

```
[Out] integrate((b*arccsch(c*x) + a)^3*x, x)
```

**maple [F]** time = 0.05, size = 0, normalized size = 0.00

$$\int x (a + b \operatorname{arccsch}(cx))^3 \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x*(a+b*arccsch(c*x))^3,x)
```

```
[Out] int(x*(a+b*arccsch(c*x))^3,x)
```

**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(x*(a+b*arccsch(c*x))^3,x, algorithm="maxima")
```

```
[Out] 3/2*a*b^2*x^2*arccsch(c*x)^2 + 1/2*a^3*x^2 + 3/2*(x^2*arccsch(c*x) + x*sqrt
(1/(c^2*x^2) + 1)/c)*a^2*b + 3*(x*sqrt(1/(c^2*x^2) + 1)*arccsch(c*x)/c + lo
g(x)/c^2)*a*b^2 - 1/4*(24*c^2*integrate(1/2*x^3*log(x)/(sqrt(c^2*x^2 + 1)*c
^2*x^2 + c^2*x^2 + sqrt(c^2*x^2 + 1) + 1), x)*log(c)^2 - 24*c^2*integrate(1
/2*x^3*log(sqrt(c^2*x^2 + 1) + 1)/(sqrt(c^2*x^2 + 1)*c^2*x^2 + c^2*x^2 + sq
rt(c^2*x^2 + 1) + 1), x)*log(c)^2 - 2*x^2*log(sqrt(c^2*x^2 + 1) + 1)^3 + 24
*c^2*integrate(1/2*sqrt(c^2*x^2 + 1)*x^3*log(x)^2/(sqrt(c^2*x^2 + 1)*c^2*x^
2 + c^2*x^2 + sqrt(c^2*x^2 + 1) + 1), x)*log(c) - 48*c^2*integrate(1/2*sqrt
(c^2*x^2 + 1)*x^3*log(x)*log(sqrt(c^2*x^2 + 1) + 1)/(sqrt(c^2*x^2 + 1)*c^2*
x^2 + c^2*x^2 + sqrt(c^2*x^2 + 1) + 1), x)*log(c) + 24*c^2*integrate(1/2*sq
rt(c^2*x^2 + 1)*x^3*log(sqrt(c^2*x^2 + 1) + 1)^2/(sqrt(c^2*x^2 + 1)*c^2*x^2
 + c^2*x^2 + sqrt(c^2*x^2 + 1) + 1), x)*log(c) + 24*c^2*integrate(1/2*x^3*l
og(x)^2/(sqrt(c^2*x^2 + 1)*c^2*x^2 + c^2*x^2 + sqrt(c^2*x^2 + 1) + 1), x)*l
og(c) - 48*c^2*integrate(1/2*x^3*log(x)*log(sqrt(c^2*x^2 + 1) + 1)/(sqrt(c^
2*x^2 + 1)*c^2*x^2 + c^2*x^2 + sqrt(c^2*x^2 + 1) + 1), x)*log(c) + 24*c^2*i
```

```
ntegrate(1/2*x^3*log(sqrt(c^2*x^2 + 1) + 1)^2/(sqrt(c^2*x^2 + 1)*c^2*x^2 +
c^2*x^2 + sqrt(c^2*x^2 + 1) + 1), x)*log(c) + 8*c^2*integrate(1/2*sqrt(c^2*
x^2 + 1)*x^3*log(x)^3/(sqrt(c^2*x^2 + 1)*c^2*x^2 + c^2*x^2 + sqrt(c^2*x^2 +
 1) + 1), x) - 24*c^2*integrate(1/2*sqrt(c^2*x^2 + 1)*x^3*log(x)^2*log(sqrt
(c^2*x^2 + 1) + 1)/(sqrt(c^2*x^2 + 1)*c^2*x^2 + c^2*x^2 + sqrt(c^2*x^2 + 1)
 + 1), x) + 24*c^2*integrate(1/2*sqrt(c^2*x^2 + 1)*x^3*log(x)*log(sqrt(c^2*
x^2 + 1) + 1)^2/(sqrt(c^2*x^2 + 1)*c^2*x^2 + c^2*x^2 + sqrt(c^2*x^2 + 1) +
1), x) + 8*c^2*integrate(1/2*x^3*log(x)^3/(sqrt(c^2*x^2 + 1)*c^2*x^2 + c^2*
x^2 + sqrt(c^2*x^2 + 1) + 1), x) - 24*c^2*integrate(1/2*x^3*log(x)^2*log(sq
rt(c^2*x^2 + 1) + 1)/(sqrt(c^2*x^2 + 1)*c^2*x^2 + c^2*x^2 + sqrt(c^2*x^2 +
1) + 1), x) + 24*c^2*integrate(1/2*x^3*log(x)*log(sqrt(c^2*x^2 + 1) + 1)^2/
(sqrt(c^2*x^2 + 1)*c^2*x^2 + c^2*x^2 + sqrt(c^2*x^2 + 1) + 1), x) + 12*c^2*
integrate(1/2*sqrt(c^2*x^2 + 1)*x^3*log(sqrt(c^2*x^2 + 1) + 1)^2/(sqrt(c^2*
x^2 + 1)*c^2*x^2 + c^2*x^2 + sqrt(c^2*x^2 + 1) + 1), x) + 24*integrate(1/2*
sqrt(c^2*x^2 + 1)*x*log(x)/(sqrt(c^2*x^2 + 1)*c^2*x^2 + c^2*x^2 + sqrt(c^2*
x^2 + 1) + 1), x)*log(c)^2 + 24*integrate(1/2*x*log(x)/(sqrt(c^2*x^2 + 1)*c
^2*x^2 + c^2*x^2 + sqrt(c^2*x^2 + 1) + 1), x)*log(c)^2 - 24*integrate(1/2*x
*log(sqrt(c^2*x^2 + 1) + 1)/(sqrt(c^2*x^2 + 1)*c^2*x^2 + c^2*x^2 + sqrt(c^2
*x^2 + 1) + 1), x)*log(c)^2 + 24*integrate(1/2*sqrt(c^2*x^2 + 1)*x*log(x)^2
/(sqrt(c^2*x^2 + 1)*c^2*x^2 + c^2*x^2 + sqrt(c^2*x^2 + 1) + 1), x)*log(c) -
 48*integrate(1/2*sqrt(c^2*x^2 + 1)*x*log(x)*log(sqrt(c^2*x^2 + 1) + 1)/(sq
rt(c^2*x^2 + 1)*c^2*x^2 + c^2*x^2 + sqrt(c^2*x^2 + 1) + 1), x)*log(c) + 24*
integrate(1/2*x*log(x)^2/(sqrt(c^2*x^2 + 1)*c^2*x^2 + c^2*x^2 + sqrt(c^2*x^
2 + 1) + 1), x)*log(c) - 48*integrate(1/2*x*log(x)*log(sqrt(c^2*x^2 + 1) +
1)/(sqrt(c^2*x^2 + 1)*c^2*x^2 + c^2*x^2 + sqrt(c^2*x^2 + 1) + 1), x)*log(c)
 + 24*integrate(1/2*x*log(sqrt(c^2*x^2 + 1) + 1)^2/(sqrt(c^2*x^2 + 1)*c^2*x
^2 + c^2*x^2 + sqrt(c^2*x^2 + 1) + 1), x)*log(c) + 2*(c^2*x^2 - 2*sqrt(c^2*
x^2 + 1) + 1)*log(c)^3/c^2 + 2*(2*sqrt(c^2*x^2 + 1) - log(c^2*x^2 + 1))*log
(c)^3/c^2 + 2*(log(c^2*x^2 + 1) - 2*log(sqrt(c^2*x^2 + 1) + 1))*log(c)^3/c^
2 + 6*(c^2*x^2 - 2*sqrt(c^2*x^2 + 1) + 1)*log(c)^2*log(x)/c^2 - 6*(c^2*x^2
- 2*sqrt(c^2*x^2 + 1) + 1)*log(c)^2*log(sqrt(c^2*x^2 + 1) + 1)/c^2 + 4*log(
c)^3*log(sqrt(c^2*x^2 + 1) + 1)/c^2 - 6*log(c)^2*log(sqrt(c^2*x^2 + 1) + 1)
^2/c^2 + 4*log(c)*log(sqrt(c^2*x^2 + 1) + 1)^3/c^2 - 3*(c^2*x^2 - 4*sqrt(c^
2*x^2 + 1) + 3*log(sqrt(c^2*x^2 + 1) + 1) - log(sqrt(c^2*x^2 + 1) - 1) + 1)
*log(c)^2/c^2 + 3*(c^2*x^2 - 6*sqrt(c^2*x^2 + 1) + 6*log(sqrt(c^2*x^2 + 1)
+ 1) + 1)*log(c)^2/c^2 + 8*integrate(1/2*sqrt(c^2*x^2 + 1)*x*log(x)^3/(sqrt
(c^2*x^2 + 1)*c^2*x^2 + c^2*x^2 + sqrt(c^2*x^2 + 1) + 1), x) - 24*integrate
(1/2*sqrt(c^2*x^2 + 1)*x*log(x)^2*log(sqrt(c^2*x^2 + 1) + 1)/(sqrt(c^2*x^2
+ 1)*c^2*x^2 + c^2*x^2 + sqrt(c^2*x^2 + 1) + 1), x) + 24*integrate(1/2*sqrt
(c^2*x^2 + 1)*x*log(x)*log(sqrt(c^2*x^2 + 1) + 1)^2/(sqrt(c^2*x^2 + 1)*c^2*
x^2 + c^2*x^2 + sqrt(c^2*x^2 + 1) + 1), x) + 8*integrate(1/2*x*log(x)^3/(sq
rt(c^2*x^2 + 1)*c^2*x^2 + c^2*x^2 + sqrt(c^2*x^2 + 1) + 1), x) - 24*integra
te(1/2*x*log(x)^2*log(sqrt(c^2*x^2 + 1) + 1)/(sqrt(c^2*x^2 + 1)*c^2*x^2 + c
^2*x^2 + sqrt(c^2*x^2 + 1) + 1), x) + 24*integrate(1/2*x*log(x)*log(sqrt(c^
2*x^2 + 1) + 1)^2/(sqrt(c^2*x^2 + 1)*c^2*x^2 + c^2*x^2 + sqrt(c^2*x^2 + 1)
```

```
+ 1), x))*b^3
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.01

$$\int x\left(a+b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)\right)^3\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x*(a + b*asinh(1/(c*x)))^3,x)
[Out] int(x*(a + b*asinh(1/(c*x)))^3, x)
```

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

$$\int x\left(a+b\,\mathrm{acsch}\,(cx)\right)^3\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*(a+b*acsch(c*x))**3,x)
[Out] Integral(x*(a + b*acsch(c*x))**3, x)
```

## 3.27 $\int \left(a+b\text{csch}^{-1}(cx)\right)^3\,dx$

**Optimal**. Leaf size=120

$$\frac{6b^2\text{Li}_2\left(-e^{\text{csch}^{-1}(cx)}\right)\left(a+b\text{csch}^{-1}(cx)\right)}{c}-\frac{6b^2\text{Li}_2\left(e^{\text{csch}^{-1}(cx)}\right)\left(a+b\text{csch}^{-1}(cx)\right)}{c}+x\left(a+b\text{csch}^{-1}(cx)\right)^3+\frac{6b\tanh^{-1}\left(\right.}{}$$

```
[Out] x*(a+b*arccsch(c*x))^3+6*b*(a+b*arccsch(c*x))^2*arctanh(1/c/x+(1+1/c^2/x^2)
^(1/2))/c+6*b^2*(a+b*arccsch(c*x))*polylog(2,-1/c/x-(1+1/c^2/x^2)^(1/2))/c-
6*b^2*(a+b*arccsch(c*x))*polylog(2,1/c/x+(1+1/c^2/x^2)^(1/2))/c-6*b^3*polyl
og(3,-1/c/x-(1+1/c^2/x^2)^(1/2))/c+6*b^3*polylog(3,1/c/x+(1+1/c^2/x^2)^(1/2
))/c
```

**Rubi [A]** time = 0.12, antiderivative size = 120, normalized size of antiderivative = 1.00, number of steps used = 9, number of rules used = 6, integrand size = 10, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.600, Rules used = {6280, 5452, 4182, 2531, 2282, 6589}

$$\frac{6b^2\text{PolyLog}\left(2,-e^{\text{csch}^{-1}(cx)}\right)\left(a+b\text{csch}^{-1}(cx)\right)}{c}-\frac{6b^2\text{PolyLog}\left(2,e^{\text{csch}^{-1}(cx)}\right)\left(a+b\text{csch}^{-1}(cx)\right)}{c}-\frac{6b^3\text{PolyLog}\left(3,-\right.}{c}$$

Antiderivative was successfully verified.

```
[In] Int[(a + b*ArcCsch[c*x])^3,x]
```

```
[Out] x*(a + b*ArcCsch[c*x])^3 + (6*b*(a + b*ArcCsch[c*x])^2*ArcTanh[E^ArcCsch[c*
x]])/c + (6*b^2*(a + b*ArcCsch[c*x])*PolyLog[2, -E^ArcCsch[c*x]])/c - (6*b^
2*(a + b*ArcCsch[c*x])*PolyLog[2, E^ArcCsch[c*x]])/c - (6*b^3*PolyLog[3, -E
^ArcCsch[c*x]])/c + (6*b^3*PolyLog[3, E^ArcCsch[c*x]])/c
```

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 5452

```
Int[Coth[(a_.) + (b_.)*(x_)]^(p_.)*Csch[(a_.) + (b_.)*(x_)]^(n_.)*((c_.) +
(d_.)*(x_))^(m_.), x_Symbol] :> -Simp[((c + d*x)^m*Csch[a + b*x]^n)/(b*n),
x] + Dist[(d*m)/(b*n), Int[(c + d*x)^(m - 1)*Csch[a + b*x]^n, x], x] /; Fre
eQ[{a, b, c, d, n}, x] && EqQ[p, 1] && GtQ[m, 0]
```

Rule 6280

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))^(n_), x_Symbol] :> -Dist[c^(-1), Su
bst[Int[(a + b*x)^n*Csch[x]*Coth[x], x], x, ArcCsch[c*x]], x] /; FreeQ[{a,
b, c, n}, x] && IGtQ[n, 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

$$\int \left(a+b\text{csch}^{-1}(cx)\right)^3 dx = -\frac{\text{Subst}\left(\int (a+bx)^3 \coth(x)\text{csch}(x)\,dx, x, \text{csch}^{-1}(cx)\right)}{c}$$
$$= x\left(a+b\text{csch}^{-1}(cx)\right)^3 - \frac{(3b)\,\text{Subst}\left(\int (a+bx)^2\text{csch}(x)\,dx, x, \text{csch}^{-1}(cx)\right)}{c}$$
$$= x\left(a+b\text{csch}^{-1}(cx)\right)^3 + \frac{6b\left(a+b\text{csch}^{-1}(cx)\right)^2 \tanh^{-1}\left(e^{\text{csch}^{-1}(cx)}\right)}{c} + \frac{\left(6b^2\right)\text{Subst}\left(\int (a\right.}{}$$
$$= x\left(a+b\text{csch}^{-1}(cx)\right)^3 + \frac{6b\left(a+b\text{csch}^{-1}(cx)\right)^2 \tanh^{-1}\left(e^{\text{csch}^{-1}(cx)}\right)}{c} + \frac{6b^2\left(a+b\text{csch}^{-1}\right.}{}$$
$$= x\left(a+b\text{csch}^{-1}(cx)\right)^3 + \frac{6b\left(a+b\text{csch}^{-1}(cx)\right)^2 \tanh^{-1}\left(e^{\text{csch}^{-1}(cx)}\right)}{c} + \frac{6b^2\left(a+b\text{csch}^{-1}\right.}{}$$
$$= x\left(a+b\text{csch}^{-1}(cx)\right)^3 + \frac{6b\left(a+b\text{csch}^{-1}(cx)\right)^2 \tanh^{-1}\left(e^{\text{csch}^{-1}(cx)}\right)}{c} + \frac{6b^2\left(a+b\text{csch}^{-1}\right.}{}$$

**Mathematica [B]** time = 0.34, size = 246, normalized size = 2.05

$$a^3x + \frac{3a^2b\log\left(cx\left(\sqrt{\frac{c^2x^2+1}{c^2x^2}}+1\right)\right)}{c} + 3a^2bx\text{csch}^{-1}(cx) + \frac{3ab^2\left(-2\text{Li}_2\left(-e^{-\text{csch}^{-1}(cx)}\right) + 2\text{Li}_2\left(e^{-\text{csch}^{-1}(cx)}\right) + \text{csch}^{-1}(c\right.}{}$$

Warning: Unable to verify antiderivative.

```
[In] Integrate[(a + b*ArcCsch[c*x])^3,x]
```

```
[Out] a^3*x + 3*a^2*b*x*ArcCsch[c*x] + (3*a^2*b*Log[c*x*(1 + Sqrt[(1 + c^2*x^2)/(
c^2*x^2)])])/c + (3*a*b^2*(ArcCsch[c*x]*(c*x*ArcCsch[c*x] - 2*Log[1 - E^(-A
rcCsch[c*x])] + 2*Log[1 + E^(-ArcCsch[c*x])]) - 2*PolyLog[2, -E^(-ArcCsch[c
*x])] + 2*PolyLog[2, E^(-ArcCsch[c*x])]))/c + (b^3*(c*x*ArcCsch[c*x]^3 - 3*
ArcCsch[c*x]^2*Log[1 - E^(-ArcCsch[c*x])] + 3*ArcCsch[c*x]^2*Log[1 + E^(-Ar
cCsch[c*x])] - 6*ArcCsch[c*x]*PolyLog[2, -E^(-ArcCsch[c*x])] + 6*ArcCsch[c*
x]*PolyLog[2, E^(-ArcCsch[c*x])] - 6*PolyLog[3, -E^(-ArcCsch[c*x])] + 6*Pol
yLog[3, E^(-ArcCsch[c*x])]))/c
```

**fricas [F]** time = 2.95, size = 0, normalized size = 0.00

$$\text{integral}\left(b^3 \operatorname{arcsch}(cx)^3 + 3\,ab^2 \operatorname{arcsch}(cx)^2 + 3\,a^2b \operatorname{arcsch}(cx) + a^3, x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))^3,x, algorithm="fricas")
```

```
[Out] integral(b^3*arccsch(c*x)^3 + 3*a*b^2*arccsch(c*x)^2 + 3*a^2*b*arccsch(c*x)
 + a^3, x)
```

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

$$\int (b\operatorname{arcsch}(cx) + a)^3\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))^3,x, algorithm="giac")
```

```
[Out] integrate((b*arccsch(c*x) + a)^3, x)
```

**maple [F]** time = 0.05, size = 0, normalized size = 0.00

$$\int (a + b\operatorname{arccsch}(cx))^3\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a+b*arccsch(c*x))^3,x)
```

```
[Out] int((a+b*arccsch(c*x))^3,x)
```

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

$$b^3x\log\left(\sqrt{c^2x^2+1}+1\right)^3 + a^3x + \frac{3\left(2\,cx\operatorname{arcsch}(cx) + \log\left(\sqrt{\frac{1}{c^2x^2}+1}+1\right) - \log\left(\sqrt{\frac{1}{c^2x^2}+1}-1\right)\right)a^2b}{2\,c} - \int \frac{b^3\log}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))^3,x, algorithm="maxima")
```

```
[Out] b^3*x*log(sqrt(c^2*x^2 + 1) + 1)^3 + a^3*x + 3/2*(2*c*x*arccsch(c*x) + log(
sqrt(1/(c^2*x^2) + 1) + 1) - log(sqrt(1/(c^2*x^2) + 1) - 1))*a^2*b/c - inte
grate((b^3*log(c)^3 - 3*a*b^2*log(c)^2 + (b^3*c^2*x^2 + b^3)*log(x)^3 + (b^
3*c^2*log(c)^3 - 3*a*b^2*c^2*log(c)^2)*x^2 + 3*(b^3*log(c) - a*b^2 + (b^3*c
^2*log(c) - a*b^2*c^2)*x^2)*log(x)^2 + 3*(b^3*log(c) - a*b^2 + (b^3*c^2*log
(c) - a*b^2*c^2)*x^2 + (b^3*c^2*x^2 + b^3)*log(x) + sqrt(c^2*x^2 + 1)*(b^3*
log(c) - a*b^2 + (b^3*c^2*(log(c) + 1) - a*b^2*c^2)*x^2 + (b^3*c^2*x^2 + b^
3)*log(x)))*log(sqrt(c^2*x^2 + 1) + 1)^2 + 3*(b^3*log(c)^2 - 2*a*b^2*log(c)
 + (b^3*c^2*log(c)^2 - 2*a*b^2*c^2*log(c))*x^2)*log(x) - 3*(b^3*log(c)^2 -
2*a*b^2*log(c) + (b^3*c^2*log(c)^2 - 2*a*b^2*c^2*log(c))*x^2 + (b^3*c^2*x^2
 + b^3)*log(x)^2 + 2*(b^3*log(c) - a*b^2 + (b^3*c^2*log(c) - a*b^2*c^2)*x^2
)*log(x) + (b^3*log(c)^2 - 2*a*b^2*log(c) + (b^3*c^2*log(c)^2 - 2*a*b^2*c^2
```

```
*log(c))*x^2 + (b^3*c^2*x^2 + b^3)*log(x)^2 + 2*(b^3*log(c) - a*b^2 + (b^3*
c^2*log(c) - a*b^2*c^2)*x^2)*log(x))*sqrt(c^2*x^2 + 1))*log(sqrt(c^2*x^2 +
1) + 1) + (b^3*log(c)^3 - 3*a*b^2*log(c)^2 + (b^3*c^2*x^2 + b^3)*log(x)^3 +
 (b^3*c^2*log(c)^3 - 3*a*b^2*c^2*log(c)^2)*x^2 + 3*(b^3*log(c) - a*b^2 + (b
^3*c^2*log(c) - a*b^2*c^2)*x^2)*log(x)^2 + 3*(b^3*log(c)^2 - 2*a*b^2*log(c)
 + (b^3*c^2*log(c)^2 - 2*a*b^2*c^2*log(c))*x^2)*log(x))*sqrt(c^2*x^2 + 1))/
(c^2*x^2 + (c^2*x^2 + 1)^(3/2) + 1), x)
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.01

$$\int \left(a+b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)\right)^3\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a + b*asinh(1/(c*x)))^3,x)
```

```
[Out] int((a + b*asinh(1/(c*x)))^3, x)
```

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

$$\int \left(a+b\,\mathrm{acsch}\,(cx)\right)^3\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*acsch(c*x))**3,x)
```

```
[Out] Integral((a + b*acsch(c*x))**3, x)
```

## 3.28 $\int \frac{\left(a+b\,\mathrm{csch}^{-1}(cx)\right)^3}{x}\,dx$

**Optimal**. Leaf size=110

$$\frac{3}{2}b^2\mathrm{Li}_3\left(e^{2\mathrm{csch}^{-1}(cx)}\right)\left(a+b\,\mathrm{csch}^{-1}(cx)\right)-\frac{3}{2}b\mathrm{Li}_2\left(e^{2\mathrm{csch}^{-1}(cx)}\right)\left(a+b\,\mathrm{csch}^{-1}(cx)\right)^2+\frac{\left(a+b\,\mathrm{csch}^{-1}(cx)\right)^4}{4b}-\log\left(1-e^{2c}\right.$$

```
[Out] 1/4*(a+b*arccsch(c*x))^4/b-(a+b*arccsch(c*x))^3*ln(1-(1/c/x+(1+1/c^2/x^2)^(
1/2))^2)-3/2*b*(a+b*arccsch(c*x))^2*polylog(2,(1/c/x+(1+1/c^2/x^2)^(1/2))^2
)+3/2*b^2*(a+b*arccsch(c*x))*polylog(3,(1/c/x+(1+1/c^2/x^2)^(1/2))^2)-3/4*b
^3*polylog(4,(1/c/x+(1+1/c^2/x^2)^(1/2))^2)
```

**Rubi [A]** time = 0.15, antiderivative size = 110, normalized size of antiderivative = 1.00, number of steps used = 7, number of rules used = 7, integrand size = 14, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.500, Rules used = {6286, 3716, 2190, 2531, 6609, 2282, 6589}

$$\frac{3}{2}b^2\mathrm{PolyLog}\left(3,e^{2\mathrm{csch}^{-1}(cx)}\right)\left(a+b\,\mathrm{csch}^{-1}(cx)\right)-\frac{3}{2}b\mathrm{PolyLog}\left(2,e^{2\mathrm{csch}^{-1}(cx)}\right)\left(a+b\,\mathrm{csch}^{-1}(cx)\right)^2-\frac{3}{4}b^3\mathrm{PolyLog}\left(4,\right.$$

Antiderivative was successfully verified.

```
[In] Int[(a + b*ArcCsch[c*x])^3/x,x]
```

```
[Out] (a + b*ArcCsch[c*x])^4/(4*b) - (a + b*ArcCsch[c*x])^3*Log[1 - E^(2*ArcCsch[
c*x])] - (3*b*(a + b*ArcCsch[c*x])^2*PolyLog[2, E^(2*ArcCsch[c*x])])/2 + (3
*b^2*(a + b*ArcCsch[c*x])*PolyLog[3, E^(2*ArcCsch[c*x])])/2 - (3*b^3*PolyLo
g[4, E^(2*ArcCsch[c*x])])/4
```

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 3716

```
Int[((c_.) + (d_.)*(x_))^(m_.)*tan[(e_.) + Pi*(k_.) + (Complex[0, fz_])*(f_
.)*(x_)], x_Symbol] :> -Simp[(I*(c + d*x)^(m + 1))/(d*(m + 1)), x] + Dist[2
*I, Int[((c + d*x)^m*E^(2*(-(I*e) + f*fz*x)))/(E^(2*I*k*Pi)*(1 + E^(2*(-(I*
e) + f*fz*x))/E^(2*I*k*Pi))), x], x] /; FreeQ[{c, d, e, f, fz}, x] && Integ
erQ[4*k] && IGtQ[m, 0]
```

Rule 6286

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))^(n_)*(x_)^(m_.), x_Symbol] :> -Dist
[(c^(m + 1))^(-1), Subst[Int[(a + b*x)^n*Csch[x]^(m + 1)*Coth[x], x], x, Ar
cCsch[c*x]], x] /; FreeQ[{a, b, c}, x] && IntegerQ[n] && IntegerQ[m] && (Gt
Q[n, 0] || LtQ[m, -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

$$\int \frac{\left(a+b\operatorname{csch}^{-1}(cx)\right)^3}{x}\,dx = -\operatorname{Subst}\left(\int (a+bx)^3\coth(x)\,dx, x, \operatorname{csch}^{-1}(cx)\right)$$
$$= \frac{\left(a+b\operatorname{csch}^{-1}(cx)\right)^4}{4b} + 2\operatorname{Subst}\left(\int \frac{e^{2x}(a+bx)^3}{1-e^{2x}}\,dx, x, \operatorname{csch}^{-1}(cx)\right)$$
$$= \frac{\left(a+b\operatorname{csch}^{-1}(cx)\right)^4}{4b} - \left(a+b\operatorname{csch}^{-1}(cx)\right)^3\log\left(1-e^{2\operatorname{csch}^{-1}(cx)}\right) + (3b)\operatorname{Subst}\left(\int (a+\right.$$
$$= \frac{\left(a+b\operatorname{csch}^{-1}(cx)\right)^4}{4b} - \left(a+b\operatorname{csch}^{-1}(cx)\right)^3\log\left(1-e^{2\operatorname{csch}^{-1}(cx)}\right) - \frac{3}{2}b\left(a+b\operatorname{csch}^{-1}(cx\right.$$
$$= \frac{\left(a+b\operatorname{csch}^{-1}(cx)\right)^4}{4b} - \left(a+b\operatorname{csch}^{-1}(cx)\right)^3\log\left(1-e^{2\operatorname{csch}^{-1}(cx)}\right) - \frac{3}{2}b\left(a+b\operatorname{csch}^{-1}(cx\right.$$
$$= \frac{\left(a+b\operatorname{csch}^{-1}(cx)\right)^4}{4b} - \left(a+b\operatorname{csch}^{-1}(cx)\right)^3\log\left(1-e^{2\operatorname{csch}^{-1}(cx)}\right) - \frac{3}{2}b\left(a+b\operatorname{csch}^{-1}(cx\right.$$
$$= \frac{\left(a+b\operatorname{csch}^{-1}(cx)\right)^4}{4b} - \left(a+b\operatorname{csch}^{-1}(cx)\right)^3\log\left(1-e^{2\operatorname{csch}^{-1}(cx)}\right) - \frac{3}{2}b\left(a+b\operatorname{csch}^{-1}(cx\right.$$

**Mathematica [A]** time = 0.23, size = 198, normalized size = 1.80

$$\frac{1}{4}\left(4a^3\log(cx) + 6a^2b\left(\operatorname{Li}_2\left(e^{-2\operatorname{csch}^{-1}(cx)}\right) - \operatorname{csch}^{-1}(cx)\left(\operatorname{csch}^{-1}(cx) + 2\log\left(1-e^{-2\operatorname{csch}^{-1}(cx)}\right)\right)\right) + 2ab^2\left(-6\operatorname{csch}^{-1}\right.\right.$$

Warning: Unable to verify antiderivative.

```
[In] Integrate[(a + b*ArcCsch[c*x])^3/x,x]
```

```
[Out] (4*a^3*Log[c*x] + 6*a^2*b*(-(ArcCsch[c*x]*(ArcCsch[c*x] + 2*Log[1 - E^(-2*A
rcCsch[c*x])])) + PolyLog[2, E^(-2*ArcCsch[c*x])]) + 2*a*b^2*(2*ArcCsch[c*x
]^2*(ArcCsch[c*x] - 3*Log[1 - E^(2*ArcCsch[c*x])]) - 6*ArcCsch[c*x]*PolyLog
[2, E^(2*ArcCsch[c*x])] + 3*PolyLog[3, E^(2*ArcCsch[c*x])]) + b^3*(ArcCsch[
c*x]^4 - 4*ArcCsch[c*x]^3*Log[1 - E^(2*ArcCsch[c*x])] - 6*ArcCsch[c*x]^2*Po
lyLog[2, E^(2*ArcCsch[c*x])] + 6*ArcCsch[c*x]*PolyLog[3, E^(2*ArcCsch[c*x])
] - 3*PolyLog[4, E^(2*ArcCsch[c*x])]))/4
```

**fricas [F]** time = 0.41, size = 0, normalized size = 0.00

$$\operatorname{integral}\left(\frac{b^3\operatorname{arcsch}(cx)^3 + 3\,ab^2\operatorname{arcsch}(cx)^2 + 3\,a^2b\operatorname{arcsch}(cx) + a^3}{x}, x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))^3/x,x, algorithm="fricas")
```

```
[Out] integral((b^3*arccsch(c*x)^3 + 3*a*b^2*arccsch(c*x)^2 + 3*a^2*b*arccsch(c*x
) + a^3)/x, x)
```

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

$$\int \frac{(b\,\mathrm{arcsch}\,(cx) + a)^3}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))^3/x,x, algorithm="giac")
```

```
[Out] integrate((b*arccsch(c*x) + a)^3/x, x)
```

**maple [F]** time = 0.06, size = 0, normalized size = 0.00

$$\int \frac{(a + b\,\mathrm{arccsch}\,(cx))^3}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a+b*arccsch(c*x))^3/x,x)
```

```
[Out] int((a+b*arccsch(c*x))^3/x,x)
```

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

$$b^3\log(x)\log\left(\sqrt{c^2x^2+1}+1\right)^3 + a^3\log(x) - \int \frac{b^3\log(c)^3 - 3\,ab^2\log(c)^2 + 3\,a^2b\log(c) + \left(b^3c^2x^2+b^3\right)\log(x)^3 + (}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))^3/x,x, algorithm="maxima")
```

```
[Out] b^3*log(x)*log(sqrt(c^2*x^2 + 1) + 1)^3 + a^3*log(x) - integrate((b^3*log(c
)^3 - 3*a*b^2*log(c)^2 + 3*a^2*b*log(c) + (b^3*c^2*x^2 + b^3)*log(x)^3 + (b
^3*c^2*log(c)^3 - 3*a*b^2*c^2*log(c)^2 + 3*a^2*b*c^2*log(c))*x^2 + 3*(b^3*l
og(c) - a*b^2 + (b^3*c^2*log(c) - a*b^2*c^2)*x^2)*log(x)^2 + 3*(b^3*log(c)
- a*b^2 + (b^3*c^2*log(c) - a*b^2*c^2)*x^2 + (b^3*c^2*x^2 + b^3)*log(x) + s
qrt(c^2*x^2 + 1)*(b^3*log(c) - a*b^2 + (b^3*c^2*log(c) - a*b^2*c^2)*x^2 + (
2*b^3*c^2*x^2 + b^3)*log(x)))*log(sqrt(c^2*x^2 + 1) + 1)^2 + 3*(b^3*log(c)^
2 - 2*a*b^2*log(c) + a^2*b + (b^3*c^2*log(c)^2 - 2*a*b^2*c^2*log(c) + a^2*b
*c^2)*x^2)*log(x) - 3*(b^3*log(c)^2 - 2*a*b^2*log(c) + a^2*b + (b^3*c^2*log
(c)^2 - 2*a*b^2*c^2*log(c) + a^2*b*c^2)*x^2 + (b^3*c^2*x^2 + b^3)*log(x)^2
```

```
+ 2*(b^3*log(c) - a*b^2 + (b^3*c^2*log(c) - a*b^2*c^2)*x^2)*log(x) + (b^3*l
og(c)^2 - 2*a*b^2*log(c) + a^2*b + (b^3*c^2*log(c)^2 - 2*a*b^2*c^2*log(c) +
 a^2*b*c^2)*x^2 + (b^3*c^2*x^2 + b^3)*log(x)^2 + 2*(b^3*log(c) - a*b^2 + (b
^3*c^2*log(c) - a*b^2*c^2)*x^2)*log(x))*sqrt(c^2*x^2 + 1))*log(sqrt(c^2*x^2
 + 1) + 1) + (b^3*log(c)^3 - 3*a*b^2*log(c)^2 + 3*a^2*b*log(c) + (b^3*c^2*x
^2 + b^3)*log(x)^3 + (b^3*c^2*log(c)^3 - 3*a*b^2*c^2*log(c)^2 + 3*a^2*b*c^2
*log(c))*x^2 + 3*(b^3*log(c) - a*b^2 + (b^3*c^2*log(c) - a*b^2*c^2)*x^2)*lo
g(x)^2 + 3*(b^3*log(c)^2 - 2*a*b^2*log(c) + a^2*b + (b^3*c^2*log(c)^2 - 2*a
*b^2*c^2*log(c) + a^2*b*c^2)*x^2)*log(x))*sqrt(c^2*x^2 + 1))/(c^2*x^3 + (c^
2*x^3 + x)*sqrt(c^2*x^2 + 1) + x), x)
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.01

$$\int \frac{\left(a+b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)\right)^3}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a + b*asinh(1/(c*x)))^3/x,x)
```

```
[Out] int((a + b*asinh(1/(c*x)))^3/x, x)
```

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

$$\int \frac{\left(a+b\,\mathrm{acsch}\,(cx)\right)^3}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*acsch(c*x))**3/x,x)
```

```
[Out] Integral((a + b*acsch(c*x))**3/x, x)
```

# 3.29 $\int \frac{\left(a+b\,\mathrm{csch}^{-1}(cx)\right)^3}{x^2}\,dx$

**Optimal**. Leaf size=78

$$-\frac{6b^2\left(a+b\,\mathrm{csch}^{-1}(cx)\right)}{x}+3bc\sqrt{\frac{1}{c^2x^2}+1}\left(a+b\,\mathrm{csch}^{-1}(cx)\right)^2-\frac{\left(a+b\,\mathrm{csch}^{-1}(cx)\right)^3}{x}+6b^3c\sqrt{\frac{1}{c^2x^2}+1}$$

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

**Rubi [A]** time = 0.10, antiderivative size = 78, normalized size of antiderivative = 1.00, number of steps used = 5, number of rules used = 3, integrand size = 14, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.214, Rules used = {6286, 3296, 2638}

$$-\frac{6b^2\left(a+b\,\mathrm{csch}^{-1}(cx)\right)}{x}+3bc\sqrt{\frac{1}{c^2x^2}+1}\left(a+b\,\mathrm{csch}^{-1}(cx)\right)^2-\frac{\left(a+b\,\mathrm{csch}^{-1}(cx)\right)^3}{x}+6b^3c\sqrt{\frac{1}{c^2x^2}+1}$$

Antiderivative was successfully verified.

```
[In] Int[(a + b*ArcCsch[c*x])^3/x^2,x]
```

```
[Out] 6*b^3*c*Sqrt[1 + 1/(c^2*x^2)] - (6*b^2*(a + b*ArcCsch[c*x]))/x + 3*b*c*Sqrt
[1 + 1/(c^2*x^2)]*(a + b*ArcCsch[c*x])^2 - (a + b*ArcCsch[c*x])^3/x
```

Rule 2638

```
Int[sin[(c_.) + (d_.)*(x_)], x_Symbol] :> -Simp[Cos[c + d*x]/d, x] /; FreeQ
[{c, d}, x]
```

Rule 3296

```
Int[((c_.) + (d_.)*(x_))^(m_.)*sin[(e_.) + (f_.)*(x_)], x_Symbol] :> -Simp[
((c + d*x)^m*Cos[e + f*x])/f, x] + Dist[(d*m)/f, Int[(c + d*x)^(m - 1)*Cos[
e + f*x], x], x] /; FreeQ[{c, d, e, f}, x] && GtQ[m, 0]
```

Rule 6286

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))^(n_)*(x_)^(m_.), x_Symbol] :> -Dist
[(c^(m + 1))^(-1), Subst[Int[(a + b*x)^n*Csch[x]^(m + 1)*Coth[x], x], x, Ar
cCsch[c*x]], x] /; FreeQ[{a, b, c}, x] && IntegerQ[n] && IntegerQ[m] && (Gt
Q[n, 0] || LtQ[m, -1])
```

Rubi steps

$$\int \frac{\left(a+b\text{csch}^{-1}(cx)\right)^3}{x^2}\,dx = -\left(c\,\text{Subst}\left(\int (a+bx)^3\cosh(x)\,dx, x, \text{csch}^{-1}(cx)\right)\right)$$
$$= -\frac{\left(a+b\text{csch}^{-1}(cx)\right)^3}{x} + (3bc)\,\text{Subst}\left(\int (a+bx)^2\sinh(x)\,dx, x, \text{csch}^{-1}(cx)\right)$$
$$= 3bc\sqrt{1+\frac{1}{c^2x^2}}\left(a+b\text{csch}^{-1}(cx)\right)^2 - \frac{\left(a+b\text{csch}^{-1}(cx)\right)^3}{x} - \left(6b^2c\right)\text{Subst}\left(\int (a+bx$$
$$= -\frac{6b^2\left(a+b\text{csch}^{-1}(cx)\right)}{x} + 3bc\sqrt{1+\frac{1}{c^2x^2}}\left(a+b\text{csch}^{-1}(cx)\right)^2 - \frac{\left(a+b\text{csch}^{-1}(cx)\right)^3}{x}$$
$$= 6b^3c\sqrt{1+\frac{1}{c^2x^2}} - \frac{6b^2\left(a+b\text{csch}^{-1}(cx)\right)}{x} + 3bc\sqrt{1+\frac{1}{c^2x^2}}\left(a+b\text{csch}^{-1}(cx)\right)^2 - \frac{(a}{}$$

**Mathematica [A]** time = 0.25, size = 132, normalized size = 1.69

$$-\frac{a^3+3b\text{csch}^{-1}(cx)\left(a^2-2abcx\sqrt{\frac{1}{c^2x^2}+1}+2b^2\right)-3a^2bcx\sqrt{\frac{1}{c^2x^2}+1}+3b^2\text{csch}^{-1}(cx)^2\left(a-bcx\sqrt{\frac{1}{c^2x^2}+1}\right)+6}{x}$$

Antiderivative was successfully verified.

```
[In] Integrate[(a + b*ArcCsch[c*x])^3/x^2,x]
```

```
[Out] -((a^3 + 6*a*b^2 - 3*a^2*b*c*Sqrt[1 + 1/(c^2*x^2)]*x - 6*b^3*c*Sqrt[1 + 1/(
c^2*x^2)]*x + 3*b*(a^2 + 2*b^2 - 2*a*b*c*Sqrt[1 + 1/(c^2*x^2)]*x)*ArcCsch[c
*x] + 3*b^2*(a - b*c*Sqrt[1 + 1/(c^2*x^2)]*x)*ArcCsch[c*x]^2 + b^3*ArcCsch[
c*x]^3)/x)
```

**fricas [B]** time = 0.83, size = 222, normalized size = 2.85

$$-\frac{b^3\log\left(\frac{cx\sqrt{\frac{c^2x^2+1}{c^2x^2}}+1}{cx}\right)^3 - 3\left(a^2b+2\,b^3\right)cx\sqrt{\frac{c^2x^2+1}{c^2x^2}} + a^3 + 6\,ab^2 - 3\left(b^3cx\sqrt{\frac{c^2x^2+1}{c^2x^2}} - ab^2\right)\log\left(\frac{cx\sqrt{\frac{c^2x^2+1}{c^2x^2}}+1}{cx}\right)^2 - 3}{x}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))^3/x^2,x, algorithm="fricas")
```

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

```
(c*x))^2 - 3*(2*a*b^2*c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) - a^2*b - 2*b^3)*lo
g((c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) + 1)/(c*x)))/x
```

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

$$\int \frac{(b \operatorname{arcsch}(cx) + a)^3}{x^2}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))^3/x^2,x, algorithm="giac")
```

```
[Out] integrate((b*arccsch(c*x) + a)^3/x^2, x)
```

**maple [F]** time = 0.05, size = 0, normalized size = 0.00

$$\int \frac{(a + b \operatorname{arccsch}(cx))^3}{x^2}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a+b*arccsch(c*x))^3/x^2,x)
```

```
[Out] int((a+b*arccsch(c*x))^3/x^2,x)
```

**maxima [A]** time = 0.35, size = 144, normalized size = 1.85

$$-\frac{b^3 \operatorname{arcsch}(cx)^3}{x} + 3\left(c\sqrt{\frac{1}{c^2x^2} + 1} - \frac{\operatorname{arcsch}(cx)}{x}\right)a^2b + 6\left(c\sqrt{\frac{1}{c^2x^2} + 1}\operatorname{arcsch}(cx) - \frac{1}{x}\right)ab^2 + 3\left(c\sqrt{\frac{1}{c^2x^2} + 1}\operatorname{arcsc}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))^3/x^2,x, algorithm="maxima")
```

```
[Out] -b^3*arccsch(c*x)^3/x + 3*(c*sqrt(1/(c^2*x^2) + 1) - arccsch(c*x)/x)*a^2*b
+ 6*(c*sqrt(1/(c^2*x^2) + 1)*arccsch(c*x) - 1/x)*a*b^2 + 3*(c*sqrt(1/(c^2*x
^2) + 1)*arccsch(c*x)^2 + 2*c*sqrt(1/(c^2*x^2) + 1) - 2*arccsch(c*x)/x)*b^3
 - 3*a*b^2*arccsch(c*x)^2/x - a^3/x
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.01

$$\int \frac{\left(a + b \operatorname{asinh}\left(\frac{1}{c\,x}\right)\right)^3}{x^2}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a + b*asinh(1/(c*x)))^3/x^2,x)
```

```
[Out] int((a + b*asinh(1/(c*x)))^3/x^2, x)
```

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

$$\int \frac{(a + b\operatorname{acsch}(cx))^3}{x^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*acsch(c*x))**3/x**2,x)
```

```
[Out] Integral((a + b*acsch(c*x))**3/x**2, x)
```

## 3.30 $\int \frac{\left(a+b\mathbf{csch}^{-1}(cx)\right)^3}{x^3}\,dx$

**Optimal**. Leaf size=123

$$-\frac{3b^2\left(a+b\text{csch}^{-1}(cx)\right)}{4x^2}+\frac{3bc\sqrt{\frac{1}{c^2x^2}+1}\left(a+b\text{csch}^{-1}(cx)\right)^2}{4x}-\frac{1}{4}c^2\left(a+b\text{csch}^{-1}(cx)\right)^3-\frac{\left(a+b\text{csch}^{-1}(cx)\right)^3}{2x^2}+\frac{3b^3c\sqrt{\ }}{8}$$

```
[Out] -3/8*b^3*c^2*arccsch(c*x)-3/4*b^2*(a+b*arccsch(c*x))/x^2-1/4*c^2*(a+b*arccs
ch(c*x))^3-1/2*(a+b*arccsch(c*x))^3/x^2+3/8*b^3*c*(1+1/c^2/x^2)^(1/2)/x+3/4
*b*c*(a+b*arccsch(c*x))^2*(1+1/c^2/x^2)^(1/2)/x
```

**Rubi [A]** time = 0.11, antiderivative size = 123, 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 = {6286, 5446, 3311, 32, 2635, 8}

$$-\frac{3b^2\left(a+b\text{csch}^{-1}(cx)\right)}{4x^2}+\frac{3bc\sqrt{\frac{1}{c^2x^2}+1}\left(a+b\text{csch}^{-1}(cx)\right)^2}{4x}-\frac{1}{4}c^2\left(a+b\text{csch}^{-1}(cx)\right)^3-\frac{\left(a+b\text{csch}^{-1}(cx)\right)^3}{2x^2}+\frac{3b^3c\sqrt{\ }}{8}$$

Antiderivative was successfully verified.

```
[In] Int[(a + b*ArcCsch[c*x])^3/x^3,x]
```

```
[Out] (3*b^3*c*Sqrt[1 + 1/(c^2*x^2)])/(8*x) - (3*b^3*c^2*ArcCsch[c*x])/8 - (3*b^2
*(a + b*ArcCsch[c*x]))/(4*x^2) + (3*b*c*Sqrt[1 + 1/(c^2*x^2)]*(a + b*ArcCsc
h[c*x])^2)/(4*x) - (c^2*(a + b*ArcCsch[c*x])^3)/4 - (a + b*ArcCsch[c*x])^3/
(2*x^2)
```

Rule 8

```
Int[a_, x_Symbol] :> Simp[a*x, x] /; FreeQ[a, x]
```

Rule 32

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

Rule 2635

```
Int[((b_.)*sin[(c_.) + (d_.)*(x_)])^(n_), x_Symbol] :> -Simp[(b*Cos[c + d*x
]*(b*Sin[c + d*x])^(n - 1))/(d*n), x] + Dist[(b^2*(n - 1))/n, Int[(b*Sin[c
+ d*x])^(n - 2), x], x] /; FreeQ[{b, c, d}, x] && GtQ[n, 1] && IntegerQ[2*n
]
```

Rule 3311

```
Int[((c_.) + (d_.)*(x_))^(m_)*((b_.)*sin[(e_.) + (f_.)*(x_)])^(n_), x_Symbo
l] :> Simp[(d*m*(c + d*x)^(m - 1)*(b*Sin[e + f*x])^n)/(f^2*n^2), x] + (Dist
[(b^2*(n - 1))/n, Int[(c + d*x)^m*(b*Sin[e + f*x])^(n - 2), x], x] - Dist[(
d^2*m*(m - 1))/(f^2*n^2), Int[(c + d*x)^(m - 2)*(b*Sin[e + f*x])^n, x], x]
- Simp[(b*(c + d*x)^m*Cos[e + f*x]*(b*Sin[e + f*x])^(n - 1))/(f*n), x]) /;
FreeQ[{b, c, d, e, f}, x] && GtQ[n, 1] && GtQ[m, 1]
```

Rule 5446

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

Rule 6286

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))^(n_)*(x_)^(m_.), x_Symbol] :> -Dist
[(c^(m + 1))^(-1), Subst[Int[(a + b*x)^n*Csch[x]^(m + 1)*Coth[x], x], x, Ar
cCsch[c*x]], x] /; FreeQ[{a, b, c}, x] && IntegerQ[n] && IntegerQ[m] && (Gt
Q[n, 0] || LtQ[m, -1])
```

Rubi steps

$$\int \frac{\left(a+b\operatorname{csch}^{-1}(cx)\right)^3}{x^3}\,dx = -\left(c^2\operatorname{Subst}\left(\int (a+bx)^3\cosh(x)\sinh(x)\,dx, x, \operatorname{csch}^{-1}(cx)\right)\right)$$

$$= -\frac{\left(a+b\operatorname{csch}^{-1}(cx)\right)^3}{2x^2}+\frac{1}{2}\left(3bc^2\right)\operatorname{Subst}\left(\int (a+bx)^2\sinh^2(x)\,dx, x, \operatorname{csch}^{-1}(cx)\right)$$

$$= -\frac{3b^2\left(a+b\operatorname{csch}^{-1}(cx)\right)}{4x^2}+\frac{3bc\sqrt{1+\frac{1}{c^2x^2}}\left(a+b\operatorname{csch}^{-1}(cx)\right)^2}{4x}-\frac{\left(a+b\operatorname{csch}^{-1}(cx)\right)^3}{2x^2}$$

$$= \frac{3b^3c\sqrt{1+\frac{1}{c^2x^2}}}{8x}-\frac{3b^2\left(a+b\operatorname{csch}^{-1}(cx)\right)}{4x^2}+\frac{3bc\sqrt{1+\frac{1}{c^2x^2}}\left(a+b\operatorname{csch}^{-1}(cx)\right)^2}{4x}-\frac{1}{4}c^2$$

$$= \frac{3b^3c\sqrt{1+\frac{1}{c^2x^2}}}{8x}-\frac{3}{8}b^3c^2\operatorname{csch}^{-1}(cx)-\frac{3b^2\left(a+b\operatorname{csch}^{-1}(cx)\right)}{4x^2}+\frac{3bc\sqrt{1+\frac{1}{c^2x^2}}\left(a+b\right.}{4x}$$

**Mathematica** [A] time = 0.33, size = 182, normalized size = 1.48

$$-\frac{4a^3+3bc^2x^2\left(2a^2+b^2\right)\sinh^{-1}\left(\frac{1}{cx}\right)+6b\operatorname{csch}^{-1}(cx)\left(2a^2-2abcx\sqrt{\frac{1}{c^2x^2}+1}+b^2\right)-6a^2bcx\sqrt{\frac{1}{c^2x^2}+1}+6b^2\operatorname{csch}}{8x^2}$$

Antiderivative was successfully verified.

```
[In] Integrate[(a + b*ArcCsch[c*x])^3/x^3,x]
```

```
[Out] -1/8*(4*a^3 + 6*a*b^2 - 6*a^2*b*c*Sqrt[1 + 1/(c^2*x^2)]*x - 3*b^3*c*Sqrt[1
+ 1/(c^2*x^2)]*x + 6*b*(2*a^2 + b^2 - 2*a*b*c*Sqrt[1 + 1/(c^2*x^2)]*x)*ArcC
sch[c*x] + 6*b^2*(-(b*c*Sqrt[1 + 1/(c^2*x^2)]*x) + a*(2 + c^2*x^2))*ArcCsch
[c*x]^2 + 2*b^3*(2 + c^2*x^2)*ArcCsch[c*x]^3 + 3*b*(2*a^2 + b^2)*c^2*x^2*Ar
cSinh[1/(c*x)])/x^2
```

**fricas** [B] time = 0.40, size = 267, normalized size = 2.17

$$-\frac{2\left(b^3c^2x^2+2\,b^3\right)\log\left(\frac{cx\sqrt{\frac{c^2x^2+1}{c^2x^2}}+1}{cx}\right)^3-3\left(2\,a^2b+b^3\right)cx\sqrt{\frac{c^2x^2+1}{c^2x^2}}+4\,a^3+6\,ab^2+6\left(ab^2c^2x^2-b^3cx\sqrt{\frac{c^2x^2+1}{c^2x^2}}+2\,a\right.}{8\,x^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))^3/x^3,x, algorithm="fricas")
```

```
[Out] -1/8*(2*(b^3*c^2*x^2 + 2*b^3)*log((c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) + 1)/(
c*x))^3 - 3*(2*a^2*b + b^3)*c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) + 4*a^3 + 6*a
*b^2 + 6*(a*b^2*c^2*x^2 - b^3*c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) + 2*a*b^2)*
log((c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) + 1)/(c*x))^2 - 3*(4*a*b^2*c*x*sqrt(
(c^2*x^2 + 1)/(c^2*x^2)) - (2*a^2*b + b^3)*c^2*x^2 - 4*a^2*b - 2*b^3)*log((
c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) + 1)/(c*x)))/x^2
```

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

$$\int\frac{\left(b\operatorname{arcsch}\left(cx\right)+a\right)^3}{x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))^3/x^3,x, algorithm="giac")
```

```
[Out] integrate((b*arccsch(c*x) + a)^3/x^3, x)
```

**maple** [F] time = 0.05, size = 0, normalized size = 0.00

$$\int\frac{\left(a+b\operatorname{arccsch}\left(cx\right)\right)^3}{x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a+b*arccsch(c*x))^3/x^3,x)
```

```
[Out] int((a+b*arccsch(c*x))^3/x^3,x)
```

**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((a+b*arccsch(c*x))^3/x^3,x, algorithm="maxima")
```

```
[Out] 3/8*a^2*b*((2*c^4*x*sqrt(1/(c^2*x^2) + 1)/(c^2*x^2*(1/(c^2*x^2) + 1) - 1) -
 c^3*log(c*x*sqrt(1/(c^2*x^2) + 1) + 1) + c^3*log(c*x*sqrt(1/(c^2*x^2) + 1)
 - 1))/c - 4*arccsch(c*x)/x^2) - 1/2*b^3*log(sqrt(c^2*x^2 + 1) + 1)^3/x^2 -
 1/2*a^3/x^2 - integrate(1/2*(2*b^3*log(c)^3 - 6*a*b^2*log(c)^2 + 2*(b^3*c^
2*x^2 + b^3)*log(x)^3 + 2*(b^3*c^2*log(c)^3 - 3*a*b^2*c^2*log(c)^2)*x^2 + 6
*(b^3*log(c) - a*b^2 + (b^3*c^2*log(c) - a*b^2*c^2)*x^2)*log(x)^2 + 3*(2*b^
3*log(c) - 2*a*b^2 + 2*(b^3*c^2*log(c) - a*b^2*c^2)*x^2 + 2*(b^3*c^2*x^2 +
b^3)*log(x) + sqrt(c^2*x^2 + 1)*(2*b^3*log(c) - 2*a*b^2 + (b^3*c^2*(2*log(c
) - 1) - 2*a*b^2*c^2)*x^2 + 2*(b^3*c^2*x^2 + b^3)*log(x)))*log(sqrt(c^2*x^2
 + 1) + 1)^2 + 6*(b^3*log(c)^2 - 2*a*b^2*log(c) + (b^3*c^2*log(c)^2 - 2*a*b
^2*c^2*log(c))*x^2)*log(x) - 6*(b^3*log(c)^2 - 2*a*b^2*log(c) + (b^3*c^2*lo
g(c)^2 - 2*a*b^2*c^2*log(c))*x^2 + (b^3*c^2*x^2 + b^3)*log(x)^2 + 2*(b^3*lo
g(c) - a*b^2 + (b^3*c^2*log(c) - a*b^2*c^2)*x^2)*log(x) + (b^3*log(c)^2 - 2
*a*b^2*log(c) + (b^3*c^2*log(c)^2 - 2*a*b^2*c^2*log(c))*x^2 + (b^3*c^2*x^2
+ b^3)*log(x)^2 + 2*(b^3*log(c) - a*b^2 + (b^3*c^2*log(c) - a*b^2*c^2)*x^2)
*log(x))*sqrt(c^2*x^2 + 1))*log(sqrt(c^2*x^2 + 1) + 1) + 2*(b^3*log(c)^3 -
3*a*b^2*log(c)^2 + (b^3*c^2*x^2 + b^3)*log(x)^3 + (b^3*c^2*log(c)^3 - 3*a*b
^2*c^2*log(c)^2)*x^2 + 3*(b^3*log(c) - a*b^2 + (b^3*c^2*log(c) - a*b^2*c^2)
*x^2)*log(x)^2 + 3*(b^3*log(c)^2 - 2*a*b^2*log(c) + (b^3*c^2*log(c)^2 - 2*a
*b^2*c^2*log(c))*x^2)*log(x))*sqrt(c^2*x^2 + 1))/(c^2*x^5 + x^3 + (c^2*x^5
+ x^3)*sqrt(c^2*x^2 + 1)), x)
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.01

$$\int \frac{\left(a+b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)\right)^3}{x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a + b*asinh(1/(c*x)))^3/x^3,x)
```

```
[Out] int((a + b*asinh(1/(c*x)))^3/x^3, x)
```

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

$$\int \frac{(a+b\operatorname{acsch}(cx))^3}{x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*acsch(c*x))**3/x**3,x)
```

```
[Out] Integral((a + b*acsch(c*x))**3/x**3, x)
```

## 3.31 $\int \frac{\left(a+b\textbf{csch}^{-1}(cx)\right)^3}{x^4}\,dx$

**Optimal**. Leaf size=166

$$\frac{4b^2c^2\left(a+b\text{csch}^{-1}(cx)\right)}{3x}-\frac{2b^2\left(a+b\text{csch}^{-1}(cx)\right)}{9x^3}+\frac{bc\sqrt{\frac{1}{c^2x^2}+1}\left(a+b\text{csch}^{-1}(cx)\right)^2}{3x^2}-\frac{2}{3}bc^3\sqrt{\frac{1}{c^2x^2}+1}\left(a+b\text{csch}\right.$$

```
[Out] 2/27*b^3*c^3*(1+1/c^2/x^2)^(3/2)-2/9*b^2*(a+b*arccsch(c*x))/x^3+4/3*b^2*c^2
*(a+b*arccsch(c*x))/x-1/3*(a+b*arccsch(c*x))^3/x^3-14/9*b^3*c^3*(1+1/c^2/x^
2)^(1/2)-2/3*b*c^3*(a+b*arccsch(c*x))^2*(1+1/c^2/x^2)^(1/2)+1/3*b*c*(a+b*ar
ccsch(c*x))^2*(1+1/c^2/x^2)^(1/2)/x^2
```

**Rubi** [A] time = 0.17, antiderivative size = 166, normalized size of antiderivative = 1.00, number of steps used = 8, number of rules used = 6, integrand size = 14, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.429, Rules used = {6286, 5446, 3311, 3296, 2638, 2633}

$$\frac{4b^2c^2\left(a+b\text{csch}^{-1}(cx)\right)}{3x}-\frac{2b^2\left(a+b\text{csch}^{-1}(cx)\right)}{9x^3}-\frac{2}{3}bc^3\sqrt{\frac{1}{c^2x^2}+1}\left(a+b\text{csch}^{-1}(cx)\right)^2+\frac{bc\sqrt{\frac{1}{c^2x^2}+1}\left(a+b\text{csch}\right.}{3x^2}$$

Antiderivative was successfully verified.

```
[In] Int[(a + b*ArcCsch[c*x])^3/x^4,x]
```

```
[Out] (-14*b^3*c^3*Sqrt[1 + 1/(c^2*x^2)])/9 + (2*b^3*c^3*(1 + 1/(c^2*x^2))^(3/2))
/27 - (2*b^2*(a + b*ArcCsch[c*x]))/(9*x^3) + (4*b^2*c^2*(a + b*ArcCsch[c*x]
))/(3*x) - (2*b*c^3*Sqrt[1 + 1/(c^2*x^2)]*(a + b*ArcCsch[c*x])^2)/3 + (b*c*
Sqrt[1 + 1/(c^2*x^2)]*(a + b*ArcCsch[c*x])^2)/(3*x^2) - (a + b*ArcCsch[c*x]
)^3/(3*x^3)
```

Rule 2633

```
Int[sin[(c_.) + (d_.)*(x_)]^(n_), x_Symbol] :> -Dist[d^(-1), Subst[Int[Expa
nd[(1 - x^2)^((n - 1)/2), x], x], x, Cos[c + d*x]], x] /; FreeQ[{c, d}, x]
&& IGtQ[(n - 1)/2, 0]
```

Rule 2638

```
Int[sin[(c_.) + (d_.)*(x_)], x_Symbol] :> -Simp[Cos[c + d*x]/d, x] /; FreeQ
[{c, d}, x]
```

Rule 3296

```
Int[((c_.) + (d_.)*(x_))^(m_.)*sin[(e_.) + (f_.)*(x_)], x_Symbol] :> -Simp[
((c + d*x)^m*Cos[e + f*x])/f, x] + Dist[(d*m)/f, Int[(c + d*x)^(m - 1)*Cos[
```

```
e + f*x], x], x] /; FreeQ[{c, d, e, f}, x] && GtQ[m, 0]
```

Rule 3311

```
Int[((c_.) + (d_.)*(x_))^(m_)*((b_.)*sin[(e_.) + (f_.)*(x_)])^(n_), x_Symbo
l] :> Simp[(d*m*(c + d*x)^(m - 1)*(b*Sin[e + f*x])^n)/(f^2*n^2), x] + (Dist
[(b^2*(n - 1))/n, Int[(c + d*x)^m*(b*Sin[e + f*x])^(n - 2), x], x] - Dist[(
d^2*m*(m - 1))/(f^2*n^2), Int[(c + d*x)^(m - 2)*(b*Sin[e + f*x])^n, x], x]
- Simp[(b*(c + d*x)^m*Cos[e + f*x]*(b*Sin[e + f*x])^(n - 1))/(f*n), x]) /;
FreeQ[{b, c, d, e, f}, x] && GtQ[n, 1] && GtQ[m, 1]
```

Rule 5446

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

Rule 6286

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))^(n_)*(x_)^(m_.), x_Symbol] :> -Dist
[(c^(m + 1))^(-1), Subst[Int[(a + b*x)^n*Csch[x]^(m + 1)*Coth[x], x], x, Ar
cCsch[c*x]], x] /; FreeQ[{a, b, c}, x] && IntegerQ[n] && IntegerQ[m] && (Gt
Q[n, 0] || LtQ[m, -1])
```

Rubi steps

$$\int \frac{\left(a+b\operatorname{csch}^{-1}(cx)\right)^3}{x^4}\,dx = -\left(c^3 \operatorname{Subst}\left(\int (a+bx)^3\cosh(x)\sinh^2(x)\,dx, x, \operatorname{csch}^{-1}(cx)\right)\right)$$

$$= -\frac{\left(a+b\operatorname{csch}^{-1}(cx)\right)^3}{3x^3} + \left(bc^3\right)\operatorname{Subst}\left(\int (a+bx)^2\sinh^3(x)\,dx, x, \operatorname{csch}^{-1}(cx)\right)$$

$$= -\frac{2b^2\left(a+b\operatorname{csch}^{-1}(cx)\right)}{9x^3} + \frac{bc\sqrt{1+\frac{1}{c^2x^2}}\left(a+b\operatorname{csch}^{-1}(cx)\right)^2}{3x^2} - \frac{\left(a+b\operatorname{csch}^{-1}(cx)\right)^3}{3x^3} -$$

$$= -\frac{2b^2\left(a+b\operatorname{csch}^{-1}(cx)\right)}{9x^3} - \frac{2}{3}bc^3\sqrt{1+\frac{1}{c^2x^2}}\left(a+b\operatorname{csch}^{-1}(cx)\right)^2 + \frac{bc\sqrt{1+\frac{1}{c^2x^2}}\left(a+\right.}{3x^2}$$

$$= -\frac{2}{9}b^3c^3\sqrt{1+\frac{1}{c^2x^2}} + \frac{2}{27}b^3c^3\left(1+\frac{1}{c^2x^2}\right)^{3/2} - \frac{2b^2\left(a+b\operatorname{csch}^{-1}(cx)\right)}{9x^3} + \frac{4b^2c^2\left(a+bc\right.}{3x}$$

$$= -\frac{14}{9}b^3c^3\sqrt{1+\frac{1}{c^2x^2}} + \frac{2}{27}b^3c^3\left(1+\frac{1}{c^2x^2}\right)^{3/2} - \frac{2b^2\left(a+b\operatorname{csch}^{-1}(cx)\right)}{9x^3} + \frac{4b^2c^2\left(a+b\right.}{3}$$

**Mathematica [A]** time = 0.31, size = 200, normalized size = 1.20

$$\frac{-9a^3+3b\operatorname{csch}^{-1}(cx)\left(-9a^2+6abcx\sqrt{\frac{1}{c^2x^2}+1}\left(1-2c^2x^2\right)+2b^2\left(6c^2x^2-1\right)\right)+9a^2bcx\sqrt{\frac{1}{c^2x^2}+1}\left(1-2c^2x^2\right)+}{}$$

Antiderivative was successfully verified.

```
[In] Integrate[(a + b*ArcCsch[c*x])^3/x^4,x]
```

```
[Out] (-9*a^3 + 2*b^3*c*Sqrt[1 + 1/(c^2*x^2)]*x*(1 - 20*c^2*x^2) + 9*a^2*b*c*Sqrt
[1 + 1/(c^2*x^2)]*x*(1 - 2*c^2*x^2) + 6*a*b^2*(-1 + 6*c^2*x^2) + 3*b*(-9*a^
2 + 6*a*b*c*Sqrt[1 + 1/(c^2*x^2)]*x*(1 - 2*c^2*x^2) + 2*b^2*(-1 + 6*c^2*x^2
))*ArcCsch[c*x] - 9*b^2*(3*a + b*c*Sqrt[1 + 1/(c^2*x^2)]*x*(-1 + 2*c^2*x^2)
)*ArcCsch[c*x]^2 - 9*b^3*ArcCsch[c*x]^3)/(27*x^3)
```

**fricas [B]** time = 0.77, size = 301, normalized size = 1.81

$$\frac{36\,ab^2c^2x^2 - 9\,b^3\log\left(\frac{cx\sqrt{\frac{c^2x^2+1}{c^2x^2}}+1}{cx}\right)^3 - 9\,a^3 - 6\,ab^2 - 9\left(3\,ab^2+\left(2\,b^3c^3x^3-b^3cx\right)\sqrt{\frac{c^2x^2+1}{c^2x^2}}\right)\log\left(\frac{cx\sqrt{\frac{c^2x^2+1}{c^2x^2}}+1}{cx}\right)^2 +}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))^3/x^4,x, algorithm="fricas")
```

```
[Out] 1/27*(36*a*b^2*c^2*x^2 - 9*b^3*log((c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) + 1)/
(c*x))^3 - 9*a^3 - 6*a*b^2 - 9*(3*a*b^2 + (2*b^3*c^3*x^3 - b^3*c*x)*sqrt((c
^2*x^2 + 1)/(c^2*x^2)))*log((c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) + 1)/(c*x))^
2 + 3*(12*b^3*c^2*x^2 - 9*a^2*b - 2*b^3 - 6*(2*a*b^2*c^3*x^3 - a*b^2*c*x)*s
qrt((c^2*x^2 + 1)/(c^2*x^2)))*log((c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) + 1)/(
c*x)) - (2*(9*a^2*b + 20*b^3)*c^3*x^3 - (9*a^2*b + 2*b^3)*c*x)*sqrt((c^2*x^
2 + 1)/(c^2*x^2)))/x^3
```

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

$$\int \frac{(b\operatorname{arcsch}(cx) + a)^3}{x^4}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))^3/x^4,x, algorithm="giac")
```

```
[Out] integrate((b*arccsch(c*x) + a)^3/x^4, x)
```

**maple [F]** time = 0.05, size = 0, normalized size = 0.00

$$\int \frac{(a + b\operatorname{arccsch}(cx))^3}{x^4}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a+b*arccsch(c*x))^3/x^4,x)
```

```
[Out] int((a+b*arccsch(c*x))^3/x^4,x)
```

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

$$\frac{1}{3}a^2b\left(\frac{c^4\left(\frac{1}{c^2x^2}+1\right)^{\frac{3}{2}} - 3c^4\sqrt{\frac{1}{c^2x^2}+1}}{c} - \frac{3\operatorname{arcsch}(cx)}{x^3}\right) - \frac{b^3\log\left(\sqrt{c^2x^2+1}+1\right)^3}{3x^3} - \frac{a^3}{3x^3} - \int \frac{b^3\log(c)^3 - 3ab^2\log(}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))^3/x^4,x, algorithm="maxima")
```

```
[Out] 1/3*a^2*b*((c^4*(1/(c^2*x^2) + 1)^(3/2) - 3*c^4*sqrt(1/(c^2*x^2) + 1))/c -
3*arccsch(c*x)/x^3) - 1/3*b^3*log(sqrt(c^2*x^2 + 1) + 1)^3/x^3 - 1/3*a^3/x^
3 - integrate((b^3*log(c)^3 - 3*a*b^2*log(c)^2 + (b^3*c^2*x^2 + b^3)*log(x)
^3 + (b^3*c^2*log(c)^3 - 3*a*b^2*c^2*log(c)^2)*x^2 + 3*(b^3*log(c) - a*b^2
```

```
+ (b^3*c^2*log(c) - a*b^2*c^2)*x^2)*log(x)^2 + (3*b^3*log(c) - 3*a*b^2 + 3*
(b^3*c^2*log(c) - a*b^2*c^2)*x^2 + 3*(b^3*c^2*x^2 + b^3)*log(x) + sqrt(c^2*
x^2 + 1)*(3*b^3*log(c) - 3*a*b^2 + (b^3*c^2*(3*log(c) - 1) - 3*a*b^2*c^2)*x
^2 + 3*(b^3*c^2*x^2 + b^3)*log(x)))*log(sqrt(c^2*x^2 + 1) + 1)^2 + 3*(b^3*l
og(c)^2 - 2*a*b^2*log(c) + (b^3*c^2*log(c)^2 - 2*a*b^2*c^2*log(c))*x^2)*log
(x) - 3*(b^3*log(c)^2 - 2*a*b^2*log(c) + (b^3*c^2*log(c)^2 - 2*a*b^2*c^2*lo
g(c))*x^2 + (b^3*c^2*x^2 + b^3)*log(x)^2 + 2*(b^3*log(c) - a*b^2 + (b^3*c^2
*log(c) - a*b^2*c^2)*x^2)*log(x) + (b^3*log(c)^2 - 2*a*b^2*log(c) + (b^3*c^
2*log(c)^2 - 2*a*b^2*c^2*log(c))*x^2 + (b^3*c^2*x^2 + b^3)*log(x)^2 + 2*(b^
3*log(c) - a*b^2 + (b^3*c^2*log(c) - a*b^2*c^2)*x^2)*log(x))*sqrt(c^2*x^2 +
 1))*log(sqrt(c^2*x^2 + 1) + 1) + (b^3*log(c)^3 - 3*a*b^2*log(c)^2 + (b^3*c
^2*x^2 + b^3)*log(x)^3 + (b^3*c^2*log(c)^3 - 3*a*b^2*c^2*log(c)^2)*x^2 + 3*
(b^3*log(c) - a*b^2 + (b^3*c^2*log(c) - a*b^2*c^2)*x^2)*log(x)^2 + 3*(b^3*l
og(c)^2 - 2*a*b^2*log(c) + (b^3*c^2*log(c)^2 - 2*a*b^2*c^2*log(c))*x^2)*log
(x))*sqrt(c^2*x^2 + 1))/(c^2*x^6 + x^4 + (c^2*x^6 + x^4)*sqrt(c^2*x^2 + 1))
, x)
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.01

$$\int \frac{\left(a+b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)\right)^3}{x^4}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a + b*asinh(1/(c*x)))^3/x^4,x)
```

```
[Out] int((a + b*asinh(1/(c*x)))^3/x^4, x)
```

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

$$\int \frac{(a+b\,\mathrm{acsch}\,(cx))^3}{x^4}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*acsch(c*x))**3/x**4,x)
```

```
[Out] Integral((a + b*acsch(c*x))**3/x**4, x)
```

## 3.32 $\int \frac{\left(a+b\,\mathrm{csch}^{-1}(cx)\right)^3}{x^5}\,dx$

**Optimal**. Leaf size=204

$$\frac{9b^2c^2\left(a+b\,\mathrm{csch}^{-1}(cx)\right)}{32x^2}-\frac{3b^2\left(a+b\,\mathrm{csch}^{-1}(cx)\right)}{32x^4}+\frac{3}{32}c^4\left(a+b\,\mathrm{csch}^{-1}(cx)\right)^3+\frac{3bc\sqrt{\frac{1}{c^2x^2}+1}\left(a+b\,\mathrm{csch}^{-1}(cx)\right)^2}{16x^3}-\frac{9b}{}$$

```
[Out] 45/256*b^3*c^4*arccsch(c*x)-3/32*b^2*(a+b*arccsch(c*x))/x^4+9/32*b^2*c^2*(a
+b*arccsch(c*x))/x^2+3/32*c^4*(a+b*arccsch(c*x))^3-1/4*(a+b*arccsch(c*x))^3
/x^4+3/128*b^3*c*(1+1/c^2/x^2)^(1/2)/x^3-45/256*b^3*c^3*(1+1/c^2/x^2)^(1/2)
/x+3/16*b*c*(a+b*arccsch(c*x))^2*(1+1/c^2/x^2)^(1/2)/x^3-9/32*b*c^3*(a+b*ar
ccsch(c*x))^2*(1+1/c^2/x^2)^(1/2)/x
```

**Rubi [A]** time = 0.18, antiderivative size = 204, normalized size of antiderivative = 1.00, number of steps used = 10, number of rules used = 6, integrand size = 14, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.429, Rules used = {6286, 5446, 3311, 32, 2635, 8}

$$\frac{9b^2c^2\left(a+b\,\mathrm{csch}^{-1}(cx)\right)}{32x^2}-\frac{3b^2\left(a+b\,\mathrm{csch}^{-1}(cx)\right)}{32x^4}-\frac{9bc^3\sqrt{\frac{1}{c^2x^2}+1}\left(a+b\,\mathrm{csch}^{-1}(cx)\right)^2}{32x}+\frac{3bc\sqrt{\frac{1}{c^2x^2}+1}\left(a+b\,\mathrm{csch}^{-1}\right.}{16x^3}$$

Antiderivative was successfully verified.

```
[In] Int[(a + b*ArcCsch[c*x])^3/x^5,x]
```

```
[Out] (3*b^3*c*Sqrt[1 + 1/(c^2*x^2)])/(128*x^3) - (45*b^3*c^3*Sqrt[1 + 1/(c^2*x^2
)])/(256*x) + (45*b^3*c^4*ArcCsch[c*x])/256 - (3*b^2*(a + b*ArcCsch[c*x]))/
(32*x^4) + (9*b^2*c^2*(a + b*ArcCsch[c*x]))/(32*x^2) + (3*b*c*Sqrt[1 + 1/(c
^2*x^2)]*(a + b*ArcCsch[c*x])^2)/(16*x^3) - (9*b*c^3*Sqrt[1 + 1/(c^2*x^2)]*
(a + b*ArcCsch[c*x])^2)/(32*x) + (3*c^4*(a + b*ArcCsch[c*x])^3)/32 - (a + b
*ArcCsch[c*x])^3/(4*x^4)
```

Rule 8

```
Int[a_, x_Symbol] :> Simp[a*x, x] /; FreeQ[a, x]
```

Rule 32

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

Rule 2635

```
Int[((b_.)*sin[(c_.) + (d_.)*(x_)])^(n_), x_Symbol] :> -Simp[(b*Cos[c + d*x
]*(b*Sin[c + d*x])^(n - 1))/(d*n), x] + Dist[(b^2*(n - 1))/n, Int[(b*Sin[c
```

```
+ d*x])^(n - 2), x], x] /; FreeQ[{b, c, d}, x] && GtQ[n, 1] && IntegerQ[2*n
]
```

Rule 3311

```
Int[((c_.) + (d_.)*(x_))^(m_)*((b_.)*sin[(e_.) + (f_.)*(x_)])^(n_), x_Symbo
l] :> Simp[(d*m*(c + d*x)^(m - 1)*(b*Sin[e + f*x])^n)/(f^2*n^2), x] + (Dist
[(b^2*(n - 1))/n, Int[(c + d*x)^m*(b*Sin[e + f*x])^(n - 2), x], x] - Dist[(
d^2*m*(m - 1))/(f^2*n^2), Int[(c + d*x)^(m - 2)*(b*Sin[e + f*x])^n, x], x]
- Simp[(b*(c + d*x)^m*Cos[e + f*x]*(b*Sin[e + f*x])^(n - 1))/(f*n), x]) /;
FreeQ[{b, c, d, e, f}, x] && GtQ[n, 1] && GtQ[m, 1]
```

Rule 5446

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

Rule 6286

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))^(n_)*(x_)^(m_.), x_Symbol] :> -Dist
[(c^(m + 1))^(-1), Subst[Int[(a + b*x)^n*Csch[x]^(m + 1)*Coth[x], x], x, Ar
cCsch[c*x]], x] /; FreeQ[{a, b, c}, x] && IntegerQ[n] && IntegerQ[m] && (Gt
Q[n, 0] || LtQ[m, -1])
```

Rubi steps

$$\int \frac{\left(a+b\text{csch}^{-1}(cx)\right)^3}{x^5}\,dx = -\left(c^4\,\text{Subst}\left(\int (a+bx)^3\cosh(x)\sinh^3(x)\,dx, x, \text{csch}^{-1}(cx)\right)\right)$$

$$= -\frac{\left(a+b\text{csch}^{-1}(cx)\right)^3}{4x^4} + \frac{1}{4}\left(3bc^4\right)\text{Subst}\left(\int (a+bx)^2\sinh^4(x)\,dx, x, \text{csch}^{-1}(cx)\right)$$

$$= -\frac{3b^2\left(a+b\text{csch}^{-1}(cx)\right)}{32x^4} + \frac{3bc\sqrt{1+\frac{1}{c^2x^2}}\left(a+b\text{csch}^{-1}(cx)\right)^2}{16x^3} - \frac{\left(a+b\text{csch}^{-1}(cx)\right)^3}{4x^4} -$$

$$= \frac{3b^3c\sqrt{1+\frac{1}{c^2x^2}}}{128x^3} - \frac{3b^2\left(a+b\text{csch}^{-1}(cx)\right)}{32x^4} + \frac{9b^2c^2\left(a+b\text{csch}^{-1}(cx)\right)}{32x^2} + \frac{3bc\sqrt{1+\frac{1}{c^2x^2}}\,(}{1}$$

$$= \frac{3b^3c\sqrt{1+\frac{1}{c^2x^2}}}{128x^3} - \frac{45b^3c^3\sqrt{1+\frac{1}{c^2x^2}}}{256x} - \frac{3b^2\left(a+b\text{csch}^{-1}(cx)\right)}{32x^4} + \frac{9b^2c^2\left(a+b\text{csch}^{-1}(cx\right.}{32x^2}$$

$$= \frac{3b^3c\sqrt{1+\frac{1}{c^2x^2}}}{128x^3} - \frac{45b^3c^3\sqrt{1+\frac{1}{c^2x^2}}}{256x} + \frac{45}{256}b^3c^4\text{csch}^{-1}(cx) - \frac{3b^2\left(a+b\text{csch}^{-1}(cx)\right)}{32x^4} +$$

**Mathematica [A]** time = 0.37, size = 277, normalized size = 1.36

$$\frac{-64a^3+9bc^4x^4\left(8a^2+5b^2\right)\sinh^{-1}\left(\frac{1}{cx}\right)-24b\text{csch}^{-1}(cx)\left(8a^2+2abcx\sqrt{\frac{1}{c^2x^2}+1}\left(3c^2x^2-2\right)+b^2\left(1-3c^2x^2\right)\right)+}{}$$

Antiderivative was successfully verified.

```
[In] Integrate[(a + b*ArcCsch[c*x])^3/x^5,x]
```

```
[Out] (-64*a^3 - 24*a*b^2 + 48*a^2*b*c*Sqrt[1 + 1/(c^2*x^2)]*x + 6*b^3*c*Sqrt[1 +
 1/(c^2*x^2)]*x + 72*a*b^2*c^2*x^2 - 72*a^2*b*c^3*Sqrt[1 + 1/(c^2*x^2)]*x^3
 - 45*b^3*c^3*Sqrt[1 + 1/(c^2*x^2)]*x^3 - 24*b*(8*a^2 + b^2*(1 - 3*c^2*x^2)
 + 2*a*b*c*Sqrt[1 + 1/(c^2*x^2)]*x*(-2 + 3*c^2*x^2))*ArcCsch[c*x] + 24*b^2*
(b*c*Sqrt[1 + 1/(c^2*x^2)]*x*(2 - 3*c^2*x^2) + a*(-8 + 3*c^4*x^4))*ArcCsch[
c*x]^2 + 8*b^3*(-8 + 3*c^4*x^4)*ArcCsch[c*x]^3 + 9*b*(8*a^2 + 5*b^2)*c^4*x^
4*ArcSinh[1/(c*x)])/(256*x^4)
```

**fricas [A]** time = 0.98, size = 346, normalized size = 1.70

$$\frac{72\,ab^2c^2x^2+8\left(3\,b^3c^4x^4-8\,b^3\right)\log\left(\frac{cx\sqrt{\frac{c^2x^2+1}{c^2x^2}}+1}{cx}\right)^3-64\,a^3-24\,ab^2+24\left(3\,ab^2c^4x^4-8\,ab^2-\left(3\,b^3c^3x^3-2\,b^3cx\right)\right.}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))^3/x^5,x, algorithm="fricas")
```

```
[Out] 1/256*(72*a*b^2*c^2*x^2 + 8*(3*b^3*c^4*x^4 - 8*b^3)*log((c*x*sqrt((c^2*x^2
+ 1)/(c^2*x^2)) + 1)/(c*x))^3 - 64*a^3 - 24*a*b^2 + 24*(3*a*b^2*c^4*x^4 - 8
*a*b^2 - (3*b^3*c^3*x^3 - 2*b^3*c*x)*sqrt((c^2*x^2 + 1)/(c^2*x^2)))*log((c*
x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) + 1)/(c*x))^2 + 3*(3*(8*a^2*b + 5*b^3)*c^4*
x^4 + 24*b^3*c^2*x^2 - 64*a^2*b - 8*b^3 - 16*(3*a*b^2*c^3*x^3 - 2*a*b^2*c*x
)*sqrt((c^2*x^2 + 1)/(c^2*x^2)))*log((c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) + 1
)/(c*x)) - 3*(3*(8*a^2*b + 5*b^3)*c^3*x^3 - 2*(8*a^2*b + b^3)*c*x)*sqrt((c^
2*x^2 + 1)/(c^2*x^2)))/x^4
```

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

$$\int \frac{(b\,\mathrm{arcsch}\,(cx) + a)^3}{x^5}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))^3/x^5,x, algorithm="giac")
```

```
[Out] integrate((b*arccsch(c*x) + a)^3/x^5, x)
```

**maple [F]** time = 0.05, size = 0, normalized size = 0.00

$$\int \frac{(a + b\,\mathrm{arccsch}\,(cx))^3}{x^5}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a+b*arccsch(c*x))^3/x^5,x)
```

```
[Out] int((a+b*arccsch(c*x))^3/x^5,x)
```

**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((a+b*arccsch(c*x))^3/x^5,x, algorithm="maxima")
```

```
[Out] 3/64*a^2*b*((3*c^5*log(c*x*sqrt(1/(c^2*x^2) + 1) + 1) - 3*c^5*log(c*x*sqrt(
1/(c^2*x^2) + 1) - 1) - 2*(3*c^8*x^3*(1/(c^2*x^2) + 1)^(3/2) - 5*c^6*x*sqrt
(1/(c^2*x^2) + 1))/(c^4*x^4*(1/(c^2*x^2) + 1)^2 - 2*c^2*x^2*(1/(c^2*x^2) +
1) + 1))/c - 16*arccsch(c*x)/x^4) - 1/4*b^3*log(sqrt(c^2*x^2 + 1) + 1)^3/x^
4 - 1/4*a^3/x^4 - integrate(1/4*(4*b^3*log(c)^3 - 12*a*b^2*log(c)^2 + 4*(b^
3*c^2*x^2 + b^3)*log(x)^3 + 4*(b^3*c^2*log(c)^3 - 3*a*b^2*c^2*log(c)^2)*x^2
 + 12*(b^3*log(c) - a*b^2 + (b^3*c^2*log(c) - a*b^2*c^2)*x^2)*log(x)^2 + 3*
```

```
(4*b^3*log(c) - 4*a*b^2 + 4*(b^3*c^2*log(c) - a*b^2*c^2)*x^2 + 4*(b^3*c^2*x
^2 + b^3)*log(x) + sqrt(c^2*x^2 + 1)*(4*b^3*log(c) - 4*a*b^2 + (b^3*c^2*(4*
log(c) - 1) - 4*a*b^2*c^2)*x^2 + 4*(b^3*c^2*x^2 + b^3)*log(x)))*log(sqrt(c^
2*x^2 + 1) + 1)^2 + 12*(b^3*log(c)^2 - 2*a*b^2*log(c) + (b^3*c^2*log(c)^2 -
 2*a*b^2*c^2*log(c))*x^2)*log(x) - 12*(b^3*log(c)^2 - 2*a*b^2*log(c) + (b^3
*c^2*log(c)^2 - 2*a*b^2*c^2*log(c))*x^2 + (b^3*c^2*x^2 + b^3)*log(x)^2 + 2*
(b^3*log(c) - a*b^2 + (b^3*c^2*log(c) - a*b^2*c^2)*x^2)*log(x) + (b^3*log(c
)^2 - 2*a*b^2*log(c) + (b^3*c^2*log(c)^2 - 2*a*b^2*c^2*log(c))*x^2 + (b^3*c
^2*x^2 + b^3)*log(x)^2 + 2*(b^3*log(c) - a*b^2 + (b^3*c^2*log(c) - a*b^2*c^
2)*x^2)*log(x))*sqrt(c^2*x^2 + 1))*log(sqrt(c^2*x^2 + 1) + 1) + 4*(b^3*log(
c)^3 - 3*a*b^2*log(c)^2 + (b^3*c^2*x^2 + b^3)*log(x)^3 + (b^3*c^2*log(c)^3
- 3*a*b^2*c^2*log(c)^2)*x^2 + 3*(b^3*log(c) - a*b^2 + (b^3*c^2*log(c) - a*b
^2*c^2)*x^2)*log(x)^2 + 3*(b^3*log(c)^2 - 2*a*b^2*log(c) + (b^3*c^2*log(c)^
2 - 2*a*b^2*c^2*log(c))*x^2)*log(x))*sqrt(c^2*x^2 + 1))/(c^2*x^7 + x^5 + (c
^2*x^7 + x^5)*sqrt(c^2*x^2 + 1)), x)
```

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

$$\int \frac{\left(a + b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)\right)^3}{x^5}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a + b*asinh(1/(c*x)))^3/x^5,x)
```

```
[Out] int((a + b*asinh(1/(c*x)))^3/x^5, x)
```

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

$$\int \frac{\left(a + b\,\mathrm{acsch}\left(cx\right)\right)^3}{x^5}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*acsch(c*x))**3/x**5,x)
```

```
[Out] Integral((a + b*acsch(c*x))**3/x**5, x)
```

## 3.33 $\int \frac{x}{a+b\operatorname{csch}^{-1}(cx)}\,dx$

**Optimal**. Leaf size=15

$$\operatorname{Int}\left(\frac{x}{a+b\operatorname{csch}^{-1}(cx)},x\right)$$

```
[Out] Unintegrable(x/(a+b*arccsch(c*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 = {}

$$\int \frac{x}{a+b\operatorname{csch}^{-1}(cx)}\,dx$$

Verification is Not applicable to the result.

```
[In] Int[x/(a + b*ArcCsch[c*x]),x]
```

```
[Out] Defer[Int][x/(a + b*ArcCsch[c*x]), x]
```

Rubi steps

$$\int \frac{x}{a+b\operatorname{csch}^{-1}(cx)}\,dx=\int \frac{x}{a+b\operatorname{csch}^{-1}(cx)}\,dx$$

**Mathematica [A]** time = 2.93, size = 0, normalized size = 0.00

$$\int \frac{x}{a+b\operatorname{csch}^{-1}(cx)}\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[x/(a + b*ArcCsch[c*x]),x]
```

```
[Out] Integrate[x/(a + b*ArcCsch[c*x]), x]
```

**fricas [A]** time = 0.88, size = 0, normalized size = 0.00

$$\operatorname{integral}\left(\frac{x}{b\operatorname{arcsch}(cx)+a},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x/(a+b*arccsch(c*x)),x, algorithm="fricas")
```

```
[Out] integral(x/(b*arccsch(c*x) + a), x)
```

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

$$\int \frac{x}{b \operatorname{arcsch}(cx) + a} \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x/(a+b*arccsch(c*x)),x, algorithm="giac")
```

```
[Out] integrate(x/(b*arccsch(c*x) + a), x)
```

**maple** [A]  time = 0.05, size = 0, normalized size = 0.00

$$\int \frac{x}{a + b \operatorname{arccsch}(cx)} \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x/(a+b*arccsch(c*x)),x)
```

```
[Out] int(x/(a+b*arccsch(c*x)),x)
```

**maxima** [A]  time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{x}{b \operatorname{arcsch}(cx) + a} \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x/(a+b*arccsch(c*x)),x, algorithm="maxima")
```

```
[Out] integrate(x/(b*arccsch(c*x) + a), x)
```

**mupad** [A]  time = 0.00, size = -1, normalized size = -0.07

$$\int \frac{x}{a + b \operatorname{asinh}\left(\frac{1}{c\,x}\right)} \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x/(a + b*asinh(1/(c*x))),x)
```

```
[Out] int(x/(a + b*asinh(1/(c*x))), x)
```

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

$$\int \frac{x}{a + b \operatorname{acsch}(cx)} \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x/(a+b*acsch(c*x)),x)
```

```
[Out] Integral(x/(a + b*acsch(c*x)), x)
```

## 3.34 $\int \frac{1}{a+b\mathbf{csch}^{-1}(cx)}\,dx$

**Optimal**. Leaf size=13

$$\mathrm{Int}\left(\frac{1}{a+b\mathrm{csch}^{-1}(cx)},x\right)$$

```
[Out] Unintegrable(1/(a+b*arccsch(c*x)),x)
```

**Rubi** [A] time = 0.01, 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 = {}

$$\int \frac{1}{a+b\mathrm{csch}^{-1}(cx)}\,dx$$

Verification is Not applicable to the result.

```
[In] Int[(a + b*ArcCsch[c*x])^(-1),x]
```

```
[Out] Defer[Int][(a + b*ArcCsch[c*x])^(-1), x]
```

Rubi steps

$$\int \frac{1}{a+b\mathrm{csch}^{-1}(cx)}\,dx=\int \frac{1}{a+b\mathrm{csch}^{-1}(cx)}\,dx$$

**Mathematica** [A] time = 2.82, size = 0, normalized size = 0.00

$$\int \frac{1}{a+b\mathrm{csch}^{-1}(cx)}\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[(a + b*ArcCsch[c*x])^(-1),x]
```

```
[Out] Integrate[(a + b*ArcCsch[c*x])^(-1), x]
```

**fricas** [A] time = 0.98, size = 0, normalized size = 0.00

$$\mathrm{integral}\left(\frac{1}{b\,\mathrm{arcsch}\,(cx)+a},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(a+b*arccsch(c*x)),x, algorithm="fricas")
```

```
[Out] integral(1/(b*arccsch(c*x) + a), x)
```

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

$$\int \frac{1}{b \operatorname{arcsch}(cx) + a} \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(a+b*arccsch(c*x)),x, algorithm="giac")
```

```
[Out] integrate(1/(b*arccsch(c*x) + a), x)
```

**maple [A]** time = 0.05, size = 0, normalized size = 0.00

$$\int \frac{1}{a + b \operatorname{arccsch}(cx)} \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(1/(a+b*arccsch(c*x)),x)
```

```
[Out] int(1/(a+b*arccsch(c*x)),x)
```

**maxima [A]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{1}{b \operatorname{arcsch}(cx) + a} \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(a+b*arccsch(c*x)),x, algorithm="maxima")
```

```
[Out] integrate(1/(b*arccsch(c*x) + a), x)
```

**mupad [A]** time = 0.00, size = -1, normalized size = -0.08

$$\int \frac{1}{a + b \operatorname{asinh}\left(\frac{1}{c\,x}\right)} \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(1/(a + b*asinh(1/(c*x))),x)
```

```
[Out] int(1/(a + b*asinh(1/(c*x))), x)
```

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

$$\int \frac{1}{a + b \operatorname{acsch}(cx)} \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(a+b*acsch(c*x)),x)
```

```
[Out] Integral(1/(a + b*acsch(c*x)), x)
```

## 3.35 $\int \frac{1}{x\left(a+b\mathbf{csch}^{-1}(cx)\right)}\,dx$

**Optimal**. Leaf size=17

$$\operatorname{Int}\left(\frac{1}{x\left(a+b\operatorname{csch}^{-1}(cx)\right)},x\right)$$

```
[Out] Unintegrable(1/x/(a+b*arccsch(c*x)),x)
```

**Rubi** [A] time = 0.03, 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 = {}

$$\int \frac{1}{x\left(a+b\operatorname{csch}^{-1}(cx)\right)}\,dx$$

Verification is Not applicable to the result.

```
[In] Int[1/(x*(a + b*ArcCsch[c*x])),x]
[Out] Defer[Int][1/(x*(a + b*ArcCsch[c*x])), x]
```

Rubi steps

$$\int \frac{1}{x\left(a+b\operatorname{csch}^{-1}(cx)\right)}\,dx=\int \frac{1}{x\left(a+b\operatorname{csch}^{-1}(cx)\right)}\,dx$$

**Mathematica** [A] time = 0.31, size = 0, normalized size = 0.00

$$\int \frac{1}{x\left(a+b\operatorname{csch}^{-1}(cx)\right)}\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[1/(x*(a + b*ArcCsch[c*x])),x]
[Out] Integrate[1/(x*(a + b*ArcCsch[c*x])), x]
```

**fricas** [A] time = 0.90, size = 0, normalized size = 0.00

$$\operatorname{integral}\left(\frac{1}{bx\operatorname{arcsch}(cx)+ax},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/x/(a+b*arccsch(c*x)),x, algorithm="fricas")
[Out] integral(1/(b*x*arccsch(c*x) + a*x), x)
```

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

$$\int \frac{1}{(b\,\mathrm{arcsch}\,(cx)+a)x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/x/(a+b*arccsch(c*x)),x, algorithm="giac")
[Out] integrate(1/((b*arccsch(c*x) + a)*x), x)
```

**maple [A]** time = 0.06, size = 0, normalized size = 0.00

$$\int \frac{1}{x\,(a+b\,\mathrm{arccsch}\,(cx))}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(1/x/(a+b*arccsch(c*x)),x)
[Out] int(1/x/(a+b*arccsch(c*x)),x)
```

**maxima [A]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{1}{(b\,\mathrm{arcsch}\,(cx)+a)x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/x/(a+b*arccsch(c*x)),x, algorithm="maxima")
[Out] integrate(1/((b*arccsch(c*x) + a)*x), x)
```

**mupad [A]** time = 0.00, size = -1, normalized size = -0.06

$$\int \frac{1}{x\,\left(a+b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)\right)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(1/(x*(a + b*asinh(1/(c*x)))),x)
[Out] int(1/(x*(a + b*asinh(1/(c*x)))), x)
```

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

$$\int \frac{1}{x\left(a + b\operatorname{acsch}\left(cx\right)\right)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/x/(a+b*acsch(c*x)),x)
```

```
[Out] Integral(1/(x*(a + b*acsch(c*x))), x)
```

## 3.36 $\int \frac{1}{x^2\left(a+b\mathbf{csch}^{-1}(cx)\right)}\,dx$

**Optimal**. Leaf size=46

$$\frac{c\sinh\left(\frac{a}{b}\right)\mathrm{Shi}\left(\frac{a}{b}+\mathrm{csch}^{-1}(cx)\right)}{b}-\frac{c\cosh\left(\frac{a}{b}\right)\mathrm{Chi}\left(\frac{a}{b}+\mathrm{csch}^{-1}(cx)\right)}{b}$$

```
[Out] -c*Chi(a/b+arccsch(c*x))*cosh(a/b)/b+c*Shi(a/b+arccsch(c*x))*sinh(a/b)/b
```

**Rubi [A]** time = 0.10, antiderivative size = 46, 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 = {6286, 3303, 3298, 3301}

$$\frac{c\sinh\left(\frac{a}{b}\right)\mathrm{Shi}\left(\frac{a}{b}+\mathrm{csch}^{-1}(cx)\right)}{b}-\frac{c\cosh\left(\frac{a}{b}\right)\mathrm{Chi}\left(\frac{a}{b}+\mathrm{csch}^{-1}(cx)\right)}{b}$$

Antiderivative was successfully verified.

```
[In] Int[1/(x^2*(a + b*ArcCsch[c*x])),x]
```

```
[Out] -((c*Cosh[a/b]*CoshIntegral[a/b + ArcCsch[c*x]])/b) + (c*Sinh[a/b]*SinhInte
gral[a/b + ArcCsch[c*x]])/b
```

Rule 3298

```
Int[sin[(e_.) + (Complex[0, fz_])*(f_.)*(x_)]/((c_.) + (d_.)*(x_)), x_Symbo
l] :> Simp[(I*SinhIntegral[(c*f*fz)/d + f*fz*x])/d, x] /; FreeQ[{c, d, e, f
, fz}, x] && EqQ[d*e - c*f*fz*I, 0]
```

Rule 3301

```
Int[sin[(e_.) + (Complex[0, fz_])*(f_.)*(x_)]/((c_.) + (d_.)*(x_)), x_Symbo
l] :> Simp[CoshIntegral[(c*f*fz)/d + f*fz*x]/d, x] /; FreeQ[{c, d, e, f, fz
}, x] && EqQ[d*(e - Pi/2) - c*f*fz*I, 0]
```

Rule 3303

```
Int[sin[(e_.) + (f_.)*(x_)]/((c_.) + (d_.)*(x_)), x_Symbol] :> Dist[Cos[(d*
e - c*f)/d], Int[Sin[(c*f)/d + f*x]/(c + d*x), x], x] + Dist[Sin[(d*e - c*f
)/d], Int[Cos[(c*f)/d + f*x]/(c + d*x), x], x] /; FreeQ[{c, d, e, f}, x] &&
 NeQ[d*e - c*f, 0]
```

Rule 6286

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))^(n_)*(x_)^(m_.), x_Symbol] :> -Dist
[(c^(m + 1))^(-1), Subst[Int[(a + b*x)^n*Csch[x]^(m + 1)*Coth[x], x], x, Ar
cCsch[c*x]], x] /; FreeQ[{a, b, c}, x] && IntegerQ[n] && IntegerQ[m] && (Gt
Q[n, 0] || LtQ[m, -1])
```

Rubi steps

$$\int \frac{1}{x^2\left(a+b\text{csch}^{-1}(cx)\right)}\,dx = -\left(c\,\text{Subst}\left(\int \frac{\cosh(x)}{a+bx}\,dx, x, \text{csch}^{-1}(cx)\right)\right)$$

$$= -\left(\left(c\cosh\left(\frac{a}{b}\right)\right)\text{Subst}\left(\int \frac{\cosh\left(\frac{a}{b}+x\right)}{a+bx}\,dx, x, \text{csch}^{-1}(cx)\right)\right) + \left(c\sinh\left(\frac{a}{b}\right)\right)\text{Subst}$$

$$= -\frac{c\cosh\left(\frac{a}{b}\right)\text{Chi}\left(\frac{a}{b}+\text{csch}^{-1}(cx)\right)}{b} + \frac{c\sinh\left(\frac{a}{b}\right)\text{Shi}\left(\frac{a}{b}+\text{csch}^{-1}(cx)\right)}{b}$$

**Mathematica [A]** time = 0.08, size = 44, normalized size = 0.96

$$-\frac{c\left(\cosh\left(\frac{a}{b}\right)\text{Chi}\left(\frac{a}{b}+\text{csch}^{-1}(cx)\right)-\sinh\left(\frac{a}{b}\right)\text{Shi}\left(\frac{a}{b}+\text{csch}^{-1}(cx)\right)\right)}{b}$$

Antiderivative was successfully verified.

```
[In] Integrate[1/(x^2*(a + b*ArcCsch[c*x])),x]
[Out] -((c*(Cosh[a/b]*CoshIntegral[a/b + ArcCsch[c*x]] - Sinh[a/b]*SinhIntegral[a
/b + ArcCsch[c*x]]))/b)
```

**fricas [F]** time = 1.59, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{1}{bx^2\,\text{arcsch}\,(cx)+ax^2}, x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/x^2/(a+b*arccsch(c*x)),x, algorithm="fricas")
[Out] integral(1/(b*x^2*arccsch(c*x) + a*x^2), x)
```

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

$$\int \frac{1}{(b\,\text{arcsch}\,(cx)+a)x^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/x^2/(a+b*arccsch(c*x)),x, algorithm="giac")
```

```
[Out] integrate(1/((b*arccsch(c*x) + a)*x^2), x)
```

**maple [F]** time = 0.05, size = 0, normalized size = 0.00

$$\int \frac{1}{x^{2} \left(a+b \,\mathrm{arccsch}\left(c x \right)\right)}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(1/x^2/(a+b*arccsch(c*x)),x)
```

```
[Out] int(1/x^2/(a+b*arccsch(c*x)),x)
```

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

$$\int \frac{1}{{\left(b \operatorname{arcsch}\left(c x\right) + a\right)} x^{2}}\,{d x}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/x^2/(a+b*arccsch(c*x)),x, algorithm="maxima")
```

```
[Out] integrate(1/((b*arccsch(c*x) + a)*x^2), x)
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.02

$$\int \frac{1}{x^2\,\left(a+b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)\right)} \,d x$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(1/(x^2*(a + b*asinh(1/(c*x)))),x)
```

```
[Out] int(1/(x^2*(a + b*asinh(1/(c*x)))), x)
```

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

$$\int \frac{1}{x^{2} \left(a + b \operatorname{acsch}{\left(c x \right)}\right)}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/x**2/(a+b*acsch(c*x)),x)
```

```
[Out] Integral(1/(x**2*(a + b*acsch(c*x))), x)
```

# 3.37 $\int \frac{1}{x^3\left(a+b\mathbf{csch}^{-1}(cx)\right)}\,dx$

**Optimal**. Leaf size=63

$$\frac{c^2 \sinh\left(\frac{2a}{b}\right)\text{Chi}\left(\frac{2a}{b}+2\text{csch}^{-1}(cx)\right)}{2b}-\frac{c^2 \cosh\left(\frac{2a}{b}\right)\text{Shi}\left(\frac{2a}{b}+2\text{csch}^{-1}(cx)\right)}{2b}$$

```
[Out] -1/2*c^2*cosh(2*a/b)*Shi(2*a/b+2*arccsch(c*x))/b+1/2*c^2*Chi(2*a/b+2*arccsc
h(c*x))*sinh(2*a/b)/b
```

**Rubi [A]** time = 0.14, antiderivative size = 63, 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 = {6286, 5448, 12, 3303, 3298, 3301}

$$\frac{c^2 \sinh\left(\frac{2a}{b}\right)\text{Chi}\left(\frac{2a}{b}+2\text{csch}^{-1}(cx)\right)}{2b}-\frac{c^2 \cosh\left(\frac{2a}{b}\right)\text{Shi}\left(\frac{2a}{b}+2\text{csch}^{-1}(cx)\right)}{2b}$$

Antiderivative was successfully verified.

```
[In] Int[1/(x^3*(a + b*ArcCsch[c*x])),x]
```

```
[Out] (c^2*CoshIntegral[(2*a)/b + 2*ArcCsch[c*x]]*Sinh[(2*a)/b])/(2*b) - (c^2*Cos
h[(2*a)/b]*SinhIntegral[(2*a)/b + 2*ArcCsch[c*x]])/(2*b)
```

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 3298

```
Int[sin[(e_.) + (Complex[0, fz_])*(f_.)*(x_)]/((c_.) + (d_.)*(x_)), x_Symbo
l] :> Simp[(I*SinhIntegral[(c*f*fz)/d + f*fz*x])/d, x] /; FreeQ[{c, d, e, f
, fz}, x] && EqQ[d*e - c*f*fz*I, 0]
```

Rule 3301

```
Int[sin[(e_.) + (Complex[0, fz_])*(f_.)*(x_)]/((c_.) + (d_.)*(x_)), x_Symbo
l] :> Simp[CoshIntegral[(c*f*fz)/d + f*fz*x]/d, x] /; FreeQ[{c, d, e, f, fz
}, x] && EqQ[d*(e - Pi/2) - c*f*fz*I, 0]
```

Rule 3303

```
Int[sin[(e_.) + (f_.)*(x_)]/((c_.) + (d_.)*(x_)), x_Symbol] :> Dist[Cos[(d*
e - c*f)/d], Int[Sin[(c*f)/d + f*x]/(c + d*x), x], x] + Dist[Sin[(d*e - c*f
)/d], Int[Cos[(c*f)/d + f*x]/(c + d*x), x], x] /; FreeQ[{c, d, e, f}, x] &&
 NeQ[d*e - c*f, 0]
```

Rule 5448

```
Int[Cosh[(a_.) + (b_.)*(x_)]^(p_.)*((c_.) + (d_.)*(x_))^(m_.)*Sinh[(a_.) +
(b_.)*(x_)]^(n_.), x_Symbol] :> Int[ExpandTrigReduce[(c + d*x)^m, Sinh[a +
b*x]^n*Cosh[a + b*x]^p, x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[n, 0] &
& IGtQ[p, 0]
```

Rule 6286

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))^(n_)*(x_)^(m_.), x_Symbol] :> -Dist
[(c^(m + 1))^(-1), Subst[Int[(a + b*x)^n*Csch[x]^(m + 1)*Coth[x], x], x, Ar
cCsch[c*x]], x] /; FreeQ[{a, b, c}, x] && IntegerQ[n] && IntegerQ[m] && (Gt
Q[n, 0] || LtQ[m, -1])
```

Rubi steps

$$\begin{aligned}
\int \frac{1}{x^3\left(a+b\text{csch}^{-1}(cx)\right)}\,dx &= -\left(c^2\,\text{Subst}\left(\int \frac{\cosh(x)\sinh(x)}{a+bx}\,dx,x,\text{csch}^{-1}(cx)\right)\right)\\
&= -\left(c^2\,\text{Subst}\left(\int \frac{\sinh(2x)}{2(a+bx)}\,dx,x,\text{csch}^{-1}(cx)\right)\right)\\
&= -\left(\frac{1}{2}c^2\,\text{Subst}\left(\int \frac{\sinh(2x)}{a+bx}\,dx,x,\text{csch}^{-1}(cx)\right)\right)\\
&= -\left(\frac{1}{2}\left(c^2\cosh\left(\frac{2a}{b}\right)\right)\text{Subst}\left(\int \frac{\sinh\left(\frac{2a}{b}+2x\right)}{a+bx}\,dx,x,\text{csch}^{-1}(cx)\right)\right)+\frac{1}{2}\left(c^2\sinh\left(\frac{2a}{b}\right.\right.\\
&= \frac{c^2\text{Chi}\left(\frac{2a}{b}+2\text{csch}^{-1}(cx)\right)\sinh\left(\frac{2a}{b}\right)}{2b}-\frac{c^2\cosh\left(\frac{2a}{b}\right)\text{Shi}\left(\frac{2a}{b}+2\text{csch}^{-1}(cx)\right)}{2b}
\end{aligned}$$

**Mathematica [A]** time = 0.08, size = 56, normalized size = 0.89

$$\frac{c^2\left(\sinh\left(\frac{2a}{b}\right)\text{Chi}\left(\frac{2a}{b}+2\text{csch}^{-1}(cx)\right)-\cosh\left(\frac{2a}{b}\right)\text{Shi}\left(\frac{2a}{b}+2\text{csch}^{-1}(cx)\right)\right)}{2b}$$

Antiderivative was successfully verified.

```
[In] Integrate[1/(x^3*(a + b*ArcCsch[c*x])),x]
```

```
[Out] (c^2*(CoshIntegral[(2*a)/b + 2*ArcCsch[c*x]]*Sinh[(2*a)/b] - Cosh[(2*a)/b]*
SinhIntegral[(2*a)/b + 2*ArcCsch[c*x]]))/(2*b)
```

**fricas [F]** time = 2.15, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{1}{bx^3\,\text{arcsch}\,(cx) + ax^3}, x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/x^3/(a+b*arccsch(c*x)),x, algorithm="fricas")
```

```
[Out] integral(1/(b*x^3*arccsch(c*x) + a*x^3), x)
```

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

$$\int \frac{1}{(b\,\text{arcsch}\,(cx) + a)x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/x^3/(a+b*arccsch(c*x)),x, algorithm="giac")
```

```
[Out] integrate(1/((b*arccsch(c*x) + a)*x^3), x)
```

**maple [F]** time = 0.05, size = 0, normalized size = 0.00

$$\int \frac{1}{x^3\,(a + b\,\text{arccsch}\,(cx))}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(1/x^3/(a+b*arccsch(c*x)),x)
```

```
[Out] int(1/x^3/(a+b*arccsch(c*x)),x)
```

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

$$\int \frac{1}{(b\,\text{arcsch}\,(cx) + a)x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/x^3/(a+b*arccsch(c*x)),x, algorithm="maxima")
```

```
[Out] integrate(1/((b*arccsch(c*x) + a)*x^3), x)
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.02

$$\int \frac{1}{x^3 \left(a + b \operatorname{asinh}\left(\frac{1}{c\,x}\right)\right)} \,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(1/(x^3*(a + b*asinh(1/(c*x)))),x)
```

```
[Out] int(1/(x^3*(a + b*asinh(1/(c*x)))), x)
```

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

$$\int \frac{1}{x^3 \left(a + b \operatorname{acsch}\left(cx\right)\right)} \,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/x**3/(a+b*acsch(c*x)),x)
```

```
[Out] Integral(1/(x**3*(a + b*acsch(c*x))), x)
```

## 3.38 $\int \frac{1}{x^4\left(a+b\,\mathbf{csch}^{-1}(cx)\right)}\,dx$

**Optimal**. Leaf size=117

$$\frac{c^3\cosh\left(\frac{a}{b}\right)\text{Chi}\left(\frac{a}{b}+\text{csch}^{-1}(cx)\right)}{4b}-\frac{c^3\cosh\left(\frac{3a}{b}\right)\text{Chi}\left(\frac{3a}{b}+3\text{csch}^{-1}(cx)\right)}{4b}-\frac{c^3\sinh\left(\frac{a}{b}\right)\text{Shi}\left(\frac{a}{b}+\text{csch}^{-1}(cx)\right)}{4b}+\frac{c^3 s}{}$$

```
[Out] 1/4*c^3*Chi(a/b+arccsch(c*x))*cosh(a/b)/b-1/4*c^3*Chi(3*a/b+3*arccsch(c*x))
*cosh(3*a/b)/b-1/4*c^3*Shi(a/b+arccsch(c*x))*sinh(a/b)/b+1/4*c^3*Shi(3*a/b+
3*arccsch(c*x))*sinh(3*a/b)/b
```

**Rubi [A]** time = 0.24, antiderivative size = 117, normalized size of antiderivative = 1.00, number of steps used = 9, number of rules used = 5, integrand size = 14, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.357, Rules used = {6286, 5448, 3303, 3298, 3301}

$$\frac{c^3\cosh\left(\frac{a}{b}\right)\text{Chi}\left(\frac{a}{b}+\text{csch}^{-1}(cx)\right)}{4b}-\frac{c^3\cosh\left(\frac{3a}{b}\right)\text{Chi}\left(\frac{3a}{b}+3\text{csch}^{-1}(cx)\right)}{4b}-\frac{c^3\sinh\left(\frac{a}{b}\right)\text{Shi}\left(\frac{a}{b}+\text{csch}^{-1}(cx)\right)}{4b}+\frac{c^3 s}{}$$

Antiderivative was successfully verified.

```
[In] Int[1/(x^4*(a + b*ArcCsch[c*x])),x]
```

```
[Out] (c^3*Cosh[a/b]*CoshIntegral[a/b + ArcCsch[c*x]])/(4*b) - (c^3*Cosh[(3*a)/b]
*CoshIntegral[(3*a)/b + 3*ArcCsch[c*x]])/(4*b) - (c^3*Sinh[a/b]*SinhIntegra
l[a/b + ArcCsch[c*x]])/(4*b) + (c^3*Sinh[(3*a)/b]*SinhIntegral[(3*a)/b + 3*
ArcCsch[c*x]])/(4*b)
```

Rule 3298

```
Int[sin[(e_.) + (Complex[0, fz_])*(f_.)*(x_)]/((c_.) + (d_.)*(x_)), x_Symbo
l] :> Simp[(I*SinhIntegral[(c*f*fz)/d + f*fz*x])/d, x] /; FreeQ[{c, d, e, f
, fz}, x] && EqQ[d*e - c*f*fz*I, 0]
```

Rule 3301

```
Int[sin[(e_.) + (Complex[0, fz_])*(f_.)*(x_)]/((c_.) + (d_.)*(x_)), x_Symbo
l] :> Simp[CoshIntegral[(c*f*fz)/d + f*fz*x]/d, x] /; FreeQ[{c, d, e, f, fz
}, x] && EqQ[d*(e - Pi/2) - c*f*fz*I, 0]
```

Rule 3303

```
Int[sin[(e_.) + (f_.)*(x_)]/((c_.) + (d_.)*(x_)), x_Symbol] :> Dist[Cos[(d*
e - c*f)/d], Int[Sin[(c*f)/d + f*x]/(c + d*x), x], x] + Dist[Sin[(d*e - c*f
)/d], Int[Cos[(c*f)/d + f*x]/(c + d*x), x], x] /; FreeQ[{c, d, e, f}, x] &&
```

```
NeQ[d*e - c*f, 0]
```

Rule 5448

```
Int[Cosh[(a_.) + (b_.)*(x_)]^(p_.)*((c_.) + (d_.)*(x_))^(m_.)*Sinh[(a_.) +
(b_.)*(x_)]^(n_.), x_Symbol] :> Int[ExpandTrigReduce[(c + d*x)^m, Sinh[a +
b*x]^n*Cosh[a + b*x]^p, x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[n, 0] &
& IGtQ[p, 0]
```

Rule 6286

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))^(n_)*(x_)^(m_.), x_Symbol] :> -Dist
[(c^(m + 1))^(-1), Subst[Int[(a + b*x)^n*Csch[x]^(m + 1)*Coth[x], x], x, Ar
cCsch[c*x]], x] /; FreeQ[{a, b, c}, x] && IntegerQ[n] && IntegerQ[m] && (Gt
Q[n, 0] || LtQ[m, -1])
```

Rubi steps

$$\int \frac{1}{x^4\left(a+b\text{csch}^{-1}(cx)\right)}\,dx = -\left(c^3\,\text{Subst}\left(\int \frac{\cosh(x)\sinh^2(x)}{a+bx}\,dx, x, \text{csch}^{-1}(cx)\right)\right)$$

$$= -\left(c^3\,\text{Subst}\left(\int \left(-\frac{\cosh(x)}{4(a+bx)}+\frac{\cosh(3x)}{4(a+bx)}\right)dx, x, \text{csch}^{-1}(cx)\right)\right)$$

$$= \frac{1}{4}c^3\,\text{Subst}\left(\int \frac{\cosh(x)}{a+bx}\,dx, x, \text{csch}^{-1}(cx)\right) - \frac{1}{4}c^3\,\text{Subst}\left(\int \frac{\cosh(3x)}{a+bx}\,dx, x, \text{csch}^{-1}(c$$

$$= \frac{1}{4}\left(c^3\cosh\left(\frac{a}{b}\right)\right)\text{Subst}\left(\int \frac{\cosh\left(\frac{a}{b}+x\right)}{a+bx}\,dx, x, \text{csch}^{-1}(cx)\right) - \frac{1}{4}\left(c^3\cosh\left(\frac{3a}{b}\right)\right)\text{Subs}$$

$$= \frac{c^3\cosh\left(\frac{a}{b}\right)\text{Chi}\left(\frac{a}{b}+\text{csch}^{-1}(cx)\right)}{4b} - \frac{c^3\cosh\left(\frac{3a}{b}\right)\text{Chi}\left(\frac{3a}{b}+3\text{csch}^{-1}(cx)\right)}{4b} - \frac{c^3\sinh}{}$$

**Mathematica [A]** time = 0.17, size = 91, normalized size = 0.78

$$-\frac{c^3\left(-\cosh\left(\frac{a}{b}\right)\text{Chi}\left(\frac{a}{b}+\text{csch}^{-1}(cx)\right)+\cosh\left(\frac{3a}{b}\right)\text{Chi}\left(3\left(\frac{a}{b}+\text{csch}^{-1}(cx)\right)\right)+\sinh\left(\frac{a}{b}\right)\text{Shi}\left(\frac{a}{b}+\text{csch}^{-1}(cx)\right)-\text{si}}{4b}$$

Antiderivative was successfully verified.

```
[In] Integrate[1/(x^4*(a + b*ArcCsch[c*x])),x]
```

```
[Out] -1/4*(c^3*(-(Cosh[a/b]*CoshIntegral[a/b + ArcCsch[c*x]]) + Cosh[(3*a)/b]*Co
shIntegral[3*(a/b + ArcCsch[c*x])] + Sinh[a/b]*SinhIntegral[a/b + ArcCsch[c
*x]] - Sinh[(3*a)/b]*SinhIntegral[3*(a/b + ArcCsch[c*x])]))/b
```

**fricas [F]** time = 2.14, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{1}{bx^4 \operatorname{arcsch}(cx) + ax^4}, x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/x^4/(a+b*arccsch(c*x)),x, algorithm="fricas")
```

```
[Out] integral(1/(b*x^4*arccsch(c*x) + a*x^4), x)
```

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

$$\int \frac{1}{(b \operatorname{arcsch}(cx) + a)x^4} \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/x^4/(a+b*arccsch(c*x)),x, algorithm="giac")
```

```
[Out] integrate(1/((b*arccsch(c*x) + a)*x^4), x)
```

**maple [F]** time = 0.05, size = 0, normalized size = 0.00

$$\int \frac{1}{x^4 (a + b \operatorname{arccsch}(cx))} \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(1/x^4/(a+b*arccsch(c*x)),x)
```

```
[Out] int(1/x^4/(a+b*arccsch(c*x)),x)
```

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

$$\int \frac{1}{(b \operatorname{arcsch}(cx) + a)x^4} \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/x^4/(a+b*arccsch(c*x)),x, algorithm="maxima")
```

```
[Out] integrate(1/((b*arccsch(c*x) + a)*x^4), x)
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.01

$$\int \frac{1}{x^4 \left(a + b \operatorname{asinh}\left(\frac{1}{c x}\right)\right)} \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(1/(x^4*(a + b*asinh(1/(c*x)))),x)
```

```
[Out] int(1/(x^4*(a + b*asinh(1/(c*x)))), x)
```

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

$$\int \frac{1}{x^4 \left(a + b \operatorname{acsch}(cx)\right)} \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/x**4/(a+b*acsch(c*x)),x)
```

```
[Out] Integral(1/(x**4*(a + b*acsch(c*x))), x)
```

# 3.39 $\int (dx)^m \left(a+b\,\mathrm{csch}^{-1}(cx)\right)^3\,dx$

**Optimal**. Leaf size=19

$$\mathrm{Int}\left((dx)^m \left(a+b\mathrm{csch}^{-1}(cx)\right)^3,x\right)$$

```
[Out] Unintegrable((d*x)^m*(a+b*arccsch(c*x))^3,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 = {}

$$\int (dx)^m \left(a+b\mathrm{csch}^{-1}(cx)\right)^3\,dx$$

Verification is Not applicable to the result.

```
[In] Int[(d*x)^m*(a + b*ArcCsch[c*x])^3,x]
```

```
[Out] Defer[Int][(d*x)^m*(a + b*ArcCsch[c*x])^3, x]
```

Rubi steps

$$\int (dx)^m \left(a+b\mathrm{csch}^{-1}(cx)\right)^3\,dx=\int (dx)^m \left(a+b\mathrm{csch}^{-1}(cx)\right)^3\,dx$$

**Mathematica** [A] time = 6.87, size = 0, normalized size = 0.00

$$\int (dx)^m \left(a+b\mathrm{csch}^{-1}(cx)\right)^3\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[(d*x)^m*(a + b*ArcCsch[c*x])^3,x]
```

```
[Out] Integrate[(d*x)^m*(a + b*ArcCsch[c*x])^3, x]
```

**fricas** [A] time = 2.69, size = 0, normalized size = 0.00

$$\mathrm{integral}\left(\left(b^3\,\mathrm{arcsch}\,(cx)^3+3\,ab^2\,\mathrm{arcsch}\,(cx)^2+3\,a^2b\,\mathrm{arcsch}\,(cx)+a^3\right)(dx)^m,x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((d*x)^m*(a+b*arccsch(c*x))^3,x, algorithm="fricas")
```

```
[Out] integral((b^3*arccsch(c*x)^3 + 3*a*b^2*arccsch(c*x)^2 + 3*a^2*b*arccsch(c*x
) + a^3)*(d*x)^m, x)
```

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

$$\int (b \operatorname{arcsch}(cx) + a)^3 (dx)^m \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((d*x)^m*(a+b*arccsch(c*x))^3,x, algorithm="giac")
[Out] integrate((b*arccsch(c*x) + a)^3*(d*x)^m, x)
```

**maple** [A] time = 0.05, size = 0, normalized size = 0.00

$$\int (dx)^m (a + b \operatorname{arccsch}(cx))^3 \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((d*x)^m*(a+b*arccsch(c*x))^3,x)
[Out] int((d*x)^m*(a+b*arccsch(c*x))^3,x)
```

**maxima** [A] 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((d*x)^m*(a+b*arccsch(c*x))^3,x, algorithm="maxima")
[Out] b^3*d^m*x*x^m*log(sqrt(c^2*x^2 + 1) + 1)^3/(m + 1) + (d*x)^(m + 1)*a^3/(d*(
m + 1)) - integrate((3*((b^3*d^m*(m + 1)*log(c) - a*b^2*d^m*(m + 1) - (a*b^
2*c^2*d^m*(m + 1) - (d^m*(m + 1)*log(c) + d^m)*b^3*c^2)*x^2 + (b^3*c^2*d^m*
(m + 1)*x^2 + b^3*d^m*(m + 1))*log(x))*sqrt(c^2*x^2 + 1)*x^m + (b^3*d^m*(m
+ 1)*log(c) - a*b^2*d^m*(m + 1) + (b^3*c^2*d^m*(m + 1)*log(c) - a*b^2*c^2*d
^m*(m + 1))*x^2 + (b^3*c^2*d^m*(m + 1)*x^2 + b^3*d^m*(m + 1))*log(x))*x^m)*
log(sqrt(c^2*x^2 + 1) + 1)^2 + (b^3*d^m*(m + 1)*log(c)^3 - 3*a*b^2*d^m*(m +
 1)*log(c)^2 + 3*a^2*b*d^m*(m + 1)*log(c) + (b^3*c^2*d^m*(m + 1)*x^2 + b^3*
d^m*(m + 1))*log(x)^3 + (b^3*c^2*d^m*(m + 1)*log(c)^3 - 3*a*b^2*c^2*d^m*(m
+ 1)*log(c)^2 + 3*a^2*b*c^2*d^m*(m + 1)*log(c))*x^2 + 3*(b^3*d^m*(m + 1)*lo
g(c) - a*b^2*d^m*(m + 1) + (b^3*c^2*d^m*(m + 1)*log(c) - a*b^2*c^2*d^m*(m +
 1))*x^2)*log(x)^2 + 3*(b^3*d^m*(m + 1)*log(c)^2 - 2*a*b^2*d^m*(m + 1)*log(
c) + a^2*b*d^m*(m + 1) + (b^3*c^2*d^m*(m + 1)*log(c)^2 - 2*a*b^2*c^2*d^m*(m
 + 1)*log(c) + a^2*b*c^2*d^m*(m + 1))*x^2)*log(x))*sqrt(c^2*x^2 + 1)*x^m +
(b^3*d^m*(m + 1)*log(c)^3 - 3*a*b^2*d^m*(m + 1)*log(c)^2 + 3*a^2*b*d^m*(m +
 1)*log(c) + (b^3*c^2*d^m*(m + 1)*x^2 + b^3*d^m*(m + 1))*log(x)^3 + (b^3*c^
2*d^m*(m + 1)*log(c)^3 - 3*a*b^2*c^2*d^m*(m + 1)*log(c)^2 + 3*a^2*b*c^2*d^m
```

```
*(m + 1)*log(c))*x^2 + 3*(b^3*d^m*(m + 1)*log(c) - a*b^2*d^m*(m + 1) + (b^3
*c^2*d^m*(m + 1)*log(c) - a*b^2*c^2*d^m*(m + 1))*x^2)*log(x)^2 + 3*(b^3*d^m
*(m + 1)*log(c)^2 - 2*a*b^2*d^m*(m + 1)*log(c) + a^2*b*d^m*(m + 1) + (b^3*c
^2*d^m*(m + 1)*log(c)^2 - 2*a*b^2*c^2*d^m*(m + 1)*log(c) + a^2*b*c^2*d^m*(m
 + 1))*x^2)*log(x))*x^m - 3*((b^3*d^m*(m + 1)*log(c)^2 - 2*a*b^2*d^m*(m + 1
)*log(c) + a^2*b*d^m*(m + 1) + (b^3*c^2*d^m*(m + 1)*log(c)^2 - 2*a*b^2*c^2*
d^m*(m + 1)*log(c) + a^2*b*c^2*d^m*(m + 1))*x^2 + (b^3*c^2*d^m*(m + 1)*x^2
+ b^3*d^m*(m + 1))*log(x)^2 + 2*(b^3*d^m*(m + 1)*log(c) - a*b^2*d^m*(m + 1)
 + (b^3*c^2*d^m*(m + 1)*log(c) - a*b^2*c^2*d^m*(m + 1))*x^2)*log(x))*sqrt(c
^2*x^2 + 1)*x^m + (b^3*d^m*(m + 1)*log(c)^2 - 2*a*b^2*d^m*(m + 1)*log(c) +
a^2*b*d^m*(m + 1) + (b^3*c^2*d^m*(m + 1)*log(c)^2 - 2*a*b^2*c^2*d^m*(m + 1)
*log(c) + a^2*b*c^2*d^m*(m + 1))*x^2 + (b^3*c^2*d^m*(m + 1)*x^2 + b^3*d^m*(
m + 1))*log(x)^2 + 2*(b^3*d^m*(m + 1)*log(c) - a*b^2*d^m*(m + 1) + (b^3*c^2
*d^m*(m + 1)*log(c) - a*b^2*c^2*d^m*(m + 1))*x^2)*log(x))*x^m)*log(sqrt(c^2
*x^2 + 1) + 1))/(c^2*(m + 1)*x^2 + (c^2*(m + 1)*x^2 + m + 1)*sqrt(c^2*x^2 +
 1) + m + 1), x)
```

**mupad [A]** time = 0.00, size = -1, normalized size = -0.05

$$\int (d\,x)^m\left(a+b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)\right)^3\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((d*x)^m*(a + b*asinh(1/(c*x)))^3,x)
[Out] int((d*x)^m*(a + b*asinh(1/(c*x)))^3, x)
```

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

$$\int (dx)^m\,(a+b\,\mathrm{acsch}\,(cx))^3\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((d*x)**m*(a+b*acsch(c*x))**3,x)
[Out] Integral((d*x)**m*(a + b*acsch(c*x))**3, x)
```

# 3.40 $\int (dx)^m \left(a+b\,\mathrm{csch}^{-1}(cx)\right)^2\,dx$

**Optimal**. Leaf size=19

$$\mathrm{Int}\left((dx)^m\left(a+b\mathrm{csch}^{-1}(cx)\right)^2,x\right)$$

```
[Out] Unintegrable((d*x)^m*(a+b*arccsch(c*x))^2,x)
```

**Rubi** [A] time = 0.03, 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 = {}

$$\int (dx)^m\left(a+b\mathrm{csch}^{-1}(cx)\right)^2\,dx$$

Verification is Not applicable to the result.

```
[In] Int[(d*x)^m*(a + b*ArcCsch[c*x])^2,x]
```

```
[Out] Defer[Int][(d*x)^m*(a + b*ArcCsch[c*x])^2, x]
```

Rubi steps

$$\int (dx)^m\left(a+b\mathrm{csch}^{-1}(cx)\right)^2\,dx=\int (dx)^m\left(a+b\mathrm{csch}^{-1}(cx)\right)^2\,dx$$

**Mathematica** [A] time = 4.49, size = 0, normalized size = 0.00

$$\int (dx)^m\left(a+b\mathrm{csch}^{-1}(cx)\right)^2\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[(d*x)^m*(a + b*ArcCsch[c*x])^2,x]
```

```
[Out] Integrate[(d*x)^m*(a + b*ArcCsch[c*x])^2, x]
```

**fricas** [A] time = 0.78, size = 0, normalized size = 0.00

$$\mathrm{integral}\left(\left(b^2\,\mathrm{arcsch}\,(cx)^2+2\,ab\,\mathrm{arcsch}\,(cx)+a^2\right)(dx)^m\,,x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((d*x)^m*(a+b*arccsch(c*x))^2,x, algorithm="fricas")
```

```
[Out] integral((b^2*arccsch(c*x)^2 + 2*a*b*arccsch(c*x) + a^2)*(d*x)^m, x)
```

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

$$\int (b \operatorname{arcsch}(cx) + a)^2 (dx)^m \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((d*x)^m*(a+b*arccsch(c*x))^2,x, algorithm="giac")
```

```
[Out] integrate((b*arccsch(c*x) + a)^2*(d*x)^m, x)
```

**maple** [A] time = 0.05, size = 0, normalized size = 0.00

$$\int (dx)^m (a + b \operatorname{arccsch}(cx))^2 \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((d*x)^m*(a+b*arccsch(c*x))^2,x)
```

```
[Out] int((d*x)^m*(a+b*arccsch(c*x))^2,x)
```

**maxima** [A] time = 0.00, size = 0, normalized size = 0.00

$$\frac{b^2 d^m x x^m \log\left(\sqrt{c^2x^2+1}+1\right)^2}{m+1} + \frac{(dx)^{m+1} a^2}{d(m+1)} - \int -\frac{\left(b^2 d^m (m+1) \log(c)^2 - 2\,abd^m (m+1) \log(c) + \left(b^2 c^2 d^m (m+1\right.\right.}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((d*x)^m*(a+b*arccsch(c*x))^2,x, algorithm="maxima")
```

```
[Out] b^2*d^m*x*x^m*log(sqrt(c^2*x^2 + 1) + 1)^2/(m + 1) + (d*x)^(m + 1)*a^2/(d*(
m + 1)) - integrate(-((b^2*d^m*(m + 1)*log(c)^2 - 2*a*b*d^m*(m + 1)*log(c)
+ (b^2*c^2*d^m*(m + 1)*log(c)^2 - 2*a*b*c^2*d^m*(m + 1)*log(c))*x^2 + (b^2*
c^2*d^m*(m + 1)*x^2 + b^2*d^m*(m + 1))*log(x)^2 + 2*(b^2*d^m*(m + 1)*log(c)
 - a*b*d^m*(m + 1) + (b^2*c^2*d^m*(m + 1)*log(c) - a*b*c^2*d^m*(m + 1))*x^2
)*log(x))*sqrt(c^2*x^2 + 1)*x^m + (b^2*d^m*(m + 1)*log(c)^2 - 2*a*b*d^m*(m
+ 1)*log(c) + (b^2*c^2*d^m*(m + 1)*log(c)^2 - 2*a*b*c^2*d^m*(m + 1)*log(c))
*x^2 + (b^2*c^2*d^m*(m + 1)*x^2 + b^2*d^m*(m + 1))*log(x)^2 + 2*(b^2*d^m*(m
 + 1)*log(c) - a*b*d^m*(m + 1) + (b^2*c^2*d^m*(m + 1)*log(c) - a*b*c^2*d^m*
(m + 1))*x^2)*log(x))*x^m - 2*((b^2*d^m*(m + 1)*log(c) - a*b*d^m*(m + 1) -
(a*b*c^2*d^m*(m + 1) - (d^m*(m + 1)*log(c) + d^m)*b^2*c^2)*x^2 + (b^2*c^2*d
^m*(m + 1)*x^2 + b^2*d^m*(m + 1))*log(x))*sqrt(c^2*x^2 + 1)*x^m + (b^2*d^m*
(m + 1)*log(c) - a*b*d^m*(m + 1) + (b^2*c^2*d^m*(m + 1)*log(c) - a*b*c^2*d^
m*(m + 1))*x^2 + (b^2*c^2*d^m*(m + 1)*x^2 + b^2*d^m*(m + 1))*log(x))*x^m)*l
```

```
og(sqrt(c^2*x^2 + 1) + 1))/(c^2*(m + 1)*x^2 + (c^2*(m + 1)*x^2 + m + 1)*sqr
t(c^2*x^2 + 1) + m + 1), x)
```

**mupad [A]** time = 0.00, size = -1, normalized size = -0.05

$$\int (d\,x)^m\,\left(a+b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)\right)^2\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((d*x)^m*(a + b*asinh(1/(c*x)))^2,x)
```

```
[Out] int((d*x)^m*(a + b*asinh(1/(c*x)))^2, x)
```

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

$$\int (dx)^m\,(a+b\,\mathrm{acsch}\,(cx))^2\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((d*x)**m*(a+b*acsch(c*x))**2,x)
```

```
[Out] Integral((d*x)**m*(a + b*acsch(c*x))**2, x)
```

# 3.41 $\int (dx)^m \left(a + b\textbf{csch}^{-1}(cx)\right) dx$

**Optimal**. Leaf size=67

$$\frac{(dx)^{m+1}\left(a+b\operatorname{csch}^{-1}(cx)\right)}{d(m+1)}+\frac{b(dx)^m\,{}_2F_1\left(\frac{1}{2},-\frac{m}{2};1-\frac{m}{2};-\frac{1}{c^2x^2}\right)}{cm(m+1)}$$

```
[Out] (d*x)^(1+m)*(a+b*arccsch(c*x))/d/(1+m)+b*(d*x)^m*hypergeom([1/2, -1/2*m],[1
-1/2*m],-1/c^2/x^2)/c/m/(1+m)
```

**Rubi [A]** time = 0.05, antiderivative size = 67, normalized size of antiderivative = 1.00, number of steps used = 3, number of rules used = 3, integrand size = 14, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.214, Rules used = {6284, 339, 364}

$$\frac{(dx)^{m+1}\left(a+b\operatorname{csch}^{-1}(cx)\right)}{d(m+1)}+\frac{b(dx)^m\,{}_2F_1\left(\frac{1}{2},-\frac{m}{2};1-\frac{m}{2};-\frac{1}{c^2x^2}\right)}{cm(m+1)}$$

Antiderivative was successfully verified.

```
[In] Int[(d*x)^m*(a + b*ArcCsch[c*x]),x]
```

```
[Out] ((d*x)^(1 + m)*(a + b*ArcCsch[c*x]))/(d*(1 + m)) + (b*(d*x)^m*Hypergeometri
c2F1[1/2, -m/2, 1 - m/2, -(1/(c^2*x^2))])/(c*m*(1 + m))
```

Rule 339

```
Int[((c_.)*(x_))^(m_)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> -Dist[((c
*x)^(m + 1)*(1/x)^(m + 1))/c, Subst[Int[(a + b/x^n)^p/x^(m + 2), x], x, 1/x
], x] /; FreeQ[{a, b, c, m, p}, x] && ILtQ[n, 0] &&  !RationalQ[m]
```

Rule 364

```
Int[((c_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Simp[(a^
p*(c*x)^(m + 1)*Hypergeometric2F1[-p, (m + 1)/n, (m + 1)/n + 1, -((b*x^n)/a
)])/(c*(m + 1)), x] /; FreeQ[{a, b, c, m, n, p}, x] &&  !IGtQ[p, 0] && (ILt
Q[p, 0] || GtQ[a, 0])
```

Rule 6284

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))*((d_.)*(x_))^(m_.), x_Symbol] :> Si
mp[((d*x)^(m + 1)*(a + b*ArcCsch[c*x]))/(d*(m + 1)), x] + Dist[(b*d)/(c*(m
+ 1)), Int[(d*x)^(m - 1)/Sqrt[1 + 1/(c^2*x^2)], x], x] /; FreeQ[{a, b, c, d
, m}, x] && NeQ[m, -1]
```

Rubi steps

$$\int (dx)^m \left(a+b\operatorname{csch}^{-1}(cx)\right)\,dx=\frac{(dx)^{1+m}\left(a+b\operatorname{csch}^{-1}(cx)\right)}{d(1+m)}+\frac{(bd)\int\frac{(dx)^{-1+m}}{\sqrt{1+\frac{1}{c^2x^2}}}\,dx}{c(1+m)}$$

$$=\frac{(dx)^{1+m}\left(a+b\operatorname{csch}^{-1}(cx)\right)}{d(1+m)}-\frac{\left(b\left(\frac{1}{x}\right)^m(dx)^m\right)\operatorname{Subst}\left(\int\frac{x^{-1-m}}{\sqrt{1+\frac{x^2}{c^2}}}\,dx,x,\frac{1}{x}\right)}{c(1+m)}$$

$$=\frac{(dx)^{1+m}\left(a+b\operatorname{csch}^{-1}(cx)\right)}{d(1+m)}+\frac{b(dx)^m\,{}_2F_1\left(\frac{1}{2},-\frac{m}{2};1-\frac{m}{2};-\frac{1}{c^2x^2}\right)}{cm(1+m)}$$

**Mathematica [A]** time = 0.24, size = 81, normalized size = 1.21

$$\frac{x(dx)^m\left((m+1)\left(a+b\operatorname{csch}^{-1}(cx)\right)+\frac{bcx\sqrt{\frac{1}{c^2x^2}+1}\,{}_2F_1\left(\frac{1}{2},\frac{m+1}{2};\frac{m+3}{2};-c^2x^2\right)}{\sqrt{c^2x^2+1}}\right)}{(m+1)^2}$$

Antiderivative was successfully verified.

```
[In] Integrate[(d*x)^m*(a + b*ArcCsch[c*x]),x]
```

```
[Out] (x*(d*x)^m*((1 + m)*(a + b*ArcCsch[c*x]) + (b*c*Sqrt[1 + 1/(c^2*x^2)]*x*Hyp
ergeometric2F1[1/2, (1 + m)/2, (3 + m)/2, -(c^2*x^2)])/Sqrt[1 + c^2*x^2]))/
(1 + m)^2
```

**fricas [F]** time = 0.83, size = 0, normalized size = 0.00

$$\operatorname{integral}\left((b\operatorname{arcsch}(cx)+a)(dx)^m,x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((d*x)^m*(a+b*arccsch(c*x)),x, algorithm="fricas")
```

```
[Out] integral((b*arccsch(c*x) + a)*(d*x)^m, x)
```

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

$$\int (b\operatorname{arcsch}(cx)+a)(dx)^m\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((d*x)^m*(a+b*arccsch(c*x)),x, algorithm="giac")
[Out] integrate((b*arccsch(c*x) + a)*(d*x)^m, x)
```

**maple [F]** time = 0.05, size = 0, normalized size = 0.00

$$\int (dx)^m (a + b \operatorname{arccsch}(cx))\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((d*x)^m*(a+b*arccsch(c*x)),x)
[Out] int((d*x)^m*(a+b*arccsch(c*x)),x)
```

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

$$\left(c^2 d^m \int \frac{x^2 x^m}{c^2(m+1)x^2 + \left(c^2(m+1)x^2 + m + 1\right)\sqrt{c^2x^2+1} + m + 1}\, dx - \frac{d^m x x^m \log(x) - d^m x x^m \log\left(\sqrt{c^2x^2+1}\right.}{m+1}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((d*x)^m*(a+b*arccsch(c*x)),x, algorithm="maxima")
[Out] (c^2*d^m*integrate(x^2*x^m/(c^2*(m + 1)*x^2 + (c^2*(m + 1)*x^2 + m + 1)*sqr
t(c^2*x^2 + 1) + m + 1), x) - (d^m*x*x^m*log(x) - d^m*x*x^m*log(sqrt(c^2*x^
2 + 1) + 1))/(m + 1) - integrate((c^2*d^m*(m + 1)*x^2*log(c) + d^m*(m + 1)*
log(c) - d^m)*x^m/(c^2*(m + 1)*x^2 + m + 1), x))*b + (d*x)^(m + 1)*a/(d*(m
+ 1))
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.01

$$\int (d\,x)^m \left(a + b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)\right) dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((d*x)^m*(a + b*asinh(1/(c*x))),x)
[Out] int((d*x)^m*(a + b*asinh(1/(c*x))), x)
```

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

$$\int (dx)^m (a + b \operatorname{acsch}(cx))\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((d*x)**m*(a+b*acsch(c*x)),x)
[Out] Integral((d*x)**m*(a + b*acsch(c*x)), x)
```

## 3.42 $\int \frac{(dx)^m}{a+b\,\mathrm{csch}^{-1}(cx)}\,dx$

**Optimal**. Leaf size=19

$$\mathrm{Int}\left(\frac{(dx)^m}{a+b\,\mathrm{csch}^{-1}(cx)},x\right)$$

```
[Out] Unintegrable((d*x)^m/(a+b*arccsch(c*x)),x)
```

**Rubi [A]** time = 0.03, 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 = {}

$$\int \frac{(dx)^m}{a+b\,\mathrm{csch}^{-1}(cx)}\,dx$$

Verification is Not applicable to the result.

```
[In] Int[(d*x)^m/(a + b*ArcCsch[c*x]),x]
```

```
[Out] Defer[Int][(d*x)^m/(a + b*ArcCsch[c*x]), x]
```

Rubi steps

$$\int \frac{(dx)^m}{a+b\,\mathrm{csch}^{-1}(cx)}\,dx = \int \frac{(dx)^m}{a+b\,\mathrm{csch}^{-1}(cx)}\,dx$$

**Mathematica [A]** time = 0.93, size = 0, normalized size = 0.00

$$\int \frac{(dx)^m}{a+b\,\mathrm{csch}^{-1}(cx)}\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[(d*x)^m/(a + b*ArcCsch[c*x]),x]
```

```
[Out] Integrate[(d*x)^m/(a + b*ArcCsch[c*x]), x]
```

**fricas [A]** time = 2.98, size = 0, normalized size = 0.00

$$\mathrm{integral}\left(\frac{(dx)^m}{b\,\mathrm{arcsch}\,(cx)+a},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((d*x)^m/(a+b*arccsch(c*x)),x, algorithm="fricas")
[Out] integral((d*x)^m/(b*arccsch(c*x) + a), x)
```

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

$$\int \frac{(dx)^m}{b \operatorname{arcsch}(cx) + a} \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((d*x)^m/(a+b*arccsch(c*x)),x, algorithm="giac")
[Out] integrate((d*x)^m/(b*arccsch(c*x) + a), x)
```

**maple** [A] time = 0.05, size = 0, normalized size = 0.00

$$\int \frac{(dx)^m}{a + b \operatorname{arccsch}(cx)} \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((d*x)^m/(a+b*arccsch(c*x)),x)
[Out] int((d*x)^m/(a+b*arccsch(c*x)),x)
```

**maxima** [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{(dx)^m}{b \operatorname{arcsch}(cx) + a} \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((d*x)^m/(a+b*arccsch(c*x)),x, algorithm="maxima")
[Out] integrate((d*x)^m/(b*arccsch(c*x) + a), x)
```

**mupad** [A] time = 0.00, size = -1, normalized size = -0.05

$$\int \frac{(d\,x)^m}{a + b \operatorname{asinh}\left(\frac{1}{c\,x}\right)} \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((d*x)^m/(a + b*asinh(1/(c*x))),x)
[Out] int((d*x)^m/(a + b*asinh(1/(c*x))), x)
```

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

$$\int \frac{(dx)^m}{a + b\,\mathrm{acsch}\,(cx)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((d*x)**m/(a+b*acsch(c*x)),x)
```

```
[Out] Integral((d*x)**m/(a + b*acsch(c*x)), x)
```

## 3.43 $\int \frac{(dx)^m}{\left(a+b\,\mathbf{csch}^{-1}(cx)\right)^2}\,dx$

**Optimal**. Leaf size=19

$$\mathrm{Int}\left(\frac{(dx)^m}{\left(a+b\,\mathrm{csch}^{-1}(cx)\right)^2},x\right)$$

```
[Out] Unintegrable((d*x)^m/(a+b*arccsch(c*x))^2,x)
```

**Rubi [A]** time = 0.03, 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 = {}

$$\int \frac{(dx)^m}{\left(a+b\,\mathrm{csch}^{-1}(cx)\right)^2}\,dx$$

Verification is Not applicable to the result.

```
[In] Int[(d*x)^m/(a + b*ArcCsch[c*x])^2,x]
```

```
[Out] Defer[Int][(d*x)^m/(a + b*ArcCsch[c*x])^2, x]
```

Rubi steps

$$\int \frac{(dx)^m}{\left(a+b\,\mathrm{csch}^{-1}(cx)\right)^2}\,dx=\int \frac{(dx)^m}{\left(a+b\,\mathrm{csch}^{-1}(cx)\right)^2}\,dx$$

**Mathematica [A]** time = 1.90, size = 0, normalized size = 0.00

$$\int \frac{(dx)^m}{\left(a+b\,\mathrm{csch}^{-1}(cx)\right)^2}\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[(d*x)^m/(a + b*ArcCsch[c*x])^2,x]
```

```
[Out] Integrate[(d*x)^m/(a + b*ArcCsch[c*x])^2, x]
```

**fricas [A]** time = 1.36, size = 0, normalized size = 0.00

$$\mathrm{integral}\left(\frac{(dx)^m}{b^2\,\mathrm{arcsch}\,(cx)^2+2\,ab\,\mathrm{arcsch}\,(cx)+a^2},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((d*x)^m/(a+b*arccsch(c*x))^2,x, algorithm="fricas")
```

```
[Out] integral((d*x)^m/(b^2*arccsch(c*x)^2 + 2*a*b*arccsch(c*x) + a^2), x)
```

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

$$\int \frac{(dx)^m}{(b\,\mathrm{arcsch}\,(cx) + a)^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((d*x)^m/(a+b*arccsch(c*x))^2,x, algorithm="giac")
```

```
[Out] integrate((d*x)^m/(b*arccsch(c*x) + a)^2, x)
```

**maple [A]** time = 0.05, size = 0, normalized size = 0.00

$$\int \frac{(dx)^m}{(a + b\,\mathrm{arccsch}\,(cx))^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((d*x)^m/(a+b*arccsch(c*x))^2,x)
```

```
[Out] int((d*x)^m/(a+b*arccsch(c*x))^2,x)
```

**maxima [A]** time = 0.00, size = 0, normalized size = 0.00

$$-\frac{\left(c^2d^mx^3 + d^mx\right)\sqrt{c^2x^2+1}\,x^m + \left(c^2d^mx^3 + d^mx\right)x^m}{\left(b^2c^2\log(c) - abc^2\right)x^2 + b^2\log(c) - ab + \left(b^2c^2x^2 + b^2\right)\log(x) - \left(b^2c^2x^2 + \sqrt{c^2x^2+1}\,b^2 + b^2\right)\log\left(\sqrt{c^2x^2+1}\right.}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((d*x)^m/(a+b*arccsch(c*x))^2,x, algorithm="maxima")
```

```
[Out] -((c^2*d^m*x^3 + d^m*x)*sqrt(c^2*x^2 + 1)*x^m + (c^2*d^m*x^3 + d^m*x)*x^m)/
((b^2*c^2*log(c) - a*b*c^2)*x^2 + b^2*log(c) - a*b + (b^2*c^2*x^2 + b^2)*lo
g(x) - (b^2*c^2*x^2 + sqrt(c^2*x^2 + 1)*b^2 + b^2)*log(sqrt(c^2*x^2 + 1) +
1) + sqrt(c^2*x^2 + 1)*(b^2*log(c) + b^2*log(x) - a*b)) - integrate(-((c^2*
d^m*(m + 3)*x^2 + d^m*(m + 1))*(c^2*x^2 + 1)*x^m + (c^4*d^m*(m + 2)*x^4 + c
^2*d^m*(3*m + 5)*x^2 + 2*d^m*(m + 1))*sqrt(c^2*x^2 + 1)*x^m + (c^4*d^m*(m +
 1)*x^4 + 2*c^2*d^m*(m + 1)*x^2 + d^m*(m + 1))*x^m)/((b^2*c^4*log(c) - a*b*
c^4)*x^4 + 2*(b^2*c^2*log(c) - a*b*c^2)*x^2 + b^2*log(c) + (c^2*x^2 + 1)*(b
^2*log(c) + b^2*log(x) - a*b) - a*b + (b^2*c^4*x^4 + 2*b^2*c^2*x^2 + b^2)*l
```

```
og(x) - (b^2*c^4*x^4 + 2*b^2*c^2*x^2 + (c^2*x^2 + 1)*b^2 + b^2 + 2*(b^2*c^2
*x^2 + b^2)*sqrt(c^2*x^2 + 1))*log(sqrt(c^2*x^2 + 1) + 1) + 2*sqrt(c^2*x^2
+ 1)*((b^2*c^2*log(c) - a*b*c^2)*x^2 + b^2*log(c) - a*b + (b^2*c^2*x^2 + b^
2)*log(x))), x)
```

**mupad** [A] time = 0.00, size = -1, normalized size = -0.05

$$\int \frac{(d\,x)^m}{\left(a+b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)\right)^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((d*x)^m/(a + b*asinh(1/(c*x)))^2,x)
```

```
[Out] int((d*x)^m/(a + b*asinh(1/(c*x)))^2, x)
```

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

$$\int \frac{(dx)^m}{(a+b\,\mathrm{acsch}\,(cx))^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((d*x)**m/(a+b*acsch(c*x))**2,x)
```

```
[Out] Integral((d*x)**m/(a + b*acsch(c*x))**2, x)
```

# 3.44 $\int (d+ex)^3 \left(a+b\text{csch}^{-1}(cx)\right) dx$

**Optimal**. Leaf size=167

$$\frac{(d+ex)^4 \left(a+b\text{csch}^{-1}(cx)\right)}{4e}+\frac{bde^2x^2\sqrt{\frac{1}{c^2x^2}+1}}{2c}+\frac{be^3x^3\sqrt{\frac{1}{c^2x^2}+1}}{12c}+\frac{bex\sqrt{\frac{1}{c^2x^2}+1}\left(9c^2d^2-e^2\right)}{6c^3}+\frac{bd\left(2c^2d^2-e^2\right)\text{ta}}{2}$$

```
[Out] -1/4*b*d^4*arccsch(c*x)/e+1/4*(e*x+d)^4*(a+b*arccsch(c*x))/e+1/2*b*d*(2*c^2
*d^2-e^2)*arctanh((1+1/c^2/x^2)^(1/2))/c^3+1/6*b*e*(9*c^2*d^2-e^2)*x*(1+1/c
^2/x^2)^(1/2)/c^3+1/2*b*d*e^2*x^2*(1+1/c^2/x^2)^(1/2)/c+1/12*b*e^3*x^3*(1+1
/c^2/x^2)^(1/2)/c
```

**Rubi [A]** time = 0.38, antiderivative size = 167, normalized size of antiderivative = 1.00, number of steps used = 11, number of rules used = 9, integrand size = 16, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.562, Rules used = {6290, 1568, 1475, 1807, 844, 215, 266, 63, 208}

$$\frac{(d+ex)^4 \left(a+b\text{csch}^{-1}(cx)\right)}{4e}+\frac{bex\sqrt{\frac{1}{c^2x^2}+1}\left(9c^2d^2-e^2\right)}{6c^3}+\frac{bd\left(2c^2d^2-e^2\right)\tanh^{-1}\left(\sqrt{\frac{1}{c^2x^2}+1}\right)}{2c^3}+\frac{bde^2x^2\sqrt{\frac{1}{c^2x^2}+1}}{2c}$$

Antiderivative was successfully verified.

```
[In] Int[(d + e*x)^3*(a + b*ArcCsch[c*x]),x]
```

```
[Out] (b*e*(9*c^2*d^2 - e^2)*Sqrt[1 + 1/(c^2*x^2)]*x)/(6*c^3) + (b*d*e^2*Sqrt[1 +
 1/(c^2*x^2)]*x^2)/(2*c) + (b*e^3*Sqrt[1 + 1/(c^2*x^2)]*x^3)/(12*c) - (b*d^
4*ArcCsch[c*x])/(4*e) + ((d + e*x)^4*(a + b*ArcCsch[c*x]))/(4*e) + (b*d*(2*
c^2*d^2 - e^2)*ArcTanh[Sqrt[1 + 1/(c^2*x^2)]])/(2*c^3)
```

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 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 215

```
Int[1/Sqrt[(a_) + (b_.)*(x_)^2], x_Symbol] :> Simp[ArcSinh[(Rt[b, 2]*x)/Sqr
t[a]]/Rt[b, 2], x] /; FreeQ[{a, b}, x] && GtQ[a, 0] && PosQ[b]
```

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 844

```
Int[((d_.) + (e_.)*(x_))^(m_)*((f_.) + (g_.)*(x_))*((a_) + (c_.)*(x_)^2)^(p
_.), x_Symbol] :> Dist[g/e, Int[(d + e*x)^(m + 1)*(a + c*x^2)^p, x], x] + D
ist[(e*f - d*g)/e, Int[(d + e*x)^m*(a + c*x^2)^p, x], x] /; FreeQ[{a, c, d,
 e, f, g, m, p}, x] && NeQ[c*d^2 + a*e^2, 0] &&  !IGtQ[m, 0]
```

Rule 1475

```
Int[(x_)^(m_.)*((a_) + (c_.)*(x_)^(n2_.))^(p_.)*((d_) + (e_.)*(x_)^(n_))^(q
_.), x_Symbol] :> Dist[1/n, Subst[Int[x^(Simplify[(m + 1)/n] - 1)*(d + e*x)
^q*(a + c*x^2)^p, x], x, x^n], x] /; FreeQ[{a, c, d, e, m, n, p, q}, x] &&
EqQ[n2, 2*n] && IntegerQ[Simplify[(m + 1)/n]]
```

Rule 1568

```
Int[(x_)^(m_.)*((d_) + (e_.)*(x_)^(mn_.))^(q_.)*((a_) + (c_.)*(x_)^(n2_.))^
(p_.), x_Symbol] :> Int[x^(m + mn*q)*(e + d/x^mn)^q*(a + c*x^n2)^p, x] /; F
reeQ[{a, c, d, e, m, mn, p}, x] && EqQ[n2, -2*mn] && IntegerQ[q] && (PosQ[n
2] ||  !IntegerQ[p])
```

Rule 1807

```
Int[(Pq_)*((c_.)*(x_))^(m_)*((a_) + (b_.)*(x_)^2)^(p_), x_Symbol] :> With[{
Q = PolynomialQuotient[Pq, c*x, x], R = PolynomialRemainder[Pq, c*x, x]}, S
imp[(R*(c*x)^(m + 1)*(a + b*x^2)^(p + 1))/(a*c*(m + 1)), x] + Dist[1/(a*c*(
m + 1)), Int[(c*x)^(m + 1)*(a + b*x^2)^p*ExpandToSum[a*c*(m + 1)*Q - b*R*(m
 + 2*p + 3)*x, x], x], x]] /; FreeQ[{a, b, c, p}, x] && PolyQ[Pq, x] && LtQ
[m, -1] && (IntegerQ[2*p] || NeQ[Expon[Pq, x], 1])
```

Rule 6290

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))*((d_.) + (e_.)*(x_))^(m_.), x_Symbo
l] :> Simp[((d + e*x)^(m + 1)*(a + b*ArcCsch[c*x]))/(e*(m + 1)), x] + Dist[
b/(c*e*(m + 1)), Int[(d + e*x)^(m + 1)/(x^2*Sqrt[1 + 1/(c^2*x^2)]), x], x]
```

```
/; FreeQ[{a, b, c, d, e, m}, x] && NeQ[m, -1]
```

Rubi steps

$$\int (d+ex)^3 \left(a+b\operatorname{csch}^{-1}(cx)\right) dx = \frac{(d+ex)^4 \left(a+b\operatorname{csch}^{-1}(cx)\right)}{4e} + \frac{b\int \frac{(d+ex)^4}{\sqrt{1+\frac{1}{c^2x^2}}\,x^2}\,dx}{4ce}$$

$$= \frac{(d+ex)^4 \left(a+b\operatorname{csch}^{-1}(cx)\right)}{4e} + \frac{b\int \frac{\left(e+\frac{d}{x}\right)^4 x^2}{\sqrt{1+\frac{1}{c^2x^2}}}\,dx}{4ce}$$

$$= \frac{(d+ex)^4 \left(a+b\operatorname{csch}^{-1}(cx)\right)}{4e} - \frac{b\,\mathrm{Subst}\left(\int \frac{(e+dx)^4}{x^4\sqrt{1+\frac{x^2}{c^2}}}\,dx, x, \frac{1}{x}\right)}{4ce}$$

$$= \frac{be^3\sqrt{1+\frac{1}{c^2x^2}}\,x^3}{12c} + \frac{(d+ex)^4 \left(a+b\operatorname{csch}^{-1}(cx)\right)}{4e} + \frac{b\,\mathrm{Subst}\left(\int \frac{-12de^3-2e^2\left(9d^2-\frac{e^2}{c^2}\right. \cdots}{x^3\sqrt{1 \cdots}} \cdots\right.}{12ce \cdots}$$

$$= \frac{bde^2\sqrt{1+\frac{1}{c^2x^2}}\,x^2}{2c} + \frac{be^3\sqrt{1+\frac{1}{c^2x^2}}\,x^3}{12c} + \frac{(d+ex)^4 \left(a+b\operatorname{csch}^{-1}(cx)\right)}{4e} - \frac{b\,\mathrm{Subs} \cdots}{\cdots}$$

$$= \frac{be\left(9c^2d^2-e^2\right)\sqrt{1+\frac{1}{c^2x^2}}\,x}{6c^3} + \frac{bde^2\sqrt{1+\frac{1}{c^2x^2}}\,x^2}{2c} + \frac{be^3\sqrt{1+\frac{1}{c^2x^2}}\,x^3}{12c} + \frac{(d+ex \cdots}{\cdots}$$

$$= \frac{be\left(9c^2d^2-e^2\right)\sqrt{1+\frac{1}{c^2x^2}}\,x}{6c^3} + \frac{bde^2\sqrt{1+\frac{1}{c^2x^2}}\,x^2}{2c} + \frac{be^3\sqrt{1+\frac{1}{c^2x^2}}\,x^3}{12c} + \frac{(d+ex \cdots}{\cdots}$$

$$= \frac{be\left(9c^2d^2-e^2\right)\sqrt{1+\frac{1}{c^2x^2}}\,x}{6c^3} + \frac{bde^2\sqrt{1+\frac{1}{c^2x^2}}\,x^2}{2c} + \frac{be^3\sqrt{1+\frac{1}{c^2x^2}}\,x^3}{12c} - \frac{bd^4\operatorname{csch} \cdots}{4e \cdots}$$

$$= \frac{be\left(9c^2d^2-e^2\right)\sqrt{1+\frac{1}{c^2x^2}}\,x}{6c^3} + \frac{bde^2\sqrt{1+\frac{1}{c^2x^2}}\,x^2}{2c} + \frac{be^3\sqrt{1+\frac{1}{c^2x^2}}\,x^3}{12c} - \frac{bd^4\operatorname{csch} \cdots}{4e \cdots}$$

$$= \frac{be\left(9c^2d^2-e^2\right)\sqrt{1+\frac{1}{c^2x^2}}\,x}{6c^3} + \frac{bde^2\sqrt{1+\frac{1}{c^2x^2}}\,x^2}{2c} + \frac{be^3\sqrt{1+\frac{1}{c^2x^2}}\,x^3}{12c} - \frac{bd^4\operatorname{csch} \cdots}{4e \cdots}$$

**Mathematica [A]** time = 0.29, size = 165, normalized size = 0.99

$$\frac{3ac^3x\left(4d^3+6d^2ex+4de^2x^2+e^3x^3\right)+3bc^3x\operatorname{csch}^{-1}(cx)\left(4d^3+6d^2ex+4de^2x^2+e^3x^3\right)+bex\sqrt{\frac{1}{c^2x^2}+1}\left(c^2\left(18d\right.\right.}{12c^3}$$

Antiderivative was successfully verified.

```
[In] Integrate[(d + e*x)^3*(a + b*ArcCsch[c*x]),x]
```

```
[Out] (3*a*c^3*x*(4*d^3 + 6*d^2*e*x + 4*d*e^2*x^2 + e^3*x^3) + b*e*Sqrt[1 + 1/(c^
2*x^2)]*x*(-2*e^2 + c^2*(18*d^2 + 6*d*e*x + e^2*x^2)) + 3*b*c^3*x*(4*d^3 +
6*d^2*e*x + 4*d*e^2*x^2 + e^3*x^3)*ArcCsch[c*x] + 6*b*d*(2*c^2*d^2 - e^2)*L
og[(1 + Sqrt[1 + 1/(c^2*x^2)])*x])/(12*c^3)
```

**fricas [B]** time = 1.16, size = 419, normalized size = 2.51

$$3\,ac^3e^3x^4+12\,ac^3de^2x^3+18\,ac^3d^2ex^2+12\,ac^3d^3x+3\left(4\,bc^3d^3+6\,bc^3d^2e+4\,bc^3de^2+bc^3e^3\right)\log\left(cx\sqrt{\frac{c^2x^2+1}{c^2x^2}}-\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((e*x+d)^3*(a+b*arccsch(c*x)),x, algorithm="fricas")
```

```
[Out] 1/12*(3*a*c^3*e^3*x^4 + 12*a*c^3*d*e^2*x^3 + 18*a*c^3*d^2*e*x^2 + 12*a*c^3*
d^3*x + 3*(4*b*c^3*d^3 + 6*b*c^3*d^2*e + 4*b*c^3*d*e^2 + b*c^3*e^3)*log(c*x
*sqrt((c^2*x^2 + 1)/(c^2*x^2)) - c*x + 1) - 6*(2*b*c^2*d^3 - b*d*e^2)*log(c
*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) - c*x) - 3*(4*b*c^3*d^3 + 6*b*c^3*d^2*e +
4*b*c^3*d*e^2 + b*c^3*e^3)*log(c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) - c*x - 1)
 + 3*(b*c^3*e^3*x^4 + 4*b*c^3*d*e^2*x^3 + 6*b*c^3*d^2*e*x^2 + 4*b*c^3*d^3*x
 - 4*b*c^3*d^3 - 6*b*c^3*d^2*e - 4*b*c^3*d*e^2 - b*c^3*e^3)*log((c*x*sqrt((
c^2*x^2 + 1)/(c^2*x^2)) + 1)/(c*x)) + (b*c^2*e^3*x^3 + 6*b*c^2*d*e^2*x^2 +
2*(9*b*c^2*d^2*e - b*e^3)*x)*sqrt((c^2*x^2 + 1)/(c^2*x^2)))/c^3
```

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

$$\int (ex+d)^3(b\operatorname{arcsch}(cx)+a)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((e*x+d)^3*(a+b*arccsch(c*x)),x, algorithm="giac")
```

```
[Out] integrate((e*x + d)^3*(b*arccsch(c*x) + a), x)
```

**maple** [A] time = 0.06, size = 269, normalized size = 1.61

$$\frac{\frac{(cxe+cd)^4 a}{4c^3 e} + \frac{b\left(\frac{e^3 \operatorname{arccsch}(cx)c^4x^4}{4} + e^2 \operatorname{arccsch}(cx)c^4x^3d + \frac{3e \operatorname{arccsch}(cx)c^4x^2d^2}{2} + \operatorname{arccsch}(cx)c^4x\,d^3 + \frac{\operatorname{arccsch}(cx)c^4d^4}{4e} + \frac{\sqrt{c^2x^2+1}\left(-3c^4d^4 \operatorname{arctanh}\left(\frac{1}{\sqrt{c^2x^2+1}}\right)+12c^3\right.}{}\right.}{c^3}}{c}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((e*x+d)^3*(a+b*arccsch(c*x)),x)
```

```
[Out] 1/c*(1/4*(c*e*x+c*d)^4*a/c^3/e+b/c^3*(1/4*e^3*arccsch(c*x)*c^4*x^4+e^2*arcc
sch(c*x)*c^4*x^3*d+3/2*e*arccsch(c*x)*c^4*x^2*d^2+arccsch(c*x)*c^4*x*d^3+1/
4/e*arccsch(c*x)*c^4*d^4+1/12/e*(c^2*x^2+1)^(1/2)*(-3*c^4*d^4*arctanh(1/(c^
2*x^2+1)^(1/2))+12*c^3*d^3*e*arcsinh(c*x)+e^4*c^2*x^2*(c^2*x^2+1)^(1/2)+6*c
^2*d*e^3*x*(c^2*x^2+1)^(1/2)+18*c^2*d^2*e^2*(c^2*x^2+1)^(1/2)-6*c*d*e^3*arc
sinh(c*x)-2*e^4*(c^2*x^2+1)^(1/2))/((c^2*x^2+1)/c^2/x^2)^(1/2)/c/x))
```

**maxima** [A] time = 0.32, size = 261, normalized size = 1.56

$$\frac{1}{4}ae^3x^4 + ade^2x^3 + \frac{3}{2}ad^2ex^2 + \frac{3}{2}\left(x^2 \operatorname{arcsch}(cx) + \frac{x\sqrt{\frac{1}{c^2x^2}+1}}{c}\right)bd^2e + \frac{1}{4}\left(4x^3 \operatorname{arcsch}(cx) + \frac{\frac{2\sqrt{\frac{1}{c^2x^2}+1}}{c^2\left(\frac{1}{c^2x^2}+1\right)-c^2} - \frac{\log\left(\sqrt{\frac{1}{c^2x^2}\cdots}\right.}{c^2}}{c}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((e*x+d)^3*(a+b*arccsch(c*x)),x, algorithm="maxima")
```

```
[Out] 1/4*a*e^3*x^4 + a*d*e^2*x^3 + 3/2*a*d^2*e*x^2 + 3/2*(x^2*arccsch(c*x) + x*s
qrt(1/(c^2*x^2) + 1)/c)*b*d^2*e + 1/4*(4*x^3*arccsch(c*x) + (2*sqrt(1/(c^2*
x^2) + 1)/(c^2*(1/(c^2*x^2) + 1) - c^2) - log(sqrt(1/(c^2*x^2) + 1) + 1)/c^
2 + log(sqrt(1/(c^2*x^2) + 1) - 1)/c^2)/c)*b*d*e^2 + 1/12*(3*x^4*arccsch(c*
x) + (c^2*x^3*(1/(c^2*x^2) + 1)^(3/2) - 3*x*sqrt(1/(c^2*x^2) + 1))/c^3)*b*e
^3 + a*d^3*x + 1/2*(2*c*x*arccsch(c*x) + log(sqrt(1/(c^2*x^2) + 1) + 1) - l
og(sqrt(1/(c^2*x^2) + 1) - 1))*b*d^3/c
```

**mupad** [F] time = 0.00, size = -1, normalized size = -0.01

$$\int \left(a + b\,\operatorname{asinh}\left(\frac{1}{c\,x}\right)\right)\,(d + e\,x)^3\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a + b*asinh(1/(c*x)))*(d + e*x)^3,x)
```

```
[Out] int((a + b*asinh(1/(c*x)))*(d + e*x)^3, x)
```

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

$$\int (a + b\,\mathrm{acsch}\,(cx))\,(d + ex)^3\;dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((e*x+d)**3*(a+b*acsch(c*x)),x)
```

```
[Out] Integral((a + b*acsch(c*x))*(d + e*x)**3, x)
```

# 3.45 $\int (d+ex)^2 \left(a+b\,\mathrm{csch}^{-1}(cx)\right) dx$

**Optimal**. Leaf size=122

$$\frac{(d+ex)^3\left(a+b\,\mathrm{csch}^{-1}(cx)\right)}{3e}+\frac{bdex\sqrt{\frac{1}{c^2x^2}+1}}{c}+\frac{be^2x^2\sqrt{\frac{1}{c^2x^2}+1}}{6c}+\frac{b\left(6c^2d^2-e^2\right)\tanh^{-1}\left(\sqrt{\frac{1}{c^2x^2}+1}\right)}{6c^3}-\frac{bd^3\mathrm{csch}^{-1}(c\ldots}{3e}$$

```
[Out] -1/3*b*d^3*arccsch(c*x)/e+1/3*(e*x+d)^3*(a+b*arccsch(c*x))/e+1/6*b*(6*c^2*d
^2-e^2)*arctanh((1+1/c^2/x^2)^(1/2))/c^3+b*d*e*x*(1+1/c^2/x^2)^(1/2)/c+1/6*
b*e^2*x^2*(1+1/c^2/x^2)^(1/2)/c
```

**Rubi [A]** time = 0.26, antiderivative size = 122, normalized size of antiderivative = 1.00, number of steps used = 10, number of rules used = 9, integrand size = 16, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.562, Rules used = {6290, 1568, 1475, 1807, 844, 215, 266, 63, 208}

$$\frac{(d+ex)^3\left(a+b\,\mathrm{csch}^{-1}(cx)\right)}{3e}+\frac{b\left(6c^2d^2-e^2\right)\tanh^{-1}\left(\sqrt{\frac{1}{c^2x^2}+1}\right)}{6c^3}+\frac{bdex\sqrt{\frac{1}{c^2x^2}+1}}{c}+\frac{be^2x^2\sqrt{\frac{1}{c^2x^2}+1}}{6c}-\frac{bd^3\mathrm{csch}^{-1}(c\ldots}{3e}$$

Antiderivative was successfully verified.

```
[In] Int[(d + e*x)^2*(a + b*ArcCsch[c*x]),x]
```

```
[Out] (b*d*e*Sqrt[1 + 1/(c^2*x^2)]*x)/c + (b*e^2*Sqrt[1 + 1/(c^2*x^2)]*x^2)/(6*c)
 - (b*d^3*ArcCsch[c*x])/(3*e) + ((d + e*x)^3*(a + b*ArcCsch[c*x]))/(3*e) +
(b*(6*c^2*d^2 - e^2)*ArcTanh[Sqrt[1 + 1/(c^2*x^2)]])/(6*c^3)
```

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 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 215

```
Int[1/Sqrt[(a_) + (b_.)*(x_)^2], x_Symbol] :> Simp[ArcSinh[(Rt[b, 2]*x)/Sqr
t[a]]/Rt[b, 2], x] /; FreeQ[{a, b}, x] && GtQ[a, 0] && PosQ[b]
```

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 844

```
Int[((d_.) + (e_.)*(x_))^(m_)*((f_.) + (g_.)*(x_))*((a_) + (c_.)*(x_)^2)^(p
_.), x_Symbol] :> Dist[g/e, Int[(d + e*x)^(m + 1)*(a + c*x^2)^p, x], x] + D
ist[(e*f - d*g)/e, Int[(d + e*x)^m*(a + c*x^2)^p, x], x] /; FreeQ[{a, c, d,
 e, f, g, m, p}, x] && NeQ[c*d^2 + a*e^2, 0] &&  !IGtQ[m, 0]
```

Rule 1475

```
Int[(x_)^(m_.)*((a_) + (c_.)*(x_)^(n2_.))^(p_.)*((d_) + (e_.)*(x_)^(n_))^(q
_.), x_Symbol] :> Dist[1/n, Subst[Int[x^(Simplify[(m + 1)/n] - 1)*(d + e*x)
^q*(a + c*x^2)^p, x], x, x^n], x] /; FreeQ[{a, c, d, e, m, n, p, q}, x] &&
EqQ[n2, 2*n] && IntegerQ[Simplify[(m + 1)/n]]
```

Rule 1568

```
Int[(x_)^(m_.)*((d_) + (e_.)*(x_)^(mn_.))^(q_.)*((a_) + (c_.)*(x_)^(n2_.))^
(p_.), x_Symbol] :> Int[x^(m + mn*q)*(e + d/x^mn)^q*(a + c*x^n2)^p, x] /; F
reeQ[{a, c, d, e, m, mn, p}, x] && EqQ[n2, -2*mn] && IntegerQ[q] && (PosQ[n
2] ||  !IntegerQ[p])
```

Rule 1807

```
Int[(Pq_)*((c_.)*(x_))^(m_)*((a_) + (b_.)*(x_)^2)^(p_), x_Symbol] :> With[{
Q = PolynomialQuotient[Pq, c*x, x], R = PolynomialRemainder[Pq, c*x, x]}, S
imp[(R*(c*x)^(m + 1)*(a + b*x^2)^(p + 1))/(a*c*(m + 1)), x] + Dist[1/(a*c*(
m + 1)), Int[(c*x)^(m + 1)*(a + b*x^2)^p*ExpandToSum[a*c*(m + 1)*Q - b*R*(m
 + 2*p + 3)*x, x], x], x]] /; FreeQ[{a, b, c, p}, x] && PolyQ[Pq, x] && LtQ
[m, -1] && (IntegerQ[2*p] || NeQ[Expon[Pq, x], 1])
```

Rule 6290

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))*((d_.) + (e_.)*(x_))^(m_.), x_Symbo
l] :> Simp[((d + e*x)^(m + 1)*(a + b*ArcCsch[c*x]))/(e*(m + 1)), x] + Dist[
b/(c*e*(m + 1)), Int[(d + e*x)^(m + 1)/(x^2*Sqrt[1 + 1/(c^2*x^2)]), x], x]
/; FreeQ[{a, b, c, d, e, m}, x] && NeQ[m, -1]
```

Rubi steps

$$\int (d+ex)^2 \left(a+b\operatorname{csch}^{-1}(cx)\right) dx = \frac{(d+ex)^3 \left(a+b\operatorname{csch}^{-1}(cx)\right)}{3e} + \frac{b\int \frac{(d+ex)^3}{\sqrt{1+\frac{1}{c^2x^2}}\,x^2}dx}{3ce}$$

$$= \frac{(d+ex)^3 \left(a+b\operatorname{csch}^{-1}(cx)\right)}{3e} + \frac{b\int \frac{\left(e+\frac{d}{x}\right)^3 x}{\sqrt{1+\frac{1}{c^2x^2}}}dx}{3ce}$$

$$= \frac{(d+ex)^3 \left(a+b\operatorname{csch}^{-1}(cx)\right)}{3e} - \frac{b\,\mathrm{Subst}\left(\int \frac{(e+dx)^3}{x^3\sqrt{1+\frac{x^2}{c^2}}}dx, x, \frac{1}{x}\right)}{3ce}$$

$$= \frac{be^2\sqrt{1+\frac{1}{c^2x^2}}\,x^2}{6c} + \frac{(d+ex)^3 \left(a+b\operatorname{csch}^{-1}(cx)\right)}{3e} + \frac{b\,\mathrm{Subst}\left(\int \frac{-6de^2-e\left(6d^2-\frac{e^2}{c^2}\right)x- \cdots}{x^2\sqrt{1+\frac{x^2}{c^2}}} \cdots\right.}{6ce}$$

$$= \frac{bde\sqrt{1+\frac{1}{c^2x^2}}\,x}{c} + \frac{be^2\sqrt{1+\frac{1}{c^2x^2}}\,x^2}{6c} + \frac{(d+ex)^3 \left(a+b\operatorname{csch}^{-1}(cx)\right)}{3e} - \frac{b\,\mathrm{Subst}\left(\cdots\right.}{\cdots}$$

$$= \frac{bde\sqrt{1+\frac{1}{c^2x^2}}\,x}{c} + \frac{be^2\sqrt{1+\frac{1}{c^2x^2}}\,x^2}{6c} + \frac{(d+ex)^3 \left(a+b\operatorname{csch}^{-1}(cx)\right)}{3e} - \frac{\left(bd^3\right)\mathrm{Sub}\cdots}{\cdots}$$

$$= \frac{bde\sqrt{1+\frac{1}{c^2x^2}}\,x}{c} + \frac{be^2\sqrt{1+\frac{1}{c^2x^2}}\,x^2}{6c} - \frac{bd^3\operatorname{csch}^{-1}(cx)}{3e} + \frac{(d+ex)^3 \left(a+b\operatorname{csch}^{-1}\cdots\right.}{3e}$$

$$= \frac{bde\sqrt{1+\frac{1}{c^2x^2}}\,x}{c} + \frac{be^2\sqrt{1+\frac{1}{c^2x^2}}\,x^2}{6c} - \frac{bd^3\operatorname{csch}^{-1}(cx)}{3e} + \frac{(d+ex)^3 \left(a+b\operatorname{csch}^{-1}\cdots\right.}{3e}$$

$$= \frac{bde\sqrt{1+\frac{1}{c^2x^2}}\,x}{c} + \frac{be^2\sqrt{1+\frac{1}{c^2x^2}}\,x^2}{6c} - \frac{bd^3\operatorname{csch}^{-1}(cx)}{3e} + \frac{(d+ex)^3 \left(a+b\operatorname{csch}^{-1}\cdots\right.}{3e}$$

**Mathematica** [A] time = 0.19, size = 122, normalized size = 1.00

$$\frac{c^2x\left(2ac\left(3d^2+3dex+e^2x^2\right)+be\sqrt{\frac{1}{c^2x^2}+1}\,(6d+ex)\right)+2bc^3x\operatorname{csch}^{-1}(cx)\left(3d^2+3dex+e^2x^2\right)+b\left(6c^2d^2-e^2\right)\mathrm{lo}\cdots}{6c^3}$$

Antiderivative was successfully verified.

```
[In] Integrate[(d + e*x)^2*(a + b*ArcCsch[c*x]),x]
```

```
[Out] (c^2*x*(b*e*Sqrt[1 + 1/(c^2*x^2)]*(6*d + e*x) + 2*a*c*(3*d^2 + 3*d*e*x + e^
2*x^2)) + 2*b*c^3*x*(3*d^2 + 3*d*e*x + e^2*x^2)*ArcCsch[c*x] + b*(6*c^2*d^2
 - e^2)*Log[(1 + Sqrt[1 + 1/(c^2*x^2)])*x])/(6*c^3)
```

**fricas [B]** time = 1.00, size = 328, normalized size = 2.69

$$2\,ac^3e^2x^3 + 6\,ac^3dex^2 + 6\,ac^3d^2x + 2\left(3\,bc^3d^2 + 3\,bc^3de + bc^3e^2\right)\log\left(cx\sqrt{\frac{c^2x^2+1}{c^2x^2}} - cx + 1\right) - \left(6\,bc^2d^2 - be^2\right)\log$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((e*x+d)^2*(a+b*arccsch(c*x)),x, algorithm="fricas")
```

```
[Out] 1/6*(2*a*c^3*e^2*x^3 + 6*a*c^3*d*e*x^2 + 6*a*c^3*d^2*x + 2*(3*b*c^3*d^2 + 3
*b*c^3*d*e + b*c^3*e^2)*log(c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) - c*x + 1) -
(6*b*c^2*d^2 - b*e^2)*log(c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) - c*x) - 2*(3*b
*c^3*d^2 + 3*b*c^3*d*e + b*c^3*e^2)*log(c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) -
 c*x - 1) + 2*(b*c^3*e^2*x^3 + 3*b*c^3*d*e*x^2 + 3*b*c^3*d^2*x - 3*b*c^3*d^
2 - 3*b*c^3*d*e - b*c^3*e^2)*log((c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) + 1)/(c
*x)) + (b*c^2*e^2*x^2 + 6*b*c^2*d*e*x)*sqrt((c^2*x^2 + 1)/(c^2*x^2)))/c^3
```

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

$$\int (ex + d)^2 (b\,\mathrm{arcsch}\,(cx) + a)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((e*x+d)^2*(a+b*arccsch(c*x)),x, algorithm="giac")
```

```
[Out] integrate((e*x + d)^2*(b*arccsch(c*x) + a), x)
```

**maple [A]** time = 0.05, size = 204, normalized size = 1.67

$$\frac{\frac{(cxe+cd)^3a}{3c^2e} + \frac{b\left(\frac{e^2\mathrm{arccsch}(cx)c^3x^3}{3} + e\,\mathrm{arccsch}(cx)c^3x^2d + \mathrm{arccsch}(cx)c^3x\,d^2 + \frac{\mathrm{arccsch}(cx)c^3d^3}{3e} + \frac{\sqrt{c^2x^2+1}\left(-2c^3d^3\,\mathrm{arctanh}\left(\frac{1}{\sqrt{c^2x^2+1}}\right) + 6c^2d^2e\,\mathrm{arcsinh}(cx) + e^3cx\,\sqrt{}\right.}{6e\sqrt{\frac{c^2x^2+1}{c^2x^2}}\,cx}\right.}{c^2}}{c}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((e*x+d)^2*(a+b*arccsch(c*x)),x)
```

```
[Out] 1/c*(1/3*(c*e*x+c*d)^3*a/c^2/e+b/c^2*(1/3*e^2*arccsch(c*x)*c^3*x^3+e*arccsc
h(c*x)*c^3*x^2*d+arccsch(c*x)*c^3*x*d^2+1/3/e*arccsch(c*x)*c^3*d^3+1/6/e*(c
^2*x^2+1)^(1/2)*(-2*c^3*d^3*arctanh(1/(c^2*x^2+1)^(1/2))+6*c^2*d^2*e*arcsin
h(c*x)+e^3*c*x*(c^2*x^2+1)^(1/2)+6*c*d*e^2*(c^2*x^2+1)^(1/2)-e^3*arcsinh(c*
x))/((c^2*x^2+1)/c^2/x^2)^(1/2)/c/x))
```

**maxima [A]** time = 0.34, size = 192, normalized size = 1.57

$$\frac{1}{3}ae^2x^3+adex^2+\left(x^2\operatorname{arcsch}(cx)+\frac{x\sqrt{\frac{1}{c^2x^2}+1}}{c}\right)bde+\frac{1}{12}\left(4x^3\operatorname{arcsch}(cx)+\frac{\frac{2\sqrt{\frac{1}{c^2x^2}+1}}{c^2\left(\frac{1}{c^2x^2}+1\right)-c^2}-\frac{\log\left(\sqrt{\frac{1}{c^2x^2}+1}+1\right)}{c^2}+\frac{\log\left(\sqrt{\right.}}{}}{c}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((e*x+d)^2*(a+b*arccsch(c*x)),x, algorithm="maxima")
```

```
[Out] 1/3*a*e^2*x^3 + a*d*e*x^2 + (x^2*arccsch(c*x) + x*sqrt(1/(c^2*x^2) + 1)/c)*
b*d*e + 1/12*(4*x^3*arccsch(c*x) + (2*sqrt(1/(c^2*x^2) + 1)/(c^2*(1/(c^2*x^
2) + 1) - c^2) - log(sqrt(1/(c^2*x^2) + 1) + 1)/c^2 + log(sqrt(1/(c^2*x^2)
+ 1) - 1)/c^2)/c)*b*e^2 + a*d^2*x + 1/2*(2*c*x*arccsch(c*x) + log(sqrt(1/(c
^2*x^2) + 1) + 1) - log(sqrt(1/(c^2*x^2) + 1) - 1))*b*d^2/c
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.01

$$\int \left(a+b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)\right)\,{\left(d+e\,x\right)}^2\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a + b*asinh(1/(c*x)))*(d + e*x)^2,x)
```

```
[Out] int((a + b*asinh(1/(c*x)))*(d + e*x)^2, x)
```

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

$$\int \left(a+b\operatorname{acsch}(cx)\right)\left(d+ex\right)^2\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((e*x+d)**2*(a+b*acsch(c*x)),x)
```

```
[Out] Integral((a + b*acsch(c*x))*(d + e*x)**2, x)
```

# 3.46 $\int (d+ex)\left(a+b\,\mathbf{csch}^{-1}(cx)\right)\,dx$

**Optimal**. Leaf size=81

$$\frac{(d+ex)^2\left(a+b\operatorname{csch}^{-1}(cx)\right)}{2e}+\frac{bd\tanh^{-1}\left(\sqrt{\frac{1}{c^2x^2}+1}\right)}{c}+\frac{bex\sqrt{\frac{1}{c^2x^2}+1}}{2c}-\frac{bd^2\operatorname{csch}^{-1}(cx)}{2e}$$

```
[Out] -1/2*b*d^2*arccsch(c*x)/e+1/2*(e*x+d)^2*(a+b*arccsch(c*x))/e+b*d*arctanh((1
+1/c^2/x^2)^(1/2))/c+1/2*b*e*x*(1+1/c^2/x^2)^(1/2)/c
```

**Rubi [A]** time = 0.16, antiderivative size = 81, normalized size of antiderivative = 1.00, number of steps used = 9, number of rules used = 9, integrand size = 14, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.643, Rules used = {6290, 1568, 1396, 1807, 844, 215, 266, 63, 208}

$$\frac{(d+ex)^2\left(a+b\operatorname{csch}^{-1}(cx)\right)}{2e}+\frac{bd\tanh^{-1}\left(\sqrt{\frac{1}{c^2x^2}+1}\right)}{c}+\frac{bex\sqrt{\frac{1}{c^2x^2}+1}}{2c}-\frac{bd^2\operatorname{csch}^{-1}(cx)}{2e}$$

Antiderivative was successfully verified.

```
[In] Int[(d + e*x)*(a + b*ArcCsch[c*x]),x]
```

```
[Out] (b*e*Sqrt[1 + 1/(c^2*x^2)]*x)/(2*c) - (b*d^2*ArcCsch[c*x])/(2*e) + ((d + e*
x)^2*(a + b*ArcCsch[c*x]))/(2*e) + (b*d*ArcTanh[Sqrt[1 + 1/(c^2*x^2)]])/c
```

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 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 215

```
Int[1/Sqrt[(a_) + (b_.)*(x_)^2], x_Symbol] :> Simp[ArcSinh[(Rt[b, 2]*x)/Sqr
t[a]]/Rt[b, 2], x] /; FreeQ[{a, b}, x] && GtQ[a, 0] && PosQ[b]
```

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 844

```
Int[((d_.) + (e_.)*(x_))^(m_)*((f_.) + (g_.)*(x_))*((a_) + (c_.)*(x_)^2)^(p
_.), x_Symbol] :> Dist[g/e, Int[(d + e*x)^(m + 1)*(a + c*x^2)^p, x], x] + D
ist[(e*f - d*g)/e, Int[(d + e*x)^m*(a + c*x^2)^p, x], x] /; FreeQ[{a, c, d,
 e, f, g, m, p}, x] && NeQ[c*d^2 + a*e^2, 0] &&  !IGtQ[m, 0]
```

Rule 1396

```
Int[((d_) + (e_.)*(x_)^(n_))^(q_.)*((a_) + (c_.)*(x_)^(n2_))^(p_), x_Symbol
] :> -Subst[Int[((d + e/x^n)^q*(a + c/x^(2*n))^p)/x^2, x], x, 1/x] /; FreeQ
[{a, c, d, e, p, q}, x] && EqQ[n2, 2*n] && ILtQ[n, 0]
```

Rule 1568

```
Int[(x_)^(m_.)*((d_) + (e_.)*(x_)^(mn_.))^(q_.)*((a_) + (c_.)*(x_)^(n2_.))^
(p_.), x_Symbol] :> Int[x^(m + mn*q)*(e + d/x^mn)^q*(a + c*x^n2)^p, x] /; F
reeQ[{a, c, d, e, m, mn, p}, x] && EqQ[n2, -2*mn] && IntegerQ[q] && (PosQ[n
2] ||  !IntegerQ[p])
```

Rule 1807

```
Int[(Pq_)*((c_.)*(x_))^(m_)*((a_) + (b_.)*(x_)^2)^(p_), x_Symbol] :> With[{
Q = PolynomialQuotient[Pq, c*x, x], R = PolynomialRemainder[Pq, c*x, x]}, S
imp[(R*(c*x)^(m + 1)*(a + b*x^2)^(p + 1))/(a*c*(m + 1)), x] + Dist[1/(a*c*(
m + 1)), Int[(c*x)^(m + 1)*(a + b*x^2)^p*ExpandToSum[a*c*(m + 1)*Q - b*R*(m
 + 2*p + 3)*x, x], x], x]] /; FreeQ[{a, b, c, p}, x] && PolyQ[Pq, x] && LtQ
[m, -1] && (IntegerQ[2*p] || NeQ[Expon[Pq, x], 1])
```

Rule 6290

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))*((d_.) + (e_.)*(x_))^(m_.), x_Symbo
l] :> Simp[((d + e*x)^(m + 1)*(a + b*ArcCsch[c*x]))/(e*(m + 1)), x] + Dist[
b/(c*e*(m + 1)), Int[(d + e*x)^(m + 1)/(x^2*Sqrt[1 + 1/(c^2*x^2)]), x], x]
/; FreeQ[{a, b, c, d, e, m}, x] && NeQ[m, -1]
```

Rubi steps

$$\int (d+ex)\left(a+b\operatorname{csch}^{-1}(cx)\right)dx = \frac{(d+ex)^2\left(a+b\operatorname{csch}^{-1}(cx)\right)}{2e} + \frac{b\int \frac{(d+ex)^2}{\sqrt{1+\frac{1}{c^2x^2}}\,x^2}\,dx}{2ce}$$

$$= \frac{(d+ex)^2\left(a+b\operatorname{csch}^{-1}(cx)\right)}{2e} + \frac{b\int \frac{\left(e+\frac{d}{x}\right)^2}{\sqrt{1+\frac{1}{c^2x^2}}}\,dx}{2ce}$$

$$= \frac{(d+ex)^2\left(a+b\operatorname{csch}^{-1}(cx)\right)}{2e} - \frac{b\,\text{Subst}\left(\int \frac{(e+dx)^2}{x^2\sqrt{1+\frac{x^2}{c^2}}}\,dx, x, \frac{1}{x}\right)}{2ce}$$

$$= \frac{be\sqrt{1+\frac{1}{c^2x^2}}\,x}{2c} + \frac{(d+ex)^2\left(a+b\operatorname{csch}^{-1}(cx)\right)}{2e} + \frac{b\,\text{Subst}\left(\int \frac{-2de-d^2x}{x\sqrt{1+\frac{x^2}{c^2}}}\,dx, x, \frac{1}{x}\right)}{2ce}$$

$$= \frac{be\sqrt{1+\frac{1}{c^2x^2}}\,x}{2c} + \frac{(d+ex)^2\left(a+b\operatorname{csch}^{-1}(cx)\right)}{2e} - \frac{(bd)\,\text{Subst}\left(\int \frac{1}{x\sqrt{1+\frac{x^2}{c^2}}}\,dx, x, \ldots\right.}{c}$$

$$= \frac{be\sqrt{1+\frac{1}{c^2x^2}}\,x}{2c} - \frac{bd^2\operatorname{csch}^{-1}(cx)}{2e} + \frac{(d+ex)^2\left(a+b\operatorname{csch}^{-1}(cx)\right)}{2e} - \frac{(bd)\,\text{Subst}\left(\ldots\right.}{\ldots}$$

$$= \frac{be\sqrt{1+\frac{1}{c^2x^2}}\,x}{2c} - \frac{bd^2\operatorname{csch}^{-1}(cx)}{2e} + \frac{(d+ex)^2\left(a+b\operatorname{csch}^{-1}(cx)\right)}{2e} - (bcd)\,\text{Subst}\ldots$$

$$= \frac{be\sqrt{1+\frac{1}{c^2x^2}}\,x}{2c} - \frac{bd^2\operatorname{csch}^{-1}(cx)}{2e} + \frac{(d+ex)^2\left(a+b\operatorname{csch}^{-1}(cx)\right)}{2e} + \frac{bd\tanh^{-1}\left(\ldots\right.}{c\ldots}$$

**Mathematica [A]** time = 0.20, size = 99, normalized size = 1.22

$$adx + \frac{1}{2}aex^2 + \frac{bdx\sqrt{\frac{1}{c^2x^2}+1}\,\sinh^{-1}(cx)}{\sqrt{c^2x^2+1}} + \frac{bex\sqrt{\frac{c^2x^2+1}{c^2x^2}}}{2c} + bdx\operatorname{csch}^{-1}(cx) + \frac{1}{2}bex^2\operatorname{csch}^{-1}(cx)$$

Antiderivative was successfully verified.

```
[In] Integrate[(d + e*x)*(a + b*ArcCsch[c*x]),x]
```

```
[Out] a*d*x + (a*e*x^2)/2 + (b*e*x*Sqrt[(1 + c^2*x^2)/(c^2*x^2)])/(2*c) + b*d*x*A
rcCsch[c*x] + (b*e*x^2*ArcCsch[c*x])/2 + (b*d*Sqrt[1 + 1/(c^2*x^2)]*x*ArcSi
nh[c*x])/Sqrt[1 + c^2*x^2]
```

**fricas [B]** time = 1.70, size = 207, normalized size = 2.56

$$\frac{acex^2 + 2\,acdx + bex\sqrt{\frac{c^2x^2+1}{c^2x^2}} - 2\,bd\log\left(cx\sqrt{\frac{c^2x^2+1}{c^2x^2}} - cx\right) + (2\,bcd + bce)\log\left(cx\sqrt{\frac{c^2x^2+1}{c^2x^2}} - cx + 1\right) - (2\,bcd + bc}{2\,c}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((e*x+d)*(a+b*arccsch(c*x)),x, algorithm="fricas")
```

```
[Out] 1/2*(a*c*e*x^2 + 2*a*c*d*x + b*e*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) - 2*b*d*lo
g(c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) - c*x) + (2*b*c*d + b*c*e)*log(c*x*sqrt
((c^2*x^2 + 1)/(c^2*x^2)) - c*x + 1) - (2*b*c*d + b*c*e)*log(c*x*sqrt((c^2*
x^2 + 1)/(c^2*x^2)) - c*x - 1) + (b*c*e*x^2 + 2*b*c*d*x - 2*b*c*d - b*c*e)*
log((c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) + 1)/(c*x)))/c
```

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

$$\int (ex + d)(b\,\mathrm{arcsch}\,(cx) + a)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((e*x+d)*(a+b*arccsch(c*x)),x, algorithm="giac")
```

```
[Out] integrate((e*x + d)*(b*arccsch(c*x) + a), x)
```

**maple [A]** time = 0.05, size = 115, normalized size = 1.42

$$\frac{\frac{a\left(\frac{1}{2}c^2x^2e + c^2dx\right)}{c} + \frac{b\left(\frac{\mathrm{arccsch}(cx)c^2x^2e}{2} + \mathrm{arccsch}(cx)c^2xd + \frac{\sqrt{c^2x^2+1}\left(e\sqrt{c^2x^2+1} + 2cd\,\mathrm{arcsinh}(cx)\right)}{2\sqrt{\frac{c^2x^2+1}{c^2x^2}}\,cx}\right)}{c}}{c}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((e*x+d)*(a+b*arccsch(c*x)),x)
```

```
[Out] 1/c*(a/c*(1/2*c^2*x^2*e+c^2*d*x)+b/c*(1/2*arccsch(c*x)*c^2*x^2*e+arccsch(c*
x)*c^2*x*d+1/2/((c^2*x^2+1)/c^2/x^2)^(1/2)/c/x*(c^2*x^2+1)^(1/2)*(e*(c^2*x^
2+1)^(1/2)+2*c*d*arcsinh(c*x))))
```

**maxima** [A] time = 0.39, size = 87, normalized size = 1.07

$$\frac{1}{2}\,aex^2+\frac{1}{2}\left(x^2\,\operatorname{arcsch}\left(cx\right)+\frac{x\sqrt{\frac{1}{c^2x^2}+1}}{c}\right)be+adx+\frac{\left(2\,cx\,\operatorname{arcsch}\left(cx\right)+\log\left(\sqrt{\frac{1}{c^2x^2}+1}+1\right)-\log\left(\sqrt{\frac{1}{c^2x^2}+1}-1\right.\right.}{2\,c}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((e*x+d)*(a+b*arccsch(c*x)),x, algorithm="maxima")
```

```
[Out] 1/2*a*e*x^2 + 1/2*(x^2*arccsch(c*x) + x*sqrt(1/(c^2*x^2) + 1)/c)*b*e + a*d*
x + 1/2*(2*c*x*arccsch(c*x) + log(sqrt(1/(c^2*x^2) + 1) + 1) - log(sqrt(1/(
c^2*x^2) + 1) - 1))*b*d/c
```

**mupad** [F] time = 0.00, size = -1, normalized size = -0.01

$$\int \left(a+b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)\right)\,\left(d+e\,x\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a + b*asinh(1/(c*x)))*(d + e*x),x)
```

```
[Out] int((a + b*asinh(1/(c*x)))*(d + e*x), x)
```

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

$$\int \left(a+b\,\operatorname{acsch}\left(cx\right)\right)\left(d+ex\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((e*x+d)*(a+b*acsch(c*x)),x)
```

```
[Out] Integral((a + b*acsch(c*x))*(d + e*x), x)
```

# 3.47 $\int \left(a+b\,\mathrm{csch}^{-1}(cx)\right)\,dx$

**Optimal**. Leaf size=30

$$ax+\frac{b\tanh^{-1}\left(\sqrt{\frac{1}{c^2x^2}+1}\right)}{c}+bx\mathrm{csch}^{-1}(cx)$$

```
[Out] a*x+b*x*arccsch(c*x)+b*arctanh((1+1/c^2/x^2)^(1/2))/c
```

**Rubi [A]** time = 0.02, antiderivative size = 30, 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 = {6278, 266, 63, 208}

$$ax+\frac{b\tanh^{-1}\left(\sqrt{\frac{1}{c^2x^2}+1}\right)}{c}+bx\mathrm{csch}^{-1}(cx)$$

Antiderivative was successfully verified.

```
[In] Int[a + b*ArcCsch[c*x],x]
```

```
[Out] a*x + b*x*ArcCsch[c*x] + (b*ArcTanh[Sqrt[1 + 1/(c^2*x^2)]])/c
```

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 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 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 6278

```
Int[ArcCsch[(c_.)*(x_)], x_Symbol] :> Simp[x*ArcCsch[c*x], x] + Dist[1/c, I
nt[1/(x*Sqrt[1 + 1/(c^2*x^2)]), x], x] /; FreeQ[c, x]
```

Rubi steps

$$\int \left(a+b\operatorname{csch}^{-1}(cx)\right)\,dx = ax+b\int \operatorname{csch}^{-1}(cx)\,dx$$

$$= ax+bx\operatorname{csch}^{-1}(cx)+\frac{b\int \frac{1}{\sqrt{1+\frac{1}{c^2x^2}}\,x}\,dx}{c}$$

$$= ax+bx\operatorname{csch}^{-1}(cx)-\frac{b\,\mathrm{Subst}\left(\int \frac{1}{x\sqrt{1+\frac{x}{c^2}}}\,dx,x,\frac{1}{x^2}\right)}{2c}$$

$$= ax+bx\operatorname{csch}^{-1}(cx)-(bc)\,\mathrm{Subst}\left(\int \frac{1}{-c^2+c^2x^2}\,dx,x,\sqrt{1+\frac{1}{c^2x^2}}\right)$$

$$= ax+bx\operatorname{csch}^{-1}(cx)+\frac{b\tanh^{-1}\left(\sqrt{1+\frac{1}{c^2x^2}}\right)}{c}$$

**Mathematica [A]** time = 0.05, size = 44, normalized size = 1.47

$$ax+\frac{bx\sqrt{\frac{1}{c^2x^2}+1}\,\sinh^{-1}(cx)}{\sqrt{c^2x^2+1}}+bx\operatorname{csch}^{-1}(cx)$$

Antiderivative was successfully verified.

```
[In] Integrate[a + b*ArcCsch[c*x],x]
```

```
[Out] a*x + b*x*ArcCsch[c*x] + (b*Sqrt[1 + 1/(c^2*x^2)]*x*ArcSinh[c*x])/Sqrt[1 +
c^2*x^2]
```

**fricas [B]** time = 0.78, size = 143, normalized size = 4.77

$$\frac{acx+bc\log\left(cx\sqrt{\frac{c^2x^2+1}{c^2x^2}}-cx+1\right)-bc\log\left(cx\sqrt{\frac{c^2x^2+1}{c^2x^2}}-cx-1\right)-b\log\left(cx\sqrt{\frac{c^2x^2+1}{c^2x^2}}-cx\right)+(bcx-bc)\log\left(\frac{cx}{\cdots}\right.}{c}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(a+b*arccsch(c*x),x, algorithm="fricas")
```

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

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

$$\int b \operatorname{arcsch}(cx) + a\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(a+b*arccsch(c*x),x, algorithm="giac")
```

```
[Out] integrate(b*arccsch(c*x) + a, x)
```

**maple [A]** time = 0.05, size = 36, normalized size = 1.20

$$ax + bx \operatorname{arccsch}(cx) + \frac{b \ln\left(cx + cx\sqrt{1 + \frac{1}{c^2x^2}}\right)}{c}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(a+b*arccsch(c*x),x)
```

```
[Out] a*x+b*x*arccsch(c*x)+b/c*ln(c*x+c*x*(1+1/c^2/x^2)^(1/2))
```

**maxima [A]** time = 0.31, size = 49, normalized size = 1.63

$$ax + \frac{\left(2\,cx \operatorname{arcsch}(cx) + \log\left(\sqrt{\frac{1}{c^2x^2} + 1} + 1\right) - \log\left(\sqrt{\frac{1}{c^2x^2} + 1} - 1\right)\right)b}{2\,c}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(a+b*arccsch(c*x),x, algorithm="maxima")
```

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

**mupad [F]** time = 0.00, size = -1, normalized size = -0.03

$$\int a + b \operatorname{asinh}\left(\frac{1}{c\,x}\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(a + b*asinh(1/(c*x)),x)
[Out] int(a + b*asinh(1/(c*x)), x)
```

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

$$\int (a + b\,\mathrm{acsch}\,(cx))\,\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(a+b*acsch(c*x),x)
[Out] Integral(a + b*acsch(c*x), x)
```

# 3.48 $\int \frac{a+b\,\textbf{csch}^{-1}(cx)}{d+ex}\,dx$

**Optimal**. Leaf size=215

$$\frac{\left(a+b\operatorname{csch}^{-1}(cx)\right)\log\left(1-\frac{\left(e-\sqrt{c^2d^2+e^2}\right)e^{\operatorname{csch}^{-1}(cx)}}{cd}\right)}{e}+\frac{\left(a+b\operatorname{csch}^{-1}(cx)\right)\log\left(1-\frac{\left(\sqrt{c^2d^2+e^2}+e\right)e^{\operatorname{csch}^{-1}(cx)}}{cd}\right)}{e}-\frac{\log\left(1-e^{2\operatorname{csch}}\right.}{}$$

```
[Out] -(a+b*arccsch(c*x))*ln(1-(1/c/x+(1+1/c^2/x^2)^(1/2))^2)/e+(a+b*arccsch(c*x)
)*ln(1-(1/c/x+(1+1/c^2/x^2)^(1/2))*(e-(c^2*d^2+e^2)^(1/2))/c/d)/e+(a+b*arcc
sch(c*x))*ln(1-(1/c/x+(1+1/c^2/x^2)^(1/2))*(e+(c^2*d^2+e^2)^(1/2))/c/d)/e-1
/2*b*polylog(2,(1/c/x+(1+1/c^2/x^2)^(1/2))^2)/e+b*polylog(2,(1/c/x+(1+1/c^2
/x^2)^(1/2))*(e-(c^2*d^2+e^2)^(1/2))/c/d)/e+b*polylog(2,(1/c/x+(1+1/c^2/x^2
)^(1/2))*(e+(c^2*d^2+e^2)^(1/2))/c/d)/e
```

**Rubi [A]** time = 0.39, antiderivative size = 215, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 2, integrand size = 16, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.125, Rules used = {6289, 2518}

$$\frac{b\text{PolyLog}\left(2,\frac{\left(e-\sqrt{c^2d^2+e^2}\right)e^{\operatorname{csch}^{-1}(cx)}}{cd}\right)}{e}+\frac{b\text{PolyLog}\left(2,\frac{\left(\sqrt{c^2d^2+e^2}+e\right)e^{\operatorname{csch}^{-1}(cx)}}{cd}\right)}{e}-\frac{b\text{PolyLog}\left(2,e^{2\operatorname{csch}^{-1}(cx)}\right)}{2e}+\frac{\left(a+b\operatorname{csch}^{-1}\right.}{}$$

Antiderivative was successfully verified.

```
[In] Int[(a + b*ArcCsch[c*x])/(d + e*x),x]
```

```
[Out] ((a + b*ArcCsch[c*x])*Log[1 - ((e - Sqrt[c^2*d^2 + e^2])*E^ArcCsch[c*x])/(c
*d)])/e + ((a + b*ArcCsch[c*x])*Log[1 - ((e + Sqrt[c^2*d^2 + e^2])*E^ArcCsc
h[c*x])/(c*d)])/e - ((a + b*ArcCsch[c*x])*Log[1 - E^(2*ArcCsch[c*x])])/e +
(b*PolyLog[2, ((e - Sqrt[c^2*d^2 + e^2])*E^ArcCsch[c*x])/(c*d)])/e + (b*Pol
yLog[2, ((e + Sqrt[c^2*d^2 + e^2])*E^ArcCsch[c*x])/(c*d)])/e - (b*PolyLog[2
, E^(2*ArcCsch[c*x])])/(2*e)
```

Rule 2518

```
Int[Log[v_]*(u_), x_Symbol] :> With[{w = DerivativeDivides[v, u*(1 - v), x]
}, Simp[w*PolyLog[2, 1 - v], x] /;  !FalseQ[w]]
```

Rule 6289

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))/((d_.) + (e_.)*(x_)), x_Symbol] :>
Simp[((a + b*ArcCsch[c*x])*Log[1 - ((e - Sqrt[c^2*d^2 + e^2])*E^ArcCsch[c*x
])/(c*d)])/e, x] + (Dist[b/(c*e), Int[Log[1 - ((e - Sqrt[c^2*d^2 + e^2])*E^
```

```
ArcCsch[c*x])/(c*d)]/(x^2*Sqrt[1 + 1/(c^2*x^2)]), x], x] + Dist[b/(c*e), In
t[Log[1 - ((e + Sqrt[c^2*d^2 + e^2])*E^ArcCsch[c*x])/(c*d)]/(x^2*Sqrt[1 + 1
/(c^2*x^2)]), x], x] - Dist[b/(c*e), Int[Log[1 - E^(2*ArcCsch[c*x])]/(x^2*S
qrt[1 + 1/(c^2*x^2)]), x], x] + Simp[((a + b*ArcCsch[c*x])*Log[1 - ((e + Sq
rt[c^2*d^2 + e^2])*E^ArcCsch[c*x])/(c*d)])/e, x] - Simp[((a + b*ArcCsch[c*x
])*Log[1 - E^(2*ArcCsch[c*x])])/e, x]) /; FreeQ[{a, b, c, d, e}, x]
```

Rubi steps

$$\int \frac{a+b\operatorname{csch}^{-1}(cx)}{d+ex}\,dx = \frac{\left(a+b\operatorname{csch}^{-1}(cx)\right)\log\left(1-\frac{\left(e-\sqrt{c^2d^2+e^2}\right)e^{\operatorname{csch}^{-1}(cx)}}{cd}\right)}{e}+\frac{\left(a+b\operatorname{csch}^{-1}(cx)\right)\log\left(1-\frac{\left(e+\sqrt{c^2d^2\cdots}\right.}{}\right.}{e}$$

$$= \frac{\left(a+b\operatorname{csch}^{-1}(cx)\right)\log\left(1-\frac{\left(e-\sqrt{c^2d^2+e^2}\right)e^{\operatorname{csch}^{-1}(cx)}}{cd}\right)}{e}+\frac{\left(a+b\operatorname{csch}^{-1}(cx)\right)\log\left(1-\frac{\left(e+\sqrt{c^2d^2\cdots}\right.}{}\right.}{e}$$

**Mathematica [C]** time = 0.66, size = 506, normalized size = 2.35

$$\frac{a\log(d+ex)}{e}+\frac{b\left(8\mathrm{Li}_2\left(\frac{\left(e-\sqrt{c^2d^2+e^2}\right)e^{\operatorname{csch}^{-1}(cx)}}{cd}\right)+8\mathrm{Li}_2\left(\frac{\left(e+\sqrt{c^2d^2+e^2}\right)e^{\operatorname{csch}^{-1}(cx)}}{cd}\right)+8\operatorname{csch}^{-1}(cx)\log\left(\frac{\left(\sqrt{c^2d^2+e^2}-e\right)e^{\operatorname{csch}^{-1}(\cdots}}{cd}\right.\cdots}{}$$

Warning: Unable to verify antiderivative.

```
[In] Integrate[(a + b*ArcCsch[c*x])/(d + e*x),x]
```

```
[Out] (a*Log[d + e*x])/e + (b*(Pi^2 - (4*I)*Pi*ArcCsch[c*x] - 8*ArcCsch[c*x]^2 -
32*ArcSin[Sqrt[1 + (I*e)/(c*d)]/Sqrt[2]]*ArcTan[((I*c*d + e)*Cot[(Pi + (2*I
)*ArcCsch[c*x])/4])/Sqrt[c^2*d^2 + e^2]] - 8*ArcCsch[c*x]*Log[1 - E^(-2*Arc
Csch[c*x])] + (4*I)*Pi*Log[1 + ((-e + Sqrt[c^2*d^2 + e^2])*E^ArcCsch[c*x])/
(c*d)] + 8*ArcCsch[c*x]*Log[1 + ((-e + Sqrt[c^2*d^2 + e^2])*E^ArcCsch[c*x])
/(c*d)] + (16*I)*ArcSin[Sqrt[1 + (I*e)/(c*d)]/Sqrt[2]]*Log[1 + ((-e + Sqrt[
c^2*d^2 + e^2])*E^ArcCsch[c*x])/(c*d)] + (4*I)*Pi*Log[1 - ((e + Sqrt[c^2*d^
2 + e^2])*E^ArcCsch[c*x])/(c*d)] + 8*ArcCsch[c*x]*Log[1 - ((e + Sqrt[c^2*d^
2 + e^2])*E^ArcCsch[c*x])/(c*d)] - (16*I)*ArcSin[Sqrt[1 + (I*e)/(c*d)]/Sqrt
[2]]*Log[1 - ((e + Sqrt[c^2*d^2 + e^2])*E^ArcCsch[c*x])/(c*d)] - (4*I)*Pi*L
og[e + d/x] + 4*PolyLog[2, E^(-2*ArcCsch[c*x])] + 8*PolyLog[2, ((e - Sqrt[c
^2*d^2 + e^2])*E^ArcCsch[c*x])/(c*d)] + 8*PolyLog[2, ((e + Sqrt[c^2*d^2 + e
^2])*E^ArcCsch[c*x])/(c*d)]))/(8*e)
```

**fricas** [F] time = 0.68, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{b \operatorname{arcsch}(cx) + a}{ex + d}, x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))/(e*x+d),x, algorithm="fricas")
```

```
[Out] integral((b*arccsch(c*x) + a)/(e*x + d), x)
```

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

$$\int \frac{b \operatorname{arcsch}(cx) + a}{ex + d}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))/(e*x+d),x, algorithm="giac")
```

```
[Out] integrate((b*arccsch(c*x) + a)/(e*x + d), x)
```

**maple** [F] time = 0.49, size = 0, normalized size = 0.00

$$\int \frac{a + b \operatorname{arccsch}(cx)}{ex + d}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a+b*arccsch(c*x))/(e*x+d),x)
```

```
[Out] int((a+b*arccsch(c*x))/(e*x+d),x)
```

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

$$b \int \frac{\log\left(\sqrt{\frac{1}{c^2x^2} + 1} + \frac{1}{cx}\right)}{ex + d}\, dx + \frac{a \log(ex + d)}{e}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))/(e*x+d),x, algorithm="maxima")
```

```
[Out] b*integrate(log(sqrt(1/(c^2*x^2) + 1) + 1/(c*x))/(e*x + d), x) + a*log(e*x
+ d)/e
```

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

$$\int \frac{a + b \operatorname{asinh}\left(\frac{1}{c\,x}\right)}{d + e\,x}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a + b*asinh(1/(c*x)))/(d + e*x),x)
```

```
[Out] int((a + b*asinh(1/(c*x)))/(d + e*x), x)
```

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

$$\int \frac{a + b \operatorname{acsch}(cx)}{d + ex} \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*acsch(c*x))/(e*x+d),x)
```

```
[Out] Integral((a + b*acsch(c*x))/(d + e*x), x)
```

## 3.49 $\int \frac{a+b\text{csch}^{-1}(cx)}{(d+ex)^2} dx$

**Optimal**. Leaf size=98

$$-\frac{a+b\text{csch}^{-1}(cx)}{e(d+ex)}+\frac{b\tanh^{-1}\left(\frac{c^2d-\frac{e}{x}}{c\sqrt{\frac{1}{c^2x^2}+1}\sqrt{c^2d^2+e^2}}\right)}{d\sqrt{c^2d^2+e^2}}+\frac{b\text{csch}^{-1}(cx)}{de}$$

```
[Out] b*arccsch(c*x)/d/e+(-a-b*arccsch(c*x))/e/(e*x+d)+b*arctanh((c^2*d-e/x)/c/(c
^2*d^2+e^2)^(1/2)/(1+1/c^2/x^2)^(1/2))/d/(c^2*d^2+e^2)^(1/2)
```

**Rubi [A]** time = 0.15, antiderivative size = 98, 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 = {6290, 1568, 1475, 844, 215, 725, 206}

$$-\frac{a+b\text{csch}^{-1}(cx)}{e(d+ex)}+\frac{b\tanh^{-1}\left(\frac{c^2d-\frac{e}{x}}{c\sqrt{\frac{1}{c^2x^2}+1}\sqrt{c^2d^2+e^2}}\right)}{d\sqrt{c^2d^2+e^2}}+\frac{b\text{csch}^{-1}(cx)}{de}$$

Antiderivative was successfully verified.

```
[In] Int[(a + b*ArcCsch[c*x])/(d + e*x)^2,x]
```

```
[Out] (b*ArcCsch[c*x])/(d*e) - (a + b*ArcCsch[c*x])/(e*(d + e*x)) + (b*ArcTanh[(c
^2*d - e/x)/(c*Sqrt[c^2*d^2 + e^2]*Sqrt[1 + 1/(c^2*x^2)])])/(d*Sqrt[c^2*d^2
 + e^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 215

```
Int[1/Sqrt[(a_) + (b_.)*(x_)^2], x_Symbol] :> Simp[ArcSinh[(Rt[b, 2]*x)/Sqr
t[a]]/Rt[b, 2], x] /; FreeQ[{a, b}, x] && GtQ[a, 0] && PosQ[b]
```

Rule 725

```
Int[1/(((d_) + (e_.)*(x_))*Sqrt[(a_) + (c_.)*(x_)^2]), x_Symbol] :> -Subst[
Int[1/(c*d^2 + a*e^2 - x^2), x], x, (a*e - c*d*x)/Sqrt[a + c*x^2]] /; FreeQ
```

```
[{a, c, d, e}, x]
```

Rule 844

```
Int[((d_.) + (e_.)*(x_))^(m_)*((f_.) + (g_.)*(x_))*((a_) + (c_.)*(x_)^2)^(p
_.), x_Symbol] :> Dist[g/e, Int[(d + e*x)^(m + 1)*(a + c*x^2)^p, x], x] + D
ist[(e*f - d*g)/e, Int[(d + e*x)^m*(a + c*x^2)^p, x], x] /; FreeQ[{a, c, d,
 e, f, g, m, p}, x] && NeQ[c*d^2 + a*e^2, 0] &&  !IGtQ[m, 0]
```

Rule 1475

```
Int[(x_)^(m_.)*((a_) + (c_.)*(x_)^(n2_.))^(p_.)*((d_) + (e_.)*(x_)^(n_))^(q
_.), x_Symbol] :> Dist[1/n, Subst[Int[x^(Simplify[(m + 1)/n] - 1)*(d + e*x)
^q*(a + c*x^2)^p, x], x, x^n], x] /; FreeQ[{a, c, d, e, m, n, p, q}, x] &&
EqQ[n2, 2*n] && IntegerQ[Simplify[(m + 1)/n]]
```

Rule 1568

```
Int[(x_)^(m_.)*((d_) + (e_.)*(x_)^(mn_.))^(q_.)*((a_) + (c_.)*(x_)^(n2_.))^
(p_.), x_Symbol] :> Int[x^(m + mn*q)*(e + d/x^mn)^q*(a + c*x^n2)^p, x] /; F
reeQ[{a, c, d, e, m, mn, p}, x] && EqQ[n2, -2*mn] && IntegerQ[q] && (PosQ[n
2] ||  !IntegerQ[p])
```

Rule 6290

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))*((d_.) + (e_.)*(x_))^(m_.), x_Symbo
l] :> Simp[((d + e*x)^(m + 1)*(a + b*ArcCsch[c*x]))/(e*(m + 1)), x] + Dist[
b/(c*e*(m + 1)), Int[(d + e*x)^(m + 1)/(x^2*Sqrt[1 + 1/(c^2*x^2)]), x], x]
/; FreeQ[{a, b, c, d, e, m}, x] && NeQ[m, -1]
```

Rubi steps

$$\int \frac{a+b\,\text{csch}^{-1}(cx)}{(d+ex)^2}\,dx = -\frac{a+b\,\text{csch}^{-1}(cx)}{e(d+ex)} - \frac{b\int \frac{1}{\sqrt{1+\frac{1}{c^2x^2}}\,x^2(d+ex)}\,dx}{ce}$$

$$= -\frac{a+b\,\text{csch}^{-1}(cx)}{e(d+ex)} - \frac{b\int \frac{1}{\sqrt{1+\frac{1}{c^2x^2}}\left(e+\frac{d}{x}\right)x^3}\,dx}{ce}$$

$$= -\frac{a+b\,\text{csch}^{-1}(cx)}{e(d+ex)} + \frac{b\,\text{Subst}\left(\int \frac{x}{(e+dx)\sqrt{1+\frac{x^2}{c^2}}}\,dx, x, \frac{1}{x}\right)}{ce}$$

$$= -\frac{a+b\,\text{csch}^{-1}(cx)}{e(d+ex)} - \frac{b\,\text{Subst}\left(\int \frac{1}{(e+dx)\sqrt{1+\frac{x^2}{c^2}}}\,dx, x, \frac{1}{x}\right)}{cd} + \frac{b\,\text{Subst}\left(\int \frac{1}{\sqrt{1+\frac{x^2}{c^2}}}\,dx, x, \frac{1}{x}\right)}{cde}$$

$$= \frac{b\,\text{csch}^{-1}(cx)}{de} - \frac{a+b\,\text{csch}^{-1}(cx)}{e(d+ex)} + \frac{b\,\text{Subst}\left(\int \frac{1}{d^2+\frac{e^2}{c^2}-x^2}\,dx, x, \frac{d-\frac{e}{c^2x}}{\sqrt{1+\frac{1}{c^2x^2}}}\right)}{cd}$$

$$= \frac{b\,\text{csch}^{-1}(cx)}{de} - \frac{a+b\,\text{csch}^{-1}(cx)}{e(d+ex)} + \frac{b\tanh^{-1}\left(\frac{c^2d-\frac{e}{x}}{c\sqrt{c^2d^2+e^2}\sqrt{1+\frac{1}{c^2x^2}}}\right)}{d\sqrt{c^2d^2+e^2}}$$

**Mathematica [A]** time = 0.22, size = 134, normalized size = 1.37

$$-\frac{a}{e(d+ex)} - \frac{b\log\left(cx\left(\sqrt{\frac{1}{c^2x^2}+1}\sqrt{c^2d^2+e^2}-cd\right)+e\right)}{d\sqrt{c^2d^2+e^2}} + \frac{b\log(d+ex)}{d\sqrt{c^2d^2+e^2}} + \frac{b\sinh^{-1}\left(\frac{1}{cx}\right)}{de} - \frac{b\,\text{csch}^{-1}(cx)}{e(d+ex)}$$

Antiderivative was successfully verified.

```
[In] Integrate[(a + b*ArcCsch[c*x])/(d + e*x)^2,x]
```

```
[Out] -(a/(e*(d + e*x))) - (b*ArcCsch[c*x])/(e*(d + e*x)) + (b*ArcSinh[1/(c*x)])/
(d*e) + (b*Log[d + e*x])/(d*Sqrt[c^2*d^2 + e^2]) - (b*Log[e + c*(-(c*d) + S
qrt[c^2*d^2 + e^2]*Sqrt[1 + 1/(c^2*x^2)])*x])/(d*Sqrt[c^2*d^2 + e^2])
```

**fricas [B]** time = 0.61, size = 354, normalized size = 3.61

$$-\frac{ac^2d^3 + ade^2 - \sqrt{c^2d^2+e^2}\left(be^2x+bde\right)\log\left(-\frac{c^3d^2x-cde+\left(c^3d^2+ce^2\right)x\sqrt{\frac{c^2x^2+1}{c^2x^2}}+\left(c^2dx\sqrt{\frac{c^2x^2+1}{c^2x^2}}+c^2dx-e\right)\sqrt{c^2d^2+e^2}}{ex+d}\right) - \left(bc^2d^3\right.}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))/(e*x+d)^2,x, algorithm="fricas")
```

```
[Out] -(a*c^2*d^3 + a*d*e^2 - sqrt(c^2*d^2 + e^2)*(b*e^2*x + b*d*e)*log(-(c^3*d^2
*x - c*d*e + (c^3*d^2 + c*e^2)*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) + (c^2*d*x*s
qrt((c^2*x^2 + 1)/(c^2*x^2)) + c^2*d*x - e)*sqrt(c^2*d^2 + e^2))/(e*x + d))
 - (b*c^2*d^3 + b*d*e^2 + (b*c^2*d^2*e + b*e^3)*x)*log(c*x*sqrt((c^2*x^2 +
1)/(c^2*x^2)) - c*x + 1) + (b*c^2*d^3 + b*d*e^2 + (b*c^2*d^2*e + b*e^3)*x)*
log(c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) - c*x - 1) + (b*c^2*d^3 + b*d*e^2)*lo
g((c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) + 1)/(c*x)))/(c^2*d^4*e + d^2*e^3 + (c
^2*d^3*e^2 + d*e^4)*x)
```

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

$$\int \frac{b\,\mathrm{arcsch}\,(cx) + a}{(ex+d)^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))/(e*x+d)^2,x, algorithm="giac")
```

```
[Out] integrate((b*arccsch(c*x) + a)/(e*x + d)^2, x)
```

**maple [B]** time = 0.09, size = 208, normalized size = 2.12

$$-\frac{ca}{(cxe+cd)\,e}-\frac{cb\,\mathrm{arccsch}\,(cx)}{(cxe+cd)\,e}+\frac{b\sqrt{c^2x^2+1}\ \operatorname{arctanh}\left(\frac{1}{\sqrt{c^2x^2+1}}\right)}{ce\sqrt{\frac{c^2x^2+1}{c^2x^2}}\ xd}-\frac{b\sqrt{c^2x^2+1}\ \ln\left(\frac{2\sqrt{c^2x^2+1}\ \sqrt{\frac{c^2d^2+e^2}{e^2}}\ e-2c^2dx+2e}{cxe+cd}\right)}{ce\sqrt{\frac{c^2x^2+1}{c^2x^2}}\ xd\sqrt{\frac{c^2d^2+e^2}{e^2}}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a+b*arccsch(c*x))/(e*x+d)^2,x)
```

```
[Out] -c*a/(c*e*x+c*d)/e-c*b/(c*e*x+c*d)/e*arccsch(c*x)+1/c*b/e*(c^2*x^2+1)^(1/2)
/((c^2*x^2+1)/c^2/x^2)^(1/2)/x/d*arctanh(1/(c^2*x^2+1)^(1/2))-1/c*b/e*(c^2*
```

```
x^2+1)^(1/2)/((c^2*x^2+1)/c^2/x^2)^(1/2)/x/d/((c^2*d^2+e^2)/e^2)^(1/2)*ln(2
*((c^2*x^2+1)^(1/2)*((c^2*d^2+e^2)/e^2)^(1/2)*e-c^2*d*x+e)/(c*e*x+c*d))
```

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

$$-\frac{1}{2}\left(2\,c^2\int\frac{x}{c^2e^2x^3+c^2dex^2+e^2x+de+\left(c^2e^2x^3+c^2dex^2+e^2x+de\right)\sqrt{c^2x^2+1}}\,dx+\frac{i\,c\left(\log\left(i\,cx+1\right)-\log\left(-i\,c\right.\right.}{c^2d^2+e^2}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))/(e*x+d)^2,x, algorithm="maxima")
```

```
[Out] -1/2*(2*c^2*integrate(x/(c^2*e^2*x^3 + c^2*d*e*x^2 + e^2*x + d*e + (c^2*e^2
*x^3 + c^2*d*e*x^2 + e^2*x + d*e)*sqrt(c^2*x^2 + 1)), x) + I*c*(log(I*c*x +
 1) - log(-I*c*x + 1))/(c^2*d^2 + e^2) - 2*e*log(e*x + d)/(c^2*d^3 + d*e^2)
 - (2*c^2*d^3*log(c) + 2*d*e^2*log(c) - 2*(c^2*d^2*e + e^3)*x*log(x) + (c^2
*d^2*e*x + c^2*d^3)*log(c^2*x^2 + 1) - 2*(c^2*d^3 + d*e^2)*log(sqrt(c^2*x^2
 + 1) + 1))/(c^2*d^4*e + d^2*e^3 + (c^2*d^3*e^2 + d*e^4)*x))*b - a/(e^2*x +
 d*e)
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.01

$$\int\frac{a+b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)}{\left(d+e\,x\right)^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a + b*asinh(1/(c*x)))/(d + e*x)^2,x)
```

```
[Out] int((a + b*asinh(1/(c*x)))/(d + e*x)^2, x)
```

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

$$\int\frac{a+b\,\mathrm{acsch}\,(cx)}{(d+ex)^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*acsch(c*x))/(e*x+d)**2,x)
```

```
[Out] Integral((a + b*acsch(c*x))/(d + e*x)**2, x)
```

## 3.50 $\int \frac{a+b\mathbf{csch}^{-1}(cx)}{(d+ex)^3}\,dx$

**Optimal**. Leaf size=163

$$-\frac{a+b\text{csch}^{-1}(cx)}{2e(d+ex)^2}-\frac{bce\sqrt{\frac{1}{c^2x^2}+1}}{2d\left(c^2d^2+e^2\right)\left(\frac{d}{x}+e\right)}+\frac{b\left(2c^2d^2+e^2\right)\tanh^{-1}\left(\frac{c^2d-\frac{e}{x}}{c\sqrt{\frac{1}{c^2x^2}+1}\sqrt{c^2d^2+e^2}}\right)}{2d^2\left(c^2d^2+e^2\right)^{3/2}}+\frac{b\text{csch}^{-1}(cx)}{2d^2e}$$

```
[Out] 1/2*b*arccsch(c*x)/d^2/e+1/2*(-a-b*arccsch(c*x))/e/(e*x+d)^2+1/2*b*(2*c^2*d
^2+e^2)*arctanh((c^2*d-e/x)/c/(c^2*d^2+e^2)^(1/2)/(1+1/c^2/x^2)^(1/2))/d^2/
(c^2*d^2+e^2)^(3/2)-1/2*b*c*e*(1+1/c^2/x^2)^(1/2)/d/(c^2*d^2+e^2)/(e+d/x)
```

**Rubi [A]** time = 0.29, antiderivative size = 163, normalized size of antiderivative = 1.00, number of steps used = 8, number of rules used = 8, integrand size = 16, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.500, Rules used = {6290, 1568, 1475, 1651, 844, 215, 725, 206}

$$-\frac{a+b\text{csch}^{-1}(cx)}{2e(d+ex)^2}-\frac{bce\sqrt{\frac{1}{c^2x^2}+1}}{2d\left(c^2d^2+e^2\right)\left(\frac{d}{x}+e\right)}+\frac{b\left(2c^2d^2+e^2\right)\tanh^{-1}\left(\frac{c^2d-\frac{e}{x}}{c\sqrt{\frac{1}{c^2x^2}+1}\sqrt{c^2d^2+e^2}}\right)}{2d^2\left(c^2d^2+e^2\right)^{3/2}}+\frac{b\text{csch}^{-1}(cx)}{2d^2e}$$

Antiderivative was successfully verified.

```
[In] Int[(a + b*ArcCsch[c*x])/(d + e*x)^3,x]
```

```
[Out] -(b*c*e*Sqrt[1 + 1/(c^2*x^2)])/(2*d*(c^2*d^2 + e^2)*(e + d/x)) + (b*ArcCsch
[c*x])/(2*d^2*e) - (a + b*ArcCsch[c*x])/(2*e*(d + e*x)^2) + (b*(2*c^2*d^2 +
 e^2)*ArcTanh[(c^2*d - e/x)/(c*Sqrt[c^2*d^2 + e^2]*Sqrt[1 + 1/(c^2*x^2)])])
/(2*d^2*(c^2*d^2 + e^2)^(3/2))
```

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 215

```
Int[1/Sqrt[(a_) + (b_.)*(x_)^2], x_Symbol] :> Simp[ArcSinh[(Rt[b, 2]*x)/Sqr
t[a]]/Rt[b, 2], x] /; FreeQ[{a, b}, x] && GtQ[a, 0] && PosQ[b]
```

Rule 725

```
Int[1/(((d_) + (e_.)*(x_))*Sqrt[(a_) + (c_.)*(x_)^2]), x_Symbol] :> -Subst[
Int[1/(c*d^2 + a*e^2 - x^2), x], x, (a*e - c*d*x)/Sqrt[a + c*x^2]] /; FreeQ
[{a, c, d, e}, x]
```

Rule 844

```
Int[((d_.) + (e_.)*(x_))^(m_)*((f_.) + (g_.)*(x_))*((a_) + (c_.)*(x_)^2)^(p
_.), x_Symbol] :> Dist[g/e, Int[(d + e*x)^(m + 1)*(a + c*x^2)^p, x], x] + D
ist[(e*f - d*g)/e, Int[(d + e*x)^m*(a + c*x^2)^p, x], x] /; FreeQ[{a, c, d,
 e, f, g, m, p}, x] && NeQ[c*d^2 + a*e^2, 0] &&  !IGtQ[m, 0]
```

Rule 1475

```
Int[(x_)^(m_.)*((a_) + (c_.)*(x_)^(n2_.))^(p_.)*((d_) + (e_.)*(x_)^(n_))^(q
_.), x_Symbol] :> Dist[1/n, Subst[Int[x^(Simplify[(m + 1)/n] - 1)*(d + e*x)
^q*(a + c*x^2)^p, x], x, x^n], x] /; FreeQ[{a, c, d, e, m, n, p, q}, x] &&
EqQ[n2, 2*n] && IntegerQ[Simplify[(m + 1)/n]]
```

Rule 1568

```
Int[(x_)^(m_.)*((d_) + (e_.)*(x_)^(mn_.))^(q_.)*((a_) + (c_.)*(x_)^(n2_.))^
(p_.), x_Symbol] :> Int[x^(m + mn*q)*(e + d/x^mn)^q*(a + c*x^n2)^p, x] /; F
reeQ[{a, c, d, e, m, mn, p}, x] && EqQ[n2, -2*mn] && IntegerQ[q] && (PosQ[n
2] ||  !IntegerQ[p])
```

Rule 1651

```
Int[(Pq_)*((d_) + (e_.)*(x_))^(m_)*((a_) + (c_.)*(x_)^2)^(p_), x_Symbol] :>
 With[{Q = PolynomialQuotient[Pq, d + e*x, x], R = PolynomialRemainder[Pq,
d + e*x, x]}, Simp[(e*R*(d + e*x)^(m + 1)*(a + c*x^2)^(p + 1))/((m + 1)*(c*
d^2 + a*e^2)), x] + Dist[1/((m + 1)*(c*d^2 + a*e^2)), Int[(d + e*x)^(m + 1)
*(a + c*x^2)^p*ExpandToSum[(m + 1)*(c*d^2 + a*e^2)*Q + c*d*R*(m + 1) - c*e*
R*(m + 2*p + 3)*x, x], x], x]] /; FreeQ[{a, c, d, e, p}, x] && PolyQ[Pq, x]
 && NeQ[c*d^2 + a*e^2, 0] && LtQ[m, -1]
```

Rule 6290

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))*((d_.) + (e_.)*(x_))^(m_.), x_Symbo
l] :> Simp[((d + e*x)^(m + 1)*(a + b*ArcCsch[c*x]))/(e*(m + 1)), x] + Dist[
b/(c*e*(m + 1)), Int[(d + e*x)^(m + 1)/(x^2*Sqrt[1 + 1/(c^2*x^2)]), x], x]
/; FreeQ[{a, b, c, d, e, m}, x] && NeQ[m, -1]
```

Rubi steps

$$\int \frac{a+b\text{csch}^{-1}(cx)}{(d+ex)^3}\,dx = -\frac{a+b\text{csch}^{-1}(cx)}{2e(d+ex)^2} - \frac{b\int \frac{1}{\sqrt{1+\frac{1}{c^2x^2}}\,x^2(d+ex)^2}\,dx}{2ce}$$

$$= -\frac{a+b\text{csch}^{-1}(cx)}{2e(d+ex)^2} - \frac{b\int \frac{1}{\sqrt{1+\frac{1}{c^2x^2}}\left(e+\frac{d}{x}\right)^2 x^4}\,dx}{2ce}$$

$$= -\frac{a+b\text{csch}^{-1}(cx)}{2e(d+ex)^2} + \frac{b\,\text{Subst}\left(\int \frac{x^2}{(e+dx)^2\sqrt{1+\frac{x^2}{c^2}}}\,dx, x, \frac{1}{x}\right)}{2ce}$$

$$= -\frac{bce\sqrt{1+\frac{1}{c^2x^2}}}{2d\left(c^2d^2+e^2\right)\left(e+\frac{d}{x}\right)} - \frac{a+b\text{csch}^{-1}(cx)}{2e(d+ex)^2} - \frac{(bc)\,\text{Subst}\left(\int \frac{e-\left(d+\frac{e^2}{c^2d}\right)x}{(e+dx)\sqrt{1+\frac{x^2}{c^2}}}\,dx, x, \frac{1}{x}\right)}{2e\left(c^2d^2+e^2\right)}$$

$$= -\frac{bce\sqrt{1+\frac{1}{c^2x^2}}}{2d\left(c^2d^2+e^2\right)\left(e+\frac{d}{x}\right)} - \frac{a+b\text{csch}^{-1}(cx)}{2e(d+ex)^2} + \frac{b\,\text{Subst}\left(\int \frac{1}{\sqrt{1+\frac{x^2}{c^2}}}\,dx, x, \frac{1}{x}\right)}{2cd^2e} - \frac{\left(bc\left(2+\frac{e^2}{c^2 \cdots}\right.\right.}{\cdots}$$

$$= -\frac{bce\sqrt{1+\frac{1}{c^2x^2}}}{2d\left(c^2d^2+e^2\right)\left(e+\frac{d}{x}\right)} + \frac{b\text{csch}^{-1}(cx)}{2d^2e} - \frac{a+b\text{csch}^{-1}(cx)}{2e(d+ex)^2} + \frac{\left(bc\left(2+\frac{e^2}{c^2d^2}\right)\right)\text{Subst}\left(\int \cdots\right.}{2\left(c^2d^2 \cdots\right.}$$

$$= -\frac{bce\sqrt{1+\frac{1}{c^2x^2}}}{2d\left(c^2d^2+e^2\right)\left(e+\frac{d}{x}\right)} + \frac{b\text{csch}^{-1}(cx)}{2d^2e} - \frac{a+b\text{csch}^{-1}(cx)}{2e(d+ex)^2} + \frac{b\left(2c^2d^2+e^2\right)\tanh^{-1}\left(\frac{\cdots}{c\sqrt{\cdots}}\right.}{2d^2\left(c^2d^2+e^{\cdots}\right.}$$

**Mathematica [A]** time = 0.48, size = 204, normalized size = 1.25

$$\frac{1}{2}\left(-\frac{a}{e(d+ex)^2} - \frac{bcex\sqrt{\frac{1}{c^2x^2}+1}}{d\left(c^2d^2+e^2\right)(d+ex)} - \frac{b\left(2c^2d^2+e^2\right)\log\left(cx\left(\sqrt{\frac{1}{c^2x^2}+1}\,\sqrt{c^2d^2+e^2}-cd\right)+e\right)}{d^2\left(c^2d^2+e^2\right)^{3/2}} + \frac{b\left(2c^2d^2+\cdots\right.}{d^2\left(c^2\cdots\right.}\right.$$

Antiderivative was successfully verified.

```
[In] Integrate[(a + b*ArcCsch[c*x])/(d + e*x)^3,x]
```

```
[Out] (-(a/(e*(d + e*x)^2)) - (b*c*e*Sqrt[1 + 1/(c^2*x^2)]*x)/(d*(c^2*d^2 + e^2)*
(d + e*x)) - (b*ArcCsch[c*x])/(e*(d + e*x)^2) + (b*ArcSinh[1/(c*x)])/(d^2*e
) + (b*(2*c^2*d^2 + e^2)*Log[d + e*x])/(d^2*(c^2*d^2 + e^2)^(3/2)) - (b*(2*
c^2*d^2 + e^2)*Log[e + c*(-(c*d) + Sqrt[c^2*d^2 + e^2]*Sqrt[1 + 1/(c^2*x^2)
])*x])/(d^2*(c^2*d^2 + e^2)^(3/2)))/2
```

**fricas [B]** time = 1.34, size = 745, normalized size = 4.57

$$-\frac{ac^4d^6 + bc^3d^5e + 2\,ac^2d^4e^2 + bcd^3e^3 + ad^2e^4 + \left(bc^3d^3e^3 + bcde^5\right)x^2 - \left(2\,bc^2d^4e + bd^2e^3 + \left(2\,bc^2d^2e^3 + be^5\right)x^2 + \cdots\right.}{\cdots}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))/(e*x+d)^3,x, algorithm="fricas")
```

```
[Out] -1/2*(a*c^4*d^6 + b*c^3*d^5*e + 2*a*c^2*d^4*e^2 + b*c*d^3*e^3 + a*d^2*e^4 +
 (b*c^3*d^3*e^3 + b*c*d*e^5)*x^2 - (2*b*c^2*d^4*e + b*d^2*e^3 + (2*b*c^2*d^
2*e^3 + b*e^5)*x^2 + 2*(2*b*c^2*d^3*e^2 + b*d*e^4)*x)*sqrt(c^2*d^2 + e^2)*l
og(-(c^3*d^2*x - c*d*e + (c^3*d^2 + c*e^2)*x*sqrt((c^2*x^2 + 1)/(c^2*x^2))
+ (c^2*d*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) + c^2*d*x - e)*sqrt(c^2*d^2 + e^2)
)/(e*x + d)) + 2*(b*c^3*d^4*e^2 + b*c*d^2*e^4)*x - (b*c^4*d^6 + 2*b*c^2*d^4
*e^2 + b*d^2*e^4 + (b*c^4*d^4*e^2 + 2*b*c^2*d^2*e^4 + b*e^6)*x^2 + 2*(b*c^4
*d^5*e + 2*b*c^2*d^3*e^3 + b*d*e^5)*x)*log(c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)
) - c*x + 1) + (b*c^4*d^6 + 2*b*c^2*d^4*e^2 + b*d^2*e^4 + (b*c^4*d^4*e^2 +
2*b*c^2*d^2*e^4 + b*e^6)*x^2 + 2*(b*c^4*d^5*e + 2*b*c^2*d^3*e^3 + b*d*e^5)*
x)*log(c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) - c*x - 1) + (b*c^4*d^6 + 2*b*c^2*
d^4*e^2 + b*d^2*e^4)*log((c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) + 1)/(c*x)) + (
(b*c^3*d^3*e^3 + b*c*d*e^5)*x^2 + (b*c^3*d^4*e^2 + b*c*d^2*e^4)*x)*sqrt((c^
2*x^2 + 1)/(c^2*x^2)))/(c^4*d^8*e + 2*c^2*d^6*e^3 + d^4*e^5 + (c^4*d^6*e^3
+ 2*c^2*d^4*e^5 + d^2*e^7)*x^2 + 2*(c^4*d^7*e^2 + 2*c^2*d^5*e^4 + d^3*e^6)*
x)
```

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

$$\int \frac{b\,\mathrm{arcsch}\,(cx) + a}{(ex + d)^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))/(e*x+d)^3,x, algorithm="giac")
```

[Out] integrate((b*arccsch(c*x) + a)/(e*x + d)^3, x)

**maple [B]** time = 0.07, size = 963, normalized size = 5.91

$$-\frac{c^2 a}{2\left(cxe+cd\right)^2 e}-\frac{c^2 b\,\mathrm{arccsch}\left(cx\right)}{2\left(cxe+cd\right)^2 e}+\frac{c^2 b\sqrt{c^2x^2+1}\;\operatorname{arctanh}\left(\frac{1}{\sqrt{c^2x^2+1}}\right)}{2\sqrt{\frac{c^2x^2+1}{c^2x^2}}\;\left(c^2d^2+e^2\right)\left(cxe+cd\right)}+\frac{c^2 b\sqrt{c^2x^2+1}\;d\operatorname{arctanh}\left(\frac{1}{\sqrt{c^2x^2+1}}\right)}{2e\sqrt{\frac{c^2x^2+1}{c^2x^2}}\;x\left(c^2d^2+e^2\right)\left(cxe+cd\right)}-\frac{c^2 b}{\sqrt{}}$$

Verification of antiderivative is not currently implemented for this CAS.

[In] int((a+b*arccsch(c*x))/(e*x+d)^3,x)

[Out] -1/2*c^2*a/(c*e*x+c*d)^2/e-1/2*c^2*b/(c*e*x+c*d)^2/e*arccsch(c*x)+1/2*c^2*b
*(c^2*x^2+1)^(1/2)/((c^2*x^2+1)/c^2/x^2)^(1/2)/(c^2*d^2+e^2)/(c*e*x+c*d)*ar
ctanh(1/(c^2*x^2+1)^(1/2))+1/2*c^2*b/e*(c^2*x^2+1)^(1/2)/((c^2*x^2+1)/c^2/x
^2)^(1/2)/x*d/(c^2*d^2+e^2)/(c*e*x+c*d)*arctanh(1/(c^2*x^2+1)^(1/2))-c^2*b*
(c^2*x^2+1)^(1/2)/((c^2*x^2+1)/c^2/x^2)^(1/2)/((c^2*d^2+e^2)/e^2)^(1/2)/(c^
2*d^2+e^2)/(c*e*x+c*d)*ln(2*((c^2*x^2+1)^(1/2)*((c^2*d^2+e^2)/e^2)^(1/2)*e-
c^2*d*x+e)/(c*e*x+c*d))-c^2*b/e*(c^2*x^2+1)^(1/2)/((c^2*x^2+1)/c^2/x^2)^(1/
2)/x*d/((c^2*d^2+e^2)/e^2)^(1/2)/(c^2*d^2+e^2)/(c*e*x+c*d)*ln(2*((c^2*x^2+1
)^(1/2)*((c^2*d^2+e^2)/e^2)^(1/2)*e-c^2*d*x+e)/(c*e*x+c*d))-1/2*c^2*b*e/((c
^2*x^2+1)/c^2/x^2)^(1/2)*x/d/(c^2*d^2+e^2)/(c*e*x+c*d)-1/2*b*e/((c^2*x^2+1)
/c^2/x^2)^(1/2)/x/d/(c^2*d^2+e^2)/(c*e*x+c*d)+1/2*b*e^2*(c^2*x^2+1)^(1/2)/(
(c^2*x^2+1)/c^2/x^2)^(1/2)/d^2/(c^2*d^2+e^2)/(c*e*x+c*d)*arctanh(1/(c^2*x^2
+1)^(1/2))+1/2*b*e*(c^2*x^2+1)^(1/2)/((c^2*x^2+1)/c^2/x^2)^(1/2)/x/d/(c^2*d
^2+e^2)/(c*e*x+c*d)*arctanh(1/(c^2*x^2+1)^(1/2))-1/2*b*e^2*(c^2*x^2+1)^(1/2
)/((c^2*x^2+1)/c^2/x^2)^(1/2)/d^2/((c^2*d^2+e^2)/e^2)^(1/2)/(c^2*d^2+e^2)/(
c*e*x+c*d)*ln(2*((c^2*x^2+1)^(1/2)*((c^2*d^2+e^2)/e^2)^(1/2)*e-c^2*d*x+e)/(
c*e*x+c*d))-1/2*b*e*(c^2*x^2+1)^(1/2)/((c^2*x^2+1)/c^2/x^2)^(1/2)/x/d/((c^2
*d^2+e^2)/e^2)^(1/2)/(c^2*d^2+e^2)/(c*e*x+c*d)*ln(2*((c^2*x^2+1)^(1/2)*((c^
2*d^2+e^2)/e^2)^(1/2)*e-c^2*d*x+e)/(c*e*x+c*d))

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

$$-\frac{1}{4}\left(\frac{2i\,c^3d\left(\log\left(i\,cx+1\right)-\log\left(-i\,cx+1\right)\right)}{c^4d^4+2\,c^2d^2e^2+e^4}+4\,c^2\int\frac{}{2\left(c^2e^3x^4+2\,c^2de^2x^3+2\,de^2x+d^2e+\left(c^2d^2e+e^3\right)x^2+\left(c^2\right.\right.}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

[In] integrate((a+b*arccsch(c*x))/(e*x+d)^3,x, algorithm="maxima")

[Out] -1/4*(2*I*c^3*d*(log(I*c*x + 1) - log(-I*c*x + 1))/(c^4*d^4 + 2*c^2*d^2*e^2
 + e^4) + 4*c^2*integrate(1/2*x/(c^2*e^3*x^4 + 2*c^2*d*e^2*x^3 + 2*d*e^2*x

```
+ d^2*e + (c^2*d^2*e + e^3)*x^2 + (c^2*e^3*x^4 + 2*c^2*d*e^2*x^3 + 2*d*e^2*
x + d^2*e + (c^2*d^2*e + e^3)*x^2)*sqrt(c^2*x^2 + 1)), x) - 2*(3*c^2*d^2*e
+ e^3)*log(e*x + d)/(c^4*d^6 + 2*c^2*d^4*e^2 + d^2*e^4) - (2*c^4*d^6*log(c)
 + 2*d^2*e^4*log(c) - 2*d^2*e^4 + 2*(2*d^4*e^2*log(c) - d^4*e^2)*c^2 - 2*(c
^2*d^3*e^3 + d*e^5)*x + (c^4*d^6 - c^2*d^4*e^2 + (c^4*d^4*e^2 - c^2*d^2*e^4
)*x^2 + 2*(c^4*d^5*e - c^2*d^3*e^3)*x)*log(c^2*x^2 + 1) - 2*((c^4*d^4*e^2 +
 2*c^2*d^2*e^4 + e^6)*x^2 + 2*(c^4*d^5*e + 2*c^2*d^3*e^3 + d*e^5)*x)*log(x)
 - 2*(c^4*d^6 + 2*c^2*d^4*e^2 + d^2*e^4)*log(sqrt(c^2*x^2 + 1) + 1))/(c^4*d
^8*e + 2*c^2*d^6*e^3 + d^4*e^5 + (c^4*d^6*e^3 + 2*c^2*d^4*e^5 + d^2*e^7)*x^
2 + 2*(c^4*d^7*e^2 + 2*c^2*d^5*e^4 + d^3*e^6)*x))*b - 1/2*a/(e^3*x^2 + 2*d*
e^2*x + d^2*e)
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.01

$$\int \frac{a+b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)}{{\left(d+e\,x\right)}^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a + b*asinh(1/(c*x)))/(d + e*x)^3,x)
[Out] int((a + b*asinh(1/(c*x)))/(d + e*x)^3, x)
```

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

$$\int \frac{a+b\,\mathrm{acsch}\,(cx)}{(d+ex)^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*acsch(c*x))/(e*x+d)**3,x)
[Out] Integral((a + b*acsch(c*x))/(d + e*x)**3, x)
```

## 3.51 $\int x^2\sqrt{d+ex}\left(a+b\mathbf{csch}^{-1}(cx)\right)dx$

**Optimal**. Leaf size=918

$$-\frac{32b\sqrt{\frac{\sqrt{-c^2}(d+ex)}{\sqrt{-c^2}d+e}}\sqrt{c^2x^2+1}\,\Pi\left(2;\sin^{-1}\left(\frac{\sqrt{1-\sqrt{-c^2}x}}{\sqrt{2}}\right)|\frac{2e}{\sqrt{-c^2}d+e}\right)d^4}{105ce^3\sqrt{1+\frac{1}{c^2x^2}}x\sqrt{d+ex}}+\frac{32bc\sqrt{\frac{c^2(d+ex)}{c^2d-\sqrt{-c^2}e}}\sqrt{c^2x^2+1}\,F\left(\sin^{-1}\left(\frac{\sqrt{1-\sqrt{-c^2}}}{\sqrt{2}}\right.\right.}{105\left(-c^2\right)^{3/2}e^2\sqrt{1+\frac{1}{c^2x^2}}x\sqrt{d}}$$

```
[Out] 2/3*d^2*(e*x+d)^(3/2)*(a+b*arccsch(c*x))/e^3-4/5*d*(e*x+d)^(5/2)*(a+b*arccs
ch(c*x))/e^3+2/7*(e*x+d)^(7/2)*(a+b*arccsch(c*x))/e^3+4/35*b*(c^2*x^2+1)*(e
*x+d)^(1/2)/c^3/(1+1/c^2/x^2)^(1/2)+8/105*b*d*(c^2*x^2+1)*(e*x+d)^(1/2)/c^3
/e/x/(1+1/c^2/x^2)^(1/2)-32/105*b*d^4*EllipticPi(1/2*(1-(-c^2)^(1/2)*x)^(1/
2)*2^(1/2),2,2^(1/2)*(e/(d*(-c^2)^(1/2)+e))^(1/2))*(c^2*x^2+1)^(1/2)*((e*x+
d)*(-c^2)^(1/2)/(d*(-c^2)^(1/2)+e))^(1/2)/c/e^3/x/(1+1/c^2/x^2)^(1/2)/(e*x+
d)^(1/2)-4/35*b*c*d^2*EllipticE(1/2*(1-(-c^2)^(1/2)*x)^(1/2)*2^(1/2),(-2*e*
(-c^2)^(1/2)/(c^2*d-e*(-c^2)^(1/2)))^(1/2))*(e*x+d)^(1/2)*(c^2*x^2+1)^(1/2)
/(-c^2)^(3/2)/e^2/x/(1+1/c^2/x^2)^(1/2)/(c^2*(e*x+d)/(c^2*d-e*(-c^2)^(1/2))
)^(1/2)+4/105*b*c*(2*c^2*d^2+9*e^2)*EllipticE(1/2*(1-(-c^2)^(1/2)*x)^(1/2)*
2^(1/2),(-2*e*(-c^2)^(1/2)/(c^2*d-e*(-c^2)^(1/2)))^(1/2))*(e*x+d)^(1/2)*(c^
2*x^2+1)^(1/2)/(-c^2)^(5/2)/e^2/x/(1+1/c^2/x^2)^(1/2)/(c^2*(e*x+d)/(c^2*d-e
*(-c^2)^(1/2)))^(1/2)+32/105*b*c*d^3*EllipticF(1/2*(1-(-c^2)^(1/2)*x)^(1/2)
*2^(1/2),(-2*e*(-c^2)^(1/2)/(c^2*d-e*(-c^2)^(1/2)))^(1/2))*(c^2*x^2+1)^(1/2
)*(c^2*(e*x+d)/(c^2*d-e*(-c^2)^(1/2)))^(1/2)/(-c^2)^(3/2)/e^2/x/(1+1/c^2/x^
2)^(1/2)/(e*x+d)^(1/2)-4/105*b*c*d*(c^2*d^2+e^2)*EllipticF(1/2*(1-(-c^2)^(1
/2)*x)^(1/2)*2^(1/2),(-2*e*(-c^2)^(1/2)/(c^2*d-e*(-c^2)^(1/2)))^(1/2))*(c^2
*x^2+1)^(1/2)*(c^2*(e*x+d)/(c^2*d-e*(-c^2)^(1/2)))^(1/2)/(-c^2)^(5/2)/e^2/x
/(1+1/c^2/x^2)^(1/2)/(e*x+d)^(1/2)
```

**Rubi [A]** time = 3.25, antiderivative size = 918, normalized size of antiderivative = 1.00, number of steps used = 31, number of rules used = 16, integrand size = 21, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.762, Rules used = {43, 6310, 12, 6721, 6742, 743, 844, 719, 424, 419, 958, 932, 168, 538, 537, 833}

$$-\frac{32b\sqrt{\frac{\sqrt{-c^2}(d+ex)}{\sqrt{-c^2}d+e}}\sqrt{c^2x^2+1}\,\Pi\left(2;\sin^{-1}\left(\frac{\sqrt{1-\sqrt{-c^2}x}}{\sqrt{2}}\right)|\frac{2e}{\sqrt{-c^2}d+e}\right)d^4}{105ce^3\sqrt{1+\frac{1}{c^2x^2}}x\sqrt{d+ex}}+\frac{32bc\sqrt{\frac{c^2(d+ex)}{c^2d-\sqrt{-c^2}e}}\sqrt{c^2x^2+1}\,F\left(\sin^{-1}\left(\frac{\sqrt{1-\sqrt{-c^2}}}{\sqrt{2}}\right.\right.}{105\left(-c^2\right)^{3/2}e^2\sqrt{1+\frac{1}{c^2x^2}}x\sqrt{d}}$$

Antiderivative was successfully verified.

```
[In] Int[x^2*Sqrt[d + e*x]*(a + b*ArcCsch[c*x]),x]
```

```
[Out] (-4*b*d*Sqrt[d + e*x]*(1 + c^2*x^2))/(105*c^3*e*Sqrt[1 + 1/(c^2*x^2)]*x) +
(4*b*(d + e*x)^(3/2)*(1 + c^2*x^2))/(35*c^3*e*Sqrt[1 + 1/(c^2*x^2)]*x) + (2
*d^2*(d + e*x)^(3/2)*(a + b*ArcCsch[c*x]))/(3*e^3) - (4*d*(d + e*x)^(5/2)*(
a + b*ArcCsch[c*x]))/(5*e^3) + (2*(d + e*x)^(7/2)*(a + b*ArcCsch[c*x]))/(7*
e^3) - (32*b*c*d^2*Sqrt[d + e*x]*Sqrt[1 + c^2*x^2]*EllipticE[ArcSin[Sqrt[1
- Sqrt[-c^2]*x]/Sqrt[2]], (-2*Sqrt[-c^2]*e)/(c^2*d - Sqrt[-c^2]*e)])/(105*(
-c^2)^(3/2)*e^2*Sqrt[1 + 1/(c^2*x^2)]*x*Sqrt[(c^2*(d + e*x))/(c^2*d - Sqrt[
-c^2]*e)]) - (4*b*c*(c^2*d^2 - 3*e^2)*Sqrt[d + e*x]*Sqrt[1 + c^2*x^2]*Ellip
ticE[ArcSin[Sqrt[1 - Sqrt[-c^2]*x]/Sqrt[2]], (-2*Sqrt[-c^2]*e)/(c^2*d - Sqr
t[-c^2]*e)])/(35*(-c^2)^(5/2)*e^2*Sqrt[1 + 1/(c^2*x^2)]*x*Sqrt[(c^2*(d + e*
x))/(c^2*d - Sqrt[-c^2]*e)]) + (32*b*c*d^3*Sqrt[(c^2*(d + e*x))/(c^2*d - Sq
rt[-c^2]*e)]*Sqrt[1 + c^2*x^2]*EllipticF[ArcSin[Sqrt[1 - Sqrt[-c^2]*x]/Sqrt
[2]], (-2*Sqrt[-c^2]*e)/(c^2*d - Sqrt[-c^2]*e)])/(105*(-c^2)^(3/2)*e^2*Sqrt
[1 + 1/(c^2*x^2)]*x*Sqrt[d + e*x]) - (4*b*c*d*(c^2*d^2 + e^2)*Sqrt[(c^2*(d
+ e*x))/(c^2*d - Sqrt[-c^2]*e)]*Sqrt[1 + c^2*x^2]*EllipticF[ArcSin[Sqrt[1 -
 Sqrt[-c^2]*x]/Sqrt[2]], (-2*Sqrt[-c^2]*e)/(c^2*d - Sqrt[-c^2]*e)])/(105*(-
c^2)^(5/2)*e^2*Sqrt[1 + 1/(c^2*x^2)]*x*Sqrt[d + e*x]) - (32*b*d^4*Sqrt[(Sqr
t[-c^2]*(d + e*x))/(Sqrt[-c^2]*d + e)]*Sqrt[1 + c^2*x^2]*EllipticPi[2, ArcS
in[Sqrt[1 - Sqrt[-c^2]*x]/Sqrt[2]], (2*e)/(Sqrt[-c^2]*d + e)])/(105*c*e^3*S
qrt[1 + 1/(c^2*x^2)]*x*Sqrt[d + e*x])
```

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 168

```
Int[1/(((a_.) + (b_.)*(x_))*Sqrt[(c_.) + (d_.)*(x_)]*Sqrt[(e_.) + (f_.)*(x_
)]*Sqrt[(g_.) + (h_.)*(x_)]), x_Symbol] :> Dist[-2, Subst[Int[1/(Simp[b*c -
 a*d - b*x^2, x]*Sqrt[Simp[(d*e - c*f)/d + (f*x^2)/d, x]]*Sqrt[Simp[(d*g -
c*h)/d + (h*x^2)/d, x]]), x], x, Sqrt[c + d*x]], x] /; FreeQ[{a, b, c, d, e
, f, g, h}, x] && GtQ[(d*e - c*f)/d, 0]
```

Rule 419

```
Int[1/(Sqrt[(a_) + (b_.)*(x_)^2]*Sqrt[(c_) + (d_.)*(x_)^2]), x_Symbol] :> S
imp[(1*EllipticF[ArcSin[Rt[-(d/c), 2]*x], (b*c)/(a*d)])/(Sqrt[a]*Sqrt[c]*Rt
[-(d/c), 2]), x] /; FreeQ[{a, b, c, d}, x] && NegQ[d/c] && GtQ[c, 0] && GtQ
```

```
[a, 0] &&  !(NegQ[b/a] && SimplerSqrtQ[-(b/a), -(d/c)])
```

Rule 424

```
Int[Sqrt[(a_) + (b_.)*(x_)^2]/Sqrt[(c_) + (d_.)*(x_)^2], x_Symbol] :> Simp[
(Sqrt[a]*EllipticE[ArcSin[Rt[-(d/c), 2]*x], (b*c)/(a*d)])/(Sqrt[c]*Rt[-(d/c
), 2]), x] /; FreeQ[{a, b, c, d}, x] && NegQ[d/c] && GtQ[c, 0] && GtQ[a, 0]
```

Rule 537

```
Int[1/(((a_) + (b_.)*(x_)^2)*Sqrt[(c_) + (d_.)*(x_)^2]*Sqrt[(e_) + (f_.)*(x
_)^2]), x_Symbol] :> Simp[(1*EllipticPi[(b*c)/(a*d), ArcSin[Rt[-(d/c), 2]*x
], (c*f)/(d*e)])/(a*Sqrt[c]*Sqrt[e]*Rt[-(d/c), 2]), x] /; FreeQ[{a, b, c, d
, e, f}, x] &&  !GtQ[d/c, 0] && GtQ[c, 0] && GtQ[e, 0] &&  !( !GtQ[f/e, 0]
&& SimplerSqrtQ[-(f/e), -(d/c)])
```

Rule 538

```
Int[1/(((a_) + (b_.)*(x_)^2)*Sqrt[(c_) + (d_.)*(x_)^2]*Sqrt[(e_) + (f_.)*(x
_)^2]), x_Symbol] :> Dist[Sqrt[1 + (d*x^2)/c]/Sqrt[c + d*x^2], Int[1/((a +
b*x^2)*Sqrt[1 + (d*x^2)/c]*Sqrt[e + f*x^2]), x], x] /; FreeQ[{a, b, c, d, e
, f}, x] &&  !GtQ[c, 0]
```

Rule 719

```
Int[((d_) + (e_.)*(x_))^(m_)/Sqrt[(a_) + (c_.)*(x_)^2], x_Symbol] :> Dist[(
2*a*Rt[-(c/a), 2]*(d + e*x)^m*Sqrt[1 + (c*x^2)/a])/(c*Sqrt[a + c*x^2]*((c*(
d + e*x))/(c*d - a*e*Rt[-(c/a), 2]))^m), Subst[Int[(1 + (2*a*e*Rt[-(c/a), 2
]*x^2)/(c*d - a*e*Rt[-(c/a), 2]))^m/Sqrt[1 - x^2], x], x, Sqrt[(1 - Rt[-(c/
a), 2]*x)/2]], x] /; FreeQ[{a, c, d, e}, x] && NeQ[c*d^2 + a*e^2, 0] && EqQ
[m^2, 1/4]
```

Rule 743

```
Int[((d_) + (e_.)*(x_))^(m_)*((a_) + (c_.)*(x_)^2)^(p_), x_Symbol] :> Simp[
(e*(d + e*x)^(m - 1)*(a + c*x^2)^(p + 1))/(c*(m + 2*p + 1)), x] + Dist[1/(c
*(m + 2*p + 1)), Int[(d + e*x)^(m - 2)*Simp[c*d^2*(m + 2*p + 1) - a*e^2*(m
- 1) + 2*c*d*e*(m + p)*x, x]*(a + c*x^2)^p, x], x] /; FreeQ[{a, c, d, e, m,
 p}, x] && NeQ[c*d^2 + a*e^2, 0] && If[RationalQ[m], GtQ[m, 1], SumSimplerQ
[m, -2]] && NeQ[m + 2*p + 1, 0] && IntQuadraticQ[a, 0, c, d, e, m, p, x]
```

Rule 833

```
Int[((d_.) + (e_.)*(x_))^(m_)*((f_.) + (g_.)*(x_))*((a_) + (c_.)*(x_)^2)^(p
_.), x_Symbol] :> Simp[(g*(d + e*x)^m*(a + c*x^2)^(p + 1))/(c*(m + 2*p + 2)
```

```
), x] + Dist[1/(c*(m + 2*p + 2)), Int[(d + e*x)^(m - 1)*(a + c*x^2)^p*Simp[
c*d*f*(m + 2*p + 2) - a*e*g*m + c*(e*f*(m + 2*p + 2) + d*g*m)*x, x], x], x]
 /; FreeQ[{a, c, d, e, f, g, p}, x] && NeQ[c*d^2 + a*e^2, 0] && GtQ[m, 0] &
& NeQ[m + 2*p + 2, 0] && (IntegerQ[m] || IntegerQ[p] || IntegersQ[2*m, 2*p]
) &&  !(IGtQ[m, 0] && EqQ[f, 0])
```

Rule 844

```
Int[((d_.) + (e_.)*(x_))^(m_)*((f_.) + (g_.)*(x_))*((a_) + (c_.)*(x_)^2)^(p
_.), x_Symbol] :> Dist[g/e, Int[(d + e*x)^(m + 1)*(a + c*x^2)^p, x], x] + D
ist[(e*f - d*g)/e, Int[(d + e*x)^m*(a + c*x^2)^p, x], x] /; FreeQ[{a, c, d,
 e, f, g, m, p}, x] && NeQ[c*d^2 + a*e^2, 0] &&  !IGtQ[m, 0]
```

Rule 932

```
Int[1/(((d_.) + (e_.)*(x_))*Sqrt[(f_.) + (g_.)*(x_)]*Sqrt[(a_) + (c_.)*(x_)
^2]), x_Symbol] :> With[{q = Rt[-(c/a), 2]}, Dist[1/Sqrt[a], Int[1/((d + e*
x)*Sqrt[f + g*x]*Sqrt[1 - q*x]*Sqrt[1 + q*x]), x], x]] /; FreeQ[{a, c, d, e
, f, g}, x] && NeQ[e*f - d*g, 0] && NeQ[c*d^2 + a*e^2, 0] && GtQ[a, 0]
```

Rule 958

```
Int[((f_.) + (g_.)*(x_))^(n_)/(((d_.) + (e_.)*(x_))*Sqrt[(a_) + (c_.)*(x_)^
2]), x_Symbol] :> Int[ExpandIntegrand[1/(Sqrt[f + g*x]*Sqrt[a + c*x^2]), (f
 + g*x)^(n + 1/2)/(d + e*x), x], x] /; FreeQ[{a, c, d, e, f, g}, x] && NeQ[
e*f - d*g, 0] && NeQ[c*d^2 + a*e^2, 0] && IntegerQ[n + 1/2]
```

Rule 6310

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))*(u_), x_Symbol] :> With[{v = IntHid
e[u, x]}, Dist[a + b*ArcCsch[c*x], v, x] + Dist[b/c, Int[SimplifyIntegrand[
v/(x^2*Sqrt[1 + 1/(c^2*x^2)]), x], x], x] /; InverseFunctionFreeQ[v, x]] /;
 FreeQ[{a, b, c}, x]
```

Rule 6721

```
Int[(u_.)*((a_.) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Dist[(b^IntPart[p]*(
a + b*x^n)^FracPart[p])/(x^(n*FracPart[p])*(1 + a/(x^n*b))^FracPart[p]), In
t[u*x^(n*p)*(1 + a/(x^n*b))^p, x], x] /; FreeQ[{a, b, p}, x] &&  !IntegerQ[
p] && ILtQ[n, 0] &&  !RationalFunctionQ[u, x] && IntegerQ[p + 1/2]
```

Rule 6742

```
Int[u_, x_Symbol] :> With[{v = ExpandIntegrand[u, x]}, Int[v, x] /; SumQ[v]
]
```

Rubi steps

$$\int x^2\sqrt{d+ex}\left(a+b\text{csch}^{-1}(cx)\right)dx=\frac{2d^2(d+ex)^{3/2}\left(a+b\text{csch}^{-1}(cx)\right)}{3e^3}-\frac{4d(d+ex)^{5/2}\left(a+b\text{csch}^{-1}(cx)\right)}{5e^3}+\cdots$$

$$=\frac{2d^2(d+ex)^{3/2}\left(a+b\text{csch}^{-1}(cx)\right)}{3e^3}-\frac{4d(d+ex)^{5/2}\left(a+b\text{csch}^{-1}(cx)\right)}{5e^3}+\cdots$$

$$=\frac{2d^2(d+ex)^{3/2}\left(a+b\text{csch}^{-1}(cx)\right)}{3e^3}-\frac{4d(d+ex)^{5/2}\left(a+b\text{csch}^{-1}(cx)\right)}{5e^3}+\cdots$$

$$=\frac{2d^2(d+ex)^{3/2}\left(a+b\text{csch}^{-1}(cx)\right)}{3e^3}-\frac{4d(d+ex)^{5/2}\left(a+b\text{csch}^{-1}(cx)\right)}{5e^3}+\cdots$$

$$=\frac{2d^2(d+ex)^{3/2}\left(a+b\text{csch}^{-1}(cx)\right)}{3e^3}-\frac{4d(d+ex)^{5/2}\left(a+b\text{csch}^{-1}(cx)\right)}{5e^3}+\cdots$$

$$=-\frac{16bd\sqrt{d+ex}\left(1+c^2x^2\right)}{105c^3e\sqrt{1+\frac{1}{c^2x^2}}\,x}+\frac{4b(d+ex)^{3/2}\left(1+c^2x^2\right)}{35c^3e\sqrt{1+\frac{1}{c^2x^2}}\,x}+\frac{2d^2(d+ex)^{3/2}\left(a+\cdots\right.}{3e^3}\cdots$$

$$=-\frac{4bd\sqrt{d+ex}\left(1+c^2x^2\right)}{105c^3e\sqrt{1+\frac{1}{c^2x^2}}\,x}+\frac{4b(d+ex)^{3/2}\left(1+c^2x^2\right)}{35c^3e\sqrt{1+\frac{1}{c^2x^2}}\,x}+\frac{2d^2(d+ex)^{3/2}\left(a+b\cdots\right.}{3e^3}\cdots$$

$$=-\frac{4bd\sqrt{d+ex}\left(1+c^2x^2\right)}{105c^3e\sqrt{1+\frac{1}{c^2x^2}}\,x}+\frac{4b(d+ex)^{3/2}\left(1+c^2x^2\right)}{35c^3e\sqrt{1+\frac{1}{c^2x^2}}\,x}+\frac{2d^2(d+ex)^{3/2}\left(a+b\cdots\right.}{3e^3}\cdots$$

$$=-\frac{4bd\sqrt{d+ex}\left(1+c^2x^2\right)}{105c^3e\sqrt{1+\frac{1}{c^2x^2}}\,x}+\frac{4b(d+ex)^{3/2}\left(1+c^2x^2\right)}{35c^3e\sqrt{1+\frac{1}{c^2x^2}}\,x}+\frac{2d^2(d+ex)^{3/2}\left(a+b\cdots\right.}{3e^3}\cdots$$

$$=-\frac{4bd\sqrt{d+ex}\left(1+c^2x^2\right)}{105c^3e\sqrt{1+\frac{1}{c^2x^2}}\,x}+\frac{4b(d+ex)^{3/2}\left(1+c^2x^2\right)}{35c^3e\sqrt{1+\frac{1}{c^2x^2}}\,x}+\frac{2d^2(d+ex)^{3/2}\left(a+b\cdots\right.}{3e^3}\cdots$$

**Mathematica [C]** time = 14.40, size = 1094, normalized size = 1.19

$$b\left(-\frac{c\left(\frac{d}{x}+e\right)x\left(-\frac{16c^3\operatorname{csch}^{-1}(cx)d^3}{105e^3}-\frac{2}{7}c^3x^3\operatorname{csch}^{-1}(cx)-\frac{2c^2x^2\left(2\sqrt{1+\frac{1}{c^2x^2}}\,e+cd\operatorname{csch}^{-1}(cx)\right)}{35e}-\frac{8cx\left(cde\sqrt{1+\frac{1}{c^2x^2}}-c^2d^2\operatorname{csch}^{-1}(cx)\right)}{105e^2}+\frac{4\left(5c^2d^2+9e^2\right)\sqrt{1+\frac{1}{c^2x^2}}}{105e^2}\right)}{\sqrt{d+ex}}-\cdots\right.$$

Warning: Unable to verify antiderivative.

```
[In] Integrate[x^2*Sqrt[d + e*x]*(a + b*ArcCsch[c*x]),x]
```

```
[Out] -((a*d^3*Sqrt[d + e*x]*Beta[-((e*x)/d), 3, 3/2])/(e^3*Sqrt[1 + (e*x)/d])) +
 (b*(-((c*(e + d/x)*x*((4*(5*c^2*d^2 + 9*e^2)*Sqrt[1 + 1/(c^2*x^2)])/(105*e
^2) - (16*c^3*d^3*ArcCsch[c*x])/(105*e^3) - (2*c^3*x^3*ArcCsch[c*x])/7 - (2
*c^2*x^2*(2*e*Sqrt[1 + 1/(c^2*x^2)] + c*d*ArcCsch[c*x]))/(35*e) - (8*c*x*(c
*d*e*Sqrt[1 + 1/(c^2*x^2)] - c^2*d^2*ArcCsch[c*x]))/(105*e^2)))/Sqrt[d + e*
x]) - (2*Sqrt[e + d/x]*Sqrt[c*x]*(-((Sqrt[2]*(9*c^3*d^3*e + c*d*e^3)*Sqrt[1
 + I*c*x]*(I + c*x)*Sqrt[(c*d + c*e*x)/(c*d - I*e)]*EllipticF[ArcSin[Sqrt[-
((e*(I + c*x))/(c*d - I*e))]], (I*c*d + e)/(2*e)])/(Sqrt[1 + 1/(c^2*x^2)]*S
qrt[e + d/x]*(c*x)^(3/2)*Sqrt[(e*(1 - I*c*x))/(I*c*d + e)])) + (I*Sqrt[2]*(
c*d - I*e)*(8*c^4*d^4 - 5*c^2*d^2*e^2 - 9*e^4)*Sqrt[1 + I*c*x]*Sqrt[(e*(I +
 c*x)*(c*d + c*e*x))/(I*c*d + e)^2]*EllipticPi[1 + (I*c*d)/e, ArcSin[Sqrt[-
((e*(I + c*x))/(c*d - I*e))]], (I*c*d + e)/(2*e)])/(e*Sqrt[1 + 1/(c^2*x^2)]
*Sqrt[e + d/x]*(c*x)^(3/2)) - (2*(-5*c^3*d^3*e - 9*c*d*e^3)*Cosh[2*ArcCsch[
c*x]]*(-((c*d + c*e*x)*(1 + c^2*x^2)) + (c*x*(c*d*Sqrt[2 + (2*I)*c*x]*(I +
c*x)*Sqrt[(c*d + c*e*x)/(c*d - I*e)]*EllipticF[ArcSin[Sqrt[-((e*(I + c*x))/
(c*d - I*e))]], (I*c*d + e)/(2*e)] + 2*Sqrt[-((e*(-I + c*x))/(c*d + I*e))]*
(I + c*x)*Sqrt[(c*d + c*e*x)/(c*d - I*e)]*((c*d + I*e)*EllipticE[ArcSin[Sqr
t[(c*d + c*e*x)/(c*d - I*e)]], (c*d - I*e)/(c*d + I*e)] - I*e*EllipticF[Arc
Sin[Sqrt[(c*d + c*e*x)/(c*d - I*e)]], (c*d - I*e)/(c*d + I*e)]) + (I*c*d +
e)*Sqrt[2 + (2*I)*c*x]*Sqrt[-((e*(I + c*x))/(c*d - I*e))]*Sqrt[(e*(I + c*x)
*(c*d + c*e*x))/(I*c*d + e)^2]*EllipticPi[1 + (I*c*d)/e, ArcSin[Sqrt[-((e*(
I + c*x))/(c*d - I*e))]], (I*c*d + e)/(2*e)]))/(2*Sqrt[-((e*(I + c*x))/(c*d
 - I*e))])))/(c*d*Sqrt[1 + 1/(c^2*x^2)]*Sqrt[e + d/x]*Sqrt[c*x]*(2 + c^2*x^
2))))/(105*e^3*Sqrt[d + e*x])))/c^4
```

**fricas [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*(a+b*arccsch(c*x))*(e*x+d)^(1/2),x, algorithm="fricas")
[Out] Timed out
```

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

$$\int \sqrt{ex+d}\,(b\,\mathrm{arcsch}\,(cx)+a)x^2\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*(a+b*arccsch(c*x))*(e*x+d)^(1/2),x, algorithm="giac")
[Out] integrate(sqrt(e*x + d)*(b*arccsch(c*x) + a)*x^2, x)
```

**maple [C]** time = 0.36, size = 2515, normalized size = 2.74

result too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^2*(a+b*arccsch(c*x))*(e*x+d)^(1/2),x)
[Out] 2/e^3*(a*(1/7*(e*x+d)^(7/2)-2/5*d*(e*x+d)^(5/2)+1/3*d^2*(e*x+d)^(3/2))+b*(1
/7*arccsch(c*x)*(e*x+d)^(7/2)-2/5*arccsch(c*x)*d*(e*x+d)^(5/2)+1/3*arccsch(
c*x)*d^2*(e*x+d)^(3/2)+2/105/c^4*(-I*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2)*(e*x
+d)^(1/2)*c*d*e^3-3*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2)*(e*x+d)^(7/2)*c^4*d-I
*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2)*(e*x+d)^(1/2)*c^3*d^3*e+7*((I*e+c*d)*c/(
c^2*d^2+e^2))^(1/2)*(e*x+d)^(5/2)*c^4*d^2-7*I*((I*e+c*d)*c/(c^2*d^2+e^2))^(
1/2)*(e*x+d)^(5/2)*c^3*d*e+I*(-(I*(e*x+d)*c*e+(e*x+d)*c^2*d-c^2*d^2-e^2)/(c
^2*d^2+e^2))^(1/2)*((I*(e*x+d)*c*e-(e*x+d)*c^2*d+c^2*d^2+e^2)/(c^2*d^2+e^2)
)^(1/2)*EllipticF((e*x+d)^(1/2)*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2),(-(2*I*c*
d*e-c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2))*c*d*e^3+3*I*((I*e+c*d)*c/(c^2*d^2+e^
2))^(1/2)*(e*x+d)^(3/2)*c*e^3-4*(-(I*(e*x+d)*c*e+(e*x+d)*c^2*d-c^2*d^2-e^2)
/(c^2*d^2+e^2))^(1/2)*((I*(e*x+d)*c*e-(e*x+d)*c^2*d+c^2*d^2+e^2)/(c^2*d^2+e
^2))^(1/2)*EllipticF((e*x+d)^(1/2)*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2),(-(2*I
*c*d*e-c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2))*c^4*d^4-5*(-(I*(e*x+d)*c*e+(e*x+d
)*c^2*d-c^2*d^2-e^2)/(c^2*d^2+e^2))^(1/2)*((I*(e*x+d)*c*e-(e*x+d)*c^2*d+c^2
*d^2+e^2)/(c^2*d^2+e^2))^(1/2)*EllipticE((e*x+d)^(1/2)*((I*e+c*d)*c/(c^2*d^
2+e^2))^(1/2),(-(2*I*c*d*e-c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2))*c^4*d^4+8*(-(
I*(e*x+d)*c*e+(e*x+d)*c^2*d-c^2*d^2-e^2)/(c^2*d^2+e^2))^(1/2)*((I*(e*x+d)*c
```

```
*e-(e*x+d)*c^2*d+c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2)*EllipticPi((e*x+d)^(1/2)
*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2),1/(I*e+c*d)/c*(c^2*d^2+e^2)/d,(-(I*e-c*d
)*c/(c^2*d^2+e^2))^(1/2)/((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2))*c^4*d^4-5*((I*e
+c*d)*c/(c^2*d^2+e^2))^(1/2)*(e*x+d)^(3/2)*c^4*d^3+3*I*((I*e+c*d)*c/(c^2*d^
2+e^2))^(1/2)*(e*x+d)^(7/2)*c^3*e+((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2)*(e*x+d)
^(1/2)*c^4*d^4+9*I*(-(I*(e*x+d)*c*e+(e*x+d)*c^2*d-c^2*d^2-e^2)/(c^2*d^2+e^2
))^(1/2)*((I*(e*x+d)*c*e-(e*x+d)*c^2*d+c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2)*El
lipticF((e*x+d)^(1/2)*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2),(-(2*I*c*d*e-c^2*d^
2+e^2)/(c^2*d^2+e^2))^(1/2))*c^3*d^3*e-8*I*(-(I*(e*x+d)*c*e+(e*x+d)*c^2*d-c
^2*d^2-e^2)/(c^2*d^2+e^2))^(1/2)*((I*(e*x+d)*c*e-(e*x+d)*c^2*d+c^2*d^2+e^2)
/(c^2*d^2+e^2))^(1/2)*EllipticPi((e*x+d)^(1/2)*((I*e+c*d)*c/(c^2*d^2+e^2))^
(1/2),1/(I*e+c*d)/c*(c^2*d^2+e^2)/d,(-(I*e-c*d)*c/(c^2*d^2+e^2))^(1/2)/((I*
e+c*d)*c/(c^2*d^2+e^2))^(1/2))*c^3*d^3*e+13*(-(I*(e*x+d)*c*e+(e*x+d)*c^2*d-
c^2*d^2-e^2)/(c^2*d^2+e^2))^(1/2)*((I*(e*x+d)*c*e-(e*x+d)*c^2*d+c^2*d^2+e^2
)/(c^2*d^2+e^2))^(1/2)*EllipticF((e*x+d)^(1/2)*((I*e+c*d)*c/(c^2*d^2+e^2))^
(1/2),(-(2*I*c*d*e-c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2))*c^2*d^2*e^2-14*(-(I*(
e*x+d)*c*e+(e*x+d)*c^2*d-c^2*d^2-e^2)/(c^2*d^2+e^2))^(1/2)*((I*(e*x+d)*c*e-
(e*x+d)*c^2*d+c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2)*EllipticE((e*x+d)^(1/2)*((I
*e+c*d)*c/(c^2*d^2+e^2))^(1/2),(-(2*I*c*d*e-c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/
2))*c^2*d^2*e^2-3*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2)*(e*x+d)^(3/2)*c^2*d*e^2
+5*I*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2)*(e*x+d)^(3/2)*c^3*d^2*e+((I*e+c*d)*c
/(c^2*d^2+e^2))^(1/2)*(e*x+d)^(1/2)*c^2*d^2*e^2+9*(-(I*(e*x+d)*c*e+(e*x+d)*
c^2*d-c^2*d^2-e^2)/(c^2*d^2+e^2))^(1/2)*((I*(e*x+d)*c*e-(e*x+d)*c^2*d+c^2*d
^2+e^2)/(c^2*d^2+e^2))^(1/2)*EllipticF((e*x+d)^(1/2)*((I*e+c*d)*c/(c^2*d^2+
e^2))^(1/2),(-(2*I*c*d*e-c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2))*e^4-9*(-(I*(e*x
+d)*c*e+(e*x+d)*c^2*d-c^2*d^2-e^2)/(c^2*d^2+e^2))^(1/2)*((I*(e*x+d)*c*e-(e*
x+d)*c^2*d+c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2)*EllipticE((e*x+d)^(1/2)*((I*e+
c*d)*c/(c^2*d^2+e^2))^(1/2),(-(2*I*c*d*e-c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2))
*e^4)/(((e*x+d)^2*c^2-2*(e*x+d)*c^2*d+c^2*d^2+e^2)/c^2/x^2/e^2)^(1/2)/x/((I
*e+c*d)*c/(c^2*d^2+e^2))^(1/2)/(I*e-c*d))
```

**maxima [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*(a+b*arccsch(c*x))*(e*x+d)^(1/2),x, algorithm="maxima")
```

```
[Out] Timed out
```

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

$$\int x^2\,\left(a+b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)\right)\,\sqrt{d+e\,x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^2*(a + b*asinh(1/(c*x)))*(d + e*x)^(1/2),x)
```

```
[Out] int(x^2*(a + b*asinh(1/(c*x)))*(d + e*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(x**2*(a+b*acsch(c*x))*(e*x+d)**(1/2),x)
```

```
[Out] Timed out
```

# 3.52 $\int x\sqrt{d+ex}\left(a+b\operatorname{csch}^{-1}(cx)\right)dx$

**Optimal**. Leaf size=679

$$-\frac{2d(d+ex)^{3/2}\left(a+b\operatorname{csch}^{-1}(cx)\right)}{3e^2}+\frac{2(d+ex)^{5/2}\left(a+b\operatorname{csch}^{-1}(cx)\right)}{5e^2}+\frac{8bd^3\sqrt{c^2x^2+1}\sqrt{\frac{\sqrt{-c^2}(d+ex)}{\sqrt{-c^2}d+e}}\Pi\left(2;\sin^{-1}\left(\frac{\sqrt{1-}}{}\right.\right.}{15ce^2x\sqrt{\frac{1}{c^2x^2}+1}\sqrt{d+ex}}$$

```
[Out] -2/3*d*(e*x+d)^(3/2)*(a+b*arccsch(c*x))/e^2+2/5*(e*x+d)^(5/2)*(a+b*arccsch(
c*x))/e^2+4/15*b*(c^2*x^2+1)*(e*x+d)^(1/2)/c^3/x/(1+1/c^2/x^2)^(1/2)+8/15*b
*d^3*EllipticPi(1/2*(1-(-c^2)^(1/2)*x)^(1/2)*2^(1/2),2,2^(1/2)*(e/(d*(-c^2)
^(1/2)+e))^(1/2))*(c^2*x^2+1)^(1/2)*((e*x+d)*(-c^2)^(1/2)/(d*(-c^2)^(1/2)+e
))^(1/2)/c/e^2/x/(1+1/c^2/x^2)^(1/2)/(e*x+d)^(1/2)+8/15*b*c*d*EllipticE(1/2
*(1-(-c^2)^(1/2)*x)^(1/2)*2^(1/2),(-2*e*(-c^2)^(1/2)/(c^2*d-e*(-c^2)^(1/2))
)^(1/2))*(e*x+d)^(1/2)*(c^2*x^2+1)^(1/2)/(-c^2)^(3/2)/e/x/(1+1/c^2/x^2)^(1/
2)/(c^2*(e*x+d)/(c^2*d-e*(-c^2)^(1/2)))^(1/2)-8/15*b*c*d^2*EllipticF(1/2*(1
-(-c^2)^(1/2)*x)^(1/2)*2^(1/2),(-2*e*(-c^2)^(1/2)/(c^2*d-e*(-c^2)^(1/2)))^(
1/2))*(c^2*x^2+1)^(1/2)*(c^2*(e*x+d)/(c^2*d-e*(-c^2)^(1/2)))^(1/2)/(-c^2)^(
3/2)/e/x/(1+1/c^2/x^2)^(1/2)/(e*x+d)^(1/2)+4/15*b*c*(c^2*d^2+e^2)*EllipticF
(1/2*(1-(-c^2)^(1/2)*x)^(1/2)*2^(1/2),(-2*e*(-c^2)^(1/2)/(c^2*d-e*(-c^2)^(1
/2)))^(1/2))*(c^2*x^2+1)^(1/2)*(c^2*(e*x+d)/(c^2*d-e*(-c^2)^(1/2)))^(1/2)/(
-c^2)^(5/2)/e/x/(1+1/c^2/x^2)^(1/2)/(e*x+d)^(1/2)
```

**Rubi** [A] time = 2.52, antiderivative size = 679, normalized size of antiderivative = 1.00, number of steps used = 24, number of rules used = 15, integrand size = 19, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.790, Rules used = {43, 6310, 12, 6721, 6742, 743, 844, 719, 424, 419, 958, 932, 168, 538, 537}

$$-\frac{2d(d+ex)^{3/2}\left(a+b\operatorname{csch}^{-1}(cx)\right)}{3e^2}+\frac{2(d+ex)^{5/2}\left(a+b\operatorname{csch}^{-1}(cx)\right)}{5e^2}+\frac{4bc\sqrt{c^2x^2+1}\left(c^2d^2+e^2\right)\sqrt{\frac{c^2(d+ex)}{c^2d-\sqrt{-c^2}e}}F\left(\sin\right.}{15\left(-c^2\right)^{5/2}ex\sqrt{\frac{1}{c^2x^2}+1}}$$

Antiderivative was successfully verified.

```
[In] Int[x*Sqrt[d + e*x]*(a + b*ArcCsch[c*x]),x]
```

```
[Out] (4*b*Sqrt[d + e*x]*(1 + c^2*x^2))/(15*c^3*Sqrt[1 + 1/(c^2*x^2)]*x) - (2*d*(
d + e*x)^(3/2)*(a + b*ArcCsch[c*x]))/(3*e^2) + (2*(d + e*x)^(5/2)*(a + b*Ar
cCsch[c*x]))/(5*e^2) + (8*b*c*d*Sqrt[d + e*x]*Sqrt[1 + c^2*x^2]*EllipticE[A
rcSin[Sqrt[1 - Sqrt[-c^2]*x]/Sqrt[2]], (-2*Sqrt[-c^2]*e)/(c^2*d - Sqrt[-c^2
]*e)])/(15*(-c^2)^(3/2)*e*Sqrt[1 + 1/(c^2*x^2)]*x*Sqrt[(c^2*(d + e*x))/(c^2
```

```
*d - Sqrt[-c^2]*e)]) - (8*b*c*d^2*Sqrt[(c^2*(d + e*x))/(c^2*d - Sqrt[-c^2]*
e)]*Sqrt[1 + c^2*x^2]*EllipticF[ArcSin[Sqrt[1 - Sqrt[-c^2]*x]/Sqrt[2]], (-2
*Sqrt[-c^2]*e)/(c^2*d - Sqrt[-c^2]*e)])/(15*(-c^2)^(3/2)*e*Sqrt[1 + 1/(c^2*
x^2)]*x*Sqrt[d + e*x]) + (4*b*c*(c^2*d^2 + e^2)*Sqrt[(c^2*(d + e*x))/(c^2*d
 - Sqrt[-c^2]*e)]*Sqrt[1 + c^2*x^2]*EllipticF[ArcSin[Sqrt[1 - Sqrt[-c^2]*x]
/Sqrt[2]], (-2*Sqrt[-c^2]*e)/(c^2*d - Sqrt[-c^2]*e)])/(15*(-c^2)^(5/2)*e*Sq
rt[1 + 1/(c^2*x^2)]*x*Sqrt[d + e*x]) + (8*b*d^3*Sqrt[(Sqrt[-c^2]*(d + e*x))
/(Sqrt[-c^2]*d + e)]*Sqrt[1 + c^2*x^2]*EllipticPi[2, ArcSin[Sqrt[1 - Sqrt[-
c^2]*x]/Sqrt[2]], (2*e)/(Sqrt[-c^2]*d + e)])/(15*c*e^2*Sqrt[1 + 1/(c^2*x^2)
]*x*Sqrt[d + e*x])
```

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 168

```
Int[1/(((a_.) + (b_.)*(x_))*Sqrt[(c_.) + (d_.)*(x_)]*Sqrt[(e_.) + (f_.)*(x_
)]*Sqrt[(g_.) + (h_.)*(x_)]), x_Symbol] :> Dist[-2, Subst[Int[1/(Simp[b*c -
 a*d - b*x^2, x]*Sqrt[Simp[(d*e - c*f)/d + (f*x^2)/d, x]]*Sqrt[Simp[(d*g -
c*h)/d + (h*x^2)/d, x]]), x], x, Sqrt[c + d*x]], x] /; FreeQ[{a, b, c, d, e
, f, g, h}, x] && GtQ[(d*e - c*f)/d, 0]
```

Rule 419

```
Int[1/(Sqrt[(a_) + (b_.)*(x_)^2]*Sqrt[(c_) + (d_.)*(x_)^2]), x_Symbol] :> S
imp[(1*EllipticF[ArcSin[Rt[-(d/c), 2]*x], (b*c)/(a*d)])/(Sqrt[a]*Sqrt[c]*Rt
[-(d/c), 2]), x] /; FreeQ[{a, b, c, d}, x] && NegQ[d/c] && GtQ[c, 0] && GtQ
[a, 0] &&  !(NegQ[b/a] && SimplerSqrtQ[-(b/a), -(d/c)])
```

Rule 424

```
Int[Sqrt[(a_) + (b_.)*(x_)^2]/Sqrt[(c_) + (d_.)*(x_)^2], x_Symbol] :> Simp[
(Sqrt[a]*EllipticE[ArcSin[Rt[-(d/c), 2]*x], (b*c)/(a*d)])/(Sqrt[c]*Rt[-(d/c
), 2]), x] /; FreeQ[{a, b, c, d}, x] && NegQ[d/c] && GtQ[c, 0] && GtQ[a, 0]
```

Rule 537

```
Int[1/(((a_) + (b_.)*(x_)^2)*Sqrt[(c_) + (d_.)*(x_)^2]*Sqrt[(e_) + (f_.)*(x
_)^2]), x_Symbol] :> Simp[(1*EllipticPi[(b*c)/(a*d), ArcSin[Rt[-(d/c), 2]*x
], (c*f)/(d*e)])/(a*Sqrt[c]*Sqrt[e]*Rt[-(d/c), 2]), x] /; FreeQ[{a, b, c, d
, e, f}, x] &&  !GtQ[d/c, 0] && GtQ[c, 0] && GtQ[e, 0] &&  !( !GtQ[f/e, 0]
&& SimplerSqrtQ[-(f/e), -(d/c)])
```

<u>Rule 538</u>

```
Int[1/(((a_) + (b_.)*(x_)^2)*Sqrt[(c_) + (d_.)*(x_)^2]*Sqrt[(e_) + (f_.)*(x
_)^2]), x_Symbol] :> Dist[Sqrt[1 + (d*x^2)/c]/Sqrt[c + d*x^2], Int[1/((a +
b*x^2)*Sqrt[1 + (d*x^2)/c]*Sqrt[e + f*x^2]), x], x] /; FreeQ[{a, b, c, d, e
, f}, x] &&  !GtQ[c, 0]
```

<u>Rule 719</u>

```
Int[((d_) + (e_.)*(x_))^(m_)/Sqrt[(a_) + (c_.)*(x_)^2], x_Symbol] :> Dist[(
2*a*Rt[-(c/a), 2]*(d + e*x)^m*Sqrt[1 + (c*x^2)/a])/(c*Sqrt[a + c*x^2]*((c*(
d + e*x))/(c*d - a*e*Rt[-(c/a), 2]))^m), Subst[Int[(1 + (2*a*e*Rt[-(c/a), 2
]*x^2)/(c*d - a*e*Rt[-(c/a), 2]))^m/Sqrt[1 - x^2], x], x, Sqrt[(1 - Rt[-(c/
a), 2]*x)/2]], x] /; FreeQ[{a, c, d, e}, x] && NeQ[c*d^2 + a*e^2, 0] && EqQ
[m^2, 1/4]
```

<u>Rule 743</u>

```
Int[((d_) + (e_.)*(x_))^(m_)*((a_) + (c_.)*(x_)^2)^(p_), x_Symbol] :> Simp[
(e*(d + e*x)^(m - 1)*(a + c*x^2)^(p + 1))/(c*(m + 2*p + 1)), x] + Dist[1/(c
*(m + 2*p + 1)), Int[(d + e*x)^(m - 2)*Simp[c*d^2*(m + 2*p + 1) - a*e^2*(m
- 1) + 2*c*d*e*(m + p)*x, x]*(a + c*x^2)^p, x], x] /; FreeQ[{a, c, d, e, m,
 p}, x] && NeQ[c*d^2 + a*e^2, 0] && If[RationalQ[m], GtQ[m, 1], SumSimplerQ
[m, -2]] && NeQ[m + 2*p + 1, 0] && IntQuadraticQ[a, 0, c, d, e, m, p, x]
```

<u>Rule 844</u>

```
Int[((d_.) + (e_.)*(x_))^(m_)*((f_.) + (g_.)*(x_))*((a_) + (c_.)*(x_)^2)^(p
_.), x_Symbol] :> Dist[g/e, Int[(d + e*x)^(m + 1)*(a + c*x^2)^p, x], x] + D
ist[(e*f - d*g)/e, Int[(d + e*x)^m*(a + c*x^2)^p, x], x] /; FreeQ[{a, c, d,
 e, f, g, m, p}, x] && NeQ[c*d^2 + a*e^2, 0] &&  !IGtQ[m, 0]
```

<u>Rule 932</u>

```
Int[1/(((d_.) + (e_.)*(x_))*Sqrt[(f_.) + (g_.)*(x_)]*Sqrt[(a_) + (c_.)*(x_)
^2]), x_Symbol] :> With[{q = Rt[-(c/a), 2]}, Dist[1/Sqrt[a], Int[1/((d + e*
x)*Sqrt[f + g*x]*Sqrt[1 - q*x]*Sqrt[1 + q*x]), x], x]] /; FreeQ[{a, c, d, e
, f, g}, x] && NeQ[e*f - d*g, 0] && NeQ[c*d^2 + a*e^2, 0] && GtQ[a, 0]
```

Rule 958

```
Int[((f_.) + (g_.)*(x_))^(n_)/(((d_.) + (e_.)*(x_))*Sqrt[(a_) + (c_.)*(x_)^
2]), x_Symbol] :> Int[ExpandIntegrand[1/(Sqrt[f + g*x]*Sqrt[a + c*x^2]), (f
 + g*x)^(n + 1/2)/(d + e*x), x], x] /; FreeQ[{a, c, d, e, f, g}, x] && NeQ[
e*f - d*g, 0] && NeQ[c*d^2 + a*e^2, 0] && IntegerQ[n + 1/2]
```

Rule 6310

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))*(u_), x_Symbol] :> With[{v = IntHid
e[u, x]}, Dist[a + b*ArcCsch[c*x], v, x] + Dist[b/c, Int[SimplifyIntegrand[
v/(x^2*Sqrt[1 + 1/(c^2*x^2)]), x], x], x] /; InverseFunctionFreeQ[v, x]] /;
 FreeQ[{a, b, c}, x]
```

Rule 6721

```
Int[(u_.)*((a_.) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Dist[(b^IntPart[p]*(
a + b*x^n)^FracPart[p])/(x^(n*FracPart[p])*(1 + a/(x^n*b))^FracPart[p]), In
t[u*x^(n*p)*(1 + a/(x^n*b))^p, x], x] /; FreeQ[{a, b, p}, x] &&  !IntegerQ[
p] && ILtQ[n, 0] &&  !RationalFunctionQ[u, x] && IntegerQ[p + 1/2]
```

Rule 6742

```
Int[u_, x_Symbol] :> With[{v = ExpandIntegrand[u, x]}, Int[v, x] /; SumQ[v]
]
```

Rubi steps

$$\int x\sqrt{d+ex}\left(a+b\text{csch}^{-1}(cx)\right)dx = -\frac{2d(d+ex)^{3/2}\left(a+b\text{csch}^{-1}(cx)\right)}{3e^2}+\frac{2(d+ex)^{5/2}\left(a+b\text{csch}^{-1}(cx)\right)}{5e^2}+\frac{b\int \frac{2}{\cdots}}{\cdots}$$

$$= -\frac{2d(d+ex)^{3/2}\left(a+b\text{csch}^{-1}(cx)\right)}{3e^2}+\frac{2(d+ex)^{5/2}\left(a+b\text{csch}^{-1}(cx)\right)}{5e^2}+\frac{(2b)\cdots}{\cdots}$$

$$= -\frac{2d(d+ex)^{3/2}\left(a+b\text{csch}^{-1}(cx)\right)}{3e^2}+\frac{2(d+ex)^{5/2}\left(a+b\text{csch}^{-1}(cx)\right)}{5e^2}+\frac{\left(2b\sqrt{\cdots}\right.}{\cdots}$$

$$= -\frac{2d(d+ex)^{3/2}\left(a+b\text{csch}^{-1}(cx)\right)}{3e^2}+\frac{2(d+ex)^{5/2}\left(a+b\text{csch}^{-1}(cx)\right)}{5e^2}+\frac{\left(2b\sqrt{\cdots}\right.}{\cdots}$$

$$= -\frac{2d(d+ex)^{3/2}\left(a+b\text{csch}^{-1}(cx)\right)}{3e^2}+\frac{2(d+ex)^{5/2}\left(a+b\text{csch}^{-1}(cx)\right)}{5e^2}-\frac{\left(4bd\cdots\right.}{\cdots}$$

$$= \frac{4b\sqrt{d+ex}\left(1+c^2x^2\right)}{15c^3\sqrt{1+\frac{1}{c^2x^2}}\,x}-\frac{2d(d+ex)^{3/2}\left(a+b\text{csch}^{-1}(cx)\right)}{3e^2}+\frac{2(d+ex)^{5/2}\left(a\cdots\right.}{5\cdots}$$

$$= \frac{4b\sqrt{d+ex}\left(1+c^2x^2\right)}{15c^3\sqrt{1+\frac{1}{c^2x^2}}\,x}-\frac{2d(d+ex)^{3/2}\left(a+b\text{csch}^{-1}(cx)\right)}{3e^2}+\frac{2(d+ex)^{5/2}\left(a\cdots\right.}{5\cdots}$$

$$= \frac{4b\sqrt{d+ex}\left(1+c^2x^2\right)}{15c^3\sqrt{1+\frac{1}{c^2x^2}}\,x}-\frac{2d(d+ex)^{3/2}\left(a+b\text{csch}^{-1}(cx)\right)}{3e^2}+\frac{2(d+ex)^{5/2}\left(a\cdots\right.}{5\cdots}$$

$$= \frac{4b\sqrt{d+ex}\left(1+c^2x^2\right)}{15c^3\sqrt{1+\frac{1}{c^2x^2}}\,x}-\frac{2d(d+ex)^{3/2}\left(a+b\text{csch}^{-1}(cx)\right)}{3e^2}+\frac{2(d+ex)^{5/2}\left(a\cdots\right.}{5\cdots}$$

$$= \frac{4b\sqrt{d+ex}\left(1+c^2x^2\right)}{15c^3\sqrt{1+\frac{1}{c^2x^2}}\,x}-\frac{2d(d+ex)^{3/2}\left(a+b\text{csch}^{-1}(cx)\right)}{3e^2}+\frac{2(d+ex)^{5/2}\left(a\cdots\right.}{5\cdots}$$

**Mathematica [C]** time = 1.68, size = 418, normalized size = 0.62

$$\frac{1}{15}\left(\frac{2a\sqrt{d+ex}\left(-2d^2+dex+3e^2x^2\right)}{e^2}+\frac{4bx\sqrt{\frac{1}{c^2x^2}+1}\sqrt{d+ex}}{c}+\frac{4ib\sqrt{-\frac{e(cx-i)}{cd+ie}}\sqrt{-\frac{e(cx+i)}{cd-ie}}\left(\left(c^2d^2-2icde+e^2\right)F\left(\right.\right.}{}\right.$$

Antiderivative was successfully verified.

```
[In] Integrate[x*Sqrt[d + e*x]*(a + b*ArcCsch[c*x]),x]
```

```
[Out] ((4*b*Sqrt[1 + 1/(c^2*x^2)]*x*Sqrt[d + e*x])/c + (2*a*Sqrt[d + e*x]*(-2*d^2
 + d*e*x + 3*e^2*x^2))/e^2 + (2*b*Sqrt[d + e*x]*(-2*d^2 + d*e*x + 3*e^2*x^2
)*ArcCsch[c*x])/e^2 + ((4*I)*b*Sqrt[-((e*(-I + c*x))/(c*d + I*e))]*Sqrt[-((
e*(I + c*x))/(c*d - I*e))]*(2*c*d*(c*d + I*e)*EllipticE[I*ArcSinh[Sqrt[-(c/
(c*d - I*e))]*Sqrt[d + e*x]], (c*d - I*e)/(c*d + I*e)] + (c^2*d^2 - (2*I)*c
*d*e + e^2)*EllipticF[I*ArcSinh[Sqrt[-(c/(c*d - I*e))]*Sqrt[d + e*x]], (c*d
 - I*e)/(c*d + I*e)] - 2*c^2*d^2*EllipticPi[1 - (I*e)/(c*d), I*ArcSinh[Sqrt
[-(c/(c*d - I*e))]*Sqrt[d + e*x]], (c*d - I*e)/(c*d + I*e)]))/(c^3*Sqrt[-(c
/(c*d - I*e))]*e^2*Sqrt[1 + 1/(c^2*x^2)]*x))/15
```

**fricas [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*arccsch(c*x))*(e*x+d)^(1/2),x, algorithm="fricas")
```

```
[Out] Timed out
```

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

$$\int \sqrt{ex+d}\,(b\,\mathrm{arcsch}\,(cx)+a)x\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*(a+b*arccsch(c*x))*(e*x+d)^(1/2),x, algorithm="giac")
```

```
[Out] integrate(sqrt(e*x + d)*(b*arccsch(c*x) + a)*x, x)
```

**maple [C]** time = 0.08, size = 1964, normalized size = 2.89

result too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x*(a+b*arccsch(c*x))*(e*x+d)^(1/2),x)
```

```
[Out] 2/e^2*(a*(1/5*(e*x+d)^(5/2)-1/3*d*(e*x+d)^(3/2))+b*(1/5*arccsch(c*x)*(e*x+d
)^(5/2)-1/3*arccsch(c*x)*d*(e*x+d)^(3/2)+2/15/c^3*(-3*I*(-(I*(e*x+d)*c*e+(e
*x+d)*c^2*d-c^2*d^2-e^2)/(c^2*d^2+e^2))^(1/2)*((I*(e*x+d)*c*e-(e*x+d)*c^2*d
+c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2)*EllipticF((e*x+d)^(1/2)*((I*e+c*d)*c/(c^
2*d^2+e^2))^(1/2),(-(2*I*c*d*e-c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2))*c^2*d^2*e
-((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2)*(e*x+d)^(5/2)*c^3*d-2*I*((I*e+c*d)*c/(c^
2*d^2+e^2))^(1/2)*(e*x+d)^(3/2)*c^2*d*e+2*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2)
*(e*x+d)^(3/2)*c^3*d^2+I*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2)*(e*x+d)^(5/2)*c^
2*e+(-(I*(e*x+d)*c*e+(e*x+d)*c^2*d-c^2*d^2-e^2)/(c^2*d^2+e^2))^(1/2)*((I*(e
*x+d)*c*e-(e*x+d)*c^2*d+c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2)*EllipticF((e*x+d)
^(1/2)*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2),(-(2*I*c*d*e-c^2*d^2+e^2)/(c^2*d^2
+e^2))^(1/2))*c^3*d^3+2*(-(I*(e*x+d)*c*e+(e*x+d)*c^2*d-c^2*d^2-e^2)/(c^2*d^
2+e^2))^(1/2)*((I*(e*x+d)*c*e-(e*x+d)*c^2*d+c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/
2)*EllipticE((e*x+d)^(1/2)*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2),(-(2*I*c*d*e-c
^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2))*c^3*d^3+I*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/
2)*(e*x+d)^(1/2)*e^3-2*(-(I*(e*x+d)*c*e+(e*x+d)*c^2*d-c^2*d^2-e^2)/(c^2*d^2
+e^2))^(1/2)*((I*(e*x+d)*c*e-(e*x+d)*c^2*d+c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2
)*EllipticPi((e*x+d)^(1/2)*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2),1/(I*e+c*d)/c*
(c^2*d^2+e^2)/d,(-(I*e-c*d)*c/(c^2*d^2+e^2))^(1/2)/((I*e+c*d)*c/(c^2*d^2+e^
2))^(1/2))*c^3*d^3+I*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2)*(e*x+d)^(1/2)*c^2*d^
2*e-((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2)*(e*x+d)^(1/2)*c^3*d^3+2*I*(-(I*(e*x+d
)*c*e+(e*x+d)*c^2*d-c^2*d^2-e^2)/(c^2*d^2+e^2))^(1/2)*((I*(e*x+d)*c*e-(e*x+
d)*c^2*d+c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2)*EllipticPi((e*x+d)^(1/2)*((I*e+c
*d)*c/(c^2*d^2+e^2))^(1/2),1/(I*e+c*d)/c*(c^2*d^2+e^2)/d,(-(I*e-c*d)*c/(c^2
*d^2+e^2))^(1/2)/((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2))*c^2*d^2*e-(-(I*(e*x+d)*
c*e+(e*x+d)*c^2*d-c^2*d^2-e^2)/(c^2*d^2+e^2))^(1/2)*((I*(e*x+d)*c*e-(e*x+d)
*c^2*d+c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2)*EllipticF((e*x+d)^(1/2)*((I*e+c*d)
*c/(c^2*d^2+e^2))^(1/2),(-(2*I*c*d*e-c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2))*c*d
*e^2+2*(-(I*(e*x+d)*c*e+(e*x+d)*c^2*d-c^2*d^2-e^2)/(c^2*d^2+e^2))^(1/2)*((I
*(e*x+d)*c*e-(e*x+d)*c^2*d+c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2)*EllipticE((e*x
+d)^(1/2)*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2),(-(2*I*c*d*e-c^2*d^2+e^2)/(c^2*
d^2+e^2))^(1/2))*c*d*e^2-I*(-(I*(e*x+d)*c*e+(e*x+d)*c^2*d-c^2*d^2-e^2)/(c^2
*d^2+e^2))^(1/2)*((I*(e*x+d)*c*e-(e*x+d)*c^2*d+c^2*d^2+e^2)/(c^2*d^2+e^2))^
(1/2)*EllipticF((e*x+d)^(1/2)*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2),(-(2*I*c*d*
e-c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2))*e^3-((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2)*
(e*x+d)^(1/2)*c*d*e^2)/(((e*x+d)^2*c^2-2*(e*x+d)*c^2*d+c^2*d^2+e^2)/c^2/x^2
/e^2)^(1/2)/x/((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2)/(I*e-c*d)))
```

**maxima [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*arccsch(c*x))*(e*x+d)^(1/2),x, algorithm="maxima")
```

```
[Out] Timed out
```

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

$$\int x\left(a+b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)\right)\sqrt{d+e\,x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x*(a + b*asinh(1/(c*x)))*(d + e*x)^(1/2),x)
```

```
[Out] int(x*(a + b*asinh(1/(c*x)))*(d + e*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(x*(a+b*acsch(c*x))*(e*x+d)**(1/2),x)
```

```
[Out] Timed out
```

## 3.53 $\int \sqrt{d+ex}\left(a+b\textbf{csch}^{-1}(cx)\right)\,dx$

**Optimal**. Leaf size=429

$$\frac{2(d+ex)^{3/2}\left(a+b\text{csch}^{-1}(cx)\right)}{3e}-\frac{4bd^2\sqrt{c^2x^2+1}\sqrt{\frac{\sqrt{-c^2}(d+ex)}{\sqrt{-c^2}d+e}}\,\Pi\left(2;\sin^{-1}\left(\frac{\sqrt{1-\sqrt{-c^2}x}}{\sqrt{2}}\right)|\frac{2e}{\sqrt{-c^2}d+e}\right)}{3cex\sqrt{\frac{1}{c^2x^2}+1}\sqrt{d+ex}}+\frac{4bcd\sqrt{c^2x^2+1}\ \cdots}{3\cdots}$$

```
[Out] 2/3*(e*x+d)^(3/2)*(a+b*arccsch(c*x))/e+4/3*b*c*EllipticE(1/2*(1-(-c^2)^(1/2
)*x)^(1/2)*2^(1/2),(-2*e*(-c^2)^(1/2)/(c^2*d-e*(-c^2)^(1/2)))^(1/2))*(e*x+d
)^(1/2)*(c^2*x^2+1)^(1/2)/(-c^2)^(3/2)/x/(1+1/c^2/x^2)^(1/2)/((e*x+d)/(d+e/
(-c^2)^(1/2)))^(1/2)+4/3*b*c*d*EllipticF(1/2*(1-(-c^2)^(1/2)*x)^(1/2)*2^(1/
2),(-2*e*(-c^2)^(1/2)/(c^2*d-e*(-c^2)^(1/2)))^(1/2))*(c^2*x^2+1)^(1/2)*((e*
x+d)/(d+e/(-c^2)^(1/2)))^(1/2)/(-c^2)^(3/2)/x/(1+1/c^2/x^2)^(1/2)/(e*x+d)^(
1/2)-4/3*b*d^2*EllipticPi(1/2*(1-(-c^2)^(1/2)*x)^(1/2)*2^(1/2),2,2^(1/2)*(e
/(d*(-c^2)^(1/2)+e))^(1/2))*(c^2*x^2+1)^(1/2)*((e*x+d)*(-c^2)^(1/2)/(d*(-c^
2)^(1/2)+e))^(1/2)/c/e/x/(1+1/c^2/x^2)^(1/2)/(e*x+d)^(1/2)
```

**Rubi [A]** time = 0.71, antiderivative size = 429, 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 = {6290, 1574, 958, 719, 419, 933, 168, 538, 537, 844, 424}

$$\frac{2(d+ex)^{3/2}\left(a+b\text{csch}^{-1}(cx)\right)}{3e}-\frac{4bd^2\sqrt{c^2x^2+1}\sqrt{\frac{\sqrt{-c^2}(d+ex)}{\sqrt{-c^2}d+e}}\,\Pi\left(2;\sin^{-1}\left(\frac{\sqrt{1-\sqrt{-c^2}x}}{\sqrt{2}}\right)|\frac{2e}{\sqrt{-c^2}d+e}\right)}{3cex\sqrt{\frac{1}{c^2x^2}+1}\sqrt{d+ex}}+\frac{4bcd\sqrt{c^2x^2+1}\ \cdots}{3\cdots}$$

Antiderivative was successfully verified.

```
[In] Int[Sqrt[d + e*x]*(a + b*ArcCsch[c*x]),x]
```

```
[Out] (2*(d + e*x)^(3/2)*(a + b*ArcCsch[c*x]))/(3*e) + (4*b*c*Sqrt[d + e*x]*Sqrt[
1 + c^2*x^2]*EllipticE[ArcSin[Sqrt[1 - Sqrt[-c^2]*x]/Sqrt[2]], (-2*Sqrt[-c^
2]*e)/(c^2*d - Sqrt[-c^2]*e)])/(3*(-c^2)^(3/2)*Sqrt[1 + 1/(c^2*x^2)]*x*Sqrt
[(d + e*x)/(d + e/Sqrt[-c^2])]) + (4*b*c*d*Sqrt[(d + e*x)/(d + e/Sqrt[-c^2]
)]*Sqrt[1 + c^2*x^2]*EllipticF[ArcSin[Sqrt[1 - Sqrt[-c^2]*x]/Sqrt[2]], (-2*
Sqrt[-c^2]*e)/(c^2*d - Sqrt[-c^2]*e)])/(3*(-c^2)^(3/2)*Sqrt[1 + 1/(c^2*x^2)
]*x*Sqrt[d + e*x]) - (4*b*d^2*Sqrt[(Sqrt[-c^2]*(d + e*x))/(Sqrt[-c^2]*d + e
)]*Sqrt[1 + c^2*x^2]*EllipticPi[2, ArcSin[Sqrt[1 - Sqrt[-c^2]*x]/Sqrt[2]],
(2*e)/(Sqrt[-c^2]*d + e)])/(3*c*e*Sqrt[1 + 1/(c^2*x^2)]*x*Sqrt[d + e*x])
```

Rule 168

```
Int[1/(((a_.) + (b_.)*(x_))*Sqrt[(c_.) + (d_.)*(x_)]*Sqrt[(e_.) + (f_.)*(x_
)]*Sqrt[(g_.) + (h_.)*(x_)]), x_Symbol] :> Dist[-2, Subst[Int[1/(Simp[b*c -
 a*d - b*x^2, x]*Sqrt[Simp[(d*e - c*f)/d + (f*x^2)/d, x]]*Sqrt[Simp[(d*g -
c*h)/d + (h*x^2)/d, x]]), x], x, Sqrt[c + d*x]], x] /; FreeQ[{a, b, c, d, e
, f, g, h}, x] && GtQ[(d*e - c*f)/d, 0]
```

Rule 419

```
Int[1/(Sqrt[(a_) + (b_.)*(x_)^2]*Sqrt[(c_) + (d_.)*(x_)^2]), x_Symbol] :> S
imp[(1*EllipticF[ArcSin[Rt[-(d/c), 2]*x], (b*c)/(a*d)])/(Sqrt[a]*Sqrt[c]*Rt
[-(d/c), 2]), x] /; FreeQ[{a, b, c, d}, x] && NegQ[d/c] && GtQ[c, 0] && GtQ
[a, 0] &&  !(NegQ[b/a] && SimplerSqrtQ[-(b/a), -(d/c)])
```

Rule 424

```
Int[Sqrt[(a_) + (b_.)*(x_)^2]/Sqrt[(c_) + (d_.)*(x_)^2], x_Symbol] :> Simp[
(Sqrt[a]*EllipticE[ArcSin[Rt[-(d/c), 2]*x], (b*c)/(a*d)])/(Sqrt[c]*Rt[-(d/c
), 2]), x] /; FreeQ[{a, b, c, d}, x] && NegQ[d/c] && GtQ[c, 0] && GtQ[a, 0]
```

Rule 537

```
Int[1/(((a_) + (b_.)*(x_)^2)*Sqrt[(c_) + (d_.)*(x_)^2]*Sqrt[(e_) + (f_.)*(x
_)^2]), x_Symbol] :> Simp[(1*EllipticPi[(b*c)/(a*d), ArcSin[Rt[-(d/c), 2]*x
], (c*f)/(d*e)])/(a*Sqrt[c]*Sqrt[e]*Rt[-(d/c), 2]), x] /; FreeQ[{a, b, c, d
, e, f}, x] &&  !GtQ[d/c, 0] && GtQ[c, 0] && GtQ[e, 0] &&  !( !GtQ[f/e, 0]
&& SimplerSqrtQ[-(f/e), -(d/c)])
```

Rule 538

```
Int[1/(((a_) + (b_.)*(x_)^2)*Sqrt[(c_) + (d_.)*(x_)^2]*Sqrt[(e_) + (f_.)*(x
_)^2]), x_Symbol] :> Dist[Sqrt[1 + (d*x^2)/c]/Sqrt[c + d*x^2], Int[1/((a +
b*x^2)*Sqrt[1 + (d*x^2)/c]*Sqrt[e + f*x^2]), x], x] /; FreeQ[{a, b, c, d, e
, f}, x] &&  !GtQ[c, 0]
```

Rule 719

```
Int[((d_) + (e_.)*(x_))^(m_)/Sqrt[(a_) + (c_.)*(x_)^2], x_Symbol] :> Dist[(
2*a*Rt[-(c/a), 2]*(d + e*x)^m*Sqrt[1 + (c*x^2)/a])/(c*Sqrt[a + c*x^2]*((c*(
d + e*x))/(c*d - a*e*Rt[-(c/a), 2]))^m), Subst[Int[(1 + (2*a*e*Rt[-(c/a), 2
]*x^2)/(c*d - a*e*Rt[-(c/a), 2]))^m/Sqrt[1 - x^2], x], x, Sqrt[(1 - Rt[-(c/
a), 2]*x)/2]], x] /; FreeQ[{a, c, d, e}, x] && NeQ[c*d^2 + a*e^2, 0] && EqQ
[m^2, 1/4]
```

Rule 844

```
Int[((d_.) + (e_.)*(x_))^(m_)*((f_.) + (g_.)*(x_))*((a_) + (c_.)*(x_)^2)^(p
_.), x_Symbol] :> Dist[g/e, Int[(d + e*x)^(m + 1)*(a + c*x^2)^p, x], x] + D
ist[(e*f - d*g)/e, Int[(d + e*x)^m*(a + c*x^2)^p, x], x] /; FreeQ[{a, c, d,
 e, f, g, m, p}, x] && NeQ[c*d^2 + a*e^2, 0] &&  !IGtQ[m, 0]
```

Rule 933

```
Int[1/(((d_.) + (e_.)*(x_))*Sqrt[(f_.) + (g_.)*(x_)]*Sqrt[(a_) + (c_.)*(x_)
^2]), x_Symbol] :> With[{q = Rt[-(c/a), 2]}, Dist[Sqrt[1 + (c*x^2)/a]/Sqrt[
a + c*x^2], Int[1/((d + e*x)*Sqrt[f + g*x]*Sqrt[1 - q*x]*Sqrt[1 + q*x]), x]
, x]] /; FreeQ[{a, c, d, e, f, g}, x] && NeQ[e*f - d*g, 0] && NeQ[c*d^2 + a
*e^2, 0] &&  !GtQ[a, 0]
```

Rule 958

```
Int[((f_.) + (g_.)*(x_))^(n_)/(((d_.) + (e_.)*(x_))*Sqrt[(a_) + (c_.)*(x_)^
2]), x_Symbol] :> Int[ExpandIntegrand[1/(Sqrt[f + g*x]*Sqrt[a + c*x^2]), (f
 + g*x)^(n + 1/2)/(d + e*x), x], x] /; FreeQ[{a, c, d, e, f, g}, x] && NeQ[
e*f - d*g, 0] && NeQ[c*d^2 + a*e^2, 0] && IntegerQ[n + 1/2]
```

Rule 1574

```
Int[(x_)^(m_.)*((a_.) + (c_.)*(x_)^(mn2_.))^(p_)*((d_) + (e_.)*(x_)^(n_.))^
(q_.), x_Symbol] :> Dist[(x^(2*n*FracPart[p])*(a + c/x^(2*n))^FracPart[p])/
(c + a*x^(2*n))^FracPart[p], Int[x^(m - 2*n*p)*(d + e*x^n)^q*(c + a*x^(2*n)
)^p, x], x] /; FreeQ[{a, c, d, e, m, n, p, q}, x] && EqQ[mn2, -2*n] &&  !In
tegerQ[p] &&  !IntegerQ[q] && PosQ[n]
```

Rule 6290

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))*((d_.) + (e_.)*(x_))^(m_.), x_Symbo
l] :> Simp[((d + e*x)^(m + 1)*(a + b*ArcCsch[c*x]))/(e*(m + 1)), x] + Dist[
b/(c*e*(m + 1)), Int[(d + e*x)^(m + 1)/(x^2*Sqrt[1 + 1/(c^2*x^2)]), x], x]
/; FreeQ[{a, b, c, d, e, m}, x] && NeQ[m, -1]
```

Rubi steps

$$\int \sqrt{d+ex}\left(a+b\text{csch}^{-1}(cx)\right)dx = \frac{2(d+ex)^{3/2}\left(a+b\text{csch}^{-1}(cx)\right)}{3e} + \frac{(2b)\int \frac{(d+ex)^{3/2}}{\sqrt{1+\frac{1}{c^2x^2}}\,x^2}\,dx}{3ce}$$

$$= \frac{2(d+ex)^{3/2}\left(a+b\text{csch}^{-1}(cx)\right)}{3e} + \frac{\left(2b\sqrt{\frac{1}{c^2}+x^2}\right)\int \frac{(d+ex)^{3/2}}{x\sqrt{\frac{1}{c^2}+x^2}}\,dx}{3ce\sqrt{1+\frac{1}{c^2x^2}}\,x}$$

$$= \frac{2(d+ex)^{3/2}\left(a+b\text{csch}^{-1}(cx)\right)}{3e} + \frac{\left(2b\sqrt{\frac{1}{c^2}+x^2}\right)\int\left(\frac{2de}{\sqrt{d+ex}\sqrt{\frac{1}{c^2}+x^2}} + \frac{d^2}{x\sqrt{d+ex}\sqrt{\frac{1}{c}\cdots}}\right.}{3ce\sqrt{1+\frac{1}{c^2x^2}}\,x}$$

$$= \frac{2(d+ex)^{3/2}\left(a+b\text{csch}^{-1}(cx)\right)}{3e} + \frac{\left(4bd\sqrt{\frac{1}{c^2}+x^2}\right)\int \frac{1}{\sqrt{d+ex}\sqrt{\frac{1}{c^2}+x^2}}\,dx}{3c\sqrt{1+\frac{1}{c^2x^2}}\,x} + \frac{\left(2bd^2\cdots\right.}{\cdots}$$

$$= \frac{2(d+ex)^{3/2}\left(a+b\text{csch}^{-1}(cx)\right)}{3e} + \frac{\left(2b\sqrt{\frac{1}{c^2}+x^2}\right)\int \frac{\sqrt{d+ex}}{\sqrt{\frac{1}{c^2}+x^2}}\,dx}{3c\sqrt{1+\frac{1}{c^2x^2}}\,x} - \frac{\left(2bd\sqrt{\frac{1}{c^2}+x\cdots}\right.}{3c\cdots}$$

$$= \frac{2(d+ex)^{3/2}\left(a+b\text{csch}^{-1}(cx)\right)}{3e} + \frac{8b\sqrt{-c^2}\,d\sqrt{\frac{d+ex}{d+\frac{e}{\sqrt{-c^2}}}}\sqrt{1+c^2x^2}\,F\left(\sin^{-1}\left(\frac{\sqrt{1-\cdots}}{\cdots}\right.\right.}{3c^3\sqrt{1+\frac{1}{c^2x^2}}\,x\sqrt{d+ex}\cdots}$$

$$= \frac{2(d+ex)^{3/2}\left(a+b\text{csch}^{-1}(cx)\right)}{3e} + \frac{4b\sqrt{-c^2}\sqrt{d+ex}\sqrt{1+c^2x^2}\,E\left(\sin^{-1}\left(\frac{\sqrt{1-\sqrt{-\cdots}}}{\sqrt{2}}\right.\right.}{3c^3\sqrt{1+\frac{1}{c^2x^2}}\,x\sqrt{\frac{d+ex}{d+\frac{e}{\sqrt{-c^2}}}}\cdots}$$

$$= \frac{2(d+ex)^{3/2}\left(a+b\text{csch}^{-1}(cx)\right)}{3e} + \frac{4b\sqrt{-c^2}\sqrt{d+ex}\sqrt{1+c^2x^2}\,E\left(\sin^{-1}\left(\frac{\sqrt{1-\sqrt{-\cdots}}}{\sqrt{2}}\right.\right.}{3c^3\sqrt{1+\frac{1}{c^2x^2}}\,x\sqrt{\frac{d+ex}{d+\frac{e}{\sqrt{-c^2}}}}\cdots}$$

**Mathematica [C]** time = 14.08, size = 926, normalized size = 2.16

$$\frac{2a(d+ex)^{3/2}}{3e}+\frac{b\left(-\frac{(cd+cex)\left(-\frac{2}{3}cx\operatorname{csch}^{-1}(cx)-\frac{2cd\operatorname{csch}^{-1}(cx)}{3e}-\frac{4}{3}\sqrt{1+\frac{1}{c^2x^2}}\right)}{\sqrt{d+ex}}-\frac{2(cd+cex)\left(-\frac{\sqrt{2}cde\sqrt{icx+1}(cx+i)\sqrt{\frac{cd+cex}{cd-ie}}F\left(\sin^{-1}\left(\sqrt{-\frac{e(cx+i)}{cd-ie}}\right)|\frac{icd+e}{2e}\right)}{\sqrt{1+\frac{1}{c^2x^2}}\sqrt{\frac{d}{x}+e}(cx)^{3/2}\sqrt{\frac{e(1-icx)}{icd+e}}}\cdots\right)}{\cdots}\right)}{\cdots}$$

Antiderivative was successfully verified.

```
[In] Integrate[Sqrt[d + e*x]*(a + b*ArcCsch[c*x]),x]
```

```
[Out] (2*a*(d + e*x)^(3/2))/(3*e) + (b*(-(((c*d + c*e*x)*((-4*Sqrt[1 + 1/(c^2*x^2
)])/3 - (2*c*d*ArcCsch[c*x])/(3*e) - (2*c*x*ArcCsch[c*x])/3))/Sqrt[d + e*x]
) - (2*(c*d + c*e*x)*(-((Sqrt[2]*c*d*e*Sqrt[1 + I*c*x]*(I + c*x)*Sqrt[(c*d
+ c*e*x)/(c*d - I*e)]*EllipticF[ArcSin[Sqrt[-((e*(I + c*x))/(c*d - I*e))]],
 (I*c*d + e)/(2*e)])/(Sqrt[1 + 1/(c^2*x^2)]*Sqrt[e + d/x]*(c*x)^(3/2)*Sqrt[
(e*(1 - I*c*x))/(I*c*d + e)])) + (I*Sqrt[2]*(c*d - I*e)*(c^2*d^2 + e^2)*Sqr
t[1 + I*c*x]*Sqrt[(e*(I + c*x)*(c*d + c*e*x))/(I*c*d + e)^2]*EllipticPi[1 +
 (I*c*d)/e, ArcSin[Sqrt[-((e*(I + c*x))/(c*d - I*e))]], (I*c*d + e)/(2*e)])
/(e*Sqrt[1 + 1/(c^2*x^2)]*Sqrt[e + d/x]*(c*x)^(3/2)) - (2*e*Cosh[2*ArcCsch[
c*x]]*(-((c*d + c*e*x)*(1 + c^2*x^2)) + (c*x*(c*d*Sqrt[2 + (2*I)*c*x]*(I +
c*x)*Sqrt[(c*d + c*e*x)/(c*d - I*e)]*EllipticF[ArcSin[Sqrt[-((e*(I + c*x))/
(c*d - I*e))]], (I*c*d + e)/(2*e)] + 2*Sqrt[-((e*(-I + c*x))/(c*d + I*e))]*
(I + c*x)*Sqrt[(c*d + c*e*x)/(c*d - I*e)]*((c*d + I*e)*EllipticE[ArcSin[Sqr
t[(c*d + c*e*x)/(c*d - I*e)]], (c*d - I*e)/(c*d + I*e)] - I*e*EllipticF[Arc
Sin[Sqrt[(c*d + c*e*x)/(c*d - I*e)]], (c*d - I*e)/(c*d + I*e)]) + (I*c*d +
e)*Sqrt[2 + (2*I)*c*x]*Sqrt[-((e*(I + c*x))/(c*d - I*e))]*Sqrt[(e*(I + c*x)
*(c*d + c*e*x))/(I*c*d + e)^2]*EllipticPi[1 + (I*c*d)/e, ArcSin[Sqrt[-((e*(
I + c*x))/(c*d - I*e))]], (I*c*d + e)/(2*e)]))/(2*Sqrt[-((e*(I + c*x))/(c*d
 - I*e))])))/(Sqrt[1 + 1/(c^2*x^2)]*Sqrt[e + d/x]*Sqrt[c*x]*(2 + c^2*x^2)))
)/(3*e*Sqrt[e + d/x]*Sqrt[c*x]*Sqrt[d + e*x])))/c^2
```

**fricas [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*arccsch(c*x))*(e*x+d)^(1/2),x, algorithm="fricas")
```

```
[Out] Timed out
```

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

$$\int \sqrt{ex+d}\,(b\operatorname{arcsch}(cx)+a)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))*(e*x+d)^(1/2),x, algorithm="giac")
```

```
[Out] integrate(sqrt(e*x + d)*(b*arccsch(c*x) + a), x)
```

**maple [C]** time = 0.08, size = 840, normalized size = 1.96

$$\frac{\frac{2a(ex+d)^{\frac{3}{2}}}{3}+2b\left(\frac{(ex+d)^{\frac{3}{2}}\operatorname{arccsch}(cx)}{3}+\frac{2\sqrt{-\frac{i(ex+d)ce+(ex+d)c^2d-c^2d^2-e^2}{c^2d^2+e^2}}\,\sqrt{\frac{i(ex+d)ce-(ex+d)c^2d+c^2d^2+e^2}{c^2d^2+e^2}}\left(i\,\mathrm{EllipticF}\left(\sqrt{ex+d}\,\sqrt{\frac{(cd+ie)c}{c^2d^2+e^2}},\sqrt{-\frac{-c^2d^2+2}{c^2d^2}}\right.\right.}{}\right.}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a+b*arccsch(c*x))*(e*x+d)^(1/2),x)
```

```
[Out] 2/e*(1/3*a*(e*x+d)^(3/2)+b*(1/3*(e*x+d)^(3/2)*arccsch(c*x)+2/3/c^2*(-(I*(e*
x+d)*c*e+(e*x+d)*c^2*d-c^2*d^2-e^2)/(c^2*d^2+e^2))^(1/2)*((I*(e*x+d)*c*e-(e
*x+d)*c^2*d+c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2)*(I*EllipticF((e*x+d)^(1/2)*((
I*e+c*d)*c/(c^2*d^2+e^2))^(1/2),(-(2*I*c*d*e-c^2*d^2+e^2)/(c^2*d^2+e^2))^(1
/2))*c*d*e-2*EllipticF((e*x+d)^(1/2)*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2),(-(2
*I*c*d*e-c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2))*c^2*d^2+EllipticE((e*x+d)^(1/2)
*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2),(-(2*I*c*d*e-c^2*d^2+e^2)/(c^2*d^2+e^2))
^(1/2))*c^2*d^2-I*EllipticPi((e*x+d)^(1/2)*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2
),1/(I*e+c*d)/c*(c^2*d^2+e^2)/d,(-(I*e-c*d)*c/(c^2*d^2+e^2))^(1/2)/((I*e+c*
d)*c/(c^2*d^2+e^2))^(1/2))*c*d*e+EllipticPi((e*x+d)^(1/2)*((I*e+c*d)*c/(c^2
*d^2+e^2))^(1/2),1/(I*e+c*d)/c*(c^2*d^2+e^2)/d,(-(I*e-c*d)*c/(c^2*d^2+e^2))
^(1/2)/((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2))*c^2*d^2-EllipticF((e*x+d)^(1/2)*(
(I*e+c*d)*c/(c^2*d^2+e^2))^(1/2),(-(2*I*c*d*e-c^2*d^2+e^2)/(c^2*d^2+e^2))^(
1/2))*e^2+EllipticE((e*x+d)^(1/2)*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2),(-(2*I*
c*d*e-c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2))*e^2)/(((e*x+d)^2*c^2-2*(e*x+d)*c^2
*d+c^2*d^2+e^2)/c^2/x^2/e^2)^(1/2)/x/((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2)/(I*e
-c*d)))
```

**maxima [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*arccsch(c*x))*(e*x+d)^(1/2),x, algorithm="maxima")
[Out] Timed out
```

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

$$\int \left(a + b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)\right)\sqrt{d + e\,x}\;dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a + b*asinh(1/(c*x)))*(d + e*x)^(1/2),x)
[Out] int((a + b*asinh(1/(c*x)))*(d + e*x)^(1/2), x)
```

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

$$\int (a + b\,\mathrm{acsch}\,(cx))\sqrt{d + ex}\;dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*acsch(c*x))*(e*x+d)**(1/2),x)
[Out] Integral((a + b*acsch(c*x))*sqrt(d + e*x), x)
```

## 3.54 $\int \frac{\sqrt{d+ex}\left(a+b\mathbf{csch}^{-1}(cx)\right)}{x}\,dx$

**Optimal**. Leaf size=24

$$\text{Int}\left(\frac{\sqrt{d+ex}\,\left(a+b\text{csch}^{-1}(cx)\right)}{x},x\right)$$

```
[Out] Unintegrable((a+b*arccsch(c*x))*(e*x+d)^(1/2)/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 = {}

$$\int \frac{\sqrt{d+ex}\,\left(a+b\text{csch}^{-1}(cx)\right)}{x}\,dx$$

Verification is Not applicable to the result.

```
[In] Int[(Sqrt[d + e*x]*(a + b*ArcCsch[c*x]))/x,x]
```

```
[Out] Defer[Int][(Sqrt[d + e*x]*(a + b*ArcCsch[c*x]))/x, x]
```

Rubi steps

$$\int \frac{\sqrt{d+ex}\,\left(a+b\text{csch}^{-1}(cx)\right)}{x}\,dx = \int \frac{\sqrt{d+ex}\,\left(a+b\text{csch}^{-1}(cx)\right)}{x}\,dx$$

**Mathematica** [A] time = 19.51, size = 0, normalized size = 0.00

$$\int \frac{\sqrt{d+ex}\,\left(a+b\text{csch}^{-1}(cx)\right)}{x}\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[(Sqrt[d + e*x]*(a + b*ArcCsch[c*x]))/x,x]
```

```
[Out] Integrate[(Sqrt[d + e*x]*(a + b*ArcCsch[c*x]))/x, x]
```

**fricas** [A] time = 0.57, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{\sqrt{ex+d}\,(b\,\text{arcsch}\,(cx)+a)}{x},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))*(e*x+d)^(1/2)/x,x, algorithm="fricas")
```

```
[Out] integral(sqrt(e*x + d)*(b*arccsch(c*x) + a)/x, x)
```

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

$$\int \frac{\sqrt{ex+d}\,(b\,\mathrm{arcsch}\,(cx)+a)}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))*(e*x+d)^(1/2)/x,x, algorithm="giac")
```

```
[Out] integrate(sqrt(e*x + d)*(b*arccsch(c*x) + a)/x, x)
```

**maple [A]** time = 6.87, size = 0, normalized size = 0.00

$$\int \frac{(a+b\,\mathrm{arccsch}\,(cx))\,\sqrt{ex+d}}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a+b*arccsch(c*x))*(e*x+d)^(1/2)/x,x)
```

```
[Out] int((a+b*arccsch(c*x))*(e*x+d)^(1/2)/x,x)
```

**maxima [A]** time = 0.00, size = 0, normalized size = 0.00

$$\left(\sqrt{d}\,\log\left(\frac{\sqrt{ex+d}-\sqrt{d}}{\sqrt{ex+d}+\sqrt{d}}\right)+2\,\sqrt{ex+d}\right)a-\left(\left(\sqrt{d}\,\log\left(\frac{\sqrt{ex+d}-\sqrt{d}}{\sqrt{ex+d}+\sqrt{d}}\right)+2\,\sqrt{ex+d}\right)\log(c)+\int\frac{\sqrt{ex+d}\,\log(x}{x}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))*(e*x+d)^(1/2)/x,x, algorithm="maxima")
```

```
[Out] (sqrt(d)*log((sqrt(e*x + d) - sqrt(d))/(sqrt(e*x + d) + sqrt(d))) + 2*sqrt(
e*x + d))*a - ((sqrt(d)*log((sqrt(e*x + d) - sqrt(d))/(sqrt(e*x + d) + sqrt
(d))) + 2*sqrt(e*x + d))*log(c) + integrate(sqrt(e*x + d)*log(x)/x, x) - in
tegrate(sqrt(e*x + d)*log(sqrt(c^2*x^2 + 1) + 1)/x, x))*b
```

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

$$\int \frac{\left(a+b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)\right)\,\sqrt{d+e\,x}}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(((a + b*asinh(1/(c*x)))*(d + e*x)^(1/2))/x,x)
```

```
[Out] int(((a + b*asinh(1/(c*x)))*(d + e*x)^(1/2))/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*acsch(c*x))*(e*x+d)**(1/2)/x,x)
```

```
[Out] Timed out
```

## 3.55 $\int \frac{\sqrt{d+ex}\left(a+b\text{csch}^{-1}(cx)\right)}{x^2}\,dx$

**Optimal**. Leaf size=24

$$\text{Int}\left(\frac{\sqrt{d+ex}\left(a+b\text{csch}^{-1}(cx)\right)}{x^2},x\right)$$

[Out] Unintegrable((a+b*arccsch(c*x))*(e*x+d)^(1/2)/x^2,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 = {}

$$\int \frac{\sqrt{d+ex}\left(a+b\text{csch}^{-1}(cx)\right)}{x^2}\,dx$$

Verification is Not applicable to the result.

[In] Int[(Sqrt[d + e*x]*(a + b*ArcCsch[c*x]))/x^2,x]

[Out] Defer[Int][(Sqrt[d + e*x]*(a + b*ArcCsch[c*x]))/x^2, x]

Rubi steps

$$\int \frac{\sqrt{d+ex}\left(a+b\text{csch}^{-1}(cx)\right)}{x^2}\,dx=\int \frac{\sqrt{d+ex}\left(a+b\text{csch}^{-1}(cx)\right)}{x^2}\,dx$$

**Mathematica [A]** time = 7.97, size = 0, normalized size = 0.00

$$\int \frac{\sqrt{d+ex}\left(a+b\text{csch}^{-1}(cx)\right)}{x^2}\,dx$$

Verification is Not applicable to the result.

[In] Integrate[(Sqrt[d + e*x]*(a + b*ArcCsch[c*x]))/x^2,x]

[Out] Integrate[(Sqrt[d + e*x]*(a + b*ArcCsch[c*x]))/x^2, x]

**fricas [A]** time = 0.92, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{\sqrt{ex+d}\,(b\,\text{arcsch}\,(cx)+a)}{x^2},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))*(e*x+d)^(1/2)/x^2,x, algorithm="fricas")
[Out] integral(sqrt(e*x + d)*(b*arccsch(c*x) + a)/x^2, x)
```

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

$$\int \frac{\sqrt{ex+d}\,(b\,\mathrm{arcsch}\,(cx)+a)}{x^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))*(e*x+d)^(1/2)/x^2,x, algorithm="giac")
[Out] integrate(sqrt(e*x + d)*(b*arccsch(c*x) + a)/x^2, x)
```

**maple [A]** time = 5.92, size = 0, normalized size = 0.00

$$\int \frac{(a+b\,\mathrm{arccsch}\,(cx))\,\sqrt{ex+d}}{x^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a+b*arccsch(c*x))*(e*x+d)^(1/2)/x^2,x)
[Out] int((a+b*arccsch(c*x))*(e*x+d)^(1/2)/x^2,x)
```

**maxima [A]** time = 0.00, size = 0, normalized size = 0.00

$$\frac{1}{2}\left(\frac{e\log\left(\frac{\sqrt{ex+d}-\sqrt{d}}{\sqrt{ex+d}+\sqrt{d}}\right)}{\sqrt{d}}-\frac{2\sqrt{ex+d}}{x}\right)a-\frac{1}{2}\left(\left(\frac{e\log\left(\frac{\sqrt{ex+d}-\sqrt{d}}{\sqrt{ex+d}+\sqrt{d}}\right)}{\sqrt{d}}-\frac{2\sqrt{ex+d}}{x}\right)\log(c)+2\int\frac{\sqrt{ex+d}\,\log(x)}{x^2}\,dx-2$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))*(e*x+d)^(1/2)/x^2,x, algorithm="maxima")
[Out] 1/2*(e*log((sqrt(e*x + d) - sqrt(d))/(sqrt(e*x + d) + sqrt(d)))/sqrt(d) - 2
*sqrt(e*x + d)/x)*a - 1/2*((e*log((sqrt(e*x + d) - sqrt(d))/(sqrt(e*x + d)
+ sqrt(d)))/sqrt(d) - 2*sqrt(e*x + d)/x)*log(c) + 2*integrate(sqrt(e*x + d)
*log(x)/x^2, x) - 2*integrate(sqrt(e*x + d)*log(sqrt(c^2*x^2 + 1) + 1)/x^2,
 x))*b
```

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

$$\int \frac{\left(a+b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)\right)\,\sqrt{d+e\,x}}{x^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(((a + b*asinh(1/(c*x)))*(d + e*x)^(1/2))/x^2,x)
```

```
[Out] int(((a + b*asinh(1/(c*x)))*(d + e*x)^(1/2))/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*acsch(c*x))*(e*x+d)**(1/2)/x**2,x)
```

```
[Out] Timed out
```

## 3.56 $\int (d+ex)^{3/2} \left(a+b\,\mathrm{csch}^{-1}(cx)\right) dx$

**Optimal**. Leaf size=486

$$\frac{2(d+ex)^{5/2}\left(a+b\operatorname{csch}^{-1}(cx)\right)}{5e}-\frac{4bd^3\sqrt{c^2x^2+1}\sqrt{\frac{\sqrt{-c^2}(d+ex)}{\sqrt{-c^2}d+e}}\,\Pi\left(2;\sin^{-1}\left(\frac{\sqrt{1-\sqrt{-c^2}x}}{\sqrt{2}}\right)|\frac{2e}{\sqrt{-c^2}d+e}\right)}{5cex\sqrt{\frac{1}{c^2x^2}+1}\sqrt{d+ex}}-\frac{4bc\sqrt{c^2x^2+1}\left(2c\right.}{}$$

```
[Out] 2/5*(e*x+d)^(5/2)*(a+b*arccsch(c*x))/e+4/15*b*e*(c^2*x^2+1)*(e*x+d)^(1/2)/c
^3/x/(1+1/c^2/x^2)^(1/2)+28/15*b*c*d*EllipticE(1/2*(1-(-c^2)^(1/2)*x)^(1/2)
*2^(1/2),(-2*e*(-c^2)^(1/2)/(c^2*d-e*(-c^2)^(1/2)))^(1/2))*(e*x+d)^(1/2)*(c
^2*x^2+1)^(1/2)/(-c^2)^(3/2)/x/(1+1/c^2/x^2)^(1/2)/((e*x+d)/(d+e/(-c^2)^(1/
2)))^(1/2)-4/15*b*c*(2*c^2*d^2-e^2)*EllipticF(1/2*(1-(-c^2)^(1/2)*x)^(1/2)*
2^(1/2),(-2*e*(-c^2)^(1/2)/(c^2*d-e*(-c^2)^(1/2)))^(1/2))*(c^2*x^2+1)^(1/2)
*((e*x+d)/(d+e/(-c^2)^(1/2)))^(1/2)/(-c^2)^(5/2)/x/(1+1/c^2/x^2)^(1/2)/(e*x
+d)^(1/2)-4/5*b*d^3*EllipticPi(1/2*(1-(-c^2)^(1/2)*x)^(1/2)*2^(1/2),2,2^(1/
2)*(e/(d*(-c^2)^(1/2)+e))^(1/2))*(c^2*x^2+1)^(1/2)*((e*x+d)*(-c^2)^(1/2)/(d
*(-c^2)^(1/2)+e))^(1/2)/c/e/x/(1+1/c^2/x^2)^(1/2)/(e*x+d)^(1/2)
```

**Rubi [A]** time = 1.02, antiderivative size = 486, normalized size of antiderivative = 1.00, number of steps used = 22, number of rules used = 13, integrand size = 18, $\frac{\text{number of rules}}{\text{integrand size}} = 0.722$, Rules used = {6290, 1574, 958, 719, 419, 933, 168, 538, 537, 844, 424, 931, 1584}

$$\frac{2(d+ex)^{5/2}\left(a+b\operatorname{csch}^{-1}(cx)\right)}{5e}-\frac{4bc\sqrt{c^2x^2+1}\left(2c^2d^2-e^2\right)\sqrt{\frac{d+ex}{\frac{e}{\sqrt{-c^2}}+d}}\,F\left(\sin^{-1}\left(\frac{\sqrt{1-\sqrt{-c^2}x}}{\sqrt{2}}\right)|-\frac{2\sqrt{-c^2}e}{c^2d-\sqrt{-c^2}e}\right)}{15\left(-c^2\right)^{5/2}x\sqrt{\frac{1}{c^2x^2}+1}\sqrt{d+ex}}-\frac{4bd^3\sqrt{c}}{}$$

Antiderivative was successfully verified.

```
[In] Int[(d + e*x)^(3/2)*(a + b*ArcCsch[c*x]),x]
```

```
[Out] (4*b*e*Sqrt[d + e*x]*(1 + c^2*x^2))/(15*c^3*Sqrt[1 + 1/(c^2*x^2)]*x) + (2*(
d + e*x)^(5/2)*(a + b*ArcCsch[c*x]))/(5*e) + (28*b*c*d*Sqrt[d + e*x]*Sqrt[1
 + c^2*x^2]*EllipticE[ArcSin[Sqrt[1 - Sqrt[-c^2]*x]/Sqrt[2]], (-2*Sqrt[-c^2
]*e)/(c^2*d - Sqrt[-c^2]*e)])/(15*(-c^2)^(3/2)*Sqrt[1 + 1/(c^2*x^2)]*x*Sqrt
[(d + e*x)/(d + e/Sqrt[-c^2])]) - (4*b*c*(2*c^2*d^2 - e^2)*Sqrt[(d + e*x)/(
d + e/Sqrt[-c^2])]*Sqrt[1 + c^2*x^2]*EllipticF[ArcSin[Sqrt[1 - Sqrt[-c^2]*x
]/Sqrt[2]], (-2*Sqrt[-c^2]*e)/(c^2*d - Sqrt[-c^2]*e)])/(15*(-c^2)^(5/2)*Sqr
t[1 + 1/(c^2*x^2)]*x*Sqrt[d + e*x]) - (4*b*d^3*Sqrt[(Sqrt[-c^2]*(d + e*x))/
(Sqrt[-c^2]*d + e)]*Sqrt[1 + c^2*x^2]*EllipticPi[2, ArcSin[Sqrt[1 - Sqrt[-c
```

```
^2]*x]/Sqrt[2]], (2*e)/(Sqrt[-c^2]*d + e)])/(5*c*e*Sqrt[1 + 1/(c^2*x^2)]*x*
Sqrt[d + e*x])
```

Rule 168

```
Int[1/(((a_.) + (b_.)*(x_))*Sqrt[(c_.) + (d_.)*(x_)]*Sqrt[(e_.) + (f_.)*(x_
)]*Sqrt[(g_.) + (h_.)*(x_)]), x_Symbol] :> Dist[-2, Subst[Int[1/(Simp[b*c -
 a*d - b*x^2, x]*Sqrt[Simp[(d*e - c*f)/d + (f*x^2)/d, x]]*Sqrt[Simp[(d*g -
c*h)/d + (h*x^2)/d, x]]), x], x, Sqrt[c + d*x]], x] /; FreeQ[{a, b, c, d, e
, f, g, h}, x] && GtQ[(d*e - c*f)/d, 0]
```

Rule 419

```
Int[1/(Sqrt[(a_) + (b_.)*(x_)^2]*Sqrt[(c_) + (d_.)*(x_)^2]), x_Symbol] :> S
imp[(1*EllipticF[ArcSin[Rt[-(d/c), 2]*x], (b*c)/(a*d)])/(Sqrt[a]*Sqrt[c]*Rt
[-(d/c), 2]), x] /; FreeQ[{a, b, c, d}, x] && NegQ[d/c] && GtQ[c, 0] && GtQ
[a, 0] &&  !(NegQ[b/a] && SimplerSqrtQ[-(b/a), -(d/c)])
```

Rule 424

```
Int[Sqrt[(a_) + (b_.)*(x_)^2]/Sqrt[(c_) + (d_.)*(x_)^2], x_Symbol] :> Simp[
(Sqrt[a]*EllipticE[ArcSin[Rt[-(d/c), 2]*x], (b*c)/(a*d)])/(Sqrt[c]*Rt[-(d/c
), 2]), x] /; FreeQ[{a, b, c, d}, x] && NegQ[d/c] && GtQ[c, 0] && GtQ[a, 0]
```

Rule 537

```
Int[1/(((a_) + (b_.)*(x_)^2)*Sqrt[(c_) + (d_.)*(x_)^2]*Sqrt[(e_) + (f_.)*(x
_)^2]), x_Symbol] :> Simp[(1*EllipticPi[(b*c)/(a*d), ArcSin[Rt[-(d/c), 2]*x
], (c*f)/(d*e)])/(a*Sqrt[c]*Sqrt[e]*Rt[-(d/c), 2]), x] /; FreeQ[{a, b, c, d
, e, f}, x] &&  !GtQ[d/c, 0] && GtQ[c, 0] && GtQ[e, 0] &&  !( !GtQ[f/e, 0]
&& SimplerSqrtQ[-(f/e), -(d/c)])
```

Rule 538

```
Int[1/(((a_) + (b_.)*(x_)^2)*Sqrt[(c_) + (d_.)*(x_)^2]*Sqrt[(e_) + (f_.)*(x
_)^2]), x_Symbol] :> Dist[Sqrt[1 + (d*x^2)/c]/Sqrt[c + d*x^2], Int[1/((a +
b*x^2)*Sqrt[1 + (d*x^2)/c]*Sqrt[e + f*x^2]), x], x] /; FreeQ[{a, b, c, d, e
, f}, x] &&  !GtQ[c, 0]
```

Rule 719

```
Int[((d_) + (e_.)*(x_))^(m_)/Sqrt[(a_) + (c_.)*(x_)^2], x_Symbol] :> Dist[(
2*a*Rt[-(c/a), 2]*(d + e*x)^m*Sqrt[1 + (c*x^2)/a])/(c*Sqrt[a + c*x^2]*((c*(
d + e*x))/(c*d - a*e*Rt[-(c/a), 2]))^m), Subst[Int[(1 + (2*a*e*Rt[-(c/a), 2
]*x^2)/(c*d - a*e*Rt[-(c/a), 2]))^m/Sqrt[1 - x^2], x], x, Sqrt[(1 - Rt[-(c/
a), 2]*x)/2]], x] /; FreeQ[{a, c, d, e}, x] && NeQ[c*d^2 + a*e^2, 0] && EqQ
```

```
[m^2, 1/4]
```

Rule 844

```
Int[((d_.) + (e_.)*(x_))^(m_)*((f_.) + (g_.)*(x_))*((a_) + (c_.)*(x_)^2)^(p
_.), x_Symbol] :> Dist[g/e, Int[(d + e*x)^(m + 1)*(a + c*x^2)^p, x], x] + D
ist[(e*f - d*g)/e, Int[(d + e*x)^m*(a + c*x^2)^p, x], x] /; FreeQ[{a, c, d,
 e, f, g, m, p}, x] && NeQ[c*d^2 + a*e^2, 0] &&  !IGtQ[m, 0]
```

Rule 931

```
Int[((d_.) + (e_.)*(x_))^(m_)/(Sqrt[(f_.) + (g_.)*(x_)]*Sqrt[(a_) + (c_.)*(
x_)^2]), x_Symbol] :> Simp[(2*e^2*(d + e*x)^(m - 2)*Sqrt[f + g*x]*Sqrt[a +
c*x^2])/(c*g*(2*m - 1)), x] - Dist[1/(c*g*(2*m - 1)), Int[((d + e*x)^(m - 3
)*Simp[a*e^2*(d*g + 2*e*f*(m - 2)) - c*d^3*g*(2*m - 1) + e*(e*(a*e*g*(2*m -
 3)) + c*d*(2*e*f - 3*d*g*(2*m - 1)))*x + 2*e^2*(c*e*f - 3*c*d*g)*(m - 1)*x
^2, x])/(Sqrt[f + g*x]*Sqrt[a + c*x^2]), x], x] /; FreeQ[{a, c, d, e, f, g}
, x] && NeQ[e*f - d*g, 0] && NeQ[c*d^2 + a*e^2, 0] && IntegerQ[2*m] && GeQ[
m, 2]
```

Rule 933

```
Int[1/(((d_.) + (e_.)*(x_))*Sqrt[(f_.) + (g_.)*(x_)]*Sqrt[(a_) + (c_.)*(x_)
^2]), x_Symbol] :> With[{q = Rt[-(c/a), 2]}, Dist[Sqrt[1 + (c*x^2)/a]/Sqrt[
a + c*x^2], Int[1/((d + e*x)*Sqrt[f + g*x]*Sqrt[1 - q*x]*Sqrt[1 + q*x]), x]
, x]] /; FreeQ[{a, c, d, e, f, g}, x] && NeQ[e*f - d*g, 0] && NeQ[c*d^2 + a
*e^2, 0] &&  !GtQ[a, 0]
```

Rule 958

```
Int[((f_.) + (g_.)*(x_))^(n_)/(((d_.) + (e_.)*(x_))*Sqrt[(a_) + (c_.)*(x_)^
2]), x_Symbol] :> Int[ExpandIntegrand[1/(Sqrt[f + g*x]*Sqrt[a + c*x^2]), (f
 + g*x)^(n + 1/2)/(d + e*x), x], x] /; FreeQ[{a, c, d, e, f, g}, x] && NeQ[
e*f - d*g, 0] && NeQ[c*d^2 + a*e^2, 0] && IntegerQ[n + 1/2]
```

Rule 1574

```
Int[(x_)^(m_.)*((a_.) + (c_.)*(x_)^(mn2_.))^(p_)*((d_) + (e_.)*(x_)^(n_.))^
(q_.), x_Symbol] :> Dist[(x^(2*n*FracPart[p])*(a + c/x^(2*n))^FracPart[p])/
(c + a*x^(2*n))^FracPart[p], Int[x^(m - 2*n*p)*(d + e*x^n)^q*(c + a*x^(2*n)
)^p, x], x] /; FreeQ[{a, c, d, e, m, n, p, q}, x] && EqQ[mn2, -2*n] &&  !In
tegerQ[p] &&  !IntegerQ[q] && PosQ[n]
```

Rule 1584

```
Int[(u_.)*(x_)^(m_.)*((a_.)*(x_)^(p_.) + (b_.)*(x_)^(q_.))^(n_.), x_Symbol]
 :> Int[u*x^(m + n*p)*(a + b*x^(q - p))^n, x] /; FreeQ[{a, b, m, p, q}, x]
&& IntegerQ[n] && PosQ[q - p]
```

Rule 6290

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))*((d_.) + (e_.)*(x_))^(m_.), x_Symbo
l] :> Simp[((d + e*x)^(m + 1)*(a + b*ArcCsch[c*x]))/(e*(m + 1)), x] + Dist[
b/(c*e*(m + 1)), Int[(d + e*x)^(m + 1)/(x^2*Sqrt[1 + 1/(c^2*x^2)]), x], x]
/; FreeQ[{a, b, c, d, e, m}, x] && NeQ[m, -1]
```

Rubi steps

$$\int (d+ex)^{3/2}\left(a+b\operatorname{csch}^{-1}(cx)\right)dx = \frac{2(d+ex)^{5/2}\left(a+b\operatorname{csch}^{-1}(cx)\right)}{5e} + \frac{(2b)\int \frac{(d+ex)^{5/2}}{\sqrt{1+\frac{1}{c^2x^2}}\,x^2}\,dx}{5ce}$$

$$= \frac{2(d+ex)^{5/2}\left(a+b\operatorname{csch}^{-1}(cx)\right)}{5e} + \frac{\left(2b\sqrt{\frac{1}{c^2}+x^2}\right)\int \frac{(d+ex)^{5/2}}{x\sqrt{\frac{1}{c^2}+x^2}}\,dx}{5ce\sqrt{1+\frac{1}{c^2x^2}}\,x}$$

$$= \frac{2(d+ex)^{5/2}\left(a+b\operatorname{csch}^{-1}(cx)\right)}{5e} + \frac{\left(2b\sqrt{\frac{1}{c^2}+x^2}\right)\int \left(\frac{3d^2e}{\sqrt{d+ex}\sqrt{\frac{1}{c^2}+x^2}} + \frac{d^3}{x\sqrt{d+ex}\sqrt{\ldots}}\ldots\right.}{5ce\sqrt{1\ldots}}$$

$$= \frac{2(d+ex)^{5/2}\left(a+b\operatorname{csch}^{-1}(cx)\right)}{5e} + \frac{\left(6bd^2\sqrt{\frac{1}{c^2}+x^2}\right)\int \frac{1}{\sqrt{d+ex}\sqrt{\frac{1}{c^2}+x^2}}\,dx}{5c\sqrt{1+\frac{1}{c^2x^2}}\,x} + \frac{\left(2b\ldots\right.}{\ldots}$$

$$= \frac{4be\sqrt{d+ex}\left(1+c^2x^2\right)}{15c^3\sqrt{1+\frac{1}{c^2x^2}}\,x} + \frac{2(d+ex)^{5/2}\left(a+b\operatorname{csch}^{-1}(cx)\right)}{5e} + \frac{\left(6bd\sqrt{\frac{1}{c^2}+x^2}\right)\ldots}{5c\sqrt{1+\ldots}}$$

$$= \frac{4be\sqrt{d+ex}\left(1+c^2x^2\right)}{15c^3\sqrt{1+\frac{1}{c^2x^2}}\,x} + \frac{2(d+ex)^{5/2}\left(a+b\operatorname{csch}^{-1}(cx)\right)}{5e} + \frac{12b\sqrt{-c^2}\,d^2\sqrt{\frac{\ldots}{d+\ldots}}\ldots}{\ldots}$$

$$= \frac{4be\sqrt{d+ex}\left(1+c^2x^2\right)}{15c^3\sqrt{1+\frac{1}{c^2x^2}}\,x} + \frac{2(d+ex)^{5/2}\left(a+b\operatorname{csch}^{-1}(cx)\right)}{5e} + \frac{12b\sqrt{-c^2}\,d\sqrt{d+\ldots}}{\ldots}$$

$$= \frac{4be\sqrt{d+ex}\left(1+c^2x^2\right)}{15c^3\sqrt{1+\frac{1}{c^2x^2}}\,x} + \frac{2(d+ex)^{5/2}\left(a+b\operatorname{csch}^{-1}(cx)\right)}{5e} + \frac{12b\sqrt{-c^2}\,d\sqrt{d+\ldots}}{\ldots}$$

**Mathematica [C]** time = 1.61, size = 380, normalized size = 0.78

$$\frac{2\left(3a(d+ex)^{5/2}+\frac{2be^2x\sqrt{\frac{1}{c^2x^2}+1}\sqrt{d+ex}}{c}+\frac{2ib\sqrt{-\frac{e(cx-i)}{cd+ie}}\sqrt{-\frac{e(cx+i)}{cd-ie}}\left(\left(-9c^2d^2-7icde+e^2\right)F\left(i\sinh^{-1}\left(\sqrt{-\frac{c}{cd-ie}}\sqrt{d+ex}\right)|\frac{cd-ie}{cd+ie}\right)+3c^2d^2\Pi\left(1-\frac{ie}{cd}\cdots\right.\right.}{c^3x\sqrt{\frac{1}{c^2x^2}+1}\sqrt{-\cdots}}\cdots\right.}{15e}$$

Antiderivative was successfully verified.

```
[In] Integrate[(d + e*x)^(3/2)*(a + b*ArcCsch[c*x]),x]
```

```
[Out] (2*((2*b*e^2*Sqrt[1 + 1/(c^2*x^2)]*x*Sqrt[d + e*x])/c + 3*a*(d + e*x)^(5/2)
 + 3*b*(d + e*x)^(5/2)*ArcCsch[c*x] + ((2*I)*b*Sqrt[-((e*(-I + c*x))/(c*d +
 I*e))]*Sqrt[-((e*(I + c*x))/(c*d - I*e))]*(7*c*d*(c*d + I*e)*EllipticE[I*A
rcSinh[Sqrt[-(c/(c*d - I*e))]*Sqrt[d + e*x]], (c*d - I*e)/(c*d + I*e)] + (-
9*c^2*d^2 - (7*I)*c*d*e + e^2)*EllipticF[I*ArcSinh[Sqrt[-(c/(c*d - I*e))]*S
qrt[d + e*x]], (c*d - I*e)/(c*d + I*e)] + 3*c^2*d^2*EllipticPi[1 - (I*e)/(c
*d), I*ArcSinh[Sqrt[-(c/(c*d - I*e))]*Sqrt[d + e*x]], (c*d - I*e)/(c*d + I*
e)]))/(c^3*Sqrt[-(c/(c*d - I*e))]*Sqrt[1 + 1/(c^2*x^2)]*x)))/(15*e)
```

**fricas [F]** time = 11.81, size = 0, normalized size = 0.00

$$\text{integral}\left((aex+ad+(bex+bd)\operatorname{arcsch}(cx))\sqrt{ex+d},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((e*x+d)^(3/2)*(a+b*arccsch(c*x)),x, algorithm="fricas")
```

```
[Out] integral((a*e*x + a*d + (b*e*x + b*d)*arccsch(c*x))*sqrt(e*x + d), x)
```

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

$$\int(ex+d)^{\frac{3}{2}}(b\operatorname{arcsch}(cx)+a)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((e*x+d)^(3/2)*(a+b*arccsch(c*x)),x, algorithm="giac")
```

```
[Out] integrate((e*x + d)^(3/2)*(b*arccsch(c*x) + a), x)
```

**maple [C]** time = 0.07, size = 1939, normalized size = 3.99

result too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((e*x+d)^(3/2)*(a+b*arccsch(c*x)),x)
```

```
[Out] 2/e*(1/5*(e*x+d)^(5/2)*a+b*(1/5*arccsch(c*x)*(e*x+d)^(5/2)+2/15/c^3*(-I*(-(
I*(e*x+d)*c*e+(e*x+d)*c^2*d-c^2*d^2-e^2)/(c^2*d^2+e^2))^(1/2)*((I*(e*x+d)*c
*e-(e*x+d)*c^2*d+c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2)*EllipticF((e*x+d)^(1/2)*
((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2),(-(2*I*c*d*e-c^2*d^2+e^2)/(c^2*d^2+e^2))^
(1/2))*e^3-((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2)*(e*x+d)^(5/2)*c^3*d+I*((I*e+c*
d)*c/(c^2*d^2+e^2))^(1/2)*(e*x+d)^(1/2)*e^3+2*((I*e+c*d)*c/(c^2*d^2+e^2))^(
1/2)*(e*x+d)^(3/2)*c^3*d^2+I*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2)*(e*x+d)^(5/2
)*c^2*e-9*(-(I*(e*x+d)*c*e+(e*x+d)*c^2*d-c^2*d^2-e^2)/(c^2*d^2+e^2))^(1/2)*
((I*(e*x+d)*c*e-(e*x+d)*c^2*d+c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2)*EllipticF((
e*x+d)^(1/2)*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2),(-(2*I*c*d*e-c^2*d^2+e^2)/(c
^2*d^2+e^2))^(1/2))*c^3*d^3+7*(-(I*(e*x+d)*c*e+(e*x+d)*c^2*d-c^2*d^2-e^2)/(
c^2*d^2+e^2))^(1/2)*((I*(e*x+d)*c*e-(e*x+d)*c^2*d+c^2*d^2+e^2)/(c^2*d^2+e^2
))^(1/2)*EllipticE((e*x+d)^(1/2)*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2),(-(2*I*c
*d*e-c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2))*c^3*d^3-3*I*(-(I*(e*x+d)*c*e+(e*x+d
)*c^2*d-c^2*d^2-e^2)/(c^2*d^2+e^2))^(1/2)*((I*(e*x+d)*c*e-(e*x+d)*c^2*d+c^2
*d^2+e^2)/(c^2*d^2+e^2))^(1/2)*EllipticPi((e*x+d)^(1/2)*((I*e+c*d)*c/(c^2*d
^2+e^2))^(1/2),1/(I*e+c*d)/c*(c^2*d^2+e^2)/d,(-(I*e-c*d)*c/(c^2*d^2+e^2))^(
1/2)/((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2))*c^2*d^2*e+3*(-(I*(e*x+d)*c*e+(e*x+d
)*c^2*d-c^2*d^2-e^2)/(c^2*d^2+e^2))^(1/2)*((I*(e*x+d)*c*e-(e*x+d)*c^2*d+c^2
*d^2+e^2)/(c^2*d^2+e^2))^(1/2)*EllipticPi((e*x+d)^(1/2)*((I*e+c*d)*c/(c^2*d
^2+e^2))^(1/2),1/(I*e+c*d)/c*(c^2*d^2+e^2)/d,(-(I*e-c*d)*c/(c^2*d^2+e^2))^(
1/2)/((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2))*c^3*d^3+2*I*(-(I*(e*x+d)*c*e+(e*x+d
)*c^2*d-c^2*d^2-e^2)/(c^2*d^2+e^2))^(1/2)*((I*(e*x+d)*c*e-(e*x+d)*c^2*d+c^2
*d^2+e^2)/(c^2*d^2+e^2))^(1/2)*EllipticF((e*x+d)^(1/2)*((I*e+c*d)*c/(c^2*d^
2+e^2))^(1/2),(-(2*I*c*d*e-c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2))*c^2*d^2*e-((I
*e+c*d)*c/(c^2*d^2+e^2))^(1/2)*(e*x+d)^(1/2)*c^3*d^3+I*((I*e+c*d)*c/(c^2*d^
2+e^2))^(1/2)*(e*x+d)^(1/2)*c^2*d^2*e-6*(-(I*(e*x+d)*c*e+(e*x+d)*c^2*d-c^2*
d^2-e^2)/(c^2*d^2+e^2))^(1/2)*((I*(e*x+d)*c*e-(e*x+d)*c^2*d+c^2*d^2+e^2)/(c
^2*d^2+e^2))^(1/2)*EllipticF((e*x+d)^(1/2)*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2
),(-(2*I*c*d*e-c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2))*c*d*e^2+7*(-(I*(e*x+d)*c*
e+(e*x+d)*c^2*d-c^2*d^2-e^2)/(c^2*d^2+e^2))^(1/2)*((I*(e*x+d)*c*e-(e*x+d)*c
^2*d+c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2)*EllipticE((e*x+d)^(1/2)*((I*e+c*d)*c
/(c^2*d^2+e^2))^(1/2),(-(2*I*c*d*e-c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2))*c*d*e
^2-2*I*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2)*(e*x+d)^(3/2)*c^2*d*e-((I*e+c*d)*c
/(c^2*d^2+e^2))^(1/2)*(e*x+d)^(1/2)*c*d*e^2)/(((e*x+d)^2*c^2-2*(e*x+d)*c^2*
d+c^2*d^2+e^2)/c^2/x^2/e^2)^(1/2)/x/((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2)/(I*e-
c*d)))
```

**maxima [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((e*x+d)^(3/2)*(a+b*arccsch(c*x)),x, algorithm="maxima")
```

```
[Out] Timed out
```

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

$$\int \left(a + b \operatorname{asinh}\left(\frac{1}{c\,x}\right)\right) (d + e\,x)^{3/2}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a + b*asinh(1/(c*x)))*(d + e*x)^(3/2),x)
```

```
[Out] int((a + b*asinh(1/(c*x)))*(d + e*x)^(3/2), 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((e*x+d)**(3/2)*(a+b*acsch(c*x)),x)
```

```
[Out] Timed out
```

## 3.57 $\int \frac{x^3\left(a+b\,\mathbf{csch}^{-1}(cx)\right)}{\sqrt{d+ex}}\,dx$

**Optimal**. Leaf size=939

$$\frac{64b\sqrt{\frac{\sqrt{-c^2}\,(d+ex)}{\sqrt{-c^2}\,d+e}}\,\sqrt{c^2x^2+1}\,\Pi\left(2;\sin^{-1}\left(\frac{\sqrt{1-\sqrt{-c^2}\,x}}{\sqrt{2}}\right)|\frac{2e}{\sqrt{-c^2}\,d+e}\right)d^4}{35ce^4\sqrt{1+\frac{1}{c^2x^2}}\,x\sqrt{d+ex}}-\frac{2\sqrt{d+ex}\,\left(a+b\,\mathrm{csch}^{-1}(cx)\right)d^3}{e^4}-\frac{64bc\sqrt{\frac{c^2(d+ex)}{c^2d-\sqrt{-c^2}\cdots}}\cdots}{\cdots}$$

```
[Out] 2*d^2*(e*x+d)^(3/2)*(a+b*arccsch(c*x))/e^4-6/5*d*(e*x+d)^(5/2)*(a+b*arccsch
(c*x))/e^4+2/7*(e*x+d)^(7/2)*(a+b*arccsch(c*x))/e^4-2*d^3*(a+b*arccsch(c*x)
)*(e*x+d)^(1/2)/e^4+4/35*b*(c^2*x^2+1)*(e*x+d)^(1/2)/c^3/e/(1+1/c^2/x^2)^(1
/2)-4/21*b*d*(c^2*x^2+1)*(e*x+d)^(1/2)/c^3/e^2/x/(1+1/c^2/x^2)^(1/2)+64/35*
b*d^4*EllipticPi(1/2*(1-(-c^2)^(1/2)*x)^(1/2)*2^(1/2),2,2^(1/2)*(e/(d*(-c^2
)^(1/2)+e))^(1/2))*(c^2*x^2+1)^(1/2)*((e*x+d)*(-c^2)^(1/2)/(d*(-c^2)^(1/2)+
e))^(1/2)/c/e^4/x/(1+1/c^2/x^2)^(1/2)/(e*x+d)^(1/2)+24/35*b*c*d^2*EllipticE
(1/2*(1-(-c^2)^(1/2)*x)^(1/2)*2^(1/2),(-2*e*(-c^2)^(1/2)/(c^2*d-e*(-c^2)^(1
/2)))^(1/2))*(e*x+d)^(1/2)*(c^2*x^2+1)^(1/2)/(-c^2)^(3/2)/e^3/x/(1+1/c^2/x^
2)^(1/2)/(c^2*(e*x+d)/(c^2*d-e*(-c^2)^(1/2)))^(1/2)+4/105*b*c*(2*c^2*d^2+9*
e^2)*EllipticE(1/2*(1-(-c^2)^(1/2)*x)^(1/2)*2^(1/2),(-2*e*(-c^2)^(1/2)/(c^2
*d-e*(-c^2)^(1/2)))^(1/2))*(e*x+d)^(1/2)*(c^2*x^2+1)^(1/2)/(-c^2)^(5/2)/e^3
/x/(1+1/c^2/x^2)^(1/2)/(c^2*(e*x+d)/(c^2*d-e*(-c^2)^(1/2)))^(1/2)-64/35*b*c
*d^3*EllipticF(1/2*(1-(-c^2)^(1/2)*x)^(1/2)*2^(1/2),(-2*e*(-c^2)^(1/2)/(c^2
*d-e*(-c^2)^(1/2)))^(1/2))*(c^2*x^2+1)^(1/2)*(c^2*(e*x+d)/(c^2*d-e*(-c^2)^(
1/2)))^(1/2)/(-c^2)^(3/2)/e^3/x/(1+1/c^2/x^2)^(1/2)/(e*x+d)^(1/2)-32/105*b*
c*d*(c^2*d^2+e^2)*EllipticF(1/2*(1-(-c^2)^(1/2)*x)^(1/2)*2^(1/2),(-2*e*(-c^
2)^(1/2)/(c^2*d-e*(-c^2)^(1/2)))^(1/2))*(c^2*x^2+1)^(1/2)*(c^2*(e*x+d)/(c^2
*d-e*(-c^2)^(1/2)))^(1/2)/(-c^2)^(5/2)/e^3/x/(1+1/c^2/x^2)^(1/2)/(e*x+d)^(1
/2)
```

**Rubi** **[A]** time = 2.87, antiderivative size = 939, normalized size of antiderivative = 1.00, number of steps used = 27, number of rules used = 17, integrand size = 21, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.810, Rules used = {43, 6310, 12, 6721, 6742, 719, 424, 944, 419, 932, 168, 538, 537, 833, 844, 942, 1654}

$$\frac{64b\sqrt{\frac{\sqrt{-c^2}\,(d+ex)}{\sqrt{-c^2}\,d+e}}\,\sqrt{c^2x^2+1}\,\Pi\left(2;\sin^{-1}\left(\frac{\sqrt{1-\sqrt{-c^2}\,x}}{\sqrt{2}}\right)|\frac{2e}{\sqrt{-c^2}\,d+e}\right)d^4}{35ce^4\sqrt{1+\frac{1}{c^2x^2}}\,x\sqrt{d+ex}}-\frac{2\sqrt{d+ex}\,\left(a+b\,\mathrm{csch}^{-1}(cx)\right)d^3}{e^4}-\frac{64bc\sqrt{\frac{c^2(d+ex)}{c^2d-\sqrt{-c^2}\cdots}}\cdots}{\cdots}$$

Antiderivative was successfully verified.

```
[In] Int[(x^3*(a + b*ArcCsch[c*x]))/Sqrt[d + e*x],x]
```

```
[Out] (4*b*Sqrt[d + e*x]*(1 + c^2*x^2))/(35*c^3*e*Sqrt[1 + 1/(c^2*x^2)]) - (4*b*d
*Sqrt[d + e*x]*(1 + c^2*x^2))/(21*c^3*e^2*Sqrt[1 + 1/(c^2*x^2)]*x) - (2*d^3
*Sqrt[d + e*x]*(a + b*ArcCsch[c*x]))/e^4 + (2*d^2*(d + e*x)^(3/2)*(a + b*Ar
cCsch[c*x]))/e^4 - (6*d*(d + e*x)^(5/2)*(a + b*ArcCsch[c*x]))/(5*e^4) + (2*
(d + e*x)^(7/2)*(a + b*ArcCsch[c*x]))/(7*e^4) + (24*b*c*d^2*Sqrt[d + e*x]*S
qrt[1 + c^2*x^2]*EllipticE[ArcSin[Sqrt[1 - Sqrt[-c^2]*x]/Sqrt[2]], (-2*Sqrt
[-c^2]*e)/(c^2*d - Sqrt[-c^2]*e)])/(35*(-c^2)^(3/2)*e^3*Sqrt[1 + 1/(c^2*x^2
)]*x*Sqrt[(c^2*(d + e*x))/(c^2*d - Sqrt[-c^2]*e)]) + (4*b*c*(2*c^2*d^2 + 9*
e^2)*Sqrt[d + e*x]*Sqrt[1 + c^2*x^2]*EllipticE[ArcSin[Sqrt[1 - Sqrt[-c^2]*x
]/Sqrt[2]], (-2*Sqrt[-c^2]*e)/(c^2*d - Sqrt[-c^2]*e)])/(105*(-c^2)^(5/2)*e^
3*Sqrt[1 + 1/(c^2*x^2)]*x*Sqrt[(c^2*(d + e*x))/(c^2*d - Sqrt[-c^2]*e)]) - (
64*b*c*d^3*Sqrt[(c^2*(d + e*x))/(c^2*d - Sqrt[-c^2]*e)]*Sqrt[1 + c^2*x^2]*E
llipticF[ArcSin[Sqrt[1 - Sqrt[-c^2]*x]/Sqrt[2]], (-2*Sqrt[-c^2]*e)/(c^2*d -
 Sqrt[-c^2]*e)])/(35*(-c^2)^(3/2)*e^3*Sqrt[1 + 1/(c^2*x^2)]*x*Sqrt[d + e*x]
) - (32*b*c*d*(c^2*d^2 + e^2)*Sqrt[(c^2*(d + e*x))/(c^2*d - Sqrt[-c^2]*e)]*
Sqrt[1 + c^2*x^2]*EllipticF[ArcSin[Sqrt[1 - Sqrt[-c^2]*x]/Sqrt[2]], (-2*Sqr
t[-c^2]*e)/(c^2*d - Sqrt[-c^2]*e)])/(105*(-c^2)^(5/2)*e^3*Sqrt[1 + 1/(c^2*x
^2)]*x*Sqrt[d + e*x]) + (64*b*d^4*Sqrt[(Sqrt[-c^2]*(d + e*x))/(Sqrt[-c^2]*d
 + e)]*Sqrt[1 + c^2*x^2]*EllipticPi[2, ArcSin[Sqrt[1 - Sqrt[-c^2]*x]/Sqrt[2
]], (2*e)/(Sqrt[-c^2]*d + e)])/(35*c*e^4*Sqrt[1 + 1/(c^2*x^2)]*x*Sqrt[d + e
*x])
```

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 168

```
Int[1/(((a_.) + (b_.)*(x_))*Sqrt[(c_.) + (d_.)*(x_)]*Sqrt[(e_.) + (f_.)*(x_
)]*Sqrt[(g_.) + (h_.)*(x_)]), x_Symbol] :> Dist[-2, Subst[Int[1/(Simp[b*c -
 a*d - b*x^2, x]*Sqrt[Simp[(d*e - c*f)/d + (f*x^2)/d, x]]*Sqrt[Simp[(d*g -
c*h)/d + (h*x^2)/d, x]]), x], x, Sqrt[c + d*x]], x] /; FreeQ[{a, b, c, d, e
, f, g, h}, x] && GtQ[(d*e - c*f)/d, 0]
```

Rule 419

```
Int[1/(Sqrt[(a_) + (b_.)*(x_)^2]*Sqrt[(c_) + (d_.)*(x_)^2]), x_Symbol] :> S
imp[(1*EllipticF[ArcSin[Rt[-(d/c), 2]*x], (b*c)/(a*d)])/(Sqrt[a]*Sqrt[c]*Rt
[-(d/c), 2]), x] /; FreeQ[{a, b, c, d}, x] && NegQ[d/c] && GtQ[c, 0] && GtQ
[a, 0] &&  !(NegQ[b/a] && SimplerSqrtQ[-(b/a), -(d/c)])
```

Rule 424

```
Int[Sqrt[(a_) + (b_.)*(x_)^2]/Sqrt[(c_) + (d_.)*(x_)^2], x_Symbol] :> Simp[
(Sqrt[a]*EllipticE[ArcSin[Rt[-(d/c), 2]*x], (b*c)/(a*d)])/(Sqrt[c]*Rt[-(d/c
), 2]), x] /; FreeQ[{a, b, c, d}, x] && NegQ[d/c] && GtQ[c, 0] && GtQ[a, 0]
```

Rule 537

```
Int[1/(((a_) + (b_.)*(x_)^2)*Sqrt[(c_) + (d_.)*(x_)^2]*Sqrt[(e_) + (f_.)*(x
_)^2]), x_Symbol] :> Simp[(1*EllipticPi[(b*c)/(a*d), ArcSin[Rt[-(d/c), 2]*x
], (c*f)/(d*e)])/(a*Sqrt[c]*Sqrt[e]*Rt[-(d/c), 2]), x] /; FreeQ[{a, b, c, d
, e, f}, x] &&  !GtQ[d/c, 0] && GtQ[c, 0] && GtQ[e, 0] &&  !( !GtQ[f/e, 0]
&& SimplerSqrtQ[-(f/e), -(d/c)])
```

Rule 538

```
Int[1/(((a_) + (b_.)*(x_)^2)*Sqrt[(c_) + (d_.)*(x_)^2]*Sqrt[(e_) + (f_.)*(x
_)^2]), x_Symbol] :> Dist[Sqrt[1 + (d*x^2)/c]/Sqrt[c + d*x^2], Int[1/((a +
b*x^2)*Sqrt[1 + (d*x^2)/c]*Sqrt[e + f*x^2]), x], x] /; FreeQ[{a, b, c, d, e
, f}, x] &&  !GtQ[c, 0]
```

Rule 719

```
Int[((d_) + (e_.)*(x_))^(m_)/Sqrt[(a_) + (c_.)*(x_)^2], x_Symbol] :> Dist[(
2*a*Rt[-(c/a), 2]*(d + e*x)^m*Sqrt[1 + (c*x^2)/a])/(c*Sqrt[a + c*x^2]*((c*(
d + e*x))/(c*d - a*e*Rt[-(c/a), 2]))^m), Subst[Int[(1 + (2*a*e*Rt[-(c/a), 2
]*x^2)/(c*d - a*e*Rt[-(c/a), 2]))^m/Sqrt[1 - x^2], x], x, Sqrt[(1 - Rt[-(c/
a), 2]*x)/2]], x] /; FreeQ[{a, c, d, e}, x] && NeQ[c*d^2 + a*e^2, 0] && EqQ
[m^2, 1/4]
```

Rule 833

```
Int[((d_.) + (e_.)*(x_))^(m_)*((f_.) + (g_.)*(x_))*((a_) + (c_.)*(x_)^2)^(p
_.), x_Symbol] :> Simp[(g*(d + e*x)^m*(a + c*x^2)^(p + 1))/(c*(m + 2*p + 2)
), x] + Dist[1/(c*(m + 2*p + 2)), Int[(d + e*x)^(m - 1)*(a + c*x^2)^p*Simp[
c*d*f*(m + 2*p + 2) - a*e*g*m + c*(e*f*(m + 2*p + 2) + d*g*m)*x, x], x], x]
 /; FreeQ[{a, c, d, e, f, g, p}, x] && NeQ[c*d^2 + a*e^2, 0] && GtQ[m, 0] &
& NeQ[m + 2*p + 2, 0] && (IntegerQ[m] || IntegerQ[p] || IntegersQ[2*m, 2*p]
) &&  !(IGtQ[m, 0] && EqQ[f, 0])
```

Rule 844

```
Int[((d_.) + (e_.)*(x_))^(m_)*((f_.) + (g_.)*(x_))*((a_) + (c_.)*(x_)^2)^(p
_.), x_Symbol] :> Dist[g/e, Int[(d + e*x)^(m + 1)*(a + c*x^2)^p, x], x] + D
ist[(e*f - d*g)/e, Int[(d + e*x)^m*(a + c*x^2)^p, x], x] /; FreeQ[{a, c, d,
 e, f, g, m, p}, x] && NeQ[c*d^2 + a*e^2, 0] &&  !IGtQ[m, 0]
```

Rule 932

```
Int[1/(((d_.) + (e_.)*(x_))*Sqrt[(f_.) + (g_.)*(x_)]*Sqrt[(a_) + (c_.)*(x_)
^2]), x_Symbol] :> With[{q = Rt[-(c/a), 2]}, Dist[1/Sqrt[a], Int[1/((d + e*
x)*Sqrt[f + g*x]*Sqrt[1 - q*x]*Sqrt[1 + q*x]), x], x]] /; FreeQ[{a, c, d, e
, f, g}, x] && NeQ[e*f - d*g, 0] && NeQ[c*d^2 + a*e^2, 0] && GtQ[a, 0]
```

Rule 942

```
Int[(((d_.) + (e_.)*(x_))^(m_)*Sqrt[(f_.) + (g_.)*(x_)])/Sqrt[(a_) + (c_.)*
(x_)^2], x_Symbol] :> Simp[(2*e*(d + e*x)^(m - 1)*Sqrt[f + g*x]*Sqrt[a + c*
x^2])/(c*(2*m + 1)), x] - Dist[1/(c*(2*m + 1)), Int[((d + e*x)^(m - 2)*Simp
[a*e*(d*g + 2*e*f*(m - 1)) - c*d^2*f*(2*m + 1) + (a*e^2*g*(2*m - 1) - c*d*(
4*e*f*m + d*g*(2*m + 1)))*x - c*e*(e*f + d*g*(4*m - 1))*x^2, x])/(Sqrt[f +
g*x]*Sqrt[a + c*x^2]), x], x] /; FreeQ[{a, c, d, e, f, g}, x] && NeQ[e*f -
d*g, 0] && NeQ[c*d^2 + a*e^2, 0] && IntegerQ[2*m] && GtQ[m, 1]
```

Rule 944

```
Int[Sqrt[(f_.) + (g_.)*(x_)]/(((d_.) + (e_.)*(x_))*Sqrt[(a_) + (c_.)*(x_)^2
]), x_Symbol] :> Dist[g/e, Int[1/(Sqrt[f + g*x]*Sqrt[a + c*x^2]), x], x] +
Dist[(e*f - d*g)/e, Int[1/((d + e*x)*Sqrt[f + g*x]*Sqrt[a + c*x^2]), x], x]
 /; FreeQ[{a, c, d, e, f, g}, x] && NeQ[e*f - d*g, 0] && NeQ[c*d^2 + a*e^2,
 0]
```

Rule 1654

```
Int[(Pq_)*((d_) + (e_.)*(x_))^(m_.)*((a_) + (c_.)*(x_)^2)^(p_), x_Symbol] :
> With[{q = Expon[Pq, x], f = Coeff[Pq, x, Expon[Pq, x]]}, Simp[(f*(d + e*x
)^(m + q - 1)*(a + c*x^2)^(p + 1))/(c*e^(q - 1)*(m + q + 2*p + 1)), x] + Di
st[1/(c*e^q*(m + q + 2*p + 1)), Int[(d + e*x)^m*(a + c*x^2)^p*ExpandToSum[c
*e^q*(m + q + 2*p + 1)*Pq - c*f*(m + q + 2*p + 1)*(d + e*x)^q - f*(d + e*x)
^(q - 2)*(a*e^2*(m + q - 1) - c*d^2*(m + q + 2*p + 1) - 2*c*d*e*(m + q + p)
*x), x], x], x] /; GtQ[q, 1] && NeQ[m + q + 2*p + 1, 0]] /; FreeQ[{a, c, d,
 e, m, p}, x] && PolyQ[Pq, x] && NeQ[c*d^2 + a*e^2, 0] &&  !(EqQ[d, 0] && T
rue) &&  !(IGtQ[m, 0] && RationalQ[a, c, d, e] && (IntegerQ[p] || ILtQ[p +
1/2, 0]))
```

Rule 6310

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))*(u_), x_Symbol] :> With[{v = IntHid
e[u, x]}, Dist[a + b*ArcCsch[c*x], v, x] + Dist[b/c, Int[SimplifyIntegrand[
v/(x^2*Sqrt[1 + 1/(c^2*x^2)]), x], x], x] /; InverseFunctionFreeQ[v, x]] /;
 FreeQ[{a, b, c}, x]
```

Rule 6721

```
Int[(u_.)*((a_.) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Dist[(b^IntPart[p]*(
a + b*x^n)^FracPart[p])/(x^(n*FracPart[p])*(1 + a/(x^n*b))^FracPart[p]), In
t[u*x^(n*p)*(1 + a/(x^n*b))^p, x], x] /; FreeQ[{a, b, p}, x] &&  !IntegerQ[
p] && ILtQ[n, 0] &&  !RationalFunctionQ[u, x] && IntegerQ[p + 1/2]
```

Rule 6742

```
Int[u_, x_Symbol] :> With[{v = ExpandIntegrand[u, x]}, Int[v, x] /; SumQ[v]
]
```

Rubi steps

$$\int \frac{x^3\left(a+b\text{csch}^{-1}(cx)\right)}{\sqrt{d+ex}}\,dx = -\frac{2d^3\sqrt{d+ex}\,\left(a+b\text{csch}^{-1}(cx)\right)}{e^4} + \frac{2d^2(d+ex)^{3/2}\left(a+b\text{csch}^{-1}(cx)\right)}{e^4} - \frac{6d(d+ex)^5}{}$$

$$= -\frac{2d^3\sqrt{d+ex}\,\left(a+b\text{csch}^{-1}(cx)\right)}{e^4} + \frac{2d^2(d+ex)^{3/2}\left(a+b\text{csch}^{-1}(cx)\right)}{e^4} - \frac{6d(d+ex)^5}{}$$

$$= -\frac{2d^3\sqrt{d+ex}\,\left(a+b\text{csch}^{-1}(cx)\right)}{e^4} + \frac{2d^2(d+ex)^{3/2}\left(a+b\text{csch}^{-1}(cx)\right)}{e^4} - \frac{6d(d+ex)^5}{}$$

$$= -\frac{2d^3\sqrt{d+ex}\,\left(a+b\text{csch}^{-1}(cx)\right)}{e^4} + \frac{2d^2(d+ex)^{3/2}\left(a+b\text{csch}^{-1}(cx)\right)}{e^4} - \frac{6d(d+ex)^5}{}$$

$$= -\frac{2d^3\sqrt{d+ex}\,\left(a+b\text{csch}^{-1}(cx)\right)}{e^4} + \frac{2d^2(d+ex)^{3/2}\left(a+b\text{csch}^{-1}(cx)\right)}{e^4} - \frac{6d(d+ex)^5}{}$$

$$= \frac{4b\sqrt{d+ex}\,\left(1+c^2x^2\right)}{35c^3e\sqrt{1+\frac{1}{c^2x^2}}} - \frac{8bd\sqrt{d+ex}\,\left(1+c^2x^2\right)}{35c^3e^2\sqrt{1+\frac{1}{c^2x^2}}\,x} - \frac{2d^3\sqrt{d+ex}\,\left(a+b\text{csch}^{-1}(cx)\right)}{e^4}$$

$$= \frac{4b\sqrt{d+ex}\,\left(1+c^2x^2\right)}{35c^3e\sqrt{1+\frac{1}{c^2x^2}}} - \frac{4bd\sqrt{d+ex}\,\left(1+c^2x^2\right)}{21c^3e^2\sqrt{1+\frac{1}{c^2x^2}}\,x} - \frac{2d^3\sqrt{d+ex}\,\left(a+b\text{csch}^{-1}(cx)\right)}{e^4}$$

$$= \frac{4b\sqrt{d+ex}\,\left(1+c^2x^2\right)}{35c^3e\sqrt{1+\frac{1}{c^2x^2}}} - \frac{4bd\sqrt{d+ex}\,\left(1+c^2x^2\right)}{21c^3e^2\sqrt{1+\frac{1}{c^2x^2}}\,x} - \frac{2d^3\sqrt{d+ex}\,\left(a+b\text{csch}^{-1}(cx)\right)}{e^4}$$

$$= \frac{4b\sqrt{d+ex}\,\left(1+c^2x^2\right)}{35c^3e\sqrt{1+\frac{1}{c^2x^2}}} - \frac{4bd\sqrt{d+ex}\,\left(1+c^2x^2\right)}{21c^3e^2\sqrt{1+\frac{1}{c^2x^2}}\,x} - \frac{2d^3\sqrt{d+ex}\,\left(a+b\text{csch}^{-1}(cx)\right)}{e^4}$$

**Mathematica [C]** time = 14.30, size = 1098, normalized size = 1.17

$$\frac{a\sqrt{\frac{ex}{d}+1}\,B_{-\frac{ex}{d}}\left(4,\frac{1}{2}\right)d^4}{e^4\sqrt{d+ex}}+\frac{b\left(\frac{2\sqrt{\frac{d}{x}+e}\,\sqrt{cx}\left(-\frac{\sqrt{2}\left(40c^3d^3e-8cde^3\right)\sqrt{icx+1}\,(cx+i)\sqrt{\frac{cd+cex}{cd-ie}}\,F\left(\sin^{-1}\left(\sqrt{-\frac{e(cx+i)}{cd-ie}}\right)\middle|\frac{icd+e}{2e}\right)}{\sqrt{1+\frac{1}{c^2x^2}}\,\sqrt{\frac{d}{x}+e}\,(cx)^{3/2}\sqrt{\frac{e(1-icx)}{icd+e}}}+\frac{i\sqrt{2}\,(cd-ie)\left(48c^4d^4-16c^2e^2d^2+9e^4\right)\cdots}{\cdots}\right.}{\cdots}\right.}{\cdots}$$

Warning: Unable to verify antiderivative.

```
[In] Integrate[(x^3*(a + b*ArcCsch[c*x]))/Sqrt[d + e*x],x]
```

```
[Out] (a*d^4*Sqrt[1 + (e*x)/d]*Beta[-((e*x)/d), 4, 1/2])/(e^4*Sqrt[d + e*x]) + (b
*(-((c*(e + d/x)*x*((4*(-16*c^2*d^2 + 9*e^2)*Sqrt[1 + 1/(c^2*x^2)])/(105*e^
3) + (32*c^3*d^3*ArcCsch[c*x])/(35*e^4) - (2*c^3*x^3*ArcCsch[c*x])/(7*e) -
(4*c^2*x^2*(e*Sqrt[1 + 1/(c^2*x^2)] - 3*c*d*ArcCsch[c*x]))/(35*e^2) + (4*c*
x*(5*c*d*e*Sqrt[1 + 1/(c^2*x^2)] - 12*c^2*d^2*ArcCsch[c*x]))/(105*e^3)))/Sq
rt[d + e*x]) + (2*Sqrt[e + d/x]*Sqrt[c*x]*(-((Sqrt[2]*(40*c^3*d^3*e - 8*c*d
*e^3)*Sqrt[1 + I*c*x]*(I + c*x)*Sqrt[(c*d + c*e*x)/(c*d - I*e)]*EllipticF[A
rcSin[Sqrt[-((e*(I + c*x))/(c*d - I*e))]], (I*c*d + e)/(2*e)])/(Sqrt[1 + 1/
(c^2*x^2)]*Sqrt[e + d/x]*(c*x)^(3/2)*Sqrt[(e*(1 - I*c*x))/(I*c*d + e)])) +
(I*Sqrt[2]*(c*d - I*e)*(48*c^4*d^4 - 16*c^2*d^2*e^2 + 9*e^4)*Sqrt[1 + I*c*x
]*Sqrt[(e*(I + c*x)*(c*d + c*e*x))/(I*c*d + e)^2]*EllipticPi[1 + (I*c*d)/e,
 ArcSin[Sqrt[-((e*(I + c*x))/(c*d - I*e))]], (I*c*d + e)/(2*e)])/(e*Sqrt[1
+ 1/(c^2*x^2)]*Sqrt[e + d/x]*(c*x)^(3/2)) - (2*(-16*c^3*d^3*e + 9*c*d*e^3)*
Cosh[2*ArcCsch[c*x]]*(-((c*d + c*e*x)*(1 + c^2*x^2)) + (c*x*(c*d*Sqrt[2 + (
2*I)*c*x]*(I + c*x)*Sqrt[(c*d + c*e*x)/(c*d - I*e)]*EllipticF[ArcSin[Sqrt[-
((e*(I + c*x))/(c*d - I*e))]], (I*c*d + e)/(2*e)] + 2*Sqrt[-((e*(-I + c*x))
/(c*d + I*e))]*(I + c*x)*Sqrt[(c*d + c*e*x)/(c*d - I*e)]*((c*d + I*e)*Ellip
ticE[ArcSin[Sqrt[(c*d + c*e*x)/(c*d - I*e)]], (c*d - I*e)/(c*d + I*e)] - I*
e*EllipticF[ArcSin[Sqrt[(c*d + c*e*x)/(c*d - I*e)]], (c*d - I*e)/(c*d + I*e
)]) + (I*c*d + e)*Sqrt[2 + (2*I)*c*x]*Sqrt[-((e*(I + c*x))/(c*d - I*e))]*Sq
rt[(e*(I + c*x)*(c*d + c*e*x))/(I*c*d + e)^2]*EllipticPi[1 + (I*c*d)/e, Arc
Sin[Sqrt[-((e*(I + c*x))/(c*d - I*e))]], (I*c*d + e)/(2*e)]))/(2*Sqrt[-((e*
(I + c*x))/(c*d - I*e))])))/(c*d*Sqrt[1 + 1/(c^2*x^2)]*Sqrt[e + d/x]*Sqrt[c
*x]*(2 + c^2*x^2))))/(105*e^4*Sqrt[d + e*x])))/c^4
```

**fricas [F]** time = 15.32, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{bx^3 \operatorname{arcsch}(cx) + ax^3}{\sqrt{ex+d}}, x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^3*(a+b*arccsch(c*x))/(e*x+d)^(1/2),x, algorithm="fricas")
[Out] integral((b*x^3*arccsch(c*x) + a*x^3)/sqrt(e*x + d), x)
```

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

$$\int \frac{(b \operatorname{arcsch}(cx) + a)x^3}{\sqrt{ex+d}}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^3*(a+b*arccsch(c*x))/(e*x+d)^(1/2),x, algorithm="giac")
[Out] integrate((b*arccsch(c*x) + a)*x^3/sqrt(e*x + d), x)
```

**maple [C]** time = 0.08, size = 2543, normalized size = 2.71

result too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^3*(a+b*arccsch(c*x))/(e*x+d)^(1/2),x)
[Out] 2/e^4*(a*(1/7*(e*x+d)^(7/2)-3/5*d*(e*x+d)^(5/2)+d^2*(e*x+d)^(3/2)-d^3*(e*x+
d)^(1/2))+b*(1/7*arccsch(c*x)*(e*x+d)^(7/2)-3/5*arccsch(c*x)*d*(e*x+d)^(5/2
)+arccsch(c*x)*d^2*(e*x+d)^(3/2)-arccsch(c*x)*d^3*(e*x+d)^(1/2)+2/105/c^4*(
-40*I*(-(I*(e*x+d)*c*e+(e*x+d)*c^2*d-c^2*d^2-e^2)/(c^2*d^2+e^2))^(1/2)*((I*
(e*x+d)*c*e-(e*x+d)*c^2*d+c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2)*EllipticF((e*x+
d)^(1/2)*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2),(-(2*I*c*d*e-c^2*d^2+e^2)/(c^2*d
^2+e^2))^(1/2))*c^3*d^3*e-3*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2)*(e*x+d)^(7/2)
*c^4*d-8*I*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2)*(e*x+d)^(1/2)*c^3*d^3*e+14*((I
*e+c*d)*c/(c^2*d^2+e^2))^(1/2)*(e*x+d)^(5/2)*c^4*d^2+8*I*(-(I*(e*x+d)*c*e+(
e*x+d)*c^2*d-c^2*d^2-e^2)/(c^2*d^2+e^2))^(1/2)*((I*(e*x+d)*c*e-(e*x+d)*c^2*
d+c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2)*EllipticF((e*x+d)^(1/2)*((I*e+c*d)*c/(c
^2*d^2+e^2))^(1/2),(-(2*I*c*d*e-c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2))*c*d*e^3-
14*I*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2)*(e*x+d)^(5/2)*c^3*d*e-8*I*((I*e+c*d)
*c/(c^2*d^2+e^2))^(1/2)*(e*x+d)^(1/2)*c*d*e^3-19*((I*e+c*d)*c/(c^2*d^2+e^2)
)^(1/2)*(e*x+d)^(3/2)*c^4*d^3+24*(-(I*(e*x+d)*c*e+(e*x+d)*c^2*d-c^2*d^2-e^2
)/(c^2*d^2+e^2))^(1/2)*((I*(e*x+d)*c*e-(e*x+d)*c^2*d+c^2*d^2+e^2)/(c^2*d^2+
```

```
e^2))^(1/2)*EllipticF((e*x+d)^(1/2)*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2),(-(2*
I*c*d*e-c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2))*c^4*d^4+16*(-(I*(e*x+d)*c*e+(e*x
+d)*c^2*d-c^2*d^2-e^2)/(c^2*d^2+e^2))^(1/2)*((I*(e*x+d)*c*e-(e*x+d)*c^2*d+c
^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2)*EllipticE((e*x+d)^(1/2)*((I*e+c*d)*c/(c^2*
d^2+e^2))^(1/2),(-(2*I*c*d*e-c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2))*c^4*d^4-48*
(-(I*(e*x+d)*c*e+(e*x+d)*c^2*d-c^2*d^2-e^2)/(c^2*d^2+e^2))^(1/2)*((I*(e*x+d
)*c*e-(e*x+d)*c^2*d+c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2)*EllipticPi((e*x+d)^(1
/2)*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2),1/(I*e+c*d)/c*(c^2*d^2+e^2)/d,(-(I*e-
c*d)*c/(c^2*d^2+e^2))^(1/2)/((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2))*c^4*d^4+3*I*
((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2)*(e*x+d)^(3/2)*c*e^3+8*((I*e+c*d)*c/(c^2*d
^2+e^2))^(1/2)*(e*x+d)^(1/2)*c^4*d^4+19*I*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2)
*(e*x+d)^(3/2)*c^3*d^2*e+48*I*(-(I*(e*x+d)*c*e+(e*x+d)*c^2*d-c^2*d^2-e^2)/(
c^2*d^2+e^2))^(1/2)*((I*(e*x+d)*c*e-(e*x+d)*c^2*d+c^2*d^2+e^2)/(c^2*d^2+e^2
))^(1/2)*EllipticPi((e*x+d)^(1/2)*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2),1/(I*e+
c*d)/c*(c^2*d^2+e^2)/d,(-(I*e-c*d)*c/(c^2*d^2+e^2))^(1/2)/((I*e+c*d)*c/(c^2
*d^2+e^2))^(1/2))*c^3*d^3*e-3*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2)*(e*x+d)^(3/
2)*c^2*d*e^2-15*(-(I*(e*x+d)*c*e+(e*x+d)*c^2*d-c^2*d^2-e^2)/(c^2*d^2+e^2))^
(1/2)*((I*(e*x+d)*c*e-(e*x+d)*c^2*d+c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2)*Ellip
ticF((e*x+d)^(1/2)*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2),(-(2*I*c*d*e-c^2*d^2+e
^2)/(c^2*d^2+e^2))^(1/2))*c^2*d^2*e^2+7*(-(I*(e*x+d)*c*e+(e*x+d)*c^2*d-c^2*
d^2-e^2)/(c^2*d^2+e^2))^(1/2)*((I*(e*x+d)*c*e-(e*x+d)*c^2*d+c^2*d^2+e^2)/(c
^2*d^2+e^2))^(1/2)*EllipticE((e*x+d)^(1/2)*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2
),(-(2*I*c*d*e-c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2))*c^2*d^2*e^2+3*I*((I*e+c*d
)*c/(c^2*d^2+e^2))^(1/2)*(e*x+d)^(7/2)*c^3*e+8*((I*e+c*d)*c/(c^2*d^2+e^2))^
(1/2)*(e*x+d)^(1/2)*c^2*d^2*e^2+9*(-(I*(e*x+d)*c*e+(e*x+d)*c^2*d-c^2*d^2-e^
2)/(c^2*d^2+e^2))^(1/2)*((I*(e*x+d)*c*e-(e*x+d)*c^2*d+c^2*d^2+e^2)/(c^2*d^2
+e^2))^(1/2)*EllipticF((e*x+d)^(1/2)*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2),(-(2
*I*c*d*e-c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2))*e^4-9*(-(I*(e*x+d)*c*e+(e*x+d)*
c^2*d-c^2*d^2-e^2)/(c^2*d^2+e^2))^(1/2)*((I*(e*x+d)*c*e-(e*x+d)*c^2*d+c^2*d
^2+e^2)/(c^2*d^2+e^2))^(1/2)*EllipticE((e*x+d)^(1/2)*((I*e+c*d)*c/(c^2*d^2+
e^2))^(1/2),(-(2*I*c*d*e-c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2))*e^4)/(((e*x+d)^
2*c^2-2*(e*x+d)*c^2*d+c^2*d^2+e^2)/c^2/x^2/e^2)^(1/2)/x/((I*e+c*d)*c/(c^2*d
^2+e^2))^(1/2)/(I*e-c*d)))
```

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

$$\frac{2}{35}\,a\left(\frac{5\,(ex+d)^{\frac{7}{2}}}{e^4}-\frac{21\,(ex+d)^{\frac{5}{2}}d}{e^4}+\frac{35\,(ex+d)^{\frac{3}{2}}d^2}{e^4}-\frac{35\,\sqrt{ex+d}\,d^3}{e^4}\right)+\frac{1}{35}\,b\left(\frac{2\left(5\,e^4x^4-de^3x^3+2\,d^2e^2x^2-8\,d^3ex\right.}{\sqrt{ex+d}}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^3*(a+b*arccsch(c*x))/(e*x+d)^(1/2),x, algorithm="maxima")
```

```
[Out] 2/35*a*(5*(e*x + d)^(7/2)/e^4 - 21*(e*x + d)^(5/2)*d/e^4 + 35*(e*x + d)^(3/
2)*d^2/e^4 - 35*sqrt(e*x + d)*d^3/e^4) + 1/35*b*(2*(5*e^4*x^4 - d*e^3*x^3 +
```

```
 2*d^2*e^2*x^2 - 8*d^3*e*x - 16*d^4)*log(sqrt(c^2*x^2 + 1) + 1)/(sqrt(e*x +
 d)*e^4) + 35*integrate(2/35*(5*c^2*e^4*x^5 - c^2*d*e^3*x^4 + 2*c^2*d^2*e^2
*x^3 - 8*c^2*d^3*e*x^2 - 16*c^2*d^4*x)/((c^2*e^4*x^2 + e^4)*sqrt(c^2*x^2 +
1)*sqrt(e*x + d) + (c^2*e^4*x^2 + e^4)*sqrt(e*x + d)), x) - 35*integrate(-1
/35*(2*c^2*d*e^3*x^4 + 16*c^2*d^3*e*x^2 - 5*(7*e^4*log(c) + 2*e^4)*c^2*x^5
+ 32*c^2*d^4*x - (4*c^2*d^2*e^2 + 35*e^4*log(c))*x^3 - 35*(c^2*e^4*x^5 + e^
4*x^3)*log(x))/((c^2*e^4*x^2 + e^4)*sqrt(e*x + d)), x))
```

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

$$\int \frac{x^3\,\left(a+b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)\right)}{\sqrt{d+e\,x}} \,d x$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((x^3*(a + b*asinh(1/(c*x))))/(d + e*x)^(1/2),x)
```

```
[Out] int((x^3*(a + b*asinh(1/(c*x))))/(d + e*x)^(1/2), x)
```

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

$$\int \frac{x^{3} \left(a + b \operatorname{acsch}{\left(c x \right)}\right)}{\sqrt{d + e x}}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**3*(a+b*acsch(c*x))/(e*x+d)**(1/2),x)
```

```
[Out] Integral(x**3*(a + b*acsch(c*x))/sqrt(d + e*x), x)
```

## 3.58 $\int \frac{x^2\left(a+b\,\mathrm{csch}^{-1}(cx)\right)}{\sqrt{d+ex}}\,dx$

**Optimal**. Leaf size=707

$$\frac{2d^2\sqrt{d+ex}\left(a+b\,\mathrm{csch}^{-1}(cx)\right)}{e^3}-\frac{4d(d+ex)^{3/2}\left(a+b\,\mathrm{csch}^{-1}(cx)\right)}{3e^3}+\frac{2(d+ex)^{5/2}\left(a+b\,\mathrm{csch}^{-1}(cx)\right)}{5e^3}-\frac{32bd^3\sqrt{c^2x^2+}}{}$$

```
[Out] -4/3*d*(e*x+d)^(3/2)*(a+b*arccsch(c*x))/e^3+2/5*(e*x+d)^(5/2)*(a+b*arccsch(
c*x))/e^3+2*d^2*(a+b*arccsch(c*x))*(e*x+d)^(1/2)/e^3+4/15*b*(c^2*x^2+1)*(e*
x+d)^(1/2)/c^3/e/x/(1+1/c^2/x^2)^(1/2)-32/15*b*d^3*EllipticPi(1/2*(1-(-c^2)
^(1/2)*x)^(1/2)*2^(1/2),2,2^(1/2)*(e/(d*(-c^2)^(1/2)+e))^(1/2))*(c^2*x^2+1)
^(1/2)*((e*x+d)*(-c^2)^(1/2)/(d*(-c^2)^(1/2)+e))^(1/2)/c/e^3/x/(1+1/c^2/x^2
)^(1/2)/(e*x+d)^(1/2)-4/5*b*c*d*EllipticE(1/2*(1-(-c^2)^(1/2)*x)^(1/2)*2^(1
/2),(-2*e*(-c^2)^(1/2)/(c^2*d-e*(-c^2)^(1/2)))^(1/2))*(e*x+d)^(1/2)*(c^2*x^
2+1)^(1/2)/(-c^2)^(3/2)/e^2/x/(1+1/c^2/x^2)^(1/2)/(c^2*(e*x+d)/(c^2*d-e*(-c
^2)^(1/2)))^(1/2)+32/15*b*c*d^2*EllipticF(1/2*(1-(-c^2)^(1/2)*x)^(1/2)*2^(1
/2),(-2*e*(-c^2)^(1/2)/(c^2*d-e*(-c^2)^(1/2)))^(1/2))*(c^2*x^2+1)^(1/2)*(c^
2*(e*x+d)/(c^2*d-e*(-c^2)^(1/2)))^(1/2)/(-c^2)^(3/2)/e^2/x/(1+1/c^2/x^2)^(1
/2)/(e*x+d)^(1/2)+4/15*b*c*(c^2*d^2+e^2)*EllipticF(1/2*(1-(-c^2)^(1/2)*x)^(
1/2)*2^(1/2),(-2*e*(-c^2)^(1/2)/(c^2*d-e*(-c^2)^(1/2)))^(1/2))*(c^2*x^2+1)^
(1/2)*(c^2*(e*x+d)/(c^2*d-e*(-c^2)^(1/2)))^(1/2)/(-c^2)^(5/2)/e^2/x/(1+1/c^
2/x^2)^(1/2)/(e*x+d)^(1/2)
```

**Rubi [A]** time = 2.14, antiderivative size = 707, normalized size of antiderivative = 1.00, number of steps used = 20, number of rules used = 15, integrand size = 21, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.714, Rules used = {43, 6310, 12, 6721, 6742, 719, 424, 944, 419, 932, 168, 538, 537, 833, 844}

$$\frac{2d^2\sqrt{d+ex}\left(a+b\,\mathrm{csch}^{-1}(cx)\right)}{e^3}-\frac{4d(d+ex)^{3/2}\left(a+b\,\mathrm{csch}^{-1}(cx)\right)}{3e^3}+\frac{2(d+ex)^{5/2}\left(a+b\,\mathrm{csch}^{-1}(cx)\right)}{5e^3}+\frac{32bcd^2\sqrt{c^2x^2+}}{}$$

Antiderivative was successfully verified.

```
[In] Int[(x^2*(a + b*ArcCsch[c*x]))/Sqrt[d + e*x],x]
```

```
[Out] (4*b*Sqrt[d + e*x]*(1 + c^2*x^2))/(15*c^3*e*Sqrt[1 + 1/(c^2*x^2)]*x) + (2*d
^2*Sqrt[d + e*x]*(a + b*ArcCsch[c*x]))/e^3 - (4*d*(d + e*x)^(3/2)*(a + b*Ar
cCsch[c*x]))/(3*e^3) + (2*(d + e*x)^(5/2)*(a + b*ArcCsch[c*x]))/(5*e^3) - (
```

```
4*b*c*d*Sqrt[d + e*x]*Sqrt[1 + c^2*x^2]*EllipticE[ArcSin[Sqrt[1 - Sqrt[-c^2
]*x]/Sqrt[2]], (-2*Sqrt[-c^2]*e)/(c^2*d - Sqrt[-c^2]*e)])/(5*(-c^2)^(3/2)*e
^2*Sqrt[1 + 1/(c^2*x^2)]*x*Sqrt[(c^2*(d + e*x))/(c^2*d - Sqrt[-c^2]*e)]) +
(32*b*c*d^2*Sqrt[(c^2*(d + e*x))/(c^2*d - Sqrt[-c^2]*e)]*Sqrt[1 + c^2*x^2]*
EllipticF[ArcSin[Sqrt[1 - Sqrt[-c^2]*x]/Sqrt[2]], (-2*Sqrt[-c^2]*e)/(c^2*d
- Sqrt[-c^2]*e)])/(15*(-c^2)^(3/2)*e^2*Sqrt[1 + 1/(c^2*x^2)]*x*Sqrt[d + e*x
]) + (4*b*c*(c^2*d^2 + e^2)*Sqrt[(c^2*(d + e*x))/(c^2*d - Sqrt[-c^2]*e)]*Sq
rt[1 + c^2*x^2]*EllipticF[ArcSin[Sqrt[1 - Sqrt[-c^2]*x]/Sqrt[2]], (-2*Sqrt[
-c^2]*e)/(c^2*d - Sqrt[-c^2]*e)])/(15*(-c^2)^(5/2)*e^2*Sqrt[1 + 1/(c^2*x^2)
]*x*Sqrt[d + e*x]) - (32*b*d^3*Sqrt[(Sqrt[-c^2]*(d + e*x))/(Sqrt[-c^2]*d +
e)]*Sqrt[1 + c^2*x^2]*EllipticPi[2, ArcSin[Sqrt[1 - Sqrt[-c^2]*x]/Sqrt[2]],
 (2*e)/(Sqrt[-c^2]*d + e)])/(15*c*e^3*Sqrt[1 + 1/(c^2*x^2)]*x*Sqrt[d + e*x]
)
```

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 168

```
Int[1/(((a_.) + (b_.)*(x_))*Sqrt[(c_.) + (d_.)*(x_)]*Sqrt[(e_.) + (f_.)*(x_
)]*Sqrt[(g_.) + (h_.)*(x_)]), x_Symbol] :> Dist[-2, Subst[Int[1/(Simp[b*c -
 a*d - b*x^2, x]*Sqrt[Simp[(d*e - c*f)/d + (f*x^2)/d, x]]*Sqrt[Simp[(d*g -
c*h)/d + (h*x^2)/d, x]]), x], x, Sqrt[c + d*x]], x] /; FreeQ[{a, b, c, d, e
, f, g, h}, x] && GtQ[(d*e - c*f)/d, 0]
```

Rule 419

```
Int[1/(Sqrt[(a_) + (b_.)*(x_)^2]*Sqrt[(c_) + (d_.)*(x_)^2]), x_Symbol] :> S
imp[(1*EllipticF[ArcSin[Rt[-(d/c), 2]*x], (b*c)/(a*d)])/(Sqrt[a]*Sqrt[c]*Rt
[-(d/c), 2]), x] /; FreeQ[{a, b, c, d}, x] && NegQ[d/c] && GtQ[c, 0] && GtQ
[a, 0] &&  !(NegQ[b/a] && SimplerSqrtQ[-(b/a), -(d/c)])
```

Rule 424

```
Int[Sqrt[(a_) + (b_.)*(x_)^2]/Sqrt[(c_) + (d_.)*(x_)^2], x_Symbol] :> Simp[
(Sqrt[a]*EllipticE[ArcSin[Rt[-(d/c), 2]*x], (b*c)/(a*d)])/(Sqrt[c]*Rt[-(d/c
```

```
), 2]), x] /; FreeQ[{a, b, c, d}, x] && NegQ[d/c] && GtQ[c, 0] && GtQ[a, 0]
```

Rule 537

```
Int[1/(((a_) + (b_.)*(x_)^2)*Sqrt[(c_) + (d_.)*(x_)^2]*Sqrt[(e_) + (f_.)*(x
_)^2]), x_Symbol] :> Simp[(1*EllipticPi[(b*c)/(a*d), ArcSin[Rt[-(d/c), 2]*x
], (c*f)/(d*e)])/(a*Sqrt[c]*Sqrt[e]*Rt[-(d/c), 2]), x] /; FreeQ[{a, b, c, d
, e, f}, x] && !GtQ[d/c, 0] && GtQ[c, 0] && GtQ[e, 0] && !( !GtQ[f/e, 0]
&& SimplerSqrtQ[-(f/e), -(d/c)])
```

Rule 538

```
Int[1/(((a_) + (b_.)*(x_)^2)*Sqrt[(c_) + (d_.)*(x_)^2]*Sqrt[(e_) + (f_.)*(x
_)^2]), x_Symbol] :> Dist[Sqrt[1 + (d*x^2)/c]/Sqrt[c + d*x^2], Int[1/((a +
b*x^2)*Sqrt[1 + (d*x^2)/c]*Sqrt[e + f*x^2]), x], x] /; FreeQ[{a, b, c, d, e
, f}, x] && !GtQ[c, 0]
```

Rule 719

```
Int[((d_) + (e_.)*(x_))^(m_)/Sqrt[(a_) + (c_.)*(x_)^2], x_Symbol] :> Dist[(
2*a*Rt[-(c/a), 2]*(d + e*x)^m*Sqrt[1 + (c*x^2)/a])/(c*Sqrt[a + c*x^2]*((c*(
d + e*x))/(c*d - a*e*Rt[-(c/a), 2]))^m), Subst[Int[(1 + (2*a*e*Rt[-(c/a), 2
]*x^2)/(c*d - a*e*Rt[-(c/a), 2]))^m/Sqrt[1 - x^2], x], x, Sqrt[(1 - Rt[-(c/
a), 2]*x)/2]], x] /; FreeQ[{a, c, d, e}, x] && NeQ[c*d^2 + a*e^2, 0] && EqQ
[m^2, 1/4]
```

Rule 833

```
Int[((d_.) + (e_.)*(x_))^(m_)*((f_.) + (g_.)*(x_))*((a_) + (c_.)*(x_)^2)^(p
_.), x_Symbol] :> Simp[(g*(d + e*x)^m*(a + c*x^2)^(p + 1))/(c*(m + 2*p + 2)
), x] + Dist[1/(c*(m + 2*p + 2)), Int[(d + e*x)^(m - 1)*(a + c*x^2)^p*Simp[
c*d*f*(m + 2*p + 2) - a*e*g*m + c*(e*f*(m + 2*p + 2) + d*g*m)*x, x], x], x]
 /; FreeQ[{a, c, d, e, f, g, p}, x] && NeQ[c*d^2 + a*e^2, 0] && GtQ[m, 0] &
& NeQ[m + 2*p + 2, 0] && (IntegerQ[m] || IntegerQ[p] || IntegersQ[2*m, 2*p]
) && !(IGtQ[m, 0] && EqQ[f, 0])
```

Rule 844

```
Int[((d_.) + (e_.)*(x_))^(m_)*((f_.) + (g_.)*(x_))*((a_) + (c_.)*(x_)^2)^(p
_.), x_Symbol] :> Dist[g/e, Int[(d + e*x)^(m + 1)*(a + c*x^2)^p, x], x] + D
ist[(e*f - d*g)/e, Int[(d + e*x)^m*(a + c*x^2)^p, x], x] /; FreeQ[{a, c, d,
 e, f, g, m, p}, x] && NeQ[c*d^2 + a*e^2, 0] && !IGtQ[m, 0]
```

Rule 932

```
Int[1/(((d_.) + (e_.)*(x_))*Sqrt[(f_.) + (g_.)*(x_)]*Sqrt[(a_) + (c_.)*(x_)
^2]), x_Symbol] :> With[{q = Rt[-(c/a), 2]}, Dist[1/Sqrt[a], Int[1/((d + e*
x)*Sqrt[f + g*x]*Sqrt[1 - q*x]*Sqrt[1 + q*x]), x], x]] /; FreeQ[{a, c, d, e
, f, g}, x] && NeQ[e*f - d*g, 0] && NeQ[c*d^2 + a*e^2, 0] && GtQ[a, 0]
```

Rule 944

```
Int[Sqrt[(f_.) + (g_.)*(x_)]/(((d_.) + (e_.)*(x_))*Sqrt[(a_) + (c_.)*(x_)^2
]), x_Symbol] :> Dist[g/e, Int[1/(Sqrt[f + g*x]*Sqrt[a + c*x^2]), x], x] +
Dist[(e*f - d*g)/e, Int[1/((d + e*x)*Sqrt[f + g*x]*Sqrt[a + c*x^2]), x], x]
 /; FreeQ[{a, c, d, e, f, g}, x] && NeQ[e*f - d*g, 0] && NeQ[c*d^2 + a*e^2,
 0]
```

Rule 6310

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))*(u_), x_Symbol] :> With[{v = IntHid
e[u, x]}, Dist[a + b*ArcCsch[c*x], v, x] + Dist[b/c, Int[SimplifyIntegrand[
v/(x^2*Sqrt[1 + 1/(c^2*x^2)]), x], x], x] /; InverseFunctionFreeQ[v, x]] /;
 FreeQ[{a, b, c}, x]
```

Rule 6721

```
Int[(u_.)*((a_.) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Dist[(b^IntPart[p]*(
a + b*x^n)^FracPart[p])/(x^(n*FracPart[p])*(1 + a/(x^n*b))^FracPart[p]), In
t[u*x^(n*p)*(1 + a/(x^n*b))^p, x], x] /; FreeQ[{a, b, p}, x] &&  !IntegerQ[
p] && ILtQ[n, 0] &&  !RationalFunctionQ[u, x] && IntegerQ[p + 1/2]
```

Rule 6742

```
Int[u_, x_Symbol] :> With[{v = ExpandIntegrand[u, x]}, Int[v, x] /; SumQ[v]
]
```

Rubi steps

$$\int \frac{x^2\left(a+b\text{csch}^{-1}(cx)\right)}{\sqrt{d+ex}}\,dx = \frac{2d^2\sqrt{d+ex}\left(a+b\text{csch}^{-1}(cx)\right)}{e^3} - \frac{4d(d+ex)^{3/2}\left(a+b\text{csch}^{-1}(cx)\right)}{3e^3} + \frac{2(d+ex)^{5/2}\left(a\right.}{5\ldots}$$

$$= \frac{2d^2\sqrt{d+ex}\left(a+b\text{csch}^{-1}(cx)\right)}{e^3} - \frac{4d(d+ex)^{3/2}\left(a+b\text{csch}^{-1}(cx)\right)}{3e^3} + \frac{2(d+ex)^{5/2}\left(a\right.}{5\ldots}$$

$$= \frac{2d^2\sqrt{d+ex}\left(a+b\text{csch}^{-1}(cx)\right)}{e^3} - \frac{4d(d+ex)^{3/2}\left(a+b\text{csch}^{-1}(cx)\right)}{3e^3} + \frac{2(d+ex)^{5/2}\left(a\right.}{5\ldots}$$

$$= \frac{2d^2\sqrt{d+ex}\left(a+b\text{csch}^{-1}(cx)\right)}{e^3} - \frac{4d(d+ex)^{3/2}\left(a+b\text{csch}^{-1}(cx)\right)}{3e^3} + \frac{2(d+ex)^{5/2}\left(a\right.}{5\ldots}$$

$$= \frac{2d^2\sqrt{d+ex}\left(a+b\text{csch}^{-1}(cx)\right)}{e^3} - \frac{4d(d+ex)^{3/2}\left(a+b\text{csch}^{-1}(cx)\right)}{3e^3} + \frac{2(d+ex)^{5/2}\left(a\right.}{5\ldots}$$

$$= \frac{4b\sqrt{d+ex}\left(1+c^2x^2\right)}{15c^3e\sqrt{1+\frac{1}{c^2x^2}}\,x} + \frac{2d^2\sqrt{d+ex}\left(a+b\text{csch}^{-1}(cx)\right)}{e^3} - \frac{4d(d+ex)^{3/2}\left(a+b\text{csch}\ldots\right.}{3e^3}$$

$$= \frac{4b\sqrt{d+ex}\left(1+c^2x^2\right)}{15c^3e\sqrt{1+\frac{1}{c^2x^2}}\,x} + \frac{2d^2\sqrt{d+ex}\left(a+b\text{csch}^{-1}(cx)\right)}{e^3} - \frac{4d(d+ex)^{3/2}\left(a+b\text{csch}\ldots\right.}{3e^3}$$

$$= \frac{4b\sqrt{d+ex}\left(1+c^2x^2\right)}{15c^3e\sqrt{1+\frac{1}{c^2x^2}}\,x} + \frac{2d^2\sqrt{d+ex}\left(a+b\text{csch}^{-1}(cx)\right)}{e^3} - \frac{4d(d+ex)^{3/2}\left(a+b\text{csch}\ldots\right.}{3e^3}$$

$$= \frac{4b\sqrt{d+ex}\left(1+c^2x^2\right)}{15c^3e\sqrt{1+\frac{1}{c^2x^2}}\,x} + \frac{2d^2\sqrt{d+ex}\left(a+b\text{csch}^{-1}(cx)\right)}{e^3} - \frac{4d(d+ex)^{3/2}\left(a+b\text{csch}\ldots\right.}{3e^3}$$

**Mathematica [C]** time = 14.43, size = 1012, normalized size = 1.43

$$b\left(-\frac{c\left(\frac{d}{x}+e\right)x\left(-\frac{16c^2\operatorname{csch}^{-1}(cx)d^2}{15e^3}+\frac{4c\sqrt{1+\frac{1}{c^2x^2}}\,d}{5e^2}-\frac{2c^2x^2\operatorname{csch}^{-1}(cx)}{5e}-\frac{4cx\left(e\sqrt{1+\frac{1}{c^2x^2}}-2cd\operatorname{csch}^{-1}(cx)\right)}{15e^2}\right)}{\sqrt{d+ex}}-\frac{2\sqrt{\frac{d}{x}+e}\,\sqrt{cx}\left(-\frac{\sqrt{2}\left(7c^2d^2e-e^3\right)\sqrt{icx+1}\,(cx+i)\sqrt{\frac{cd+cex}{cd-ie}}}{\sqrt{1+\frac{1}{c^2x^2}}\,\sqrt{\frac{d}{x}+e}\,(cx)^{3}}\right.}{}\right.$$

Antiderivative was successfully verified.

```
[In] Integrate[(x^2*(a + b*ArcCsch[c*x]))/Sqrt[d + e*x],x]
```

```
[Out] -((a*d^3*Sqrt[1 + (e*x)/d]*Beta[-((e*x)/d), 3, 1/2])/(e^3*Sqrt[d + e*x])) +
 (b*(-((c*(e + d/x)*x*((4*c*d*Sqrt[1 + 1/(c^2*x^2)])/(5*e^2) - (16*c^2*d^2*
ArcCsch[c*x])/(15*e^3) - (2*c^2*x^2*ArcCsch[c*x])/(5*e) - (4*c*x*(e*Sqrt[1
+ 1/(c^2*x^2)] - 2*c*d*ArcCsch[c*x]))/(15*e^2)))/Sqrt[d + e*x]) - (2*Sqrt[e
 + d/x]*Sqrt[c*x]*(-((Sqrt[2]*(7*c^2*d^2*e - e^3)*Sqrt[1 + I*c*x]*(I + c*x)
*Sqrt[(c*d + c*e*x)/(c*d - I*e)]*EllipticF[ArcSin[Sqrt[-((e*(I + c*x))/(c*d
 - I*e))]], (I*c*d + e)/(2*e)])/(Sqrt[1 + 1/(c^2*x^2)]*Sqrt[e + d/x]*(c*x)^
(3/2)*Sqrt[(e*(1 - I*c*x))/(I*c*d + e)])) + (I*Sqrt[2]*(c*d - I*e)*(8*c^3*d
^3 - 3*c*d*e^2)*Sqrt[1 + I*c*x]*Sqrt[(e*(I + c*x)*(c*d + c*e*x))/(I*c*d + e
)^2]*EllipticPi[1 + (I*c*d)/e, ArcSin[Sqrt[-((e*(I + c*x))/(c*d - I*e))]],
(I*c*d + e)/(2*e)])/(e*Sqrt[1 + 1/(c^2*x^2)]*Sqrt[e + d/x]*(c*x)^(3/2)) + (
6*c*d*e*Cosh[2*ArcCsch[c*x]]*(-((c*d + c*e*x)*(1 + c^2*x^2)) + (c*x*(c*d*Sq
rt[2 + (2*I)*c*x]*(I + c*x)*Sqrt[(c*d + c*e*x)/(c*d - I*e)]*EllipticF[ArcSi
n[Sqrt[-((e*(I + c*x))/(c*d - I*e))]], (I*c*d + e)/(2*e)] + 2*Sqrt[-((e*(-I
 + c*x))/(c*d + I*e))]*(I + c*x)*Sqrt[(c*d + c*e*x)/(c*d - I*e)]*((c*d + I*
e)*EllipticE[ArcSin[Sqrt[(c*d + c*e*x)/(c*d - I*e)]], (c*d - I*e)/(c*d + I*
e)] - I*e*EllipticF[ArcSin[Sqrt[(c*d + c*e*x)/(c*d - I*e)]], (c*d - I*e)/(c
*d + I*e)]) + (I*c*d + e)*Sqrt[2 + (2*I)*c*x]*Sqrt[-((e*(I + c*x))/(c*d - I
*e))]*Sqrt[(e*(I + c*x)*(c*d + c*e*x))/(I*c*d + e)^2]*EllipticPi[1 + (I*c*d
)/e, ArcSin[Sqrt[-((e*(I + c*x))/(c*d - I*e))]], (I*c*d + e)/(2*e)]))/(2*Sq
rt[-((e*(I + c*x))/(c*d - I*e))])))/(Sqrt[1 + 1/(c^2*x^2)]*Sqrt[e + d/x]*Sq
rt[c*x]*(2 + c^2*x^2))))/(15*e^3*Sqrt[d + e*x])))/c^3
```

**fricas [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*(a+b*arccsch(c*x))/(e*x+d)^(1/2),x, algorithm="fricas")
```

```
[Out] Timed out
```

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

$$\int \frac{(b \operatorname{arcsch}(cx) + a)x^2}{\sqrt{ex + d}}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*(a+b*arccsch(c*x))/(e*x+d)^(1/2),x, algorithm="giac")
```

```
[Out] integrate((b*arccsch(c*x) + a)*x^2/sqrt(e*x + d), x)
```

**maple [C]** time = 0.07, size = 1991, normalized size = 2.82

result too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^2*(a+b*arccsch(c*x))/(e*x+d)^(1/2),x)
```

```
[Out] 2/e^3*(a*(1/5*(e*x+d)^(5/2)-2/3*d*(e*x+d)^(3/2)+d^2*(e*x+d)^(1/2))+b*(1/5*a
rccsch(c*x)*(e*x+d)^(5/2)-2/3*arccsch(c*x)*d*(e*x+d)^(3/2)+arccsch(c*x)*d^2
*(e*x+d)^(1/2)+2/15/c^3*(I*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2)*(e*x+d)^(1/2)*
e^3-((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2)*(e*x+d)^(5/2)*c^3*d+I*((I*e+c*d)*c/(c
^2*d^2+e^2))^(1/2)*(e*x+d)^(1/2)*c^2*d^2*e-2*I*((I*e+c*d)*c/(c^2*d^2+e^2))^
(1/2)*(e*x+d)^(3/2)*c^2*d*e-I*(-(I*(e*x+d)*c*e+(e*x+d)*c^2*d-c^2*d^2-e^2)/(
c^2*d^2+e^2))^(1/2)*((I*(e*x+d)*c*e-(e*x+d)*c^2*d+c^2*d^2+e^2)/(c^2*d^2+e^2
))^(1/2)*EllipticF((e*x+d)^(1/2)*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2),(-(2*I*c
*d*e-c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2))*e^3+2*((I*e+c*d)*c/(c^2*d^2+e^2))^(
1/2)*(e*x+d)^(3/2)*c^3*d^2-4*(-(I*(e*x+d)*c*e+(e*x+d)*c^2*d-c^2*d^2-e^2)/(c
^2*d^2+e^2))^(1/2)*((I*(e*x+d)*c*e-(e*x+d)*c^2*d+c^2*d^2+e^2)/(c^2*d^2+e^2)
)^(1/2)*EllipticF((e*x+d)^(1/2)*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2),(-(2*I*c*
d*e-c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2))*c^3*d^3-3*(-(I*(e*x+d)*c*e+(e*x+d)*c
^2*d-c^2*d^2-e^2)/(c^2*d^2+e^2))^(1/2)*((I*(e*x+d)*c*e-(e*x+d)*c^2*d+c^2*d^
2+e^2)/(c^2*d^2+e^2))^(1/2)*EllipticE((e*x+d)^(1/2)*((I*e+c*d)*c/(c^2*d^2+e
^2))^(1/2),(-(2*I*c*d*e-c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2))*c^3*d^3+8*(-(I*(
e*x+d)*c*e+(e*x+d)*c^2*d-c^2*d^2-e^2)/(c^2*d^2+e^2))^(1/2)*((I*(e*x+d)*c*e-
(e*x+d)*c^2*d+c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2)*EllipticPi((e*x+d)^(1/2)*((
I*e+c*d)*c/(c^2*d^2+e^2))^(1/2),1/(I*e+c*d)/c*(c^2*d^2+e^2)/d,(-(I*e-c*d)*c
/(c^2*d^2+e^2))^(1/2)/((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2))*c^3*d^3+7*I*(-(I*(
e*x+d)*c*e+(e*x+d)*c^2*d-c^2*d^2-e^2)/(c^2*d^2+e^2))^(1/2)*((I*(e*x+d)*c*e-
(e*x+d)*c^2*d+c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2)*EllipticF((e*x+d)^(1/2)*((I
```

```
*e+c*d)*c/(c^2*d^2+e^2))^(1/2),(-(2*I*c*d*e-c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/
2))*c^2*d^2*e-((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2)*(e*x+d)^(1/2)*c^3*d^3-8*I*(
-(I*(e*x+d)*c*e+(e*x+d)*c^2*d-c^2*d^2-e^2)/(c^2*d^2+e^2))^(1/2)*((I*(e*x+d)
*c*e-(e*x+d)*c^2*d+c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2)*EllipticPi((e*x+d)^(1/
2)*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2),1/(I*e+c*d)/c*(c^2*d^2+e^2)/d,(-(I*e-c
*d)*c/(c^2*d^2+e^2))^(1/2)/((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2))*c^2*d^2*e+4*(
-(I*(e*x+d)*c*e+(e*x+d)*c^2*d-c^2*d^2-e^2)/(c^2*d^2+e^2))^(1/2)*((I*(e*x+d)
*c*e-(e*x+d)*c^2*d+c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2)*EllipticF((e*x+d)^(1/2
)*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2),(-(2*I*c*d*e-c^2*d^2+e^2)/(c^2*d^2+e^2)
)^(1/2))*c*d*e^2-3*(-(I*(e*x+d)*c*e+(e*x+d)*c^2*d-c^2*d^2-e^2)/(c^2*d^2+e^2
))^(1/2)*((I*(e*x+d)*c*e-(e*x+d)*c^2*d+c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2)*El
lipticE((e*x+d)^(1/2)*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2),(-(2*I*c*d*e-c^2*d^
2+e^2)/(c^2*d^2+e^2))^(1/2))*c*d*e^2+I*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2)*(e
*x+d)^(5/2)*c^2*e-((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2)*(e*x+d)^(1/2)*c*d*e^2)/
(((e*x+d)^2*c^2-2*(e*x+d)*c^2*d+c^2*d^2+e^2)/c^2/x^2/e^2)^(1/2)/x/((I*e+c*d
)*c/(c^2*d^2+e^2))^(1/2)/(I*e-c*d)))
```

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

$$\frac{2}{15}\,a\left(\frac{3\,(ex+d)^{\frac{5}{2}}}{e^3}-\frac{10\,(ex+d)^{\frac{3}{2}}d}{e^3}+\frac{15\,\sqrt{ex+d}\,d^2}{e^3}\right)+\frac{1}{15}\,b\left(\frac{2\left(3\,e^3x^3-de^2x^2+4\,d^2ex+8\,d^3\right)\log\left(\sqrt{c^2x^2+1}\,+1\right.}{\sqrt{ex+d}\,e^3}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*(a+b*arccsch(c*x))/(e*x+d)^(1/2),x, algorithm="maxima")
```

```
[Out] 2/15*a*(3*(e*x + d)^(5/2)/e^3 - 10*(e*x + d)^(3/2)*d/e^3 + 15*sqrt(e*x + d)
*d^2/e^3) + 1/15*b*(2*(3*e^3*x^3 - d*e^2*x^2 + 4*d^2*e*x + 8*d^3)*log(sqrt(
c^2*x^2 + 1) + 1)/(sqrt(e*x + d)*e^3) + 15*integrate(2/15*(3*c^2*e^3*x^4 -
c^2*d*e^2*x^3 + 4*c^2*d^2*e*x^2 + 8*c^2*d^3*x)/((c^2*e^3*x^2 + e^3)*sqrt(c^
2*x^2 + 1)*sqrt(e*x + d) + (c^2*e^3*x^2 + e^3)*sqrt(e*x + d)), x) - 15*inte
grate(-1/15*(2*c^2*d*e^2*x^3 - 3*(5*e^3*log(c) + 2*e^3)*c^2*x^4 - 16*c^2*d^
3*x - (8*c^2*d^2*e + 15*e^3*log(c))*x^2 - 15*(c^2*e^3*x^4 + e^3*x^2)*log(x)
)/((c^2*e^3*x^2 + e^3)*sqrt(e*x + d)), x))
```

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

$$\int \frac{x^2\,\left(a+b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)\right)}{\sqrt{d+e\,x}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((x^2*(a + b*asinh(1/(c*x))))/(d + e*x)^(1/2),x)
```

```
[Out] int((x^2*(a + b*asinh(1/(c*x))))/(d + e*x)^(1/2), x)
```

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

$$\int \frac{x^2 (a + b \operatorname{acsch}(cx))}{\sqrt{d + ex}} \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**2*(a+b*acsch(c*x))/(e*x+d)**(1/2),x)
```

```
[Out] Integral(x**2*(a + b*acsch(c*x))/sqrt(d + e*x), x)
```

## 3.59 $\int \frac{x\left(a+b\,\mathrm{csch}^{-1}(cx)\right)}{\sqrt{d+ex}}\,dx$

**Optimal**. Leaf size=474

$$-\frac{2d\sqrt{d+ex}\left(a+b\,\mathrm{csch}^{-1}(cx)\right)}{e^2}+\frac{2(d+ex)^{3/2}\left(a+b\,\mathrm{csch}^{-1}(cx)\right)}{3e^2}+\frac{8bd^2\sqrt{c^2x^2+1}\sqrt{\frac{\sqrt{-c^2}\,(d+ex)}{\sqrt{-c^2}\,d+e}}\,\Pi\left(2;\sin^{-1}\left(\frac{\sqrt{1-\sqrt{}}}{\sqrt{2}}\right.\right.}{3ce^2x\sqrt{\frac{1}{c^2x^2}+1}\sqrt{d+ex}}$$

```
[Out] 2/3*(e*x+d)^(3/2)*(a+b*arccsch(c*x))/e^2-2*d*(a+b*arccsch(c*x))*(e*x+d)^(1/
2)/e^2+8/3*b*d^2*EllipticPi(1/2*(1-(-c^2)^(1/2)*x)^(1/2)*2^(1/2),2,2^(1/2)*
(e/(d*(-c^2)^(1/2)+e))^(1/2))*(c^2*x^2+1)^(1/2)*((e*x+d)*(-c^2)^(1/2)/(d*(-
c^2)^(1/2)+e))^(1/2)/c/e^2/x/(1+1/c^2/x^2)^(1/2)/(e*x+d)^(1/2)+4/3*b*c*Elli
pticE(1/2*(1-(-c^2)^(1/2)*x)^(1/2)*2^(1/2),(-2*e*(-c^2)^(1/2)/(c^2*d-e*(-c^
2)^(1/2)))^(1/2))*(e*x+d)^(1/2)*(c^2*x^2+1)^(1/2)/(-c^2)^(3/2)/e/x/(1+1/c^2
/x^2)^(1/2)/(c^2*(e*x+d)/(c^2*d-e*(-c^2)^(1/2)))^(1/2)-8/3*b*c*d*EllipticF(
1/2*(1-(-c^2)^(1/2)*x)^(1/2)*2^(1/2),(-2*e*(-c^2)^(1/2)/(c^2*d-e*(-c^2)^(1/
2)))^(1/2))*(c^2*x^2+1)^(1/2)*(c^2*(e*x+d)/(c^2*d-e*(-c^2)^(1/2)))^(1/2)/(-
c^2)^(3/2)/e/x/(1+1/c^2/x^2)^(1/2)/(e*x+d)^(1/2)
```

**Rubi** [A] time = 1.75, antiderivative size = 474, normalized size of antiderivative = 1.00, number of steps used = 14, number of rules used = 13, integrand size = 19, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.684, Rules used = {43, 6310, 12, 6721, 6742, 719, 424, 944, 419, 932, 168, 538, 537}

$$-\frac{2d\sqrt{d+ex}\left(a+b\,\mathrm{csch}^{-1}(cx)\right)}{e^2}+\frac{2(d+ex)^{3/2}\left(a+b\,\mathrm{csch}^{-1}(cx)\right)}{3e^2}+\frac{8bd^2\sqrt{c^2x^2+1}\sqrt{\frac{\sqrt{-c^2}\,(d+ex)}{\sqrt{-c^2}\,d+e}}\,\Pi\left(2;\sin^{-1}\left(\frac{\sqrt{1-\sqrt{}}}{\sqrt{2}}\right.\right.}{3ce^2x\sqrt{\frac{1}{c^2x^2}+1}\sqrt{d+ex}}$$

Antiderivative was successfully verified.

```
[In] Int[(x*(a + b*ArcCsch[c*x]))/Sqrt[d + e*x],x]
```

```
[Out] (-2*d*Sqrt[d + e*x]*(a + b*ArcCsch[c*x]))/e^2 + (2*(d + e*x)^(3/2)*(a + b*A
rcCsch[c*x]))/(3*e^2) + (4*b*c*Sqrt[d + e*x]*Sqrt[1 + c^2*x^2]*EllipticE[Ar
cSin[Sqrt[1 - Sqrt[-c^2]*x]/Sqrt[2]], (-2*Sqrt[-c^2]*e)/(c^2*d - Sqrt[-c^2]
*e)])/(3*(-c^2)^(3/2)*e*Sqrt[1 + 1/(c^2*x^2)]*x*Sqrt[(c^2*(d + e*x))/(c^2*d
 - Sqrt[-c^2]*e)]) - (8*b*c*d*Sqrt[(c^2*(d + e*x))/(c^2*d - Sqrt[-c^2]*e)]*
Sqrt[1 + c^2*x^2]*EllipticF[ArcSin[Sqrt[1 - Sqrt[-c^2]*x]/Sqrt[2]], (-2*Sqr
t[-c^2]*e)/(c^2*d - Sqrt[-c^2]*e)])/(3*(-c^2)^(3/2)*e*Sqrt[1 + 1/(c^2*x^2)]
*x*Sqrt[d + e*x]) + (8*b*d^2*Sqrt[(Sqrt[-c^2]*(d + e*x))/(Sqrt[-c^2]*d + e)
```

```
]*Sqrt[1 + c^2*x^2]*EllipticPi[2, ArcSin[Sqrt[1 - Sqrt[-c^2]*x]/Sqrt[2]], (
2*e)/(Sqrt[-c^2]*d + e)])/(3*c*e^2*Sqrt[1 + 1/(c^2*x^2)]*x*Sqrt[d + e*x])
```

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 168

```
Int[1/(((a_.) + (b_.)*(x_))*Sqrt[(c_.) + (d_.)*(x_)]*Sqrt[(e_.) + (f_.)*(x_
)]*Sqrt[(g_.) + (h_.)*(x_)]), x_Symbol] :> Dist[-2, Subst[Int[1/(Simp[b*c -
 a*d - b*x^2, x]*Sqrt[Simp[(d*e - c*f)/d + (f*x^2)/d, x]]*Sqrt[Simp[(d*g -
c*h)/d + (h*x^2)/d, x]]), x], x, Sqrt[c + d*x]], x] /; FreeQ[{a, b, c, d, e
, f, g, h}, x] && GtQ[(d*e - c*f)/d, 0]
```

Rule 419

```
Int[1/(Sqrt[(a_) + (b_.)*(x_)^2]*Sqrt[(c_) + (d_.)*(x_)^2]), x_Symbol] :> S
imp[(1*EllipticF[ArcSin[Rt[-(d/c), 2]*x], (b*c)/(a*d)])/(Sqrt[a]*Sqrt[c]*Rt
[-(d/c), 2]), x] /; FreeQ[{a, b, c, d}, x] && NegQ[d/c] && GtQ[c, 0] && GtQ
[a, 0] &&  !(NegQ[b/a] && SimplerSqrtQ[-(b/a), -(d/c)])
```

Rule 424

```
Int[Sqrt[(a_) + (b_.)*(x_)^2]/Sqrt[(c_) + (d_.)*(x_)^2], x_Symbol] :> Simp[
(Sqrt[a]*EllipticE[ArcSin[Rt[-(d/c), 2]*x], (b*c)/(a*d)])/(Sqrt[c]*Rt[-(d/c
), 2]), x] /; FreeQ[{a, b, c, d}, x] && NegQ[d/c] && GtQ[c, 0] && GtQ[a, 0]
```

Rule 537

```
Int[1/(((a_) + (b_.)*(x_)^2)*Sqrt[(c_) + (d_.)*(x_)^2]*Sqrt[(e_) + (f_.)*(x
_)^2]), x_Symbol] :> Simp[(1*EllipticPi[(b*c)/(a*d), ArcSin[Rt[-(d/c), 2]*x
], (c*f)/(d*e)])/(a*Sqrt[c]*Sqrt[e]*Rt[-(d/c), 2]), x] /; FreeQ[{a, b, c, d
, e, f}, x] &&  !GtQ[d/c, 0] && GtQ[c, 0] && GtQ[e, 0] &&  !( !GtQ[f/e, 0]
&& SimplerSqrtQ[-(f/e), -(d/c)])
```

Rule 538

```
Int[1/(((a_) + (b_.)*(x_)^2)*Sqrt[(c_) + (d_.)*(x_)^2]*Sqrt[(e_) + (f_.)*(x
_)^2]), x_Symbol] :> Dist[Sqrt[1 + (d*x^2)/c]/Sqrt[c + d*x^2], Int[1/((a +
b*x^2)*Sqrt[1 + (d*x^2)/c]*Sqrt[e + f*x^2]), x], x] /; FreeQ[{a, b, c, d, e
, f}, x] &&  !GtQ[c, 0]
```

Rule 719

```
Int[((d_) + (e_.)*(x_))^(m_)/Sqrt[(a_) + (c_.)*(x_)^2], x_Symbol] :> Dist[(
2*a*Rt[-(c/a), 2]*(d + e*x)^m*Sqrt[1 + (c*x^2)/a])/(c*Sqrt[a + c*x^2]*((c*(
d + e*x))/(c*d - a*e*Rt[-(c/a), 2]))^m), Subst[Int[(1 + (2*a*e*Rt[-(c/a), 2
]*x^2)/(c*d - a*e*Rt[-(c/a), 2]))^m/Sqrt[1 - x^2], x], x, Sqrt[(1 - Rt[-(c/
a), 2]*x)/2]], x] /; FreeQ[{a, c, d, e}, x] && NeQ[c*d^2 + a*e^2, 0] && EqQ
[m^2, 1/4]
```

Rule 932

```
Int[1/(((d_.) + (e_.)*(x_))*Sqrt[(f_.) + (g_.)*(x_)]*Sqrt[(a_) + (c_.)*(x_)
^2]), x_Symbol] :> With[{q = Rt[-(c/a), 2]}, Dist[1/Sqrt[a], Int[1/((d + e*
x)*Sqrt[f + g*x]*Sqrt[1 - q*x]*Sqrt[1 + q*x]), x], x]] /; FreeQ[{a, c, d, e
, f, g}, x] && NeQ[e*f - d*g, 0] && NeQ[c*d^2 + a*e^2, 0] && GtQ[a, 0]
```

Rule 944

```
Int[Sqrt[(f_.) + (g_.)*(x_)]/(((d_.) + (e_.)*(x_))*Sqrt[(a_) + (c_.)*(x_)^2
]), x_Symbol] :> Dist[g/e, Int[1/(Sqrt[f + g*x]*Sqrt[a + c*x^2]), x], x] +
Dist[(e*f - d*g)/e, Int[1/((d + e*x)*Sqrt[f + g*x]*Sqrt[a + c*x^2]), x], x]
 /; FreeQ[{a, c, d, e, f, g}, x] && NeQ[e*f - d*g, 0] && NeQ[c*d^2 + a*e^2,
 0]
```

Rule 6310

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))*(u_), x_Symbol] :> With[{v = IntHid
e[u, x]}, Dist[a + b*ArcCsch[c*x], v, x] + Dist[b/c, Int[SimplifyIntegrand[
v/(x^2*Sqrt[1 + 1/(c^2*x^2)]), x], x], x] /; InverseFunctionFreeQ[v, x]] /;
 FreeQ[{a, b, c}, x]
```

Rule 6721

```
Int[(u_.)*((a_.) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Dist[(b^IntPart[p]*(
a + b*x^n)^FracPart[p])/(x^(n*FracPart[p])*(1 + a/(x^n*b))^FracPart[p]), In
t[u*x^(n*p)*(1 + a/(x^n*b))^p, x], x] /; FreeQ[{a, b, p}, x] &&  !IntegerQ[
p] && ILtQ[n, 0] &&  !RationalFunctionQ[u, x] && IntegerQ[p + 1/2]
```

Rule 6742

```
Int[u_, x_Symbol] :> With[{v = ExpandIntegrand[u, x]}, Int[v, x] /; SumQ[v]
]
```

Rubi steps

$$\int \frac{x\left(a+b\text{csch}^{-1}(cx)\right)}{\sqrt{d+ex}}\,dx = -\frac{2d\sqrt{d+ex}\,\left(a+b\text{csch}^{-1}(cx)\right)}{e^2}+\frac{2(d+ex)^{3/2}\left(a+b\text{csch}^{-1}(cx)\right)}{3e^2}+\frac{b\int \frac{2(-2d+ex)\sqrt{d+\cdots}}{3e^2\sqrt{1+\frac{1}{c^2x^2}}\cdots}}{c}$$

$$= -\frac{2d\sqrt{d+ex}\,\left(a+b\text{csch}^{-1}(cx)\right)}{e^2}+\frac{2(d+ex)^{3/2}\left(a+b\text{csch}^{-1}(cx)\right)}{3e^2}+\frac{(2b)\int \frac{(-2d+ex)\sqrt{\cdots}}{\sqrt{1+\frac{1}{c^2x\cdots}}}}{3ce^2}$$

$$= -\frac{2d\sqrt{d+ex}\,\left(a+b\text{csch}^{-1}(cx)\right)}{e^2}+\frac{2(d+ex)^{3/2}\left(a+b\text{csch}^{-1}(cx)\right)}{3e^2}+\frac{\left(2b\sqrt{1+c^2x^2}\right)\cdots}{3ce^2\sqrt{\cdots}}$$

$$= -\frac{2d\sqrt{d+ex}\,\left(a+b\text{csch}^{-1}(cx)\right)}{e^2}+\frac{2(d+ex)^{3/2}\left(a+b\text{csch}^{-1}(cx)\right)}{3e^2}+\frac{\left(2b\sqrt{1+c^2x^2}\right)\cdots}{3c\cdots}$$

$$= -\frac{2d\sqrt{d+ex}\,\left(a+b\text{csch}^{-1}(cx)\right)}{e^2}+\frac{2(d+ex)^{3/2}\left(a+b\text{csch}^{-1}(cx)\right)}{3e^2}-\frac{\left(4bd\sqrt{1+c^2x^2}\cdots\right.}{3ce^2\sqrt{1\cdots}}$$

$$= -\frac{2d\sqrt{d+ex}\,\left(a+b\text{csch}^{-1}(cx)\right)}{e^2}+\frac{2(d+ex)^{3/2}\left(a+b\text{csch}^{-1}(cx)\right)}{3e^2}-\frac{\left(4bd^2\sqrt{1+c^2x^{\cdots}}\right.}{3ce^2\cdots}$$

$$= -\frac{2d\sqrt{d+ex}\,\left(a+b\text{csch}^{-1}(cx)\right)}{e^2}+\frac{2(d+ex)^{3/2}\left(a+b\text{csch}^{-1}(cx)\right)}{3e^2}+\frac{4b\sqrt{-c^2}\,\sqrt{d+e\cdots}}{\cdots}$$

$$= -\frac{2d\sqrt{d+ex}\,\left(a+b\text{csch}^{-1}(cx)\right)}{e^2}+\frac{2(d+ex)^{3/2}\left(a+b\text{csch}^{-1}(cx)\right)}{3e^2}+\frac{4b\sqrt{-c^2}\,\sqrt{d+e\cdots}}{\cdots}$$

$$= -\frac{2d\sqrt{d+ex}\,\left(a+b\text{csch}^{-1}(cx)\right)}{e^2}+\frac{2(d+ex)^{3/2}\left(a+b\text{csch}^{-1}(cx)\right)}{3e^2}+\frac{4b\sqrt{-c^2}\,\sqrt{d+e\cdots}}{\cdots}$$

$$\cdots 2d\sqrt{d+ex}\,\left(a+b\text{csch}^{-1}(cx)\right) \cdots 2(d+ex)^{3/2}\left(a+b\text{csch}^{-1}(cx)\right) \cdots 4b\sqrt{-c^2}\,\sqrt{d+e\cdots}$$

**Mathematica [C]** time = 1.34, size = 343, normalized size = 0.72

$$\frac{2\left(a\sqrt{d+ex}\,(ex-2d)+\frac{2b\sqrt{-\frac{e(cx-i)}{cd+ie}}\sqrt{-\frac{e(cx+i)}{cd-ie}}\left((e+icd)F\left(i\sinh^{-1}\left(\sqrt{-\frac{c}{cd-ie}}\sqrt{d+ex}\right)|\frac{cd-ie}{cd+ie}\right)+(-e+icd)E\left(i\sinh^{-1}\left(\sqrt{-\frac{c}{cd-ie}}\sqrt{d+ex}\right)|\frac{cd-ie}{cd+ie}\right)-2ic\right.}{c^2x\sqrt{\frac{1}{c^2x^2}+1}\sqrt{-\frac{c}{cd-ie}}}\right.}{3e^2}$$

Antiderivative was successfully verified.

```
[In] Integrate[(x*(a + b*ArcCsch[c*x]))/Sqrt[d + e*x],x]
```

```
[Out] (2*(a*(-2*d + e*x)*Sqrt[d + e*x] + b*(-2*d + e*x)*Sqrt[d + e*x]*ArcCsch[c*x
] + (2*b*Sqrt[-((e*(-I + c*x))/(c*d + I*e))]*Sqrt[-((e*(I + c*x))/(c*d - I*
e))]*((I*c*d - e)*EllipticE[I*ArcSinh[Sqrt[-(c/(c*d - I*e))]*Sqrt[d + e*x]]
, (c*d - I*e)/(c*d + I*e)] + (I*c*d + e)*EllipticF[I*ArcSinh[Sqrt[-(c/(c*d
- I*e))]*Sqrt[d + e*x]], (c*d - I*e)/(c*d + I*e)] - (2*I)*c*d*EllipticPi[1
- (I*e)/(c*d), I*ArcSinh[Sqrt[-(c/(c*d - I*e))]*Sqrt[d + e*x]], (c*d - I*e)
/(c*d + I*e)]))/(c^2*Sqrt[-(c/(c*d - I*e))]*Sqrt[1 + 1/(c^2*x^2)]*x)))/(3*e
^2)
```

**fricas [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*arccsch(c*x))/(e*x+d)^(1/2),x, algorithm="fricas")
```

```
[Out] Timed out
```

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

$$\int \frac{(b\,\mathrm{arcsch}\,(cx)+a)x}{\sqrt{ex+d}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*(a+b*arccsch(c*x))/(e*x+d)^(1/2),x, algorithm="giac")
```

```
[Out] integrate((b*arccsch(c*x) + a)*x/sqrt(e*x + d), x)
```

**maple [C]** time = 0.07, size = 868, normalized size = 1.83

$$2a\left(\frac{(ex+d)^{\frac{3}{2}}}{3}-d\sqrt{ex+d}\right)+2b\left(\frac{(ex+d)^{\frac{3}{2}}\,\mathrm{arccsch}(cx)}{3}-\mathrm{arccsch}\,(cx)\,d\sqrt{ex+d}-\frac{2\sqrt{-\frac{i(ex+d)ce+(ex+d)c^2d-c^2d^2-e^2}{c^2d^2+e^2}}\sqrt{\frac{i(ex+d)ce-(ex+d)c^2}{c^2d^2+e^2}}}{}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x*(a+b*arccsch(c*x))/(e*x+d)^(1/2),x)
```

```
[Out] 2/e^2*(a*(1/3*(e*x+d)^(3/2)-d*(e*x+d)^(1/2))+b*(1/3*(e*x+d)^(3/2)*arccsch(c
*x)-arccsch(c*x)*d*(e*x+d)^(1/2)-2/3/c^2*(-(I*(e*x+d)*c*e+(e*x+d)*c^2*d-c^2
*d^2-e^2)/(c^2*d^2+e^2))^(1/2)*((I*(e*x+d)*c*e-(e*x+d)*c^2*d+c^2*d^2+e^2)/(
c^2*d^2+e^2))^(1/2)*(2*I*EllipticF((e*x+d)^(1/2)*((I*e+c*d)*c/(c^2*d^2+e^2)
)^(1/2),(-(2*I*c*d*e-c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2))*c*d*e-EllipticF((e*
x+d)^(1/2)*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2),(-(2*I*c*d*e-c^2*d^2+e^2)/(c^2
*d^2+e^2))^(1/2))*c^2*d^2-EllipticE((e*x+d)^(1/2)*((I*e+c*d)*c/(c^2*d^2+e^2
))^(1/2),(-(2*I*c*d*e-c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2))*c^2*d^2-2*I*Ellipt
icPi((e*x+d)^(1/2)*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2),1/(I*e+c*d)/c*(c^2*d^2
+e^2)/d,(-(I*e-c*d)*c/(c^2*d^2+e^2))^(1/2)/((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2
))*c*d*e+2*EllipticPi((e*x+d)^(1/2)*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2),1/(I*
e+c*d)/c*(c^2*d^2+e^2)/d,(-(I*e-c*d)*c/(c^2*d^2+e^2))^(1/2)/((I*e+c*d)*c/(c
^2*d^2+e^2))^(1/2))*c^2*d^2+EllipticF((e*x+d)^(1/2)*((I*e+c*d)*c/(c^2*d^2+e
^2))^(1/2),(-(2*I*c*d*e-c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2))*e^2-EllipticE((e
*x+d)^(1/2)*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2),(-(2*I*c*d*e-c^2*d^2+e^2)/(c^
2*d^2+e^2))^(1/2))*e^2)/(((e*x+d)^2*c^2-2*(e*x+d)*c^2*d+c^2*d^2+e^2)/c^2/x^
2/e^2)^(1/2)/x/((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2)/(I*e-c*d)))
```

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

$$\frac{2}{3}\,a\left(\frac{(ex+d)^{\frac{3}{2}}}{e^2}-\frac{3\,\sqrt{ex+d}\,d}{e^2}\right)+\frac{1}{3}\,b\left(\frac{2\left(e^2x^2-dex-2\,d^2\right)\log\left(\sqrt{c^2x^2+1}\,+1\right)}{\sqrt{ex+d}\,e^2}+3\int\frac{2\left(c^2e^2x^3\right.}{3\left(\left(c^2e^2x^2+e^2\right)\sqrt{c^2x^2+1}\right.}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*(a+b*arccsch(c*x))/(e*x+d)^(1/2),x, algorithm="maxima")
```

```
[Out] 2/3*a*((e*x + d)^(3/2)/e^2 - 3*sqrt(e*x + d)*d/e^2) + 1/3*b*(2*(e^2*x^2 - d
*e*x - 2*d^2)*log(sqrt(c^2*x^2 + 1) + 1)/(sqrt(e*x + d)*e^2) + 3*integrate(
2/3*(c^2*e^2*x^3 - c^2*d*e*x^2 - 2*c^2*d^2*x)/((c^2*e^2*x^2 + e^2)*sqrt(c^2
*x^2 + 1)*sqrt(e*x + d) + (c^2*e^2*x^2 + e^2)*sqrt(e*x + d)), x) - 3*integr
ate(-1/3*(2*c^2*d*e*x^2 - (3*e^2*log(c) + 2*e^2)*c^2*x^3 + (4*c^2*d^2 - 3*e
^2*log(c))*x - 3*(c^2*e^2*x^3 + e^2*x)*log(x))/((c^2*e^2*x^2 + e^2)*sqrt(e*
x + d)), x))
```

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

$$\int \frac{x\,\left(a+b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)\right)}{\sqrt{d+e\,x}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((x*(a + b*asinh(1/(c*x))))/(d + e*x)^(1/2),x)
```

```
[Out] int((x*(a + b*asinh(1/(c*x))))/(d + e*x)^(1/2), x)
```

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

$$\int \frac{x\left(a + b\operatorname{acsch}\left(cx\right)\right)}{\sqrt{d + ex}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*(a+b*acsch(c*x))/(e*x+d)**(1/2),x)
```

```
[Out] Integral(x*(a + b*acsch(c*x))/sqrt(d + e*x), x)
```

# 3.60 $\int \frac{a+b\mathbf{csch}^{-1}(cx)}{\sqrt{d+ex}}\,dx$

**Optimal**. Leaf size=284

$$\frac{2\sqrt{d+ex}\left(a+b\operatorname{csch}^{-1}(cx)\right)}{e}+\frac{4bc\sqrt{c^2x^2+1}\sqrt{\frac{d+ex}{\frac{e}{\sqrt{-c^2}}+d}}\,F\left(\sin^{-1}\left(\frac{\sqrt{1-\sqrt{-c^2}\,x}}{\sqrt{2}}\right)|-\frac{2\sqrt{-c^2}\,e}{c^2d-\sqrt{-c^2}\,e}\right)}{\left(-c^2\right)^{3/2}x\sqrt{\frac{1}{c^2x^2}+1}\sqrt{d+ex}}-\frac{4bd\sqrt{c^2x^2+1}\sqrt{\ldots}}{c\ldots}$$

```
[Out] 2*(a+b*arccsch(c*x))*(e*x+d)^(1/2)/e+4*b*c*EllipticF(1/2*(1-(-c^2)^(1/2)*x)
^(1/2)*2^(1/2),(-2*e*(-c^2)^(1/2)/(c^2*d-e*(-c^2)^(1/2)))^(1/2))*(c^2*x^2+1
)^(1/2)*((e*x+d)/(d+e/(-c^2)^(1/2)))^(1/2)/(-c^2)^(3/2)/x/(1+1/c^2/x^2)^(1/
2)/(e*x+d)^(1/2)-4*b*d*EllipticPi(1/2*(1-(-c^2)^(1/2)*x)^(1/2)*2^(1/2),2,2^
(1/2)*(e/(d*(-c^2)^(1/2)+e))^(1/2))*(c^2*x^2+1)^(1/2)*((e*x+d)*(-c^2)^(1/2)
/(d*(-c^2)^(1/2)+e))^(1/2)/c/e/x/(1+1/c^2/x^2)^(1/2)/(e*x+d)^(1/2)
```

**Rubi** [A] time = 0.41, antiderivative size = 284, normalized size of antiderivative = 1.00, number of steps used = 9, number of rules used = 9, integrand size = 18, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.500, Rules used = {6290, 1574, 944, 719, 419, 933, 168, 538, 537}

$$\frac{2\sqrt{d+ex}\left(a+b\operatorname{csch}^{-1}(cx)\right)}{e}+\frac{4bc\sqrt{c^2x^2+1}\sqrt{\frac{d+ex}{\frac{e}{\sqrt{-c^2}}+d}}\,F\left(\sin^{-1}\left(\frac{\sqrt{1-\sqrt{-c^2}\,x}}{\sqrt{2}}\right)|-\frac{2\sqrt{-c^2}\,e}{c^2d-\sqrt{-c^2}\,e}\right)}{\left(-c^2\right)^{3/2}x\sqrt{\frac{1}{c^2x^2}+1}\sqrt{d+ex}}-\frac{4bd\sqrt{c^2x^2+1}\sqrt{\ldots}}{c\ldots}$$

Antiderivative was successfully verified.

```
[In] Int[(a + b*ArcCsch[c*x])/Sqrt[d + e*x],x]
```

```
[Out] (2*Sqrt[d + e*x]*(a + b*ArcCsch[c*x]))/e + (4*b*c*Sqrt[(d + e*x)/(d + e/Sqr
t[-c^2])]*Sqrt[1 + c^2*x^2]*EllipticF[ArcSin[Sqrt[1 - Sqrt[-c^2]*x]/Sqrt[2]
], (-2*Sqrt[-c^2]*e)/(c^2*d - Sqrt[-c^2]*e)])/((-c^2)^(3/2)*Sqrt[1 + 1/(c^2
*x^2)]*x*Sqrt[d + e*x]) - (4*b*d*Sqrt[(Sqrt[-c^2]*(d + e*x))/(Sqrt[-c^2]*d
+ e)]*Sqrt[1 + c^2*x^2]*EllipticPi[2, ArcSin[Sqrt[1 - Sqrt[-c^2]*x]/Sqrt[2]
], (2*e)/(Sqrt[-c^2]*d + e)])/(c*e*Sqrt[1 + 1/(c^2*x^2)]*x*Sqrt[d + e*x])
```

Rule 168

```
Int[1/(((a_.) + (b_.)*(x_))*Sqrt[(c_.) + (d_.)*(x_)]*Sqrt[(e_.) + (f_.)*(x_
)]*Sqrt[(g_.) + (h_.)*(x_)]), x_Symbol] :> Dist[-2, Subst[Int[1/(Simp[b*c -
 a*d - b*x^2, x]*Sqrt[Simp[(d*e - c*f)/d + (f*x^2)/d, x]]*Sqrt[Simp[(d*g -
c*h)/d + (h*x^2)/d, x]]), x], x, Sqrt[c + d*x]], x] /; FreeQ[{a, b, c, d, e
, f, g, h}, x] && GtQ[(d*e - c*f)/d, 0]
```

Rule 419

```
Int[1/(Sqrt[(a_) + (b_.)*(x_)^2]*Sqrt[(c_) + (d_.)*(x_)^2]), x_Symbol] :> S
imp[(1*EllipticF[ArcSin[Rt[-(d/c), 2]*x], (b*c)/(a*d)])/(Sqrt[a]*Sqrt[c]*Rt
[-(d/c), 2]), x] /; FreeQ[{a, b, c, d}, x] && NegQ[d/c] && GtQ[c, 0] && GtQ
[a, 0] &&  !(NegQ[b/a] && SimplerSqrtQ[-(b/a), -(d/c)])
```

Rule 537

```
Int[1/(((a_) + (b_.)*(x_)^2)*Sqrt[(c_) + (d_.)*(x_)^2]*Sqrt[(e_) + (f_.)*(x
_)^2]), x_Symbol] :> Simp[(1*EllipticPi[(b*c)/(a*d), ArcSin[Rt[-(d/c), 2]*x
], (c*f)/(d*e)])/(a*Sqrt[c]*Sqrt[e]*Rt[-(d/c), 2]), x] /; FreeQ[{a, b, c, d
, e, f}, x] &&  !GtQ[d/c, 0] && GtQ[c, 0] && GtQ[e, 0] &&  !( !GtQ[f/e, 0]
&& SimplerSqrtQ[-(f/e), -(d/c)])
```

Rule 538

```
Int[1/(((a_) + (b_.)*(x_)^2)*Sqrt[(c_) + (d_.)*(x_)^2]*Sqrt[(e_) + (f_.)*(x
_)^2]), x_Symbol] :> Dist[Sqrt[1 + (d*x^2)/c]/Sqrt[c + d*x^2], Int[1/((a +
b*x^2)*Sqrt[1 + (d*x^2)/c]*Sqrt[e + f*x^2]), x], x] /; FreeQ[{a, b, c, d, e
, f}, x] &&  !GtQ[c, 0]
```

Rule 719

```
Int[((d_) + (e_.)*(x_))^(m_)/Sqrt[(a_) + (c_.)*(x_)^2], x_Symbol] :> Dist[(
2*a*Rt[-(c/a), 2]*(d + e*x)^m*Sqrt[1 + (c*x^2)/a])/(c*Sqrt[a + c*x^2]*((c*(
d + e*x))/(c*d - a*e*Rt[-(c/a), 2]))^m), Subst[Int[(1 + (2*a*e*Rt[-(c/a), 2
]*x^2)/(c*d - a*e*Rt[-(c/a), 2]))^m/Sqrt[1 - x^2], x], x, Sqrt[(1 - Rt[-(c/
a), 2]*x)/2]], x] /; FreeQ[{a, c, d, e}, x] && NeQ[c*d^2 + a*e^2, 0] && EqQ
[m^2, 1/4]
```

Rule 933

```
Int[1/(((d_.) + (e_.)*(x_))*Sqrt[(f_.) + (g_.)*(x_)]*Sqrt[(a_) + (c_.)*(x_)
^2]), x_Symbol] :> With[{q = Rt[-(c/a), 2]}, Dist[Sqrt[1 + (c*x^2)/a]/Sqrt[
a + c*x^2], Int[1/((d + e*x)*Sqrt[f + g*x]*Sqrt[1 - q*x]*Sqrt[1 + q*x]), x]
, x]] /; FreeQ[{a, c, d, e, f, g}, x] && NeQ[e*f - d*g, 0] && NeQ[c*d^2 + a
*e^2, 0] &&  !GtQ[a, 0]
```

Rule 944

```
Int[Sqrt[(f_.) + (g_.)*(x_)]/(((d_.) + (e_.)*(x_))*Sqrt[(a_) + (c_.)*(x_)^2
]), x_Symbol] :> Dist[g/e, Int[1/(Sqrt[f + g*x]*Sqrt[a + c*x^2]), x], x] +
Dist[(e*f - d*g)/e, Int[1/((d + e*x)*Sqrt[f + g*x]*Sqrt[a + c*x^2]), x], x]
 /; FreeQ[{a, c, d, e, f, g}, x] && NeQ[e*f - d*g, 0] && NeQ[c*d^2 + a*e^2,
```

```
0]
```

Rule 1574

```
Int[(x_)^(m_.)*((a_.) + (c_.)*(x_)^(mn2_.))^(p_)*((d_) + (e_.)*(x_)^(n_.))^
(q_.), x_Symbol] :> Dist[(x^(2*n*FracPart[p])*(a + c/x^(2*n))^FracPart[p])/
(c + a*x^(2*n))^FracPart[p], Int[x^(m - 2*n*p)*(d + e*x^n)^q*(c + a*x^(2*n)
)^p, x], x] /; FreeQ[{a, c, d, e, m, n, p, q}, x] && EqQ[mn2, -2*n] && !In
tegerQ[p] && !IntegerQ[q] && PosQ[n]
```

Rule 6290

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))*((d_.) + (e_.)*(x_))^(m_.), x_Symbo
l] :> Simp[((d + e*x)^(m + 1)*(a + b*ArcCsch[c*x]))/(e*(m + 1)), x] + Dist[
b/(c*e*(m + 1)), Int[(d + e*x)^(m + 1)/(x^2*Sqrt[1 + 1/(c^2*x^2)]), x], x]
/; FreeQ[{a, b, c, d, e, m}, x] && NeQ[m, -1]
```

Rubi steps

$$\int \frac{a+b\text{csch}^{-1}(cx)}{\sqrt{d+ex}}\,dx = \frac{2\sqrt{d+ex}\left(a+b\text{csch}^{-1}(cx)\right)}{e} + \frac{(2b)\int \frac{\sqrt{d+ex}}{\sqrt{1+\frac{1}{c^2x^2}}\,x^2}\,dx}{ce}$$

$$= \frac{2\sqrt{d+ex}\left(a+b\text{csch}^{-1}(cx)\right)}{e} + \frac{\left(2b\sqrt{\frac{1}{c^2}+x^2}\right)\int \frac{\sqrt{d+ex}}{x\sqrt{\frac{1}{c^2}+x^2}}\,dx}{ce\sqrt{1+\frac{1}{c^2x^2}}\,x}$$

$$= \frac{2\sqrt{d+ex}\left(a+b\text{csch}^{-1}(cx)\right)}{e} + \frac{\left(2b\sqrt{\frac{1}{c^2}+x^2}\right)\int \frac{1}{\sqrt{d+ex}\sqrt{\frac{1}{c^2}+x^2}}\,dx}{c\sqrt{1+\frac{1}{c^2x^2}}\,x} + \frac{\left(2bd\sqrt{\frac{1}{c^2}+x^2}\right)\int \ldots}{ce\sqrt{1+\ldots}}$$

$$= \frac{2\sqrt{d+ex}\left(a+b\text{csch}^{-1}(cx)\right)}{e} + \frac{\left(2bd\sqrt{1+c^2x^2}\right)\int \frac{1}{x\sqrt{1-\sqrt{-c^2}\,x}\sqrt{1+\sqrt{-c^2}\,x}\sqrt{d+ex}}\,dx}{ce\sqrt{1+\frac{1}{c^2x^2}}\,x} + \frac{\left(4b\sqrt{\ldots}\right.}{\ldots}$$

$$= \frac{2\sqrt{d+ex}\left(a+b\text{csch}^{-1}(cx)\right)}{e} + \frac{4b\sqrt{-c^2}\sqrt{\frac{d+ex}{d+\frac{e}{\sqrt{-c^2}}}}\sqrt{1+c^2x^2}\,F\left(\sin^{-1}\left(\frac{\sqrt{1-\sqrt{-c^2}\,x}}{\sqrt{2}}\right)\middle|-\frac{2\ldots}{c^2d\ldots}\right.}{c^3\sqrt{1+\frac{1}{c^2x^2}}\,x\sqrt{d+ex}}$$

$$= \frac{2\sqrt{d+ex}\left(a+b\text{csch}^{-1}(cx)\right)}{e} + \frac{4b\sqrt{-c^2}\sqrt{\frac{d+ex}{d+\frac{e}{\sqrt{-c^2}}}}\sqrt{1+c^2x^2}\,F\left(\sin^{-1}\left(\frac{\sqrt{1-\sqrt{-c^2}\,x}}{\sqrt{2}}\right)\middle|-\frac{2\ldots}{c^2d\ldots}\right.}{c^3\sqrt{1+\frac{1}{c^2x^2}}\,x\sqrt{d+ex}}$$

$$= \frac{2\sqrt{d+ex}\left(a+b\text{csch}^{-1}(cx)\right)}{e} + \frac{4b\sqrt{-c^2}\sqrt{\frac{d+ex}{d+\frac{e}{\sqrt{-c^2}}}}\sqrt{1+c^2x^2}\,F\left(\sin^{-1}\left(\frac{\sqrt{1-\sqrt{-c^2}\,x}}{\sqrt{2}}\right)\middle|-\frac{2\ldots}{c^2d\ldots}\right.}{c^3\sqrt{1+\frac{1}{c^2x^2}}\,x\sqrt{d+ex}}$$

**Mathematica [C]** time = 5.22, size = 307, normalized size = 1.08

$$\frac{2\left(ae(d+ex)-\frac{b\left(\frac{d}{x}+e\right)\left(-cex\operatorname{csch}^{-1}(cx)+\frac{\sqrt{2}\sqrt{1+icx}\left(cd(e+icd)\sqrt{-\frac{e(cx+i)}{cd-ie}}\sqrt{\frac{ce(cx+i)(d+ex)}{(e+icd)^2}}\Pi\left(\frac{icd}{e}+1;\sin^{-1}\left(\sqrt{-\frac{e(cx+i)}{cd-ie}}\right)|\frac{icd+e}{2e}\right)-e^2(cx+i)\sqrt{\frac{c(d+ex)}{cd-ie}}F\left(\sin^{-1}\left(\cdots\right.\right.\right.}{\sqrt{\frac{1}{c^2x^2}+1}\sqrt{-\frac{e(cx+i)}{cd-ie}}(cd+cex)}\cdots}{c}\cdots\right)}{e^2\sqrt{d+ex}}$$

Antiderivative was successfully verified.

```
[In] Integrate[(a + b*ArcCsch[c*x])/Sqrt[d + e*x],x]
```

```
[Out] (2*(a*e*(d + e*x) - (b*(e + d/x)*(-(c*e*x*ArcCsch[c*x]) + (Sqrt[2]*Sqrt[1 +
 I*c*x]*(-(e^2*(I + c*x)*Sqrt[(c*(d + e*x))/(c*d - I*e)]*EllipticF[ArcSin[S
qrt[-((e*(I + c*x))/(c*d - I*e))]], (I*c*d + e)/(2*e)]) + c*d*(I*c*d + e)*S
qrt[-((e*(I + c*x))/(c*d - I*e))]*Sqrt[(c*e*(I + c*x)*(d + e*x))/(I*c*d + e
)^2]*EllipticPi[1 + (I*c*d)/e, ArcSin[Sqrt[-((e*(I + c*x))/(c*d - I*e))]],
(I*c*d + e)/(2*e)]))/(Sqrt[1 + 1/(c^2*x^2)]*Sqrt[-((e*(I + c*x))/(c*d - I*e
))]*(c*d + c*e*x))))/c))/(e^2*Sqrt[d + e*x])
```

**fricas [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*arccsch(c*x))/(e*x+d)^(1/2),x, algorithm="fricas")
```

```
[Out] Timed out
```

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

$$\int \frac{b\operatorname{arcsch}(cx)+a}{\sqrt{ex+d}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))/(e*x+d)^(1/2),x, algorithm="giac")
```

```
[Out] integrate((b*arccsch(c*x) + a)/sqrt(e*x + d), x)
```

**maple [C]** time = 0.07, size = 395, normalized size = 1.39

$$\frac{2a\sqrt{ex+d}+2b\left(\sqrt{ex+d}\,\operatorname{arccsch}(cx)+\frac{2\sqrt{-\frac{i(ex+d)ce+(ex+d)c^2d-c^2d^2-e^2}{c^2d^2+e^2}}\,\sqrt{\frac{i(ex+d)ce-(ex+d)c^2d+c^2d^2+e^2}{c^2d^2+e^2}}\left(\operatorname{EllipticF}\left(\sqrt{ex+d}\,\sqrt{\frac{(cd+ie)c}{c^2d^2+e^2}},\sqrt{\right.\right.}{c\sqrt{\frac{(ex+d)^2c^2-2(ex+d)c^2d+c^2d^2+e^2}{c^2x^2e^2}}}\right)}{e}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a+b*arccsch(c*x))/(e*x+d)^(1/2),x)
```

```
[Out] 2/e*(a*(e*x+d)^(1/2)+b*((e*x+d)^(1/2)*arccsch(c*x)+2/c*(-(I*(e*x+d)*c*e+(e*
x+d)*c^2*d-c^2*d^2-e^2)/(c^2*d^2+e^2))^(1/2)*((I*(e*x+d)*c*e-(e*x+d)*c^2*d+
c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2)*(EllipticF((e*x+d)^(1/2)*((I*e+c*d)*c/(c^
2*d^2+e^2))^(1/2),(-(2*I*c*d*e-c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2))-EllipticP
i((e*x+d)^(1/2)*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2),1/(I*e+c*d)/c*(c^2*d^2+e^
2)/d,(-(I*e-c*d)*c/(c^2*d^2+e^2))^(1/2)/((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2)))
/(((e*x+d)^2*c^2-2*(e*x+d)*c^2*d+c^2*d^2+e^2)/c^2/x^2/e^2)^(1/2)/x/((I*e+c*
d)*c/(c^2*d^2+e^2))^(1/2)))
```

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

$$b\left(\frac{2\sqrt{ex+d}\,\log\left(\sqrt{c^2x^2+1}+1\right)}{e}+\int\frac{2\left(c^2ex^2+c^2dx\right)}{\left(c^2ex^2+e\right)\sqrt{c^2x^2+1}\,\sqrt{ex+d}+\left(c^2ex^2+e\right)\sqrt{ex+d}}\,dx-\int\frac{\left(e\log(c)+2\right.}{}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))/(e*x+d)^(1/2),x, algorithm="maxima")
```

```
[Out] b*(2*sqrt(e*x + d)*log(sqrt(c^2*x^2 + 1) + 1)/e + integrate(2*(c^2*e*x^2 +
c^2*d*x)/((c^2*e*x^2 + e)*sqrt(c^2*x^2 + 1)*sqrt(e*x + d) + (c^2*e*x^2 + e)
*sqrt(e*x + d)), x) - integrate(((e*log(c) + 2*e)*c^2*x^2 + 2*c^2*d*x + e*l
og(c) + (c^2*e*x^2 + e)*log(x))/((c^2*e*x^2 + e)*sqrt(e*x + d)), x)) + 2*sq
rt(e*x + d)*a/e
```

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

$$\int\frac{a+b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)}{\sqrt{d+e\,x}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a + b*asinh(1/(c*x)))/(d + e*x)^(1/2),x)
[Out] int((a + b*asinh(1/(c*x)))/(d + e*x)^(1/2), x)
```

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

$$\int \frac{a + b \operatorname{acsch}(cx)}{\sqrt{d + ex}}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*acsch(c*x))/(e*x+d)**(1/2),x)
[Out] Integral((a + b*acsch(c*x))/sqrt(d + e*x), x)
```

# 3.61 $\int \frac{a+b\text{csch}^{-1}(cx)}{x\sqrt{d+ex}}\,dx$

**Optimal**. Leaf size=24

$$\text{Int}\left(\frac{a+b\text{csch}^{-1}(cx)}{x\sqrt{d+ex}},x\right)$$

```
[Out] Unintegrable((a+b*arccsch(c*x))/x/(e*x+d)^(1/2),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 = {}

$$\int \frac{a+b\text{csch}^{-1}(cx)}{x\sqrt{d+ex}}\,dx$$

Verification is Not applicable to the result.

```
[In] Int[(a + b*ArcCsch[c*x])/(x*Sqrt[d + e*x]),x]
[Out] Defer[Int][(a + b*ArcCsch[c*x])/(x*Sqrt[d + e*x]), x]
```

Rubi steps

$$\int \frac{a+b\text{csch}^{-1}(cx)}{x\sqrt{d+ex}}\,dx = \int \frac{a+b\text{csch}^{-1}(cx)}{x\sqrt{d+ex}}\,dx$$

**Mathematica** [A] time = 6.55, size = 0, normalized size = 0.00

$$\int \frac{a+b\text{csch}^{-1}(cx)}{x\sqrt{d+ex}}\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[(a + b*ArcCsch[c*x])/(x*Sqrt[d + e*x]),x]
[Out] Integrate[(a + b*ArcCsch[c*x])/(x*Sqrt[d + e*x]), x]
```

**fricas** [A] time = 1.12, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{\sqrt{ex+d}\,(b\,\text{arcsch}\,(cx)+a)}{ex^2+dx},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))/x/(e*x+d)^(1/2),x, algorithm="fricas")
```

```
[Out] integral(sqrt(e*x + d)*(b*arccsch(c*x) + a)/(e*x^2 + d*x), x)
```

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

$$\int \frac{b \operatorname{arcsch}(cx) + a}{\sqrt{ex + d}\, x}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))/x/(e*x+d)^(1/2),x, algorithm="giac")
```

```
[Out] integrate((b*arccsch(c*x) + a)/(sqrt(e*x + d)*x), x)
```

**maple [A]** time = 1.53, size = 0, normalized size = 0.00

$$\int \frac{a + b \operatorname{arccsch}(cx)}{x\sqrt{ex + d}}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a+b*arccsch(c*x))/x/(e*x+d)^(1/2),x)
```

```
[Out] int((a+b*arccsch(c*x))/x/(e*x+d)^(1/2),x)
```

**maxima [A]** time = 0.00, size = 0, normalized size = 0.00

$$-\left(\frac{\log(c)\log\left(\frac{\sqrt{ex+d}-\sqrt{d}}{\sqrt{ex+d}+\sqrt{d}}\right)}{\sqrt{d}} + \int \frac{\log(x)}{\sqrt{ex + d}\, x}\, dx - \int \frac{\log\left(\sqrt{c^2x^2 + 1} + 1\right)}{\sqrt{ex + d}\, x}\, dx\right)b + \frac{a\log\left(\frac{\sqrt{ex+d}-\sqrt{d}}{\sqrt{ex+d}+\sqrt{d}}\right)}{\sqrt{d}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))/x/(e*x+d)^(1/2),x, algorithm="maxima")
```

```
[Out] -(log(c)*log((sqrt(e*x + d) - sqrt(d))/(sqrt(e*x + d) + sqrt(d)))/sqrt(d) +
 integrate(log(x)/(sqrt(e*x + d)*x), x) - integrate(log(sqrt(c^2*x^2 + 1) +
 1)/(sqrt(e*x + d)*x), x))*b + a*log((sqrt(e*x + d) - sqrt(d))/(sqrt(e*x +
d) + sqrt(d)))/sqrt(d)
```

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

$$\int \frac{a + b \operatorname{asinh}\left(\frac{1}{c\,x}\right)}{x\,\sqrt{d + e\,x}}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a + b*asinh(1/(c*x)))/(x*(d + e*x)^(1/2)),x)
```

```
[Out] int((a + b*asinh(1/(c*x)))/(x*(d + e*x)^(1/2)), x)
```

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

$$\int \frac{a + b\,\text{acsch}\,(cx)}{x\sqrt{d + ex}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*acsch(c*x))/x/(e*x+d)**(1/2),x)
```

```
[Out] Integral((a + b*acsch(c*x))/(x*sqrt(d + e*x)), x)
```

# 3.62 $\int \frac{a+b\operatorname{csch}^{-1}(cx)}{x^2\sqrt{d+ex}}\,dx$

**Optimal**. Leaf size=24

$$\operatorname{Int}\left(\frac{a+b\operatorname{csch}^{-1}(cx)}{x^2\sqrt{d+ex}},x\right)$$

```
[Out] Unintegrable((a+b*arccsch(c*x))/x^2/(e*x+d)^(1/2),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 = {}

$$\int \frac{a+b\operatorname{csch}^{-1}(cx)}{x^2\sqrt{d+ex}}\,dx$$

Verification is Not applicable to the result.

```
[In] Int[(a + b*ArcCsch[c*x])/(x^2*Sqrt[d + e*x]),x]
```

```
[Out] Defer[Int][(a + b*ArcCsch[c*x])/(x^2*Sqrt[d + e*x]), x]
```

Rubi steps

$$\int \frac{a+b\operatorname{csch}^{-1}(cx)}{x^2\sqrt{d+ex}}\,dx=\int \frac{a+b\operatorname{csch}^{-1}(cx)}{x^2\sqrt{d+ex}}\,dx$$

**Mathematica [A]** time = 9.21, size = 0, normalized size = 0.00

$$\int \frac{a+b\operatorname{csch}^{-1}(cx)}{x^2\sqrt{d+ex}}\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[(a + b*ArcCsch[c*x])/(x^2*Sqrt[d + e*x]),x]
```

```
[Out] Integrate[(a + b*ArcCsch[c*x])/(x^2*Sqrt[d + e*x]), x]
```

**fricas [A]** time = 0.83, size = 0, normalized size = 0.00

$$\operatorname{integral}\left(\frac{\sqrt{ex+d}\,(b\operatorname{arcsch}(cx)+a)}{ex^3+dx^2},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))/x^2/(e*x+d)^(1/2),x, algorithm="fricas")
```

```
[Out] integral(sqrt(e*x + d)*(b*arccsch(c*x) + a)/(e*x^3 + d*x^2), x)
```

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

$$\int \frac{b \operatorname{arcsch}(cx) + a}{\sqrt{ex+d}\, x^2}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))/x^2/(e*x+d)^(1/2),x, algorithm="giac")
```

```
[Out] integrate((b*arccsch(c*x) + a)/(sqrt(e*x + d)*x^2), x)
```

**maple [A]** time = 5.26, size = 0, normalized size = 0.00

$$\int \frac{a + b \operatorname{arccsch}(cx)}{x^2 \sqrt{ex+d}}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a+b*arccsch(c*x))/x^2/(e*x+d)^(1/2),x)
```

```
[Out] int((a+b*arccsch(c*x))/x^2/(e*x+d)^(1/2),x)
```

**maxima [A]** time = 0.00, size = 0, normalized size = 0.00

$$\frac{1}{2}\left(\left(\frac{2\sqrt{ex+d}\,e}{(ex+d)d-d^2} + \frac{e\log\left(\frac{\sqrt{ex+d}-\sqrt{d}}{\sqrt{ex+d}+\sqrt{d}}\right)}{d^{\frac{3}{2}}}\right)\log(c) - 2\int \frac{\log(x)}{\sqrt{ex+d}\,x^2}\,dx + 2\int \frac{\log\left(\sqrt{c^2x^2+1}+1\right)}{\sqrt{ex+d}\,x^2}\,dx\right)b - \frac{1}{2}a\left(\frac{2}{(ex}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))/x^2/(e*x+d)^(1/2),x, algorithm="maxima")
```

```
[Out] 1/2*((2*sqrt(e*x + d)*e/((e*x + d)*d - d^2) + e*log((sqrt(e*x + d) - sqrt(d
))/(sqrt(e*x + d) + sqrt(d)))/d^(3/2))*log(c) - 2*integrate(log(x)/(sqrt(e*
x + d)*x^2), x) + 2*integrate(log(sqrt(c^2*x^2 + 1) + 1)/(sqrt(e*x + d)*x^2
), x))*b - 1/2*a*(2*sqrt(e*x + d)*e/((e*x + d)*d - d^2) + e*log((sqrt(e*x +
 d) - sqrt(d))/(sqrt(e*x + d) + sqrt(d)))/d^(3/2))
```

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

$$\int \frac{a + b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)}{x^2\,\sqrt{d+e\,x}}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a + b*asinh(1/(c*x)))/(x^2*(d + e*x)^(1/2)),x)
```

```
[Out] int((a + b*asinh(1/(c*x)))/(x^2*(d + e*x)^(1/2)), x)
```

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

$$\int \frac{a + b\,\text{acsch}\,(cx)}{x^2\sqrt{d + ex}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*acsch(c*x))/x**2/(e*x+d)**(1/2),x)
```

```
[Out] Integral((a + b*acsch(c*x))/(x**2*sqrt(d + e*x)), x)
```

## 3.63 $\int \frac{x^3\left(a+b\,\mathrm{csch}^{-1}(cx)\right)}{(d+ex)^{3/2}}\,dx$

**Optimal**. Leaf size=731

$$\frac{2d^3\left(a+b\mathrm{csch}^{-1}(cx)\right)}{e^4\sqrt{d+ex}}+\frac{6d^2\sqrt{d+ex}\left(a+b\mathrm{csch}^{-1}(cx)\right)}{e^4}-\frac{2d(d+ex)^{3/2}\left(a+b\mathrm{csch}^{-1}(cx)\right)}{e^4}+\frac{2(d+ex)^{5/2}\left(a+b\mathrm{csch}\right.}{5e^4}$$

```
[Out] -2*d*(e*x+d)^(3/2)*(a+b*arccsch(c*x))/e^4+2/5*(e*x+d)^(5/2)*(a+b*arccsch(c*
x))/e^4+2*d^3*(a+b*arccsch(c*x))/e^4/(e*x+d)^(1/2)+6*d^2*(a+b*arccsch(c*x))
*(e*x+d)^(1/2)/e^4+4/15*b*(c^2*x^2+1)*(e*x+d)^(1/2)/c^3/e^2/x/(1+1/c^2/x^2)
^(1/2)-64/5*b*d^3*EllipticPi(1/2*(1-(-c^2)^(1/2)*x)^(1/2)*2^(1/2),2,2^(1/2)
*(e/(d*(-c^2)^(1/2)+e))^(1/2))*(c^2*x^2+1)^(1/2)*((e*x+d)*(-c^2)^(1/2)/(d*(
-c^2)^(1/2)+e))^(1/2)/c/e^4/x/(1+1/c^2/x^2)^(1/2)/(e*x+d)^(1/2)-32/15*b*c*d
*EllipticE(1/2*(1-(-c^2)^(1/2)*x)^(1/2)*2^(1/2),(-2*e*(-c^2)^(1/2)/(c^2*d-e
*(-c^2)^(1/2)))^(1/2))*(e*x+d)^(1/2)*(c^2*x^2+1)^(1/2)/(-c^2)^(3/2)/e^3/x/(
1+1/c^2/x^2)^(1/2)/(c^2*(e*x+d)/(c^2*d-e*(-c^2)^(1/2)))^(1/2)+8*b*c*d^2*Ell
ipticF(1/2*(1-(-c^2)^(1/2)*x)^(1/2)*2^(1/2),(-2*e*(-c^2)^(1/2)/(c^2*d-e*(-c
^2)^(1/2)))^(1/2))*(c^2*x^2+1)^(1/2)*(c^2*(e*x+d)/(c^2*d-e*(-c^2)^(1/2)))^(
1/2)/(-c^2)^(3/2)/e^3/x/(1+1/c^2/x^2)^(1/2)/(e*x+d)^(1/2)-4/15*b*c*(2*c^2*d
^2-e^2)*EllipticF(1/2*(1-(-c^2)^(1/2)*x)^(1/2)*2^(1/2),(-2*e*(-c^2)^(1/2)/(
c^2*d-e*(-c^2)^(1/2)))^(1/2))*(c^2*x^2+1)^(1/2)*(c^2*(e*x+d)/(c^2*d-e*(-c^2
)^(1/2)))^(1/2)/(-c^2)^(5/2)/e^3/x/(1+1/c^2/x^2)^(1/2)/(e*x+d)^(1/2)
```

**Rubi [A]** time = 2.64, antiderivative size = 731, normalized size of antiderivative = 1.00, number of steps used = 23, number of rules used = 15, integrand size = 21, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.714, Rules used = {43, 6310, 12, 6721, 6742, 719, 419, 932, 168, 538, 537, 844, 424, 931, 1584}

$$\frac{2d^3\left(a+b\mathrm{csch}^{-1}(cx)\right)}{e^4\sqrt{d+ex}}+\frac{6d^2\sqrt{d+ex}\left(a+b\mathrm{csch}^{-1}(cx)\right)}{e^4}-\frac{2d(d+ex)^{3/2}\left(a+b\mathrm{csch}^{-1}(cx)\right)}{e^4}+\frac{2(d+ex)^{5/2}\left(a+b\mathrm{csch}\right.}{5e^4}$$

Antiderivative was successfully verified.

```
[In] Int[(x^3*(a + b*ArcCsch[c*x]))/(d + e*x)^(3/2),x]
```

```
[Out] (4*b*Sqrt[d + e*x]*(1 + c^2*x^2))/(15*c^3*e^2*Sqrt[1 + 1/(c^2*x^2)]*x) + (2
*d^3*(a + b*ArcCsch[c*x]))/(e^4*Sqrt[d + e*x]) + (6*d^2*Sqrt[d + e*x]*(a +
b*ArcCsch[c*x]))/e^4 - (2*d*(d + e*x)^(3/2)*(a + b*ArcCsch[c*x]))/e^4 + (2*
```

```
(d + e*x)^(5/2)*(a + b*ArcCsch[c*x]))/(5*e^4) - (32*b*c*d*Sqrt[d + e*x]*Sqr
t[1 + c^2*x^2]*EllipticE[ArcSin[Sqrt[1 - Sqrt[-c^2]*x]/Sqrt[2]], (-2*Sqrt[-
c^2]*e)/(c^2*d - Sqrt[-c^2]*e)])/(15*(-c^2)^(3/2)*e^3*Sqrt[1 + 1/(c^2*x^2)]
*x*Sqrt[(c^2*(d + e*x))/(c^2*d - Sqrt[-c^2]*e)]) + (8*b*c*d^2*Sqrt[(c^2*(d
+ e*x))/(c^2*d - Sqrt[-c^2]*e)]*Sqrt[1 + c^2*x^2]*EllipticF[ArcSin[Sqrt[1 -
 Sqrt[-c^2]*x]/Sqrt[2]], (-2*Sqrt[-c^2]*e)/(c^2*d - Sqrt[-c^2]*e)])/((-c^2)
^(3/2)*e^3*Sqrt[1 + 1/(c^2*x^2)]*x*Sqrt[d + e*x]) - (4*b*c*(2*c^2*d^2 - e^2
)*Sqrt[(c^2*(d + e*x))/(c^2*d - Sqrt[-c^2]*e)]*Sqrt[1 + c^2*x^2]*EllipticF[
ArcSin[Sqrt[1 - Sqrt[-c^2]*x]/Sqrt[2]], (-2*Sqrt[-c^2]*e)/(c^2*d - Sqrt[-c^
2]*e)])/(15*(-c^2)^(5/2)*e^3*Sqrt[1 + 1/(c^2*x^2)]*x*Sqrt[d + e*x]) - (64*b
*d^3*Sqrt[(Sqrt[-c^2]*(d + e*x))/(Sqrt[-c^2]*d + e)]*Sqrt[1 + c^2*x^2]*Elli
pticPi[2, ArcSin[Sqrt[1 - Sqrt[-c^2]*x]/Sqrt[2]], (2*e)/(Sqrt[-c^2]*d + e)]
)/(5*c*e^4*Sqrt[1 + 1/(c^2*x^2)]*x*Sqrt[d + e*x])
```

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 168

```
Int[1/(((a_.) + (b_.)*(x_))*Sqrt[(c_.) + (d_.)*(x_)]*Sqrt[(e_.) + (f_.)*(x_
)]*Sqrt[(g_.) + (h_.)*(x_)]), x_Symbol] :> Dist[-2, Subst[Int[1/(Simp[b*c -
 a*d - b*x^2, x]*Sqrt[Simp[(d*e - c*f)/d + (f*x^2)/d, x]]*Sqrt[Simp[(d*g -
c*h)/d + (h*x^2)/d, x]]), x], x, Sqrt[c + d*x]], x] /; FreeQ[{a, b, c, d, e
, f, g, h}, x] && GtQ[(d*e - c*f)/d, 0]
```

Rule 419

```
Int[1/(Sqrt[(a_) + (b_.)*(x_)^2]*Sqrt[(c_) + (d_.)*(x_)^2]), x_Symbol] :> S
imp[(1*EllipticF[ArcSin[Rt[-(d/c), 2]*x], (b*c)/(a*d)])/(Sqrt[a]*Sqrt[c]*Rt
[-(d/c), 2]), x] /; FreeQ[{a, b, c, d}, x] && NegQ[d/c] && GtQ[c, 0] && GtQ
[a, 0] &&  !(NegQ[b/a] && SimplerSqrtQ[-(b/a), -(d/c)])
```

Rule 424

```
Int[Sqrt[(a_) + (b_.)*(x_)^2]/Sqrt[(c_) + (d_.)*(x_)^2], x_Symbol] :> Simp[
(Sqrt[a]*EllipticE[ArcSin[Rt[-(d/c), 2]*x], (b*c)/(a*d)])/(Sqrt[c]*Rt[-(d/c
```

```
), 2]), x] /; FreeQ[{a, b, c, d}, x] && NegQ[d/c] && GtQ[c, 0] && GtQ[a, 0]
```

Rule 537

```
Int[1/(((a_) + (b_.)*(x_)^2)*Sqrt[(c_) + (d_.)*(x_)^2]*Sqrt[(e_) + (f_.)*(x
_)^2]), x_Symbol] :> Simp[(1*EllipticPi[(b*c)/(a*d), ArcSin[Rt[-(d/c), 2]*x
], (c*f)/(d*e)])/(a*Sqrt[c]*Sqrt[e]*Rt[-(d/c), 2]), x] /; FreeQ[{a, b, c, d
, e, f}, x] &&  !GtQ[d/c, 0] && GtQ[c, 0] && GtQ[e, 0] &&  !( !GtQ[f/e, 0]
&& SimplerSqrtQ[-(f/e), -(d/c)])
```

Rule 538

```
Int[1/(((a_) + (b_.)*(x_)^2)*Sqrt[(c_) + (d_.)*(x_)^2]*Sqrt[(e_) + (f_.)*(x
_)^2]), x_Symbol] :> Dist[Sqrt[1 + (d*x^2)/c]/Sqrt[c + d*x^2], Int[1/((a +
b*x^2)*Sqrt[1 + (d*x^2)/c]*Sqrt[e + f*x^2]), x], x] /; FreeQ[{a, b, c, d, e
, f}, x] &&  !GtQ[c, 0]
```

Rule 719

```
Int[((d_) + (e_.)*(x_))^(m_)/Sqrt[(a_) + (c_.)*(x_)^2], x_Symbol] :> Dist[(
2*a*Rt[-(c/a), 2]*(d + e*x)^m*Sqrt[1 + (c*x^2)/a])/(c*Sqrt[a + c*x^2]*((c*(
d + e*x))/(c*d - a*e*Rt[-(c/a), 2]))^m), Subst[Int[(1 + (2*a*e*Rt[-(c/a), 2
]*x^2)/(c*d - a*e*Rt[-(c/a), 2]))^m/Sqrt[1 - x^2], x], x, Sqrt[(1 - Rt[-(c/
a), 2]*x)/2]], x] /; FreeQ[{a, c, d, e}, x] && NeQ[c*d^2 + a*e^2, 0] && EqQ
[m^2, 1/4]
```

Rule 844

```
Int[((d_.) + (e_.)*(x_))^(m_)*((f_.) + (g_.)*(x_))*((a_) + (c_.)*(x_)^2)^(p
_.), x_Symbol] :> Dist[g/e, Int[(d + e*x)^(m + 1)*(a + c*x^2)^p, x], x] + D
ist[(e*f - d*g)/e, Int[(d + e*x)^m*(a + c*x^2)^p, x], x] /; FreeQ[{a, c, d,
 e, f, g, m, p}, x] && NeQ[c*d^2 + a*e^2, 0] &&  !IGtQ[m, 0]
```

Rule 931

```
Int[((d_.) + (e_.)*(x_))^(m_)/(Sqrt[(f_.) + (g_.)*(x_)]*Sqrt[(a_) + (c_.)*(
x_)^2]), x_Symbol] :> Simp[(2*e^2*(d + e*x)^(m - 2)*Sqrt[f + g*x]*Sqrt[a +
c*x^2])/(c*g*(2*m - 1)), x] - Dist[1/(c*g*(2*m - 1)), Int[((d + e*x)^(m - 3
)*Simp[a*e^2*(d*g + 2*e*f*(m - 2)) - c*d^3*g*(2*m - 1) + e*(e*(a*e*g*(2*m -
 3)) + c*d*(2*e*f - 3*d*g*(2*m - 1)))*x + 2*e^2*(c*e*f - 3*c*d*g)*(m - 1)*x
^2, x])/(Sqrt[f + g*x]*Sqrt[a + c*x^2]), x], x] /; FreeQ[{a, c, d, e, f, g}
, x] && NeQ[e*f - d*g, 0] && NeQ[c*d^2 + a*e^2, 0] && IntegerQ[2*m] && GeQ[
m, 2]
```

Rule 932

```
Int[1/(((d_.) + (e_.)*(x_))*Sqrt[(f_.) + (g_.)*(x_)]*Sqrt[(a_) + (c_.)*(x_)
^2]), x_Symbol] :> With[{q = Rt[-(c/a), 2]}, Dist[1/Sqrt[a], Int[1/((d + e*
x)*Sqrt[f + g*x]*Sqrt[1 - q*x]*Sqrt[1 + q*x]), x], x]] /; FreeQ[{a, c, d, e
, f, g}, x] && NeQ[e*f - d*g, 0] && NeQ[c*d^2 + a*e^2, 0] && GtQ[a, 0]
```

Rule 1584

```
Int[(u_.)*(x_)^(m_.)*((a_.)*(x_)^(p_.) + (b_.)*(x_)^(q_.))^(n_.), x_Symbol]
 :> Int[u*x^(m + n*p)*(a + b*x^(q - p))^n, x] /; FreeQ[{a, b, m, p, q}, x]
&& IntegerQ[n] && PosQ[q - p]
```

Rule 6310

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))*(u_), x_Symbol] :> With[{v = IntHid
e[u, x]}, Dist[a + b*ArcCsch[c*x], v, x] + Dist[b/c, Int[SimplifyIntegrand[
v/(x^2*Sqrt[1 + 1/(c^2*x^2)]), x], x], x] /; InverseFunctionFreeQ[v, x]] /;
 FreeQ[{a, b, c}, x]
```

Rule 6721

```
Int[(u_.)*((a_.) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Dist[(b^IntPart[p]*(
a + b*x^n)^FracPart[p])/(x^(n*FracPart[p])*(1 + a/(x^n*b))^FracPart[p]), In
t[u*x^(n*p)*(1 + a/(x^n*b))^p, x], x] /; FreeQ[{a, b, p}, x] &&  !IntegerQ[
p] && ILtQ[n, 0] &&  !RationalFunctionQ[u, x] && IntegerQ[p + 1/2]
```

Rule 6742

```
Int[u_, x_Symbol] :> With[{v = ExpandIntegrand[u, x]}, Int[v, x] /; SumQ[v]
]
```

Rubi steps

$$\int \frac{x^3\left(a+b\text{csch}^{-1}(cx)\right)}{(d+ex)^{3/2}}\,dx = \frac{2d^3\left(a+b\text{csch}^{-1}(cx)\right)}{e^4\sqrt{d+ex}} + \frac{6d^2\sqrt{d+ex}\left(a+b\text{csch}^{-1}(cx)\right)}{e^4} - \frac{2d(d+ex)^{3/2}\left(a+b\text{csch}\right.}{e^4}$$

$$= \frac{2d^3\left(a+b\text{csch}^{-1}(cx)\right)}{e^4\sqrt{d+ex}} + \frac{6d^2\sqrt{d+ex}\left(a+b\text{csch}^{-1}(cx)\right)}{e^4} - \frac{2d(d+ex)^{3/2}\left(a+b\text{csch}\right.}{e^4}$$

$$= \frac{2d^3\left(a+b\text{csch}^{-1}(cx)\right)}{e^4\sqrt{d+ex}} + \frac{6d^2\sqrt{d+ex}\left(a+b\text{csch}^{-1}(cx)\right)}{e^4} - \frac{2d(d+ex)^{3/2}\left(a+b\text{csch}\right.}{e^4}$$

$$= \frac{2d^3\left(a+b\text{csch}^{-1}(cx)\right)}{e^4\sqrt{d+ex}} + \frac{6d^2\sqrt{d+ex}\left(a+b\text{csch}^{-1}(cx)\right)}{e^4} - \frac{2d(d+ex)^{3/2}\left(a+b\text{csch}\right.}{e^4}$$

$$= \frac{2d^3\left(a+b\text{csch}^{-1}(cx)\right)}{e^4\sqrt{d+ex}} + \frac{6d^2\sqrt{d+ex}\left(a+b\text{csch}^{-1}(cx)\right)}{e^4} - \frac{2d(d+ex)^{3/2}\left(a+b\text{csch}\right.}{e^4}$$

$$= \frac{4b\sqrt{d+ex}\left(1+c^2x^2\right)}{15c^3e^2\sqrt{1+\frac{1}{c^2x^2}}\,x} + \frac{2d^3\left(a+b\text{csch}^{-1}(cx)\right)}{e^4\sqrt{d+ex}} + \frac{6d^2\sqrt{d+ex}\left(a+b\text{csch}^{-1}(cx)\right)}{e^4} -$$

$$= \frac{4b\sqrt{d+ex}\left(1+c^2x^2\right)}{15c^3e^2\sqrt{1+\frac{1}{c^2x^2}}\,x} + \frac{2d^3\left(a+b\text{csch}^{-1}(cx)\right)}{e^4\sqrt{d+ex}} + \frac{6d^2\sqrt{d+ex}\left(a+b\text{csch}^{-1}(cx)\right)}{e^4} -$$

$$= \frac{4b\sqrt{d+ex}\left(1+c^2x^2\right)}{15c^3e^2\sqrt{1+\frac{1}{c^2x^2}}\,x} + \frac{2d^3\left(a+b\text{csch}^{-1}(cx)\right)}{e^4\sqrt{d+ex}} + \frac{6d^2\sqrt{d+ex}\left(a+b\text{csch}^{-1}(cx)\right)}{e^4} -$$

$$= \frac{4b\sqrt{d+ex}\left(1+c^2x^2\right)}{15c^3e^2\sqrt{1+\frac{1}{c^2x^2}}\,x} + \frac{2d^3\left(a+b\text{csch}^{-1}(cx)\right)}{e^4\sqrt{d+ex}} + \frac{6d^2\sqrt{d+ex}\left(a+b\text{csch}^{-1}(cx)\right)}{e^4} -$$

**Mathematica [C]** time = 14.70, size = 1042, normalized size = 1.43

$$\frac{a\left(\frac{ex}{d}+1\right)^{3/2}B_{-\frac{ex}{d}}\left(4,-\frac{1}{2}\right)d^4}{e^4(d+ex)^{3/2}}+\frac{b\left(-\frac{c^2\left(\frac{d}{x}+e\right)^2\left(\frac{2c^2\operatorname{csch}^{-1}(cx)d^2}{e^3\left(\frac{d}{x}+e\right)}-\frac{32c^2\operatorname{csch}^{-1}(cx)d^2}{5e^4}+\frac{32c\sqrt{1+\frac{1}{c^2x^2}}\,d}{15e^3}-\frac{2c^2x^2\operatorname{csch}^{-1}(cx)}{5e^2}-\frac{2cx\left(2e\sqrt{1+\frac{1}{c^2x^2}}-9cd\operatorname{csch}^{-1}(c\right.}{15e^3}\right.}{(d+ex)^{3/2}}\right.}{}$$

Antiderivative was successfully verified.

```
[In] Integrate[(x^3*(a + b*ArcCsch[c*x]))/(d + e*x)^(3/2),x]
```

```
[Out] (a*d^4*(1 + (e*x)/d)^(3/2)*Beta[-((e*x)/d), 4, -1/2])/(e^4*(d + e*x)^(3/2))
 + (b*(-((c^2*(e + d/x)^2*x^2*((32*c*d*Sqrt[1 + 1/(c^2*x^2)])/(15*e^3) - (3
2*c^2*d^2*ArcCsch[c*x])/(5*e^4) + (2*c^2*d^2*ArcCsch[c*x])/(e^3*(e + d/x))
- (2*c^2*x^2*ArcCsch[c*x])/(5*e^2) - (2*c*x*(2*e*Sqrt[1 + 1/(c^2*x^2)] - 9*
c*d*ArcCsch[c*x]))/(15*e^3)))/(d + e*x)^(3/2)) - (2*(e + d/x)^(3/2)*(c*x)^(
3/2)*(-((Sqrt[2]*(32*c^2*d^2*e - e^3)*Sqrt[1 + I*c*x]*(I + c*x)*Sqrt[(c*d +
 c*e*x)/(c*d - I*e)]*EllipticF[ArcSin[Sqrt[-((e*(I + c*x))/(c*d - I*e))]],
(I*c*d + e)/(2*e)])/(Sqrt[1 + 1/(c^2*x^2)]*Sqrt[e + d/x]*(c*x)^(3/2)*Sqrt[(
e*(1 - I*c*x))/(I*c*d + e)])) + (I*Sqrt[2]*(c*d - I*e)*(48*c^3*d^3 - 8*c*d*
e^2)*Sqrt[1 + I*c*x]*Sqrt[(e*(I + c*x)*(c*d + c*e*x))/(I*c*d + e)^2]*Ellipt
icPi[1 + (I*c*d)/e, ArcSin[Sqrt[-((e*(I + c*x))/(c*d - I*e))]], (I*c*d + e)
/(2*e)])/(e*Sqrt[1 + 1/(c^2*x^2)]*Sqrt[e + d/x]*(c*x)^(3/2)) + (16*c*d*e*Co
sh[2*ArcCsch[c*x]]*(-((c*d + c*e*x)*(1 + c^2*x^2)) + (c*x*(c*d*Sqrt[2 + (2*
I)*c*x]*(I + c*x)*Sqrt[(c*d + c*e*x)/(c*d - I*e)]*EllipticF[ArcSin[Sqrt[-((
e*(I + c*x))/(c*d - I*e))]], (I*c*d + e)/(2*e)] + 2*Sqrt[-((e*(-I + c*x))/(
c*d + I*e))]*(I + c*x)*Sqrt[(c*d + c*e*x)/(c*d - I*e)]*((c*d + I*e)*Ellipti
cE[ArcSin[Sqrt[(c*d + c*e*x)/(c*d - I*e)]], (c*d - I*e)/(c*d + I*e)] - I*e*
EllipticF[ArcSin[Sqrt[(c*d + c*e*x)/(c*d - I*e)]], (c*d - I*e)/(c*d + I*e)]
) + (I*c*d + e)*Sqrt[2 + (2*I)*c*x]*Sqrt[-((e*(I + c*x))/(c*d - I*e))]*Sqrt
[(e*(I + c*x)*(c*d + c*e*x))/(I*c*d + e)^2]*EllipticPi[1 + (I*c*d)/e, ArcSi
n[Sqrt[-((e*(I + c*x))/(c*d - I*e))]], (I*c*d + e)/(2*e)]))/(2*Sqrt[-((e*(I
 + c*x))/(c*d - I*e))])))/(Sqrt[1 + 1/(c^2*x^2)]*Sqrt[e + d/x]*Sqrt[c*x]*(2
 + c^2*x^2))))/(15*e^4*(d + e*x)^(3/2))))/c^4
```

**fricas** [F] time = 16.60, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{\left(bx^3\operatorname{arcsch}(cx)+ax^3\right)\sqrt{ex+d}}{e^2x^2+2\,dex+d^2},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^3*(a+b*arccsch(c*x))/(e*x+d)^(3/2),x, algorithm="fricas")
```

```
[Out] integral((b*x^3*arccsch(c*x) + a*x^3)*sqrt(e*x + d)/(e^2*x^2 + 2*d*e*x + d^
2), x)
```

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

$$\int\frac{(b\operatorname{arcsch}(cx)+a)x^3}{(ex+d)^{\frac{3}{2}}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^3*(a+b*arccsch(c*x))/(e*x+d)^(3/2),x, algorithm="giac")
```

```
[Out] integrate((b*arccsch(c*x) + a)*x^3/(e*x + d)^(3/2), x)
```

**maple** [C] time = 0.08, size = 2019, normalized size = 2.76

result too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^3*(a+b*arccsch(c*x))/(e*x+d)^(3/2),x)
```

```
[Out] 2/e^4*(a*(1/5*(e*x+d)^(5/2)-d*(e*x+d)^(3/2)+3*d^2*(e*x+d)^(1/2)+d^3/(e*x+d)
^(1/2))+b*(1/5*arccsch(c*x)*(e*x+d)^(5/2)-arccsch(c*x)*d*(e*x+d)^(3/2)+3*ar
ccsch(c*x)*d^2*(e*x+d)^(1/2)+arccsch(c*x)*d^3/(e*x+d)^(1/2)+2/15/c^3*(-48*I
*(-(I*(e*x+d)*c*e+(e*x+d)*c^2*d-c^2*d^2-e^2)/(c^2*d^2+e^2))^(1/2)*((I*(e*x+
d)*c*e-(e*x+d)*c^2*d+c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2)*EllipticPi((e*x+d)^(
1/2)*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2),1/(I*e+c*d)/c*(c^2*d^2+e^2)/d,(-(I*e
-c*d)*c/(c^2*d^2+e^2))^(1/2)/((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2))*c^2*d^2*e-(
(I*e+c*d)*c/(c^2*d^2+e^2))^(1/2)*(e*x+d)^(5/2)*c^3*d-2*I*((I*e+c*d)*c/(c^2*
d^2+e^2))^(1/2)*(e*x+d)^(3/2)*c^2*d*e+I*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2)*(
e*x+d)^(5/2)*c^2*e-I*(-(I*(e*x+d)*c*e+(e*x+d)*c^2*d-c^2*d^2-e^2)/(c^2*d^2+e
^2))^(1/2)*((I*(e*x+d)*c*e-(e*x+d)*c^2*d+c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2)*
EllipticF((e*x+d)^(1/2)*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2),(-(2*I*c*d*e-c^2*
d^2+e^2)/(c^2*d^2+e^2))^(1/2))*e^3+2*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2)*(e*x
+d)^(3/2)*c^3*d^2-24*(-(I*(e*x+d)*c*e+(e*x+d)*c^2*d-c^2*d^2-e^2)/(c^2*d^2+e
```

```
^2))^(1/2)*((I*(e*x+d)*c*e-(e*x+d)*c^2*d+c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2)*
EllipticF((e*x+d)^(1/2)*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2),(-(2*I*c*d*e-c^2*
d^2+e^2)/(c^2*d^2+e^2))^(1/2))*c^3*d^3-8*(-(I*(e*x+d)*c*e+(e*x+d)*c^2*d-c^2
*d^2-e^2)/(c^2*d^2+e^2))^(1/2)*((I*(e*x+d)*c*e-(e*x+d)*c^2*d+c^2*d^2+e^2)/(
c^2*d^2+e^2))^(1/2)*EllipticE((e*x+d)^(1/2)*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/
2),(-(2*I*c*d*e-c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2))*c^3*d^3+48*(-(I*(e*x+d)*
c*e+(e*x+d)*c^2*d-c^2*d^2-e^2)/(c^2*d^2+e^2))^(1/2)*((I*(e*x+d)*c*e-(e*x+d)
*c^2*d+c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2)*EllipticPi((e*x+d)^(1/2)*((I*e+c*d
)*c/(c^2*d^2+e^2))^(1/2),1/(I*e+c*d)/c*(c^2*d^2+e^2)/d,(-(I*e-c*d)*c/(c^2*d
^2+e^2))^(1/2)/((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2))*c^3*d^3+I*((I*e+c*d)*c/(c
^2*d^2+e^2))^(1/2)*(e*x+d)^(1/2)*c^2*d^2*e-((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2
)*(e*x+d)^(1/2)*c^3*d^3+I*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2)*(e*x+d)^(1/2)*e
^3+9*(-(I*(e*x+d)*c*e+(e*x+d)*c^2*d-c^2*d^2-e^2)/(c^2*d^2+e^2))^(1/2)*((I*(
e*x+d)*c*e-(e*x+d)*c^2*d+c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2)*EllipticF((e*x+d
)^(1/2)*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2),(-(2*I*c*d*e-c^2*d^2+e^2)/(c^2*d^
2+e^2))^(1/2))*c*d*e^2-8*(-(I*(e*x+d)*c*e+(e*x+d)*c^2*d-c^2*d^2-e^2)/(c^2*d
^2+e^2))^(1/2)*((I*(e*x+d)*c*e-(e*x+d)*c^2*d+c^2*d^2+e^2)/(c^2*d^2+e^2))^(1
/2)*EllipticE((e*x+d)^(1/2)*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2),(-(2*I*c*d*e-
c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2))*c*d*e^2+32*I*(-(I*(e*x+d)*c*e+(e*x+d)*c^
2*d-c^2*d^2-e^2)/(c^2*d^2+e^2))^(1/2)*((I*(e*x+d)*c*e-(e*x+d)*c^2*d+c^2*d^2
+e^2)/(c^2*d^2+e^2))^(1/2)*EllipticF((e*x+d)^(1/2)*((I*e+c*d)*c/(c^2*d^2+e^
2))^(1/2),(-(2*I*c*d*e-c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2))*c^2*d^2*e-((I*e+c
*d)*c/(c^2*d^2+e^2))^(1/2)*(e*x+d)^(1/2)*c*d*e^2)/(((e*x+d)^2*c^2-2*(e*x+d)
*c^2*d+c^2*d^2+e^2)/c^2/x^2/e^2)^(1/2)/x/((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2)/
(I*e-c*d)))
```

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

$$\frac{2}{5}\,a\left(\frac{(ex+d)^{\frac{5}{2}}}{e^4}-\frac{5\,(ex+d)^{\frac{3}{2}}d}{e^4}+\frac{15\,\sqrt{ex+d}\,d^2}{e^4}+\frac{5\,d^3}{\sqrt{ex+d}\,e^4}\right)+\frac{1}{5}\,b\left(\frac{2\left(e^3x^3-2\,de^2x^2+8\,d^2ex+16\,d^3\right)\log\left(\sqrt{c^2}\right.}{\sqrt{ex+d}\,e^4}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^3*(a+b*arccsch(c*x))/(e*x+d)^(3/2),x, algorithm="maxima")
```

```
[Out] 2/5*a*((e*x + d)^(5/2)/e^4 - 5*(e*x + d)^(3/2)*d/e^4 + 15*sqrt(e*x + d)*d^2
/e^4 + 5*d^3/(sqrt(e*x + d)*e^4)) + 1/5*b*(2*(e^3*x^3 - 2*d*e^2*x^2 + 8*d^2
*e*x + 16*d^3)*log(sqrt(c^2*x^2 + 1) + 1)/(sqrt(e*x + d)*e^4) + 5*integrate
(2/5*(c^2*e^3*x^4 - 2*c^2*d*e^2*x^3 + 8*c^2*d^2*e*x^2 + 16*c^2*d^3*x)/((c^2
*e^4*x^2 + e^4)*sqrt(c^2*x^2 + 1)*sqrt(e*x + d) + (c^2*e^4*x^2 + e^4)*sqrt(
e*x + d)), x) - 5*integrate(-1/5*(2*c^2*d*e^3*x^4 - 48*c^2*d^3*e*x^2 - (5*e
^4*log(c) + 2*e^4)*c^2*x^5 - 32*c^2*d^4*x - (12*c^2*d^2*e^2 + 5*e^4*log(c))
*x^3 - 5*(c^2*e^4*x^5 + e^4*x^3)*log(x))/((c^2*e^5*x^3 + c^2*d*e^4*x^2 + e^
5*x + d*e^4)*sqrt(e*x + d)), x))
```

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

$$\int \frac{x^3 \left(a + b \operatorname{asinh}\left(\frac{1}{c\,x}\right)\right)}{(d + e\,x)^{3/2}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((x^3*(a + b*asinh(1/(c*x))))/(d + e*x)^(3/2),x)
[Out] int((x^3*(a + b*asinh(1/(c*x))))/(d + e*x)^(3/2), x)
```

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

$$\int \frac{x^3 (a + b \operatorname{acsch}(cx))}{(d + ex)^{\frac{3}{2}}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**3*(a+b*acsch(c*x))/(e*x+d)**(3/2),x)
[Out] Integral(x**3*(a + b*acsch(c*x))/(d + e*x)**(3/2), x)
```

# 3.64 $\int \frac{x^2\left(a+b\text{csch}^{-1}(cx)\right)}{(d+ex)^{3/2}}\,dx$

**Optimal**. Leaf size=499

$$-\frac{2d^2\left(a+b\text{csch}^{-1}(cx)\right)}{e^3\sqrt{d+ex}}-\frac{4d\sqrt{d+ex}\left(a+b\text{csch}^{-1}(cx)\right)}{e^3}+\frac{2(d+ex)^{3/2}\left(a+b\text{csch}^{-1}(cx)\right)}{3e^3}+\frac{32bd^2\sqrt{c^2x^2+1}\sqrt{\frac{\sqrt{-c}}{\sqrt{-}}}}{3ce}$$

```
[Out] 2/3*(e*x+d)^(3/2)*(a+b*arccsch(c*x))/e^3-2*d^2*(a+b*arccsch(c*x))/e^3/(e*x+
d)^(1/2)-4*d*(a+b*arccsch(c*x))*(e*x+d)^(1/2)/e^3+32/3*b*d^2*EllipticPi(1/2
*(1-(-c^2)^(1/2)*x)^(1/2)*2^(1/2),2,2^(1/2)*(e/(d*(-c^2)^(1/2)+e))^(1/2))*(
c^2*x^2+1)^(1/2)*((e*x+d)*(-c^2)^(1/2)/(d*(-c^2)^(1/2)+e))^(1/2)/c/e^3/x/(1
+1/c^2/x^2)^(1/2)/(e*x+d)^(1/2)+4/3*b*c*EllipticE(1/2*(1-(-c^2)^(1/2)*x)^(1
/2)*2^(1/2),(-2*e*(-c^2)^(1/2)/(c^2*d-e*(-c^2)^(1/2)))^(1/2))*(e*x+d)^(1/2)
*(c^2*x^2+1)^(1/2)/(-c^2)^(3/2)/e^2/x/(1+1/c^2/x^2)^(1/2)/(c^2*(e*x+d)/(c^2
*d-e*(-c^2)^(1/2)))^(1/2)-20/3*b*c*d*EllipticF(1/2*(1-(-c^2)^(1/2)*x)^(1/2)
*2^(1/2),(-2*e*(-c^2)^(1/2)/(c^2*d-e*(-c^2)^(1/2)))^(1/2))*(c^2*x^2+1)^(1/2
)*(c^2*(e*x+d)/(c^2*d-e*(-c^2)^(1/2)))^(1/2)/(-c^2)^(3/2)/e^2/x/(1+1/c^2/x^
2)^(1/2)/(e*x+d)^(1/2)
```

**Rubi [A]** time = 2.01, antiderivative size = 499, normalized size of antiderivative = 1.00, number of steps used = 16, number of rules used = 13, integrand size = 21, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.619, Rules used = {43, 6310, 12, 6721, 6742, 719, 419, 932, 168, 538, 537, 844, 424}

$$-\frac{2d^2\left(a+b\text{csch}^{-1}(cx)\right)}{e^3\sqrt{d+ex}}-\frac{4d\sqrt{d+ex}\left(a+b\text{csch}^{-1}(cx)\right)}{e^3}+\frac{2(d+ex)^{3/2}\left(a+b\text{csch}^{-1}(cx)\right)}{3e^3}+\frac{32bd^2\sqrt{c^2x^2+1}\sqrt{\frac{\sqrt{-c}}{\sqrt{-}}}}{3ce}$$

Antiderivative was successfully verified.

```
[In] Int[(x^2*(a + b*ArcCsch[c*x]))/(d + e*x)^(3/2),x]
```

```
[Out] (-2*d^2*(a + b*ArcCsch[c*x]))/(e^3*Sqrt[d + e*x]) - (4*d*Sqrt[d + e*x]*(a +
 b*ArcCsch[c*x]))/e^3 + (2*(d + e*x)^(3/2)*(a + b*ArcCsch[c*x]))/(3*e^3) +
(4*b*c*Sqrt[d + e*x]*Sqrt[1 + c^2*x^2]*EllipticE[ArcSin[Sqrt[1 - Sqrt[-c^2]
*x]/Sqrt[2]], (-2*Sqrt[-c^2]*e)/(c^2*d - Sqrt[-c^2]*e)])/(3*(-c^2)^(3/2)*e^
2*Sqrt[1 + 1/(c^2*x^2)]*x*Sqrt[(c^2*(d + e*x))/(c^2*d - Sqrt[-c^2]*e)]) - (
20*b*c*d*Sqrt[(c^2*(d + e*x))/(c^2*d - Sqrt[-c^2]*e)]*Sqrt[1 + c^2*x^2]*Ell
ipticF[ArcSin[Sqrt[1 - Sqrt[-c^2]*x]/Sqrt[2]], (-2*Sqrt[-c^2]*e)/(c^2*d - S
```

```
qrt[-c^2]*e)])/(3*(-c^2)^(3/2)*e^2*Sqrt[1 + 1/(c^2*x^2)]*x*Sqrt[d + e*x]) +
 (32*b*d^2*Sqrt[(Sqrt[-c^2]*(d + e*x))/(Sqrt[-c^2]*d + e)]*Sqrt[1 + c^2*x^2
]*EllipticPi[2, ArcSin[Sqrt[1 - Sqrt[-c^2]*x]/Sqrt[2]], (2*e)/(Sqrt[-c^2]*d
 + e)])/(3*c*e^3*Sqrt[1 + 1/(c^2*x^2)]*x*Sqrt[d + e*x])
```

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 168

```
Int[1/(((a_.) + (b_.)*(x_))*Sqrt[(c_.) + (d_.)*(x_)]*Sqrt[(e_.) + (f_.)*(x_
)]*Sqrt[(g_.) + (h_.)*(x_)]), x_Symbol] :> Dist[-2, Subst[Int[1/(Simp[b*c -
 a*d - b*x^2, x]*Sqrt[Simp[(d*e - c*f)/d + (f*x^2)/d, x]]*Sqrt[Simp[(d*g -
c*h)/d + (h*x^2)/d, x]]), x], x, Sqrt[c + d*x]], x] /; FreeQ[{a, b, c, d, e
, f, g, h}, x] && GtQ[(d*e - c*f)/d, 0]
```

Rule 419

```
Int[1/(Sqrt[(a_) + (b_.)*(x_)^2]*Sqrt[(c_) + (d_.)*(x_)^2]), x_Symbol] :> S
imp[(1*EllipticF[ArcSin[Rt[-(d/c), 2]*x], (b*c)/(a*d)])/(Sqrt[a]*Sqrt[c]*Rt
[-(d/c), 2]), x] /; FreeQ[{a, b, c, d}, x] && NegQ[d/c] && GtQ[c, 0] && GtQ
[a, 0] &&  !(NegQ[b/a] && SimplerSqrtQ[-(b/a), -(d/c)])
```

Rule 424

```
Int[Sqrt[(a_) + (b_.)*(x_)^2]/Sqrt[(c_) + (d_.)*(x_)^2], x_Symbol] :> Simp[
(Sqrt[a]*EllipticE[ArcSin[Rt[-(d/c), 2]*x], (b*c)/(a*d)])/(Sqrt[c]*Rt[-(d/c
), 2]), x] /; FreeQ[{a, b, c, d}, x] && NegQ[d/c] && GtQ[c, 0] && GtQ[a, 0]
```

Rule 537

```
Int[1/(((a_) + (b_.)*(x_)^2)*Sqrt[(c_) + (d_.)*(x_)^2]*Sqrt[(e_) + (f_.)*(x
_)^2]), x_Symbol] :> Simp[(1*EllipticPi[(b*c)/(a*d), ArcSin[Rt[-(d/c), 2]*x
], (c*f)/(d*e)])/(a*Sqrt[c]*Sqrt[e]*Rt[-(d/c), 2]), x] /; FreeQ[{a, b, c, d
, e, f}, x] &&  !GtQ[d/c, 0] && GtQ[c, 0] && GtQ[e, 0] &&  !( !GtQ[f/e, 0]
&& SimplerSqrtQ[-(f/e), -(d/c)])
```

Rule 538

```
Int[1/(((a_) + (b_.)*(x_)^2)*Sqrt[(c_) + (d_.)*(x_)^2]*Sqrt[(e_) + (f_.)*(x
_)^2]), x_Symbol] :> Dist[Sqrt[1 + (d*x^2)/c]/Sqrt[c + d*x^2], Int[1/((a +
b*x^2)*Sqrt[1 + (d*x^2)/c]*Sqrt[e + f*x^2]), x], x] /; FreeQ[{a, b, c, d, e
, f}, x] &&  !GtQ[c, 0]
```

Rule 719

```
Int[((d_) + (e_.)*(x_))^(m_)/Sqrt[(a_) + (c_.)*(x_)^2], x_Symbol] :> Dist[(
2*a*Rt[-(c/a), 2]*(d + e*x)^m*Sqrt[1 + (c*x^2)/a])/(c*Sqrt[a + c*x^2]*((c*(
d + e*x))/(c*d - a*e*Rt[-(c/a), 2]))^m), Subst[Int[(1 + (2*a*e*Rt[-(c/a), 2
]*x^2)/(c*d - a*e*Rt[-(c/a), 2]))^m/Sqrt[1 - x^2], x], x, Sqrt[(1 - Rt[-(c/
a), 2]*x)/2]], x] /; FreeQ[{a, c, d, e}, x] && NeQ[c*d^2 + a*e^2, 0] && EqQ
[m^2, 1/4]
```

Rule 844

```
Int[((d_.) + (e_.)*(x_))^(m_)*((f_.) + (g_.)*(x_))*((a_) + (c_.)*(x_)^2)^(p
_.), x_Symbol] :> Dist[g/e, Int[(d + e*x)^(m + 1)*(a + c*x^2)^p, x], x] + D
ist[(e*f - d*g)/e, Int[(d + e*x)^m*(a + c*x^2)^p, x], x] /; FreeQ[{a, c, d,
 e, f, g, m, p}, x] && NeQ[c*d^2 + a*e^2, 0] &&  !IGtQ[m, 0]
```

Rule 932

```
Int[1/(((d_.) + (e_.)*(x_))*Sqrt[(f_.) + (g_.)*(x_)]*Sqrt[(a_) + (c_.)*(x_)
^2]), x_Symbol] :> With[{q = Rt[-(c/a), 2]}, Dist[1/Sqrt[a], Int[1/((d + e*
x)*Sqrt[f + g*x]*Sqrt[1 - q*x]*Sqrt[1 + q*x]), x], x]] /; FreeQ[{a, c, d, e
, f, g}, x] && NeQ[e*f - d*g, 0] && NeQ[c*d^2 + a*e^2, 0] && GtQ[a, 0]
```

Rule 6310

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))*(u_), x_Symbol] :> With[{v = IntHid
e[u, x]}, Dist[a + b*ArcCsch[c*x], v, x] + Dist[b/c, Int[SimplifyIntegrand[
v/(x^2*Sqrt[1 + 1/(c^2*x^2)]), x], x], x] /; InverseFunctionFreeQ[v, x]] /;
 FreeQ[{a, b, c}, x]
```

Rule 6721

```
Int[(u_.)*((a_.) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Dist[(b^IntPart[p]*(
a + b*x^n)^FracPart[p])/(x^(n*FracPart[p])*(1 + a/(x^n*b))^FracPart[p]), In
t[u*x^(n*p)*(1 + a/(x^n*b))^p, x], x] /; FreeQ[{a, b, p}, x] &&  !IntegerQ[
p] && ILtQ[n, 0] &&  !RationalFunctionQ[u, x] && IntegerQ[p + 1/2]
```

Rule 6742

```
Int[u_, x_Symbol] :> With[{v = ExpandIntegrand[u, x]}, Int[v, x] /; SumQ[v]
]
```

Rubi steps

$$\int \frac{x^2\left(a+b\operatorname{csch}^{-1}(cx)\right)}{(d+ex)^{3/2}}\,dx = -\frac{2d^2\left(a+b\operatorname{csch}^{-1}(cx)\right)}{e^3\sqrt{d+ex}} - \frac{4d\sqrt{d+ex}\,\left(a+b\operatorname{csch}^{-1}(cx)\right)}{e^3} + \frac{2(d+ex)^{3/2}\left(a+b\operatorname{csc}\right.}{3e^3}$$

$$= -\frac{2d^2\left(a+b\operatorname{csch}^{-1}(cx)\right)}{e^3\sqrt{d+ex}} - \frac{4d\sqrt{d+ex}\,\left(a+b\operatorname{csch}^{-1}(cx)\right)}{e^3} + \frac{2(d+ex)^{3/2}\left(a+b\operatorname{csc}\right.}{3e^3}$$

$$= -\frac{2d^2\left(a+b\operatorname{csch}^{-1}(cx)\right)}{e^3\sqrt{d+ex}} - \frac{4d\sqrt{d+ex}\,\left(a+b\operatorname{csch}^{-1}(cx)\right)}{e^3} + \frac{2(d+ex)^{3/2}\left(a+b\operatorname{csc}\right.}{3e^3}$$

$$= -\frac{2d^2\left(a+b\operatorname{csch}^{-1}(cx)\right)}{e^3\sqrt{d+ex}} - \frac{4d\sqrt{d+ex}\,\left(a+b\operatorname{csch}^{-1}(cx)\right)}{e^3} + \frac{2(d+ex)^{3/2}\left(a+b\operatorname{csc}\right.}{3e^3}$$

$$= -\frac{2d^2\left(a+b\operatorname{csch}^{-1}(cx)\right)}{e^3\sqrt{d+ex}} - \frac{4d\sqrt{d+ex}\,\left(a+b\operatorname{csch}^{-1}(cx)\right)}{e^3} + \frac{2(d+ex)^{3/2}\left(a+b\operatorname{csc}\right.}{3e^3}$$

$$= -\frac{2d^2\left(a+b\operatorname{csch}^{-1}(cx)\right)}{e^3\sqrt{d+ex}} - \frac{4d\sqrt{d+ex}\,\left(a+b\operatorname{csch}^{-1}(cx)\right)}{e^3} + \frac{2(d+ex)^{3/2}\left(a+b\operatorname{csc}\right.}{3e^3}$$

$$= -\frac{2d^2\left(a+b\operatorname{csch}^{-1}(cx)\right)}{e^3\sqrt{d+ex}} - \frac{4d\sqrt{d+ex}\,\left(a+b\operatorname{csch}^{-1}(cx)\right)}{e^3} + \frac{2(d+ex)^{3/2}\left(a+b\operatorname{csc}\right.}{3e^3}$$

$$= -\frac{2d^2\left(a+b\operatorname{csch}^{-1}(cx)\right)}{e^3\sqrt{d+ex}} - \frac{4d\sqrt{d+ex}\,\left(a+b\operatorname{csch}^{-1}(cx)\right)}{e^3} + \frac{2(d+ex)^{3/2}\left(a+b\operatorname{csc}\right.}{3e^3}$$

$$= -\frac{2d^2\left(a+b\operatorname{csch}^{-1}(cx)\right)}{e^3\sqrt{d+ex}} - \frac{4d\sqrt{d+ex}\,\left(a+b\operatorname{csch}^{-1}(cx)\right)}{e^3} + \frac{2(d+ex)^{3/2}\left(a+b\operatorname{csc}\right.}{3e^3}$$

**Mathematica [C]** time = 14.49, size = 979, normalized size = 1.96

$$b\left(\frac{2\left(\frac{d}{x}+e\right)^{3/2}(cx)^{3/2}\left(-\frac{5\sqrt{2}\,cde\sqrt{icx+1}\,(cx+i)\sqrt{\frac{cd+cex}{cd-ie}}\,F\left(\sin^{-1}\left(\sqrt{-\frac{e(cx+i)}{cd-ie}}\right)|\frac{icd+e}{2e}\right)}{\sqrt{1+\frac{1}{c^2x^2}}\sqrt{\frac{d}{x}+e}\,(cx)^{3/2}\sqrt{\frac{e(1-icx)}{icd+e}}}+\frac{i\sqrt{2}\,(cd-ie)\left(8c^2d^2-e^2\right)\sqrt{icx+1}\sqrt{\frac{e(cx+i)(cd+cex)}{(icd+e)^2}}\,\Pi\left(\frac{icd}{e}+1;\sin^{-1}\left(\sqrt{-\frac{e(cx+i)}{cd-ie}}\right)|\frac{icd+e}{2e}\cdots\right.}{e\sqrt{1+\frac{1}{c^2x^2}}\sqrt{\frac{d}{x}+e}\,(cx)^{3/2}}\cdots\right.}{\cdots}\cdots\right.$$

Antiderivative was successfully verified.

```
[In] Integrate[(x^2*(a + b*ArcCsch[c*x]))/(d + e*x)^(3/2),x]
```

```
[Out] -((a*d^3*(1 + (e*x)/d)^(3/2)*Beta[-((e*x)/d), 3, -1/2])/(e^3*(d + e*x)^(3/2
))) + (b*(-((c^2*(e + d/x)^2*x^2*((-4*Sqrt[1 + 1/(c^2*x^2)])/(3*e^2) + (16*
c*d*ArcCsch[c*x])/(3*e^3) - (2*c*d*ArcCsch[c*x])/(e^2*(e + d/x)) - (2*c*x*A
rcCsch[c*x])/(3*e^2)))/(d + e*x)^(3/2)) + (2*(e + d/x)^(3/2)*(c*x)^(3/2)*((
-5*Sqrt[2]*c*d*e*Sqrt[1 + I*c*x]*(I + c*x)*Sqrt[(c*d + c*e*x)/(c*d - I*e)]*
EllipticF[ArcSin[Sqrt[-((e*(I + c*x))/(c*d - I*e))]], (I*c*d + e)/(2*e)])/(
Sqrt[1 + 1/(c^2*x^2)]*Sqrt[e + d/x]*(c*x)^(3/2)*Sqrt[(e*(1 - I*c*x))/(I*c*d
 + e)]) + (I*Sqrt[2]*(c*d - I*e)*(8*c^2*d^2 - e^2)*Sqrt[1 + I*c*x]*Sqrt[(e*
(I + c*x)*(c*d + c*e*x))/(I*c*d + e)^2]*EllipticPi[1 + (I*c*d)/e, ArcSin[Sq
rt[-((e*(I + c*x))/(c*d - I*e))]], (I*c*d + e)/(2*e)])/(e*Sqrt[1 + 1/(c^2*x
^2)]*Sqrt[e + d/x]*(c*x)^(3/2)) + (2*e*Cosh[2*ArcCsch[c*x]]*(-((c*d + c*e*x
)*(1 + c^2*x^2)) + (c*x*(c*d*Sqrt[2 + (2*I)*c*x]*(I + c*x)*Sqrt[(c*d + c*e*
x)/(c*d - I*e)]*EllipticF[ArcSin[Sqrt[-((e*(I + c*x))/(c*d - I*e))]], (I*c*
d + e)/(2*e)] + 2*Sqrt[-((e*(-I + c*x))/(c*d + I*e))]*(I + c*x)*Sqrt[(c*d +
 c*e*x)/(c*d - I*e)]*((c*d + I*e)*EllipticE[ArcSin[Sqrt[(c*d + c*e*x)/(c*d
- I*e)]], (c*d - I*e)/(c*d + I*e)] - I*e*EllipticF[ArcSin[Sqrt[(c*d + c*e*x
)/(c*d - I*e)]], (c*d - I*e)/(c*d + I*e)]) + (I*c*d + e)*Sqrt[2 + (2*I)*c*x
]*Sqrt[-((e*(I + c*x))/(c*d - I*e))]*Sqrt[(e*(I + c*x)*(c*d + c*e*x))/(I*c*
d + e)^2]*EllipticPi[1 + (I*c*d)/e, ArcSin[Sqrt[-((e*(I + c*x))/(c*d - I*e)
)]], (I*c*d + e)/(2*e)]))/(2*Sqrt[-((e*(I + c*x))/(c*d - I*e))])))/(Sqrt[1
+ 1/(c^2*x^2)]*Sqrt[e + d/x]*Sqrt[c*x]*(2 + c^2*x^2))))/(3*e^3*(d + e*x)^(3
/2))))/c^3
```

**fricas [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*(a+b*arccsch(c*x))/(e*x+d)^(3/2),x, algorithm="fricas")
```

```
[Out] Timed out
```

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

$$\int \frac{(b\,\operatorname{arcsch}(cx) + a)x^2}{(ex + d)^{\frac{3}{2}}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*(a+b*arccsch(c*x))/(e*x+d)^(3/2),x, algorithm="giac")
```

```
[Out] integrate((b*arccsch(c*x) + a)*x^2/(e*x + d)^(3/2), x)
```

**maple [C]** time = 0.07, size = 896, normalized size = 1.80

$$\frac{2a\left(\frac{(ex+d)^{\frac{3}{2}}}{3} - 2d\sqrt{ex+d} - \frac{d^2}{\sqrt{ex+d}}\right) + 2b\left(\frac{(ex+d)^{\frac{3}{2}}\operatorname{arccsch}(cx)}{3} - 2\operatorname{arccsch}(cx)\,d\sqrt{ex+d} - \frac{\operatorname{arccsch}(cx)d^2}{\sqrt{ex+d}} - \frac{2\sqrt{-\frac{i(ex+d)ce+(\cdots}{\cdots}}\cdots}{\cdots}\cdots\right.}{\cdots}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^2*(a+b*arccsch(c*x))/(e*x+d)^(3/2),x)
```

```
[Out] 2/e^3*(a*(1/3*(e*x+d)^(3/2)-2*d*(e*x+d)^(1/2)-d^2/(e*x+d)^(1/2))+b*(1/3*(e*
x+d)^(3/2)*arccsch(c*x)-2*arccsch(c*x)*d*(e*x+d)^(1/2)-arccsch(c*x)*d^2/(e*
x+d)^(1/2)-2/3/c^2*(-(I*(e*x+d)*c*e+(e*x+d)*c^2*d-c^2*d^2-e^2)/(c^2*d^2+e^2
))^(1/2)*((I*(e*x+d)*c*e-(e*x+d)*c^2*d+c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2)*(5
*I*EllipticF((e*x+d)^(1/2)*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2),(-(2*I*c*d*e-c
^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2))*c*d*e-4*EllipticF((e*x+d)^(1/2)*((I*e+c*d
)*c/(c^2*d^2+e^2))^(1/2),(-(2*I*c*d*e-c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2))*c^
2*d^2-EllipticE((e*x+d)^(1/2)*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2),(-(2*I*c*d*
e-c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2))*c^2*d^2-8*I*EllipticPi((e*x+d)^(1/2)*(
(I*e+c*d)*c/(c^2*d^2+e^2))^(1/2),1/(I*e+c*d)/c*(c^2*d^2+e^2)/d,(-(I*e-c*d)*
c/(c^2*d^2+e^2))^(1/2)/((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2))*c*d*e+8*EllipticP
i((e*x+d)^(1/2)*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2),1/(I*e+c*d)/c*(c^2*d^2+e^
2)/d,(-(I*e-c*d)*c/(c^2*d^2+e^2))^(1/2)/((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2))*
c^2*d^2+EllipticF((e*x+d)^(1/2)*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2),(-(2*I*c*
d*e-c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2))*e^2-EllipticE((e*x+d)^(1/2)*((I*e+c*
d)*c/(c^2*d^2+e^2))^(1/2),(-(2*I*c*d*e-c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2))*e
```

```
^2)/(((e*x+d)^2*c^2-2*(e*x+d)*c^2*d+c^2*d^2+e^2)/c^2/x^2/e^2)^(1/2)/x/((I*e
+c*d)*c/(c^2*d^2+e^2))^(1/2)/(I*e-c*d)))
```

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

$$\frac{2}{3}\,a\left(\frac{(ex+d)^{\frac{3}{2}}}{e^3}-\frac{6\,\sqrt{ex+d}\,d}{e^3}-\frac{3\,d^2}{\sqrt{ex+d}\,e^3}\right)+\frac{1}{3}\,b\left(\frac{2\left(e^2x^2-4\,dex-8\,d^2\right)\log\left(\sqrt{c^2x^2+1}+1\right)}{\sqrt{ex+d}\,e^3}+3\int\frac{}{3\left(\left(c^2e^3x^2+\right.\right.}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*(a+b*arccsch(c*x))/(e*x+d)^(3/2),x, algorithm="maxima")
```

```
[Out] 2/3*a*((e*x + d)^(3/2)/e^3 - 6*sqrt(e*x + d)*d/e^3 - 3*d^2/(sqrt(e*x + d)*e
^3)) + 1/3*b*(2*(e^2*x^2 - 4*d*e*x - 8*d^2)*log(sqrt(c^2*x^2 + 1) + 1)/(sqr
t(e*x + d)*e^3) + 3*integrate(2/3*(c^2*e^2*x^3 - 4*c^2*d*e*x^2 - 8*c^2*d^2*
x)/((c^2*e^3*x^2 + e^3)*sqrt(c^2*x^2 + 1)*sqrt(e*x + d) + (c^2*e^3*x^2 + e^
3)*sqrt(e*x + d)), x) - 3*integrate(-1/3*(6*c^2*d*e^2*x^3 - (3*e^3*log(c) +
 2*e^3)*c^2*x^4 + 16*c^2*d^3*x + 3*(8*c^2*d^2*e - e^3*log(c))*x^2 - 3*(c^2*
e^3*x^4 + e^3*x^2)*log(x))/((c^2*e^4*x^3 + c^2*d*e^3*x^2 + e^4*x + d*e^3)*s
qrt(e*x + d)), x))
```

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

$$\int \frac{x^2\,\left(a+b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)\right)}{{\left(d+e\,x\right)}^{3/2}} \,d x$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((x^2*(a + b*asinh(1/(c*x))))/(d + e*x)^(3/2),x)
```

```
[Out] int((x^2*(a + b*asinh(1/(c*x))))/(d + e*x)^(3/2), x)
```

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

$$\int \frac{x^{2} \left(a + b \operatorname{acsch}{\left(c x \right)}\right)}{\left(d + e x\right)^{\frac{3}{2}}}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**2*(a+b*acsch(c*x))/(e*x+d)**(3/2),x)
```

```
[Out] Integral(x**2*(a + b*acsch(c*x))/(d + e*x)**(3/2), x)
```

# 3.65 $\int \frac{x(a+b\text{csch}^{-1}(cx))}{(d+ex)^{3/2}}\,dx$

**Optimal**. Leaf size=318

$$\frac{2\sqrt{d+ex}\,\left(a+b\text{csch}^{-1}(cx)\right)}{e^2}+\frac{2d\left(a+b\text{csch}^{-1}(cx)\right)}{e^2\sqrt{d+ex}}-\frac{8bd\sqrt{c^2x^2+1}\,\sqrt{\frac{\sqrt{-c^2}\,(d+ex)}{\sqrt{-c^2}\,d+e}}\,\Pi\left(2;\sin^{-1}\left(\frac{\sqrt{1-\sqrt{-c^2}\,x}}{\sqrt{2}}\right)|\frac{2e}{\sqrt{-c^2}\,d+e}\right)}{ce^2x\sqrt{\frac{1}{c^2x^2}+1}\,\sqrt{d+ex}}$$

```
[Out] 2*d*(a+b*arccsch(c*x))/e^2/(e*x+d)^(1/2)+2*(a+b*arccsch(c*x))*(e*x+d)^(1/2)
/e^2-8*b*d*EllipticPi(1/2*(1-(-c^2)^(1/2)*x)^(1/2)*2^(1/2),2,2^(1/2)*(e/(d*
(-c^2)^(1/2)+e))^(1/2))*(c^2*x^2+1)^(1/2)*((e*x+d)*(-c^2)^(1/2)/(d*(-c^2)^(
1/2)+e))^(1/2)/c/e^2/x/(1+1/c^2/x^2)^(1/2)/(e*x+d)^(1/2)+4*b*c*EllipticF(1/
2*(1-(-c^2)^(1/2)*x)^(1/2)*2^(1/2),(-2*e*(-c^2)^(1/2)/(c^2*d-e*(-c^2)^(1/2)
))^(1/2))*(c^2*x^2+1)^(1/2)*(c^2*(e*x+d)/(c^2*d-e*(-c^2)^(1/2)))^(1/2)/(-c^
2)^(3/2)/e/x/(1+1/c^2/x^2)^(1/2)/(e*x+d)^(1/2)
```

**Rubi [A]** time = 1.69, antiderivative size = 318, normalized size of antiderivative = 1.00, number of steps used = 11, number of rules used = 11, integrand size = 19, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.579, Rules used = {43, 6310, 12, 6721, 6742, 719, 419, 932, 168, 538, 537}

$$\frac{2\sqrt{d+ex}\,\left(a+b\text{csch}^{-1}(cx)\right)}{e^2}+\frac{2d\left(a+b\text{csch}^{-1}(cx)\right)}{e^2\sqrt{d+ex}}-\frac{8bd\sqrt{c^2x^2+1}\,\sqrt{\frac{\sqrt{-c^2}\,(d+ex)}{\sqrt{-c^2}\,d+e}}\,\Pi\left(2;\sin^{-1}\left(\frac{\sqrt{1-\sqrt{-c^2}\,x}}{\sqrt{2}}\right)|\frac{2e}{\sqrt{-c^2}\,d+e}\right)}{ce^2x\sqrt{\frac{1}{c^2x^2}+1}\,\sqrt{d+ex}}$$

Antiderivative was successfully verified.

```
[In] Int[(x*(a + b*ArcCsch[c*x]))/(d + e*x)^(3/2),x]
```

```
[Out] (2*d*(a + b*ArcCsch[c*x]))/(e^2*Sqrt[d + e*x]) + (2*Sqrt[d + e*x]*(a + b*Ar
cCsch[c*x]))/e^2 + (4*b*c*Sqrt[(c^2*(d + e*x))/(c^2*d - Sqrt[-c^2]*e)]*Sqrt
[1 + c^2*x^2]*EllipticF[ArcSin[Sqrt[1 - Sqrt[-c^2]*x]/Sqrt[2]], (-2*Sqrt[-c
^2]*e)/(c^2*d - Sqrt[-c^2]*e)])/((-c^2)^(3/2)*e*Sqrt[1 + 1/(c^2*x^2)]*x*Sqr
t[d + e*x]) - (8*b*d*Sqrt[(Sqrt[-c^2]*(d + e*x))/(Sqrt[-c^2]*d + e)]*Sqrt[1
 + c^2*x^2]*EllipticPi[2, ArcSin[Sqrt[1 - Sqrt[-c^2]*x]/Sqrt[2]], (2*e)/(Sq
rt[-c^2]*d + e)])/(c*e^2*Sqrt[1 + 1/(c^2*x^2)]*x*Sqrt[d + e*x])
```

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 168

```
Int[1/(((a_.) + (b_.)*(x_))*Sqrt[(c_.) + (d_.)*(x_)]*Sqrt[(e_.) + (f_.)*(x_
)]*Sqrt[(g_.) + (h_.)*(x_)]), x_Symbol] :> Dist[-2, Subst[Int[1/(Simp[b*c -
 a*d - b*x^2, x]*Sqrt[Simp[(d*e - c*f)/d + (f*x^2)/d, x]]*Sqrt[Simp[(d*g -
c*h)/d + (h*x^2)/d, x]]), x], x, Sqrt[c + d*x]], x] /; FreeQ[{a, b, c, d, e
, f, g, h}, x] && GtQ[(d*e - c*f)/d, 0]
```

Rule 419

```
Int[1/(Sqrt[(a_) + (b_.)*(x_)^2]*Sqrt[(c_) + (d_.)*(x_)^2]), x_Symbol] :> S
imp[(1*EllipticF[ArcSin[Rt[-(d/c), 2]*x], (b*c)/(a*d)])/(Sqrt[a]*Sqrt[c]*Rt
[-(d/c), 2]), x] /; FreeQ[{a, b, c, d}, x] && NegQ[d/c] && GtQ[c, 0] && GtQ
[a, 0] &&  !(NegQ[b/a] && SimplerSqrtQ[-(b/a), -(d/c)])
```

Rule 537

```
Int[1/(((a_) + (b_.)*(x_)^2)*Sqrt[(c_) + (d_.)*(x_)^2]*Sqrt[(e_) + (f_.)*(x
_)^2]), x_Symbol] :> Simp[(1*EllipticPi[(b*c)/(a*d), ArcSin[Rt[-(d/c), 2]*x
], (c*f)/(d*e)])/(a*Sqrt[c]*Sqrt[e]*Rt[-(d/c), 2]), x] /; FreeQ[{a, b, c, d
, e, f}, x] &&  !GtQ[d/c, 0] && GtQ[c, 0] && GtQ[e, 0] &&  !( !GtQ[f/e, 0]
&& SimplerSqrtQ[-(f/e), -(d/c)])
```

Rule 538

```
Int[1/(((a_) + (b_.)*(x_)^2)*Sqrt[(c_) + (d_.)*(x_)^2]*Sqrt[(e_) + (f_.)*(x
_)^2]), x_Symbol] :> Dist[Sqrt[1 + (d*x^2)/c]/Sqrt[c + d*x^2], Int[1/((a +
b*x^2)*Sqrt[1 + (d*x^2)/c]*Sqrt[e + f*x^2]), x], x] /; FreeQ[{a, b, c, d, e
, f}, x] &&  !GtQ[c, 0]
```

Rule 719

```
Int[((d_) + (e_.)*(x_))^(m_)/Sqrt[(a_) + (c_.)*(x_)^2], x_Symbol] :> Dist[(
2*a*Rt[-(c/a), 2]*(d + e*x)^m*Sqrt[1 + (c*x^2)/a])/(c*Sqrt[a + c*x^2]*((c*(
d + e*x))/(c*d - a*e*Rt[-(c/a), 2]))^m), Subst[Int[(1 + (2*a*e*Rt[-(c/a), 2
]*x^2)/(c*d - a*e*Rt[-(c/a), 2]))^m/Sqrt[1 - x^2], x], x, Sqrt[(1 - Rt[-(c/
a), 2]*x)/2]], x] /; FreeQ[{a, c, d, e}, x] && NeQ[c*d^2 + a*e^2, 0] && EqQ
[m^2, 1/4]
```

Rule 932

```
Int[1/(((d_.) + (e_.)*(x_))*Sqrt[(f_.) + (g_.)*(x_)]*Sqrt[(a_) + (c_.)*(x_)
^2]), x_Symbol] :> With[{q = Rt[-(c/a), 2]}, Dist[1/Sqrt[a], Int[1/((d + e*
x)*Sqrt[f + g*x]*Sqrt[1 - q*x]*Sqrt[1 + q*x]), x], x]] /; FreeQ[{a, c, d, e
, f, g}, x] && NeQ[e*f - d*g, 0] && NeQ[c*d^2 + a*e^2, 0] && GtQ[a, 0]
```

Rule 6310

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))*(u_), x_Symbol] :> With[{v = IntHid
e[u, x]}, Dist[a + b*ArcCsch[c*x], v, x] + Dist[b/c, Int[SimplifyIntegrand[
v/(x^2*Sqrt[1 + 1/(c^2*x^2)]), x], x], x] /; InverseFunctionFreeQ[v, x]] /;
 FreeQ[{a, b, c}, x]
```

Rule 6721

```
Int[(u_.)*((a_.) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Dist[(b^IntPart[p]*(
a + b*x^n)^FracPart[p])/(x^(n*FracPart[p])*(1 + a/(x^n*b))^FracPart[p]), In
t[u*x^(n*p)*(1 + a/(x^n*b))^p, x], x] /; FreeQ[{a, b, p}, x] &&  !IntegerQ[
p] && ILtQ[n, 0] &&  !RationalFunctionQ[u, x] && IntegerQ[p + 1/2]
```

Rule 6742

```
Int[u_, x_Symbol] :> With[{v = ExpandIntegrand[u, x]}, Int[v, x] /; SumQ[v]
]
```

Rubi steps

$$\int \frac{x\left(a+b\operatorname{csch}^{-1}(cx)\right)}{(d+ex)^{3/2}}\,dx = \frac{2d\left(a+b\operatorname{csch}^{-1}(cx)\right)}{e^2\sqrt{d+ex}} + \frac{2\sqrt{d+ex}\,\left(a+b\operatorname{csch}^{-1}(cx)\right)}{e^2} + \frac{b\int \frac{2(2d+ex)}{e^2\sqrt{1+\frac{1}{c^2x^2}}\,x^2\sqrt{d+ex}}\,dx}{c}$$

$$= \frac{2d\left(a+b\operatorname{csch}^{-1}(cx)\right)}{e^2\sqrt{d+ex}} + \frac{2\sqrt{d+ex}\,\left(a+b\operatorname{csch}^{-1}(cx)\right)}{e^2} + \frac{(2b)\int \frac{2d+ex}{\sqrt{1+\frac{1}{c^2x^2}}\,x^2\sqrt{d+ex}}\,dx}{ce^2}$$

$$= \frac{2d\left(a+b\operatorname{csch}^{-1}(cx)\right)}{e^2\sqrt{d+ex}} + \frac{2\sqrt{d+ex}\,\left(a+b\operatorname{csch}^{-1}(cx)\right)}{e^2} + \frac{\left(2b\sqrt{1+c^2x^2}\right)\int \frac{2d+ex}{x\sqrt{d+ex}\,\sqrt{1+c}}}{ce^2\sqrt{1+\frac{1}{c^2x^2}}\,x}$$

$$= \frac{2d\left(a+b\operatorname{csch}^{-1}(cx)\right)}{e^2\sqrt{d+ex}} + \frac{2\sqrt{d+ex}\,\left(a+b\operatorname{csch}^{-1}(cx)\right)}{e^2} + \frac{\left(2b\sqrt{1+c^2x^2}\right)\int \left(\frac{e}{\sqrt{d+ex}\,\sqrt{1+}}\right.}{ce^2\sqrt{1+}}$$

$$= \frac{2d\left(a+b\operatorname{csch}^{-1}(cx)\right)}{e^2\sqrt{d+ex}} + \frac{2\sqrt{d+ex}\,\left(a+b\operatorname{csch}^{-1}(cx)\right)}{e^2} + \frac{\left(4bd\sqrt{1+c^2x^2}\right)\int \frac{1}{x\sqrt{d+ex}\,\sqrt{1}}}{ce^2\sqrt{1+\frac{1}{c^2x^2}}\,x}$$

$$= \frac{2d\left(a+b\operatorname{csch}^{-1}(cx)\right)}{e^2\sqrt{d+ex}} + \frac{2\sqrt{d+ex}\,\left(a+b\operatorname{csch}^{-1}(cx)\right)}{e^2} + \frac{\left(4bd\sqrt{1+c^2x^2}\right)\int \frac{}{x\sqrt{1-\sqrt{-c^2}}}}{ce^2\sqrt{1+\frac{1}{c^2x}}}$$

$$= \frac{2d\left(a+b\operatorname{csch}^{-1}(cx)\right)}{e^2\sqrt{d+ex}} + \frac{2\sqrt{d+ex}\,\left(a+b\operatorname{csch}^{-1}(cx)\right)}{e^2} + \frac{4b\sqrt{-c^2}\,\sqrt{\frac{c^2(d+ex)}{c^2d-\sqrt{-c^2}\,e}}\,\sqrt{1+c^2}}{c^3e\sqrt{1}}$$

$$= \frac{2d\left(a+b\operatorname{csch}^{-1}(cx)\right)}{e^2\sqrt{d+ex}} + \frac{2\sqrt{d+ex}\,\left(a+b\operatorname{csch}^{-1}(cx)\right)}{e^2} + \frac{4b\sqrt{-c^2}\,\sqrt{\frac{c^2(d+ex)}{c^2d-\sqrt{-c^2}\,e}}\,\sqrt{1+c^2}}{c^3e\sqrt{1}}$$

$$= \frac{2d\left(a+b\operatorname{csch}^{-1}(cx)\right)}{e^2\sqrt{d+ex}} + \frac{2\sqrt{d+ex}\,\left(a+b\operatorname{csch}^{-1}(cx)\right)}{e^2} + \frac{4b\sqrt{-c^2}\,\sqrt{\frac{c^2(d+ex)}{c^2d-\sqrt{-c^2}\,e}}\,\sqrt{1+c^2}}{c^3e\sqrt{1}}$$

**Mathematica [C]** time = 1.58, size = 264, normalized size = 0.83

$$\frac{2\left(\frac{a(2d+ex)}{\sqrt{d+ex}}-\frac{2ib\sqrt{-\frac{e(cx-i)}{cd+ie}}\sqrt{-\frac{e(cx+i)}{cd-ie}}\left(F\left(i\sinh^{-1}\left(\sqrt{-\frac{c}{cd-ie}}\sqrt{d+ex}\right)|\frac{cd-ie}{cd+ie}\right)-2\Pi\left(1-\frac{ie}{cd};i\sinh^{-1}\left(\sqrt{-\frac{c}{cd-ie}}\sqrt{d+ex}\right)|\frac{cd-ie}{cd+ie}\right)\right)}{cx\sqrt{\frac{1}{c^2x^2}+1}\sqrt{-\frac{c}{cd-ie}}}+\frac{b\operatorname{csch}^{-1}(cx)(2d+ex)}{\sqrt{d+ex}}\right.}{e^2}$$

Antiderivative was successfully verified.

```
[In] Integrate[(x*(a + b*ArcCsch[c*x]))/(d + e*x)^(3/2),x]
```

```
[Out] (2*((a*(2*d + e*x))/Sqrt[d + e*x] + (b*(2*d + e*x)*ArcCsch[c*x])/Sqrt[d + e
*x] - ((2*I)*b*Sqrt[-((e*(-I + c*x))/(c*d + I*e))]*Sqrt[-((e*(I + c*x))/(c*
d - I*e))]*(EllipticF[I*ArcSinh[Sqrt[-(c/(c*d - I*e))]*Sqrt[d + e*x]], (c*d
 - I*e)/(c*d + I*e)] - 2*EllipticPi[1 - (I*e)/(c*d), I*ArcSinh[Sqrt[-(c/(c*
d - I*e))]*Sqrt[d + e*x]], (c*d - I*e)/(c*d + I*e)]))/(c*Sqrt[-(c/(c*d - I*
e))]*Sqrt[1 + 1/(c^2*x^2)]*x)))/e^2
```

**fricas [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*arccsch(c*x))/(e*x+d)^(3/2),x, algorithm="fricas")
```

```
[Out] Timed out
```

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

$$\int \frac{(b\operatorname{arcsch}(cx)+a)x}{(ex+d)^{\frac{3}{2}}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*(a+b*arccsch(c*x))/(e*x+d)^(3/2),x, algorithm="giac")
```

```
[Out] integrate((b*arccsch(c*x) + a)*x/(e*x + d)^(3/2), x)
```

**maple [C]** time = 0.07, size = 418, normalized size = 1.31

$$\frac{2a\left(\sqrt{ex+d}+\frac{d}{\sqrt{ex+d}}\right)+2b\left(\sqrt{ex+d}\operatorname{arccsch}(cx)+\frac{\operatorname{arccsch}(cx)d}{\sqrt{ex+d}}+\frac{2\sqrt{-\frac{i(ex+d)ce+(ex+d)c^2d-c^2d^2-e^2}{c^2d^2+e^2}}\sqrt{\frac{i(ex+d)ce-(ex+d)c^2d+c^2d^2+e}{c^2d^2+e^2}}}{}\right.}{e^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x*(a+b*arccsch(c*x))/(e*x+d)^(3/2),x)
```

```
[Out] 2/e^2*(a*((e*x+d)^(1/2)+d/(e*x+d)^(1/2))+b*((e*x+d)^(1/2)*arccsch(c*x)+arcc
sch(c*x)*d/(e*x+d)^(1/2)+2/c*(-(I*(e*x+d)*c*e+(e*x+d)*c^2*d-c^2*d^2-e^2)/(c
^2*d^2+e^2))^(1/2)*((I*(e*x+d)*c*e-(e*x+d)*c^2*d+c^2*d^2+e^2)/(c^2*d^2+e^2)
)^(1/2)*(EllipticF((e*x+d)^(1/2)*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2),(-(2*I*c
*d*e-c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2))-2*EllipticPi((e*x+d)^(1/2)*((I*e+c*
d)*c/(c^2*d^2+e^2))^(1/2),1/(I*e+c*d)/c*(c^2*d^2+e^2)/d,(-(I*e-c*d)*c/(c^2*
d^2+e^2))^(1/2)/((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2)))/(((e*x+d)^2*c^2-2*(e*x+
d)*c^2*d+c^2*d^2+e^2)/c^2/x^2/e^2)^(1/2)/x/((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2
)))
```

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

$$b\left(\frac{2\,(ex+2\,d)\log\left(\sqrt{c^2x^2+1}\,+1\right)}{\sqrt{ex+d}\,e^2}+\int\frac{2\left(c^2ex^2+2\,c^2dx\right)}{\left(c^2e^2x^2+e^2\right)\sqrt{c^2x^2+1}\,\sqrt{ex+d}\,+\left(c^2e^2x^2+e^2\right)\sqrt{ex+d}}\,dx-\int\frac{6\,c^2dex}{}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*(a+b*arccsch(c*x))/(e*x+d)^(3/2),x, algorithm="maxima")
```

```
[Out] b*(2*(e*x + 2*d)*log(sqrt(c^2*x^2 + 1) + 1)/(sqrt(e*x + d)*e^2) + integrate
(2*(c^2*e*x^2 + 2*c^2*d*x)/((c^2*e^2*x^2 + e^2)*sqrt(c^2*x^2 + 1)*sqrt(e*x
+ d) + (c^2*e^2*x^2 + e^2)*sqrt(e*x + d)), x) - integrate((6*c^2*d*e*x^2 +
(e^2*log(c) + 2*e^2)*c^2*x^3 + (4*c^2*d^2 + e^2*log(c))*x + (c^2*e^2*x^3 +
e^2*x)*log(x))/((c^2*e^3*x^3 + c^2*d*e^2*x^2 + e^3*x + d*e^2)*sqrt(e*x + d)
), x)) + 2*a*(sqrt(e*x + d)/e^2 + d/(sqrt(e*x + d)*e^2))
```

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

$$\int\frac{x\,\left(a+b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)\right)}{{\left(d+e\,x\right)}^{3/2}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((x*(a + b*asinh(1/(c*x))))/(d + e*x)^(3/2),x)
```

```
[Out] int((x*(a + b*asinh(1/(c*x))))/(d + e*x)^(3/2), x)
```

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

$$\int\frac{x\,(a+b\,\mathrm{acsch}\,(cx))}{(d+ex)^{\frac{3}{2}}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*(a+b*acsch(c*x))/(e*x+d)**(3/2),x)
```

```
[Out] Integral(x*(a + b*acsch(c*x))/(d + e*x)**(3/2), x)
```

## 3.66 $\int \frac{a+b\operatorname{csch}^{-1}(cx)}{(d+ex)^{3/2}}\,dx$

**Optimal**. Leaf size=149

$$\frac{4b\sqrt{c^2x^2+1}\sqrt{\frac{\sqrt{-c^2}(d+ex)}{\sqrt{-c^2}d+e}}\,\Pi\left(2;\sin^{-1}\left(\frac{\sqrt{1-\sqrt{-c^2}x}}{\sqrt{2}}\right)|\frac{2e}{\sqrt{-c^2}d+e}\right)}{cex\sqrt{\frac{1}{c^2x^2}+1}\sqrt{d+ex}}-\frac{2\left(a+b\operatorname{csch}^{-1}(cx)\right)}{e\sqrt{d+ex}}$$

```
[Out] -2*(a+b*arccsch(c*x))/e/(e*x+d)^(1/2)+4*b*EllipticPi(1/2*(1-(-c^2)^(1/2)*x)
^(1/2)*2^(1/2),2,2^(1/2)*(e/(d*(-c^2)^(1/2)+e))^(1/2))*(c^2*x^2+1)^(1/2)*((
e*x+d)*(-c^2)^(1/2)/(d*(-c^2)^(1/2)+e))^(1/2)/c/e/x/(1+1/c^2/x^2)^(1/2)/(e*
x+d)^(1/2)
```

**Rubi [A]** time = 0.28, antiderivative size = 149, 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 = {6290, 1574, 933, 168, 538, 537}

$$\frac{4b\sqrt{c^2x^2+1}\sqrt{\frac{\sqrt{-c^2}(d+ex)}{\sqrt{-c^2}d+e}}\,\Pi\left(2;\sin^{-1}\left(\frac{\sqrt{1-\sqrt{-c^2}x}}{\sqrt{2}}\right)|\frac{2e}{\sqrt{-c^2}d+e}\right)}{cex\sqrt{\frac{1}{c^2x^2}+1}\sqrt{d+ex}}-\frac{2\left(a+b\operatorname{csch}^{-1}(cx)\right)}{e\sqrt{d+ex}}$$

Antiderivative was successfully verified.

```
[In] Int[(a + b*ArcCsch[c*x])/(d + e*x)^(3/2),x]
```

```
[Out] (-2*(a + b*ArcCsch[c*x]))/(e*Sqrt[d + e*x]) + (4*b*Sqrt[(Sqrt[-c^2]*(d + e*
x))/(Sqrt[-c^2]*d + e)]*Sqrt[1 + c^2*x^2]*EllipticPi[2, ArcSin[Sqrt[1 - Sqr
t[-c^2]*x]/Sqrt[2]], (2*e)/(Sqrt[-c^2]*d + e)])/(c*e*Sqrt[1 + 1/(c^2*x^2)]*
x*Sqrt[d + e*x])
```

Rule 168

```
Int[1/(((a_.) + (b_.)*(x_))*Sqrt[(c_.) + (d_.)*(x_)]*Sqrt[(e_.) + (f_.)*(x_
)]*Sqrt[(g_.) + (h_.)*(x_)]), x_Symbol] :> Dist[-2, Subst[Int[1/(Simp[b*c -
 a*d - b*x^2, x]*Sqrt[Simp[(d*e - c*f)/d + (f*x^2)/d, x]]*Sqrt[Simp[(d*g -
c*h)/d + (h*x^2)/d, x]]), x], x, Sqrt[c + d*x]], x] /; FreeQ[{a, b, c, d, e
, f, g, h}, x] && GtQ[(d*e - c*f)/d, 0]
```

Rule 537

```
Int[1/(((a_) + (b_.)*(x_)^2)*Sqrt[(c_) + (d_.)*(x_)^2]*Sqrt[(e_) + (f_.)*(x
_)^2]), x_Symbol] :> Simp[(1*EllipticPi[(b*c)/(a*d), ArcSin[Rt[-(d/c), 2]*x
```

```
], (c*f)/(d*e)])/(a*Sqrt[c]*Sqrt[e]*Rt[-(d/c), 2]), x] /; FreeQ[{a, b, c, d
, e, f}, x] && !GtQ[d/c, 0] && GtQ[c, 0] && GtQ[e, 0] && !( !GtQ[f/e, 0]
&& SimplerSqrtQ[-(f/e), -(d/c)])
```

Rule 538

```
Int[1/(((a_) + (b_.)*(x_)^2)*Sqrt[(c_) + (d_.)*(x_)^2]*Sqrt[(e_) + (f_.)*(x
_)^2]), x_Symbol] :> Dist[Sqrt[1 + (d*x^2)/c]/Sqrt[c + d*x^2], Int[1/((a +
b*x^2)*Sqrt[1 + (d*x^2)/c]*Sqrt[e + f*x^2]), x], x] /; FreeQ[{a, b, c, d, e
, f}, x] && !GtQ[c, 0]
```

Rule 933

```
Int[1/(((d_.) + (e_.)*(x_))*Sqrt[(f_.) + (g_.)*(x_)]*Sqrt[(a_) + (c_.)*(x_)
^2]), x_Symbol] :> With[{q = Rt[-(c/a), 2]}, Dist[Sqrt[1 + (c*x^2)/a]/Sqrt[
a + c*x^2], Int[1/((d + e*x)*Sqrt[f + g*x]*Sqrt[1 - q*x]*Sqrt[1 + q*x]), x]
, x]] /; FreeQ[{a, c, d, e, f, g}, x] && NeQ[e*f - d*g, 0] && NeQ[c*d^2 + a
*e^2, 0] && !GtQ[a, 0]
```

Rule 1574

```
Int[(x_)^(m_.)*((a_.) + (c_.)*(x_)^(mn2_.))^(p_)*((d_) + (e_.)*(x_)^(n_.))^
(q_.), x_Symbol] :> Dist[(x^(2*n*FracPart[p])*(a + c/x^(2*n))^FracPart[p])/
(c + a*x^(2*n))^FracPart[p], Int[x^(m - 2*n*p)*(d + e*x^n)^q*(c + a*x^(2*n)
)^p, x], x] /; FreeQ[{a, c, d, e, m, n, p, q}, x] && EqQ[mn2, -2*n] && !In
tegerQ[p] && !IntegerQ[q] && PosQ[n]
```

Rule 6290

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))*((d_.) + (e_.)*(x_))^(m_.), x_Symbo
l] :> Simp[((d + e*x)^(m + 1)*(a + b*ArcCsch[c*x]))/(e*(m + 1)), x] + Dist[
b/(c*e*(m + 1)), Int[(d + e*x)^(m + 1)/(x^2*Sqrt[1 + 1/(c^2*x^2)]), x], x]
/; FreeQ[{a, b, c, d, e, m}, x] && NeQ[m, -1]
```

Rubi steps

$$\int \frac{a+b\operatorname{csch}^{-1}(cx)}{(d+ex)^{3/2}}\,dx = -\frac{2\left(a+b\operatorname{csch}^{-1}(cx)\right)}{e\sqrt{d+ex}} - \frac{(2b)\int \frac{1}{\sqrt{1+\frac{1}{c^2x^2}}\,x^2\sqrt{d+ex}}\,dx}{ce}$$

$$= -\frac{2\left(a+b\operatorname{csch}^{-1}(cx)\right)}{e\sqrt{d+ex}} - \frac{\left(2b\sqrt{\frac{1}{c^2}+x^2}\right)\int \frac{1}{x\sqrt{d+ex}\sqrt{\frac{1}{c^2}+x^2}}\,dx}{ce\sqrt{1+\frac{1}{c^2x^2}}\,x}$$

$$= -\frac{2\left(a+b\operatorname{csch}^{-1}(cx)\right)}{e\sqrt{d+ex}} - \frac{\left(2b\sqrt{1+c^2x^2}\right)\int \frac{1}{x\sqrt{1-\sqrt{-c^2}\,x}\sqrt{1+\sqrt{-c^2}\,x}\sqrt{d+ex}}\,dx}{ce\sqrt{1+\frac{1}{c^2x^2}}\,x}$$

$$= -\frac{2\left(a+b\operatorname{csch}^{-1}(cx)\right)}{e\sqrt{d+ex}} + \frac{\left(4b\sqrt{1+c^2x^2}\right)\operatorname{Subst}\left(\int \frac{1}{(1-x^2)\sqrt{2-x^2}\sqrt{d+\frac{e}{\sqrt{-c^2}}-\frac{ex^2}{\sqrt{-c^2}}}}\,dx, x, \sqrt{1-\right.}{ce\sqrt{1+\frac{1}{c^2x^2}}\,x}$$

$$= -\frac{2\left(a+b\operatorname{csch}^{-1}(cx)\right)}{e\sqrt{d+ex}} + \frac{\left(4b\sqrt{1+c^2x^2}\sqrt{1+\frac{e\left(-1+\sqrt{-c^2}\,x\right)}{\sqrt{-c^2}\,d+e}}\right)\operatorname{Subst}\left(\int \frac{1}{(1-x^2)\sqrt{2-x^2}\sqrt{1-\frac{}{\sqrt{-c^2}(}}}\right.}{ce\sqrt{1+\frac{1}{c^2x^2}}\,x\sqrt{d+ex}}$$

$$= -\frac{2\left(a+b\operatorname{csch}^{-1}(cx)\right)}{e\sqrt{d+ex}} + \frac{4b\sqrt{1+c^2x^2}\sqrt{1-\frac{e\left(1-\sqrt{-c^2}\,x\right)}{\sqrt{-c^2}\,d+e}}\,\Pi\left(2;\sin^{-1}\left(\frac{\sqrt{1-\sqrt{-c^2}\,x}}{\sqrt{2}}\right)|\frac{2e}{\sqrt{-c^2}\,d+e}\right)}{ce\sqrt{1+\frac{1}{c^2x^2}}\,x\sqrt{d+ex}}$$

**Mathematica [C]** time = 0.68, size = 166, normalized size = 1.11

$$\frac{-2e\left(c^2x^2+1\right)\left(a+b\operatorname{csch}^{-1}(cx)\right)+2bcx\sqrt{\frac{2}{c^2x^2}+2}\sqrt{1+icx}\,(e+icd)\sqrt{\frac{ce(cx+i)(d+ex)}{(e+icd)^2}}\,\Pi\left(\frac{icd}{e}+1;\sin^{-1}\left(\sqrt{-\frac{e(cx+i)}{cd-ie}}\right)|\right.}{e^2\left(c^2x^2+1\right)\sqrt{d+ex}}$$

Antiderivative was successfully verified.

```
[In] Integrate[(a + b*ArcCsch[c*x])/(d + e*x)^(3/2),x]
```

```
[Out] (-2*e*(1 + c^2*x^2)*(a + b*ArcCsch[c*x]) + 2*b*c*(I*c*d + e)*Sqrt[2 + 2/(c^
2*x^2)]*x*Sqrt[1 + I*c*x]*Sqrt[(c*e*(I + c*x)*(d + e*x))/(I*c*d + e)^2]*Ell
```

```
ipticPi[1 + (I*c*d)/e, ArcSin[Sqrt[-((e*(I + c*x))/(c*d - I*e))]], (I*c*d +
 e)/(2*e)])/(e^2*Sqrt[d + e*x]*(1 + c^2*x^2))
```

**fricas [F]** time = 9.00, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{\sqrt{ex+d}\,(b\operatorname{arcsch}(cx)+a)}{e^2x^2+2\,dex+d^2},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))/(e*x+d)^(3/2),x, algorithm="fricas")
```

```
[Out] integral(sqrt(e*x + d)*(b*arccsch(c*x) + a)/(e^2*x^2 + 2*d*e*x + d^2), x)
```

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

$$\int \frac{b\operatorname{arcsch}(cx)+a}{(ex+d)^{\frac{3}{2}}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))/(e*x+d)^(3/2),x, algorithm="giac")
```

```
[Out] integrate((b*arccsch(c*x) + a)/(e*x + d)^(3/2), x)
```

**maple [C]** time = 0.07, size = 328, normalized size = 2.20

$$\frac{-\frac{2a}{\sqrt{ex+d}}+2b\left(-\frac{\operatorname{arccsch}(cx)}{\sqrt{ex+d}}+\frac{2\sqrt{-\frac{i(ex+d)ce+(ex+d)c^2d-c^2d^2-e^2}{c^2d^2+e^2}}\sqrt{\frac{i(ex+d)ce-(ex+d)c^2d+c^2d^2+e^2}{c^2d^2+e^2}}\operatorname{EllipticPi}\left(\sqrt{ex+d}\sqrt{\frac{(cd+ie)c}{c^2d^2+e^2}},\frac{c^2d^2+e^2}{(cd+ie)cd},\frac{\sqrt{-\frac{(-cd+ie)c}{c^2d^2+e^2}}}{\sqrt{\frac{(cd+ie)c}{c^2d^2+e^2}}}\right)}{c\sqrt{\frac{(ex+d)^2c^2-2(ex+d)c^2d+c^2d^2+e^2}{c^2x^2e^2}}\,xd\sqrt{\frac{(cd+ie)c}{c^2d^2+e^2}}}\right)}{e}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a+b*arccsch(c*x))/(e*x+d)^(3/2),x)
```

```
[Out] 2/e*(-a/(e*x+d)^(1/2)+b*(-1/(e*x+d)^(1/2)*arccsch(c*x)+2/c/(((e*x+d)^2*c^2-
2*(e*x+d)*c^2*d+c^2*d^2+e^2)/c^2/x^2/e^2)^(1/2)/x/d/((I*e+c*d)*c/(c^2*d^2+e
^2))^(1/2)*(-(I*(e*x+d)*c*e+(e*x+d)*c^2*d-c^2*d^2-e^2)/(c^2*d^2+e^2))^(1/2)
*((I*(e*x+d)*c*e-(e*x+d)*c^2*d+c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2)*EllipticPi
((e*x+d)^(1/2)*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2),1/(I*e+c*d)/c*(c^2*d^2+e^2
)/d,(-(I*e-c*d)*c/(c^2*d^2+e^2))^(1/2)/((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2))))
```

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

$$-\left(2\,c^2\int \frac{x}{\left(c^2ex^2+e\right)\sqrt{c^2x^2+1}\,\sqrt{ex+d}+\left(c^2ex^2+e\right)\sqrt{ex+d}}\,dx+\frac{2\,\log\left(\sqrt{c^2x^2+1}+1\right)}{\sqrt{ex+d}\,e}+\int \frac{\left(e\log(c)-2\,e\right)c}{\left(c^2e^2\right.}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))/(e*x+d)^(3/2),x, algorithm="maxima")
```

```
[Out] -(2*c^2*integrate(x/((c^2*e*x^2 + e)*sqrt(c^2*x^2 + 1)*sqrt(e*x + d) + (c^2
*e*x^2 + e)*sqrt(e*x + d)), x) + 2*log(sqrt(c^2*x^2 + 1) + 1)/(sqrt(e*x + d
)*e) + integrate(((e*log(c) - 2*e)*c^2*x^2 - 2*c^2*d*x + e*log(c) + (c^2*e*
x^2 + e)*log(x))/((c^2*e^2*x^3 + c^2*d*e*x^2 + e^2*x + d*e)*sqrt(e*x + d)),
 x))*b - 2*a/(sqrt(e*x + d)*e)
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.01

$$\int \frac{a+b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)}{{\left(d+e\,x\right)}^{3/2}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a + b*asinh(1/(c*x)))/(d + e*x)^(3/2),x)
```

```
[Out] int((a + b*asinh(1/(c*x)))/(d + e*x)^(3/2), x)
```

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

$$\int \frac{a+b\,\mathrm{acsch}\,(cx)}{(d+ex)^{\frac{3}{2}}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*acsch(c*x))/(e*x+d)**(3/2),x)
```

```
[Out] Integral((a + b*acsch(c*x))/(d + e*x)**(3/2), x)
```

# 3.67 $\int \frac{a+b\operatorname{csch}^{-1}(cx)}{x(d+ex)^{3/2}}\,dx$

**Optimal**. Leaf size=24

$$\operatorname{Int}\left(\frac{a+b\operatorname{csch}^{-1}(cx)}{x(d+ex)^{3/2}},x\right)$$

```
[Out] Unintegrable((a+b*arccsch(c*x))/x/(e*x+d)^(3/2),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 = {}

$$\int \frac{a+b\operatorname{csch}^{-1}(cx)}{x(d+ex)^{3/2}}\,dx$$

Verification is Not applicable to the result.

```
[In] Int[(a + b*ArcCsch[c*x])/(x*(d + e*x)^(3/2)),x]
```

```
[Out] Defer[Int][(a + b*ArcCsch[c*x])/(x*(d + e*x)^(3/2)), x]
```

Rubi steps

$$\int \frac{a+b\operatorname{csch}^{-1}(cx)}{x(d+ex)^{3/2}}\,dx=\int \frac{a+b\operatorname{csch}^{-1}(cx)}{x(d+ex)^{3/2}}\,dx$$

**Mathematica [A]** time = 12.17, size = 0, normalized size = 0.00

$$\int \frac{a+b\operatorname{csch}^{-1}(cx)}{x(d+ex)^{3/2}}\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[(a + b*ArcCsch[c*x])/(x*(d + e*x)^(3/2)),x]
```

```
[Out] Integrate[(a + b*ArcCsch[c*x])/(x*(d + e*x)^(3/2)), x]
```

**fricas [A]** time = 0.81, size = 0, normalized size = 0.00

$$\operatorname{integral}\left(\frac{\sqrt{ex+d}\,(b\operatorname{arcsch}(cx)+a)}{e^2x^3+2\,dex^2+d^2x},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))/x/(e*x+d)^(3/2),x, algorithm="fricas")
```

```
[Out] integral(sqrt(e*x + d)*(b*arccsch(c*x) + a)/(e^2*x^3 + 2*d*e*x^2 + d^2*x),
x)
```

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

$$\int \frac{b\,\text{arcsch}\,(cx) + a}{(ex+d)^{\frac{3}{2}}x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))/x/(e*x+d)^(3/2),x, algorithm="giac")
```

```
[Out] integrate((b*arccsch(c*x) + a)/((e*x + d)^(3/2)*x), x)
```

**maple** [A] time = 6.99, size = 0, normalized size = 0.00

$$\int \frac{a + b\,\text{arccsch}\,(cx)}{x\,(ex+d)^{\frac{3}{2}}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a+b*arccsch(c*x))/x/(e*x+d)^(3/2),x)
```

```
[Out] int((a+b*arccsch(c*x))/x/(e*x+d)^(3/2),x)
```

**maxima** [A] time = 0.00, size = 0, normalized size = 0.00

$$-b\left(\frac{\left(\frac{e\log\left(\frac{\sqrt{ex+d}-\sqrt{d}}{\sqrt{ex+d}+\sqrt{d}}\right)}{d^{\frac{3}{2}}} + \frac{2e}{\sqrt{ex+d}\,d}\right)\log(c)}{e} + \int \frac{\log(x)}{\sqrt{ex+d}\,ex^2 + \sqrt{ex+d}\,dx}\,dx - \int \frac{\log\left(\sqrt{c^2x^2+1}+1\right)}{\sqrt{ex+d}\,ex^2 + \sqrt{ex+d}\,dx}\,dx\right) + a\left(\frac{\text{lo}}{-}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))/x/(e*x+d)^(3/2),x, algorithm="maxima")
```

```
[Out] -b*((e*log((sqrt(e*x + d) - sqrt(d))/(sqrt(e*x + d) + sqrt(d)))/d^(3/2) + 2
*e/(sqrt(e*x + d)*d))*log(c)/e + integrate(log(x)/(sqrt(e*x + d)*e*x^2 + sq
rt(e*x + d)*d*x), x) - integrate(log(sqrt(c^2*x^2 + 1) + 1)/(sqrt(e*x + d)*
e*x^2 + sqrt(e*x + d)*d*x), x)) + a*(log((sqrt(e*x + d) - sqrt(d))/(sqrt(e*
x + d) + sqrt(d)))/d^(3/2) + 2/(sqrt(e*x + d)*d))
```

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

$$\int \frac{a+b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)}{x\,{\left(d+e\,x\right)}^{3/2}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a + b*asinh(1/(c*x)))/(x*(d + e*x)^(3/2)),x)
[Out] int((a + b*asinh(1/(c*x)))/(x*(d + e*x)^(3/2)), x)
```

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

$$\int \frac{a+b\,\mathrm{acsch}\,(cx)}{x\,(d+ex)^{\frac{3}{2}}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*acsch(c*x))/x/(e*x+d)**(3/2),x)
[Out] Integral((a + b*acsch(c*x))/(x*(d + e*x)**(3/2)), x)
```

## 3.68 $\int \frac{a+b\text{csch}^{-1}(cx)}{x^2(d+ex)^{3/2}} \, dx$

**Optimal**. Leaf size=24

$$\text{Int}\left(\frac{a+b\text{csch}^{-1}(cx)}{x^2(d+ex)^{3/2}},x\right)$$

```
[Out] Unintegrable((a+b*arccsch(c*x))/x^2/(e*x+d)^(3/2),x)
```

**Rubi [A]** time = 0.10, 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 = {}

$$\int \frac{a+b\text{csch}^{-1}(cx)}{x^2(d+ex)^{3/2}} \, dx$$

Verification is Not applicable to the result.

```
[In] Int[(a + b*ArcCsch[c*x])/(x^2*(d + e*x)^(3/2)),x]
```

```
[Out] Defer[Int][(a + b*ArcCsch[c*x])/(x^2*(d + e*x)^(3/2)), x]
```

Rubi steps

$$\int \frac{a+b\text{csch}^{-1}(cx)}{x^2(d+ex)^{3/2}} \, dx = \int \frac{a+b\text{csch}^{-1}(cx)}{x^2(d+ex)^{3/2}} \, dx$$

**Mathematica [A]** time = 15.68, size = 0, normalized size = 0.00

$$\int \frac{a+b\text{csch}^{-1}(cx)}{x^2(d+ex)^{3/2}} \, dx$$

Verification is Not applicable to the result.

```
[In] Integrate[(a + b*ArcCsch[c*x])/(x^2*(d + e*x)^(3/2)),x]
```

```
[Out] Integrate[(a + b*ArcCsch[c*x])/(x^2*(d + e*x)^(3/2)), x]
```

**fricas [A]** time = 1.35, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{\sqrt{ex+d}\,(b\,\text{arcsch}\,(cx)+a)}{e^2x^4+2\,dex^3+d^2x^2},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

[In] integrate((a+b*arccsch(c*x))/x^2/(e*x+d)^(3/2),x, algorithm="fricas")

[Out] integral(sqrt(e*x + d)*(b*arccsch(c*x) + a)/(e^2*x^4 + 2*d*e*x^3 + d^2*x^2)
, x)

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

$$\int \frac{b \operatorname{arcsch}(cx) + a}{(ex+d)^{\frac{3}{2}} x^2} \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

[In] integrate((a+b*arccsch(c*x))/x^2/(e*x+d)^(3/2),x, algorithm="giac")

[Out] integrate((b*arccsch(c*x) + a)/((e*x + d)^(3/2)*x^2), x)

**maple [F(-2)]** time = 180.00, size = 0, normalized size = 0.00

$$\int \frac{a + b \operatorname{arccsch}(cx)}{x^2 (ex+d)^{\frac{3}{2}}} \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

[In] int((a+b*arccsch(c*x))/x^2/(e*x+d)^(3/2),x)

[Out] int((a+b*arccsch(c*x))/x^2/(e*x+d)^(3/2),x)

**maxima [A]** time = 0.00, size = 0, normalized size = 0.00

$$\frac{1}{2} b \left( \frac{\left( \frac{3 e^2 \log\left( \frac{\sqrt{ex+d} - \sqrt{d}}{\sqrt{ex+d} + \sqrt{d}} \right)}{d^{\frac{5}{2}}} + \frac{2 \left( 3 (ex+d) e^2 - 2 d e^2 \right)}{(ex+d)^{\frac{3}{2}} d^2 - \sqrt{ex+d}\, d^3} \right) \log(c)}{e} - 2 \int \frac{\log(x)}{\sqrt{ex+d}\, ex^3 + \sqrt{ex+d}\, dx^2} \, dx + 2 \int \frac{\log\left( \sqrt{c^2 x^2 + \right.}{\sqrt{ex+d}\, ex^3 + \sqrt{}}$$

Verification of antiderivative is not currently implemented for this CAS.

[In] integrate((a+b*arccsch(c*x))/x^2/(e*x+d)^(3/2),x, algorithm="maxima")

[Out] 1/2*b*((3*e^2*log((sqrt(e*x + d) - sqrt(d))/(sqrt(e*x + d) + sqrt(d)))/d^(5
/2) + 2*(3*(e*x + d)*e^2 - 2*d*e^2)/((e*x + d)^(3/2)*d^2 - sqrt(e*x + d)*d^
3))*log(c)/e - 2*integrate(log(x)/(sqrt(e*x + d)*e*x^3 + sqrt(e*x + d)*d*x^
2), x) + 2*integrate(log(sqrt(c^2*x^2 + 1) + 1)/(sqrt(e*x + d)*e*x^3 + sqrt
(e*x + d)*d*x^2), x)) - 1/2*a*(2*(3*(e*x + d)*e - 2*d*e)/((e*x + d)^(3/2)*d
^2 - sqrt(e*x + d)*d^3) + 3*e*log((sqrt(e*x + d) - sqrt(d))/(sqrt(e*x + d)
+ sqrt(d)))/d^(5/2))

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

$$\int \frac{a+b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)}{x^2\,{\left(d+e\,x\right)}^{3/2}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a + b*asinh(1/(c*x)))/(x^2*(d + e*x)^(3/2)),x)
[Out] int((a + b*asinh(1/(c*x)))/(x^2*(d + e*x)^(3/2)), x)
```

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

$$\int \frac{a+b\,\mathrm{acsch}\,(cx)}{x^2\,(d+ex)^{\frac{3}{2}}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*acsch(c*x))/x**2/(e*x+d)**(3/2),x)
[Out] Integral((a + b*acsch(c*x))/(x**2*(d + e*x)**(3/2)), x)
```

# 3.69 $\int \frac{x^3\left(a+b\,\mathrm{csch}^{-1}(cx)\right)}{(d+ex)^{5/2}}\,dx$

**Optimal**. Leaf size=777

$$\frac{2d^3\left(a+b\mathrm{csch}^{-1}(cx)\right)}{3e^4(d+ex)^{3/2}}-\frac{6d^2\left(a+b\mathrm{csch}^{-1}(cx)\right)}{e^4\sqrt{d+ex}}-\frac{6d\sqrt{d+ex}\left(a+b\mathrm{csch}^{-1}(cx)\right)}{e^4}+\frac{2(d+ex)^{3/2}\left(a+b\mathrm{csch}^{-1}(cx)\right)}{3e^4}+$$

```
[Out] 2/3*d^3*(a+b*arccsch(c*x))/e^4/(e*x+d)^(3/2)+2/3*(e*x+d)^(3/2)*(a+b*arccsch
(c*x))/e^4-6*d^2*(a+b*arccsch(c*x))/e^4/(e*x+d)^(1/2)+4/3*b*d^2*(c^2*x^2+1)
/c/e^2/(c^2*d^2+e^2)/x/(1+1/c^2/x^2)^(1/2)/(e*x+d)^(1/2)-6*d*(a+b*arccsch(c
*x))*(e*x+d)^(1/2)/e^4+64/3*b*d^2*EllipticPi(1/2*(1-(-c^2)^(1/2)*x)^(1/2)*2
^(1/2),2,2^(1/2)*(e/(d*(-c^2)^(1/2)+e))^(1/2))*(c^2*x^2+1)^(1/2)*((e*x+d)*(
-c^2)^(1/2)/(d*(-c^2)^(1/2)+e))^(1/2)/c/e^4/x/(1+1/c^2/x^2)^(1/2)/(e*x+d)^(
1/2)+4/3*b*c*(2*c^2*d^2+e^2)*EllipticE(1/2*(1-(-c^2)^(1/2)*x)^(1/2)*2^(1/2)
,(-2*e*(-c^2)^(1/2)/(c^2*d-e*(-c^2)^(1/2)))^(1/2))*(e*x+d)^(1/2)*(c^2*x^2+1
)^(1/2)/(-c^2)^(3/2)/e^3/(c^2*d^2+e^2)/x/(1+1/c^2/x^2)^(1/2)/(c^2*(e*x+d)/(
c^2*d-e*(-c^2)^(1/2)))^(1/2)-8/3*b*d^2*EllipticE(1/2*(1-(-c^2)^(1/2)*x)^(1/
2)*2^(1/2),(-2*e*(-c^2)^(1/2)/(c^2*d-e*(-c^2)^(1/2)))^(1/2))*(-c^2)^(1/2)*(
e*x+d)^(1/2)*(c^2*x^2+1)^(1/2)/c/e^3/(c^2*d^2+e^2)/x/(1+1/c^2/x^2)^(1/2)/(c
^2*(e*x+d)/(c^2*d-e*(-c^2)^(1/2)))^(1/2)-32/3*b*c*d*EllipticF(1/2*(1-(-c^2)
^(1/2)*x)^(1/2)*2^(1/2),(-2*e*(-c^2)^(1/2)/(c^2*d-e*(-c^2)^(1/2)))^(1/2))*(
c^2*x^2+1)^(1/2)*(c^2*(e*x+d)/(c^2*d-e*(-c^2)^(1/2)))^(1/2)/(-c^2)^(3/2)/e^
3/x/(1+1/c^2/x^2)^(1/2)/(e*x+d)^(1/2)
```

**Rubi [A]** time = 3.19, antiderivative size = 777, normalized size of antiderivative = 1.00, number of steps used = 31, number of rules used = 18, integrand size = 21, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.857, Rules used = {43, 6310, 12, 6721, 6742, 745, 21, 719, 424, 958, 932, 168, 538, 537, 835, 844, 419, 1651}

$$\frac{2d^3\left(a+b\mathrm{csch}^{-1}(cx)\right)}{3e^4(d+ex)^{3/2}}-\frac{6d^2\left(a+b\mathrm{csch}^{-1}(cx)\right)}{e^4\sqrt{d+ex}}-\frac{6d\sqrt{d+ex}\left(a+b\mathrm{csch}^{-1}(cx)\right)}{e^4}+\frac{2(d+ex)^{3/2}\left(a+b\mathrm{csch}^{-1}(cx)\right)}{3e^4}+$$

Antiderivative was successfully verified.

```
[In] Int[(x^3*(a + b*ArcCsch[c*x]))/(d + e*x)^(5/2),x]
```

```
[Out] (4*b*d^2*(1 + c^2*x^2))/(3*c*e^2*(c^2*d^2 + e^2)*Sqrt[1 + 1/(c^2*x^2)]*x*Sq
rt[d + e*x]) + (2*d^3*(a + b*ArcCsch[c*x]))/(3*e^4*(d + e*x)^(3/2)) - (6*d^
```

```
2*(a + b*ArcCsch[c*x]))/(e^4*Sqrt[d + e*x]) - (6*d*Sqrt[d + e*x]*(a + b*Arc
Csch[c*x]))/e^4 + (2*(d + e*x)^(3/2)*(a + b*ArcCsch[c*x]))/(3*e^4) - (8*b*S
qrt[-c^2]*d^2*Sqrt[d + e*x]*Sqrt[1 + c^2*x^2]*EllipticE[ArcSin[Sqrt[1 - Sqr
t[-c^2]*x]/Sqrt[2]], (-2*Sqrt[-c^2]*e)/(c^2*d - Sqrt[-c^2]*e)])/(3*c*e^3*(c
^2*d^2 + e^2)*Sqrt[1 + 1/(c^2*x^2)]*x*Sqrt[(c^2*(d + e*x))/(c^2*d - Sqrt[-c
^2]*e)]) + (4*b*c*(2*c^2*d^2 + e^2)*Sqrt[d + e*x]*Sqrt[1 + c^2*x^2]*Ellipti
cE[ArcSin[Sqrt[1 - Sqrt[-c^2]*x]/Sqrt[2]], (-2*Sqrt[-c^2]*e)/(c^2*d - Sqrt[
-c^2]*e)])/(3*(-c^2)^(3/2)*e^3*(c^2*d^2 + e^2)*Sqrt[1 + 1/(c^2*x^2)]*x*Sqrt
[(c^2*(d + e*x))/(c^2*d - Sqrt[-c^2]*e)]) - (32*b*c*d*Sqrt[(c^2*(d + e*x))/
(c^2*d - Sqrt[-c^2]*e)]*Sqrt[1 + c^2*x^2]*EllipticF[ArcSin[Sqrt[1 - Sqrt[-c
^2]*x]/Sqrt[2]], (-2*Sqrt[-c^2]*e)/(c^2*d - Sqrt[-c^2]*e)])/(3*(-c^2)^(3/2)
*e^3*Sqrt[1 + 1/(c^2*x^2)]*x*Sqrt[d + e*x]) + (64*b*d^2*Sqrt[(Sqrt[-c^2]*(d
 + e*x))/(Sqrt[-c^2]*d + e)]*Sqrt[1 + c^2*x^2]*EllipticPi[2, ArcSin[Sqrt[1
- Sqrt[-c^2]*x]/Sqrt[2]], (2*e)/(Sqrt[-c^2]*d + e)])/(3*c*e^4*Sqrt[1 + 1/(c
^2*x^2)]*x*Sqrt[d + e*x])
```

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 21

```
Int[(u_.)*((a_) + (b_.)*(v_))^(m_.)*((c_) + (d_.)*(v_))^(n_.), x_Symbol] :>
 Dist[(b/d)^m, Int[u*(c + d*v)^(m + n), x], x] /; FreeQ[{a, b, c, d, n}, x]
 && EqQ[b*c - a*d, 0] && IntegerQ[m] && ( !IntegerQ[n] || SimplerQ[c + d*x,
 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 168

```
Int[1/(((a_.) + (b_.)*(x_))*Sqrt[(c_.) + (d_.)*(x_)]*Sqrt[(e_.) + (f_.)*(x_
)]*Sqrt[(g_.) + (h_.)*(x_)]), x_Symbol] :> Dist[-2, Subst[Int[1/(Simp[b*c -
 a*d - b*x^2, x]*Sqrt[Simp[(d*e - c*f)/d + (f*x^2)/d, x]]*Sqrt[Simp[(d*g -
c*h)/d + (h*x^2)/d, x]]), x], x, Sqrt[c + d*x]], x] /; FreeQ[{a, b, c, d, e
, f, g, h}, x] && GtQ[(d*e - c*f)/d, 0]
```

Rule 419

```
Int[1/(Sqrt[(a_) + (b_.)*(x_)^2]*Sqrt[(c_) + (d_.)*(x_)^2]), x_Symbol] :> S
```

```
imp[(1*EllipticF[ArcSin[Rt[-(d/c), 2]*x], (b*c)/(a*d)])/(Sqrt[a]*Sqrt[c]*Rt
[-(d/c), 2]), x] /; FreeQ[{a, b, c, d}, x] && NegQ[d/c] && GtQ[c, 0] && GtQ
[a, 0] &&  !(NegQ[b/a] && SimplerSqrtQ[-(b/a), -(d/c)])
```

Rule 424

```
Int[Sqrt[(a_) + (b_.)*(x_)^2]/Sqrt[(c_) + (d_.)*(x_)^2], x_Symbol] :> Simp[
(Sqrt[a]*EllipticE[ArcSin[Rt[-(d/c), 2]*x], (b*c)/(a*d)])/(Sqrt[c]*Rt[-(d/c
), 2]), x] /; FreeQ[{a, b, c, d}, x] && NegQ[d/c] && GtQ[c, 0] && GtQ[a, 0]
```

Rule 537

```
Int[1/(((a_) + (b_.)*(x_)^2)*Sqrt[(c_) + (d_.)*(x_)^2]*Sqrt[(e_) + (f_.)*(x
_)^2]), x_Symbol] :> Simp[(1*EllipticPi[(b*c)/(a*d), ArcSin[Rt[-(d/c), 2]*x
], (c*f)/(d*e)])/(a*Sqrt[c]*Sqrt[e]*Rt[-(d/c), 2]), x] /; FreeQ[{a, b, c, d
, e, f}, x] &&  !GtQ[d/c, 0] && GtQ[c, 0] && GtQ[e, 0] &&  !( !GtQ[f/e, 0]
&& SimplerSqrtQ[-(f/e), -(d/c)])
```

Rule 538

```
Int[1/(((a_) + (b_.)*(x_)^2)*Sqrt[(c_) + (d_.)*(x_)^2]*Sqrt[(e_) + (f_.)*(x
_)^2]), x_Symbol] :> Dist[Sqrt[1 + (d*x^2)/c]/Sqrt[c + d*x^2], Int[1/((a +
b*x^2)*Sqrt[1 + (d*x^2)/c]*Sqrt[e + f*x^2]), x], x] /; FreeQ[{a, b, c, d, e
, f}, x] &&  !GtQ[c, 0]
```

Rule 719

```
Int[((d_) + (e_.)*(x_))^(m_)/Sqrt[(a_) + (c_.)*(x_)^2], x_Symbol] :> Dist[(
2*a*Rt[-(c/a), 2]*(d + e*x)^m*Sqrt[1 + (c*x^2)/a])/(c*Sqrt[a + c*x^2]*((c*(
d + e*x))/(c*d - a*e*Rt[-(c/a), 2]))^m), Subst[Int[(1 + (2*a*e*Rt[-(c/a), 2
]*x^2)/(c*d - a*e*Rt[-(c/a), 2]))^m/Sqrt[1 - x^2], x], x, Sqrt[(1 - Rt[-(c/
a), 2]*x)/2]], x] /; FreeQ[{a, c, d, e}, x] && NeQ[c*d^2 + a*e^2, 0] && EqQ
[m^2, 1/4]
```

Rule 745

```
Int[((d_) + (e_.)*(x_))^(m_)*((a_) + (c_.)*(x_)^2)^(p_), x_Symbol] :> Simp[
(e*(d + e*x)^(m + 1)*(a + c*x^2)^(p + 1))/((m + 1)*(c*d^2 + a*e^2)), x] + D
ist[c/((m + 1)*(c*d^2 + a*e^2)), Int[(d + e*x)^(m + 1)*Simp[d*(m + 1) - e*(
m + 2*p + 3)*x, x]*(a + c*x^2)^p, x], x] /; FreeQ[{a, c, d, e, m, p}, x] &&
 NeQ[c*d^2 + a*e^2, 0] && NeQ[m, -1] && ((LtQ[m, -1] && IntQuadraticQ[a, 0,
 c, d, e, m, p, x]) || (SumSimplerQ[m, 1] && IntegerQ[p]) || ILtQ[Simplify[
m + 2*p + 3], 0])
```

Rule 835

```
Int[((d_.) + (e_.)*(x_))^(m_)*((f_.) + (g_.)*(x_))*((a_) + (c_.)*(x_)^2)^(p
_.), x_Symbol] :> Simp[((e*f - d*g)*(d + e*x)^(m + 1)*(a + c*x^2)^(p + 1))/
((m + 1)*(c*d^2 + a*e^2)), x] + Dist[1/((m + 1)*(c*d^2 + a*e^2)), Int[(d +
e*x)^(m + 1)*(a + c*x^2)^p*Simp[(c*d*f + a*e*g)*(m + 1) - c*(e*f - d*g)*(m
+ 2*p + 3)*x, x], x], x] /; FreeQ[{a, c, d, e, f, g, p}, x] && NeQ[c*d^2 +
a*e^2, 0] && LtQ[m, -1] && (IntegerQ[m] || IntegerQ[p] || IntegersQ[2*m, 2*
p])
```

Rule 844

```
Int[((d_.) + (e_.)*(x_))^(m_)*((f_.) + (g_.)*(x_))*((a_) + (c_.)*(x_)^2)^(p
_.), x_Symbol] :> Dist[g/e, Int[(d + e*x)^(m + 1)*(a + c*x^2)^p, x], x] + D
ist[(e*f - d*g)/e, Int[(d + e*x)^m*(a + c*x^2)^p, x], x] /; FreeQ[{a, c, d,
 e, f, g, m, p}, x] && NeQ[c*d^2 + a*e^2, 0] &&  !IGtQ[m, 0]
```

Rule 932

```
Int[1/(((d_.) + (e_.)*(x_))*Sqrt[(f_.) + (g_.)*(x_)]*Sqrt[(a_) + (c_.)*(x_)
^2]), x_Symbol] :> With[{q = Rt[-(c/a), 2]}, Dist[1/Sqrt[a], Int[1/((d + e*
x)*Sqrt[f + g*x]*Sqrt[1 - q*x]*Sqrt[1 + q*x]), x], x]] /; FreeQ[{a, c, d, e
, f, g}, x] && NeQ[e*f - d*g, 0] && NeQ[c*d^2 + a*e^2, 0] && GtQ[a, 0]
```

Rule 958

```
Int[((f_.) + (g_.)*(x_))^(n_)/(((d_.) + (e_.)*(x_))*Sqrt[(a_) + (c_.)*(x_)^
2]), x_Symbol] :> Int[ExpandIntegrand[1/(Sqrt[f + g*x]*Sqrt[a + c*x^2]), (f
 + g*x)^(n + 1/2)/(d + e*x), x], x] /; FreeQ[{a, c, d, e, f, g}, x] && NeQ[
e*f - d*g, 0] && NeQ[c*d^2 + a*e^2, 0] && IntegerQ[n + 1/2]
```

Rule 1651

```
Int[(Pq_)*((d_) + (e_.)*(x_))^(m_)*((a_) + (c_.)*(x_)^2)^(p_), x_Symbol] :>
 With[{Q = PolynomialQuotient[Pq, d + e*x, x], R = PolynomialRemainder[Pq,
d + e*x, x]}, Simp[(e*R*(d + e*x)^(m + 1)*(a + c*x^2)^(p + 1))/((m + 1)*(c*
d^2 + a*e^2)), x] + Dist[1/((m + 1)*(c*d^2 + a*e^2)), Int[(d + e*x)^(m + 1)
*(a + c*x^2)^p*ExpandToSum[(m + 1)*(c*d^2 + a*e^2)*Q + c*d*R*(m + 1) - c*e*
R*(m + 2*p + 3)*x, x], x], x]] /; FreeQ[{a, c, d, e, p}, x] && PolyQ[Pq, x]
 && NeQ[c*d^2 + a*e^2, 0] && LtQ[m, -1]
```

Rule 6310

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))*(u_), x_Symbol] :> With[{v = IntHid
e[u, x]}, Dist[a + b*ArcCsch[c*x], v, x] + Dist[b/c, Int[SimplifyIntegrand[
```

```
v/(x^2*Sqrt[1 + 1/(c^2*x^2)]), x], x], x] /; InverseFunctionFreeQ[v, x]] /;
 FreeQ[{a, b, c}, x]
```

Rule 6721

```
Int[(u_.)*((a_.) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Dist[(b^IntPart[p]*(
a + b*x^n)^FracPart[p])/(x^(n*FracPart[p])*(1 + a/(x^n*b))^FracPart[p]), In
t[u*x^(n*p)*(1 + a/(x^n*b))^p, x], x] /; FreeQ[{a, b, p}, x] &&  !IntegerQ[
p] && ILtQ[n, 0] &&  !RationalFunctionQ[u, x] && IntegerQ[p + 1/2]
```

Rule 6742

```
Int[u_, x_Symbol] :> With[{v = ExpandIntegrand[u, x]}, Int[v, x] /; SumQ[v]
]
```

Rubi steps

$$\int \frac{x^3\left(a+b\operatorname{csch}^{-1}(cx)\right)}{(d+ex)^{5/2}}\,dx = \frac{2d^3\left(a+b\operatorname{csch}^{-1}(cx)\right)}{3e^4(d+ex)^{3/2}} - \frac{6d^2\left(a+b\operatorname{csch}^{-1}(cx)\right)}{e^4\sqrt{d+ex}} - \frac{6d\sqrt{d+ex}\left(a+b\operatorname{csch}^{-1}(cx)\right)}{e^4} + \cdots$$

$$= \frac{2d^3\left(a+b\operatorname{csch}^{-1}(cx)\right)}{3e^4(d+ex)^{3/2}} - \frac{6d^2\left(a+b\operatorname{csch}^{-1}(cx)\right)}{e^4\sqrt{d+ex}} - \frac{6d\sqrt{d+ex}\left(a+b\operatorname{csch}^{-1}(cx)\right)}{e^4} + \cdots$$

$$= \frac{2d^3\left(a+b\operatorname{csch}^{-1}(cx)\right)}{3e^4(d+ex)^{3/2}} - \frac{6d^2\left(a+b\operatorname{csch}^{-1}(cx)\right)}{e^4\sqrt{d+ex}} - \frac{6d\sqrt{d+ex}\left(a+b\operatorname{csch}^{-1}(cx)\right)}{e^4} + \cdots$$

$$= \frac{2d^3\left(a+b\operatorname{csch}^{-1}(cx)\right)}{3e^4(d+ex)^{3/2}} - \frac{6d^2\left(a+b\operatorname{csch}^{-1}(cx)\right)}{e^4\sqrt{d+ex}} - \frac{6d\sqrt{d+ex}\left(a+b\operatorname{csch}^{-1}(cx)\right)}{e^4} + \cdots$$

$$= \frac{2d^3\left(a+b\operatorname{csch}^{-1}(cx)\right)}{3e^4(d+ex)^{3/2}} - \frac{6d^2\left(a+b\operatorname{csch}^{-1}(cx)\right)}{e^4\sqrt{d+ex}} - \frac{6d\sqrt{d+ex}\left(a+b\operatorname{csch}^{-1}(cx)\right)}{e^4} + \cdots$$

$$= \frac{68bd^2\left(1+c^2x^2\right)}{3ce^2\left(c^2d^2+e^2\right)\sqrt{1+\frac{1}{c^2x^2}}\,x\sqrt{d+ex}} + \frac{2d^3\left(a+b\operatorname{csch}^{-1}(cx)\right)}{3e^4(d+ex)^{3/2}} - \frac{6d^2\left(a+b\operatorname{csch}^{-1}(c\cdots\right.}{e^4\sqrt{d+ex}}$$

$$= \frac{68bd^2\left(1+c^2x^2\right)}{3ce^2\left(c^2d^2+e^2\right)\sqrt{1+\frac{1}{c^2x^2}}\,x\sqrt{d+ex}} + \frac{2d^3\left(a+b\operatorname{csch}^{-1}(cx)\right)}{3e^4(d+ex)^{3/2}} - \frac{6d^2\left(a+b\operatorname{csch}^{-1}(c\cdots\right.}{e^4\sqrt{d+ex}}$$

$$= \frac{4bd^2\left(1+c^2x^2\right)}{3ce^2\left(c^2d^2+e^2\right)\sqrt{1+\frac{1}{c^2x^2}}\,x\sqrt{d+ex}} + \frac{2d^3\left(a+b\operatorname{csch}^{-1}(cx)\right)}{3e^4(d+ex)^{3/2}} - \frac{6d^2\left(a+b\operatorname{csch}^{-1}(c\cdots\right.}{e^4\sqrt{d+ex}}$$

$$= \frac{4bd^2\left(1+c^2x^2\right)}{3ce^2\left(c^2d^2+e^2\right)\sqrt{1+\frac{1}{c^2x^2}}\,x\sqrt{d+ex}} + \frac{2d^3\left(a+b\operatorname{csch}^{-1}(cx)\right)}{3e^4(d+ex)^{3/2}} - \frac{6d^2\left(a+b\operatorname{csch}^{-1}(c\cdots\right.}{e^4\sqrt{d+ex}}$$

$$= \frac{4bd^2\left(1+c^2x^2\right)}{3ce^2\left(c^2d^2+e^2\right)\sqrt{1+\frac{1}{c^2x^2}}\,x\sqrt{d+ex}} + \frac{2d^3\left(a+b\operatorname{csch}^{-1}(cx)\right)}{3e^4(d+ex)^{3/2}} - \frac{6d^2\left(a+b\operatorname{csch}^{-1}(c\cdots\right.}{e^4\sqrt{d+ex}}$$

**Mathematica [C]** time = 14.49, size = 1108, normalized size = 1.43

$$\frac{a\left(\frac{ex}{d}+1\right)^{5/2}B_{-\frac{ex}{d}}\left(4,-\frac{3}{2}\right)d^4}{e^4(d+ex)^{5/2}}+\frac{b\left(\frac{2\left(\frac{d}{x}+e\right)^{5/2}(cx)^{5/2}\left(\frac{2\cosh\left(2\operatorname{csch}^{-1}(cx)\right)\left(\frac{cx\left(cd\sqrt{2icx+2}\,(cx+i)\sqrt{\frac{cd+cex}{cd-ie}}\,F\left(\sin^{-1}\left(\sqrt{-\frac{e(cx+i)}{cd-ie}}\right)\middle|\frac{icd+e}{2e}\right)+2\sqrt{-\frac{e(cx-i)}{cd+ie}}\,(cx+i\cdots\right.}{\cdots}\right.}{\cdots}\right.}{\cdots}\right.}{\cdots}$$

Antiderivative was successfully verified.

```
[In] Integrate[(x^3*(a + b*ArcCsch[c*x]))/(d + e*x)^(5/2),x]
```

```
[Out] (a*d^4*(1 + (e*x)/d)^(5/2)*Beta[-((e*x)/d), 4, -3/2])/(e^4*(d + e*x)^(5/2))
 + (b*(-((c^3*(e + d/x)^3*x^3*((-4*Sqrt[1 + 1/(c^2*x^2)])/(3*e*(c^2*d^2 + e
^2)) + (32*c*d*ArcCsch[c*x])/(3*e^4) - (2*c*d*ArcCsch[c*x])/(3*e^2*(e + d/x
)^2) - (2*c*x*ArcCsch[c*x])/(3*e^3) - (2*(2*c^2*d^2*e*Sqrt[1 + 1/(c^2*x^2)]
 + 7*c^3*d^3*ArcCsch[c*x] + 7*c*d*e^2*ArcCsch[c*x]))/(3*e^3*(c^2*d^2 + e^2)
*(e + d/x))))/(d + e*x)^(5/2)) + (2*(e + d/x)^(5/2)*(c*x)^(5/2)*(-((Sqrt[2]
*(8*c^3*d^3*e + 8*c*d*e^3)*Sqrt[1 + I*c*x]*(I + c*x)*Sqrt[(c*d + c*e*x)/(c*
d - I*e)]*EllipticF[ArcSin[Sqrt[-((e*(I + c*x))/(c*d - I*e))]], (I*c*d + e)
/(2*e)])/(Sqrt[1 + 1/(c^2*x^2)]*Sqrt[e + d/x]*(c*x)^(3/2)*Sqrt[(e*(1 - I*c*
x))/(I*c*d + e)])) + (I*Sqrt[2]*(c*d - I*e)*(16*c^4*d^4 + 16*c^2*d^2*e^2 -
e^4)*Sqrt[1 + I*c*x]*Sqrt[(e*(I + c*x)*(c*d + c*e*x))/(I*c*d + e)^2]*Ellipt
icPi[1 + (I*c*d)/e, ArcSin[Sqrt[-((e*(I + c*x))/(c*d - I*e))]], (I*c*d + e)
/(2*e)])/(e*Sqrt[1 + 1/(c^2*x^2)]*Sqrt[e + d/x]*(c*x)^(3/2)) + (2*e^3*Cosh[
2*ArcCsch[c*x]]*(-((c*d + c*e*x)*(1 + c^2*x^2)) + (c*x*(c*d*Sqrt[2 + (2*I)*
c*x]*(I + c*x)*Sqrt[(c*d + c*e*x)/(c*d - I*e)]*EllipticF[ArcSin[Sqrt[-((e*(
I + c*x))/(c*d - I*e))]], (I*c*d + e)/(2*e)] + 2*Sqrt[-((e*(-I + c*x))/(c*d
 + I*e))]*(I + c*x)*Sqrt[(c*d + c*e*x)/(c*d - I*e)]*((c*d + I*e)*EllipticE[
ArcSin[Sqrt[(c*d + c*e*x)/(c*d - I*e)]], (c*d - I*e)/(c*d + I*e)] - I*e*Ell
ipticF[ArcSin[Sqrt[(c*d + c*e*x)/(c*d - I*e)]], (c*d - I*e)/(c*d + I*e)]) +
 (I*c*d + e)*Sqrt[2 + (2*I)*c*x]*Sqrt[-((e*(I + c*x))/(c*d - I*e))]*Sqrt[(e
*(I + c*x)*(c*d + c*e*x))/(I*c*d + e)^2]*EllipticPi[1 + (I*c*d)/e, ArcSin[S
qrt[-((e*(I + c*x))/(c*d - I*e))]], (I*c*d + e)/(2*e)]))/(2*Sqrt[-((e*(I +
c*x))/(c*d - I*e))])))/(Sqrt[1 + 1/(c^2*x^2)]*Sqrt[e + d/x]*Sqrt[c*x]*(2 +
c^2*x^2))))/(3*e^4*(c^2*d^2 + e^2)*(d + e*x)^(5/2))))/c^4
```

**fricas** [F] time = 16.42, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{\left(bx^3\,\text{arcsch}\,(cx)+ax^3\right)\sqrt{ex+d}}{e^3x^3+3\,de^2x^2+3\,d^2ex+d^3},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^3*(a+b*arccsch(c*x))/(e*x+d)^(5/2),x, algorithm="fricas")
```

```
[Out] integral((b*x^3*arccsch(c*x) + a*x^3)*sqrt(e*x + d)/(e^3*x^3 + 3*d*e^2*x^2
+ 3*d^2*e*x + d^3), x)
```

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

$$\int\frac{(b\,\text{arcsch}\,(cx)+a)x^3}{(ex+d)^{\frac{5}{2}}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^3*(a+b*arccsch(c*x))/(e*x+d)^(5/2),x, algorithm="giac")
```

```
[Out] integrate((b*arccsch(c*x) + a)*x^3/(e*x + d)^(5/2), x)
```

**maple** [C] time = 0.09, size = 2726, normalized size = 3.51

result too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^3*(a+b*arccsch(c*x))/(e*x+d)^(5/2),x)
```

```
[Out] 2/e^4*(a*(1/3*(e*x+d)^(3/2)-3*d*(e*x+d)^(1/2)-3*d^2/(e*x+d)^(1/2)+1/3*d^3/(
e*x+d)^(3/2))+b*(1/3*(e*x+d)^(3/2)*arccsch(c*x)-3*arccsch(c*x)*d*(e*x+d)^(1
/2)-3*arccsch(c*x)*d^2/(e*x+d)^(1/2)+1/3*arccsch(c*x)*d^3/(e*x+d)^(3/2)+2/3
/c^2*(-2*I*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2)*(e*x+d)*c^3*d^3*e-((I*e+c*d)*c
/(c^2*d^2+e^2))^(1/2)*(e*x+d)^2*c^4*d^3+I*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2)
*c*d^2*e^3+8*(-(I*(e*x+d)*c*e+(e*x+d)*c^2*d-c^2*d^2-e^2)/(c^2*d^2+e^2))^(1/
2)*((I*(e*x+d)*c*e-(e*x+d)*c^2*d+c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2)*Elliptic
F((e*x+d)^(1/2)*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2),(-(2*I*c*d*e-c^2*d^2+e^2)
/(c^2*d^2+e^2))^(1/2))*(e*x+d)^(1/2)*c^4*d^4+16*I*(-(I*(e*x+d)*c*e+(e*x+d)*
c^2*d-c^2*d^2-e^2)/(c^2*d^2+e^2))^(1/2)*((I*(e*x+d)*c*e-(e*x+d)*c^2*d+c^2*d
^2+e^2)/(c^2*d^2+e^2))^(1/2)*EllipticPi((e*x+d)^(1/2)*((I*e+c*d)*c/(c^2*d^2
+e^2))^(1/2),1/(I*e+c*d)/c*(c^2*d^2+e^2)/d,(-(I*e-c*d)*c/(c^2*d^2+e^2))^(1/
2)/((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2))*(e*x+d)^(1/2)*c*d*e^3-16*(-(I*(e*x+d)
*c*e+(e*x+d)*c^2*d-c^2*d^2-e^2)/(c^2*d^2+e^2))^(1/2)*((I*(e*x+d)*c*e-(e*x+d
```

```
)*c^2*d+c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2)*EllipticPi((e*x+d)^(1/2)*((I*e+c*
d)*c/(c^2*d^2+e^2))^(1/2),1/(I*e+c*d)/c*(c^2*d^2+e^2)/d,(-(I*e-c*d)*c/(c^2*
d^2+e^2))^(1/2)/((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2))*(e*x+d)^(1/2)*c^4*d^4-8*
I*(-(I*(e*x+d)*c*e+(e*x+d)*c^2*d-c^2*d^2-e^2)/(c^2*d^2+e^2))^(1/2)*((I*(e*x
+d)*c*e-(e*x+d)*c^2*d+c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2)*EllipticF((e*x+d)^(
1/2)*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2),(-(2*I*c*d*e-c^2*d^2+e^2)/(c^2*d^2+e
^2))^(1/2))*(e*x+d)^(1/2)*c^3*d^3*e+2*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2)*(e*
x+d)*c^4*d^4+I*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2)*(e*x+d)^2*c^3*d^2*e-((I*e+
c*d)*c/(c^2*d^2+e^2))^(1/2)*c^4*d^5+16*I*(-(I*(e*x+d)*c*e+(e*x+d)*c^2*d-c^2
*d^2-e^2)/(c^2*d^2+e^2))^(1/2)*((I*(e*x+d)*c*e-(e*x+d)*c^2*d+c^2*d^2+e^2)/(
c^2*d^2+e^2))^(1/2)*EllipticPi((e*x+d)^(1/2)*((I*e+c*d)*c/(c^2*d^2+e^2))^(1
/2),1/(I*e+c*d)/c*(c^2*d^2+e^2)/d,(-(I*e-c*d)*c/(c^2*d^2+e^2))^(1/2)/((I*e+
c*d)*c/(c^2*d^2+e^2))^(1/2))*(e*x+d)^(1/2)*c^3*d^3*e+7*(-(I*(e*x+d)*c*e+(e*
x+d)*c^2*d-c^2*d^2-e^2)/(c^2*d^2+e^2))^(1/2)*((I*(e*x+d)*c*e-(e*x+d)*c^2*d+
c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2)*EllipticF((e*x+d)^(1/2)*((I*e+c*d)*c/(c^2
*d^2+e^2))^(1/2),(-(2*I*c*d*e-c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2))*(e*x+d)^(1
/2)*c^2*d^2*e^2+(-(I*(e*x+d)*c*e+(e*x+d)*c^2*d-c^2*d^2-e^2)/(c^2*d^2+e^2))^
(1/2)*((I*(e*x+d)*c*e-(e*x+d)*c^2*d+c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2)*Ellip
ticE((e*x+d)^(1/2)*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2),(-(2*I*c*d*e-c^2*d^2+e
^2)/(c^2*d^2+e^2))^(1/2))*(e*x+d)^(1/2)*c^2*d^2*e^2-8*I*(-(I*(e*x+d)*c*e+(e
*x+d)*c^2*d-c^2*d^2-e^2)/(c^2*d^2+e^2))^(1/2)*((I*(e*x+d)*c*e-(e*x+d)*c^2*d
+c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2)*EllipticF((e*x+d)^(1/2)*((I*e+c*d)*c/(c^
2*d^2+e^2))^(1/2),(-(2*I*c*d*e-c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2))*(e*x+d)^(
1/2)*c*d*e^3-16*(-(I*(e*x+d)*c*e+(e*x+d)*c^2*d-c^2*d^2-e^2)/(c^2*d^2+e^2))^
(1/2)*((I*(e*x+d)*c*e-(e*x+d)*c^2*d+c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2)*Ellip
ticPi((e*x+d)^(1/2)*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2),1/(I*e+c*d)/c*(c^2*d^
2+e^2)/d,(-(I*e-c*d)*c/(c^2*d^2+e^2))^(1/2)/((I*e+c*d)*c/(c^2*d^2+e^2))^(1/
2))*(e*x+d)^(1/2)*c^2*d^2*e^2+I*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2)*c^3*d^4*e
-((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2)*c^2*d^3*e^2-(-(I*(e*x+d)*c*e+(e*x+d)*c^2
*d-c^2*d^2-e^2)/(c^2*d^2+e^2))^(1/2)*((I*(e*x+d)*c*e-(e*x+d)*c^2*d+c^2*d^2+
e^2)/(c^2*d^2+e^2))^(1/2)*EllipticF((e*x+d)^(1/2)*((I*e+c*d)*c/(c^2*d^2+e^2
))^(1/2),(-(2*I*c*d*e-c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2))*(e*x+d)^(1/2)*e^4+
(-(I*(e*x+d)*c*e+(e*x+d)*c^2*d-c^2*d^2-e^2)/(c^2*d^2+e^2))^(1/2)*((I*(e*x+d
)*c*e-(e*x+d)*c^2*d+c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2)*EllipticE((e*x+d)^(1/
2)*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2),(-(2*I*c*d*e-c^2*d^2+e^2)/(c^2*d^2+e^2
))^(1/2))*(e*x+d)^(1/2)*e^4)/(((e*x+d)^2*c^2-2*(e*x+d)*c^2*d+c^2*d^2+e^2)/c
^2/x^2/e^2)^(1/2)/x/(c^2*d^2+e^2)/(e*x+d)^(1/2)/((I*e+c*d)*c/(c^2*d^2+e^2))
^(1/2)/(I*e-c*d)))
```

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

$$\frac{1}{3}b\left(\frac{2\left(e^{3}x^{3}-6\,de^{2}x^{2}-24\,d^{2}ex-16\,d^{3}\right)\log\left(\sqrt{c^{2}x^{2}+1}+1\right)}{\left(e^{5}x+de^{4}\right)\sqrt{ex+d}}+3\int\frac{2\left(c^{2}e^{3}x^{4}-6\,c^{2}de\right.}{3\left(\left(c^{2}e^{5}x^{3}+c^{2}de^{4}x^{2}+e^{5}x+de^{4}\right)\sqrt{c^{2}x^{2}+\right.}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^3*(a+b*arccsch(c*x))/(e*x+d)^(5/2),x, algorithm="maxima")
```

```
[Out] 1/3*b*(2*(e^3*x^3 - 6*d*e^2*x^2 - 24*d^2*e*x - 16*d^3)*log(sqrt(c^2*x^2 + 1
) + 1)/((e^5*x + d*e^4)*sqrt(e*x + d)) + 3*integrate(2/3*(c^2*e^3*x^4 - 6*c
^2*d*e^2*x^3 - 24*c^2*d^2*e*x^2 - 16*c^2*d^3*x)/((c^2*e^5*x^3 + c^2*d*e^4*x
^2 + e^5*x + d*e^4)*sqrt(c^2*x^2 + 1)*sqrt(e*x + d) + (c^2*e^5*x^3 + c^2*d*
e^4*x^2 + e^5*x + d*e^4)*sqrt(e*x + d)), x) - 3*integrate(-1/3*(10*c^2*d*e^
3*x^4 + 80*c^2*d^3*e*x^2 - (3*e^4*log(c) + 2*e^4)*c^2*x^5 + 32*c^2*d^4*x +
3*(20*c^2*d^2*e^2 - e^4*log(c))*x^3 - 3*(c^2*e^4*x^5 + e^4*x^3)*log(x))/((c
^2*e^6*x^4 + 2*c^2*d*e^5*x^3 + 2*d*e^5*x + d^2*e^4 + (c^2*d^2*e^4 + e^6)*x^
2)*sqrt(e*x + d)), x)) + 2/3*a*((e*x + d)^(3/2)/e^4 - 9*sqrt(e*x + d)*d/e^4
 - 9*d^2/(sqrt(e*x + d)*e^4) + d^3/((e*x + d)^(3/2)*e^4))
```

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

$$\int \frac{x^3\,\left(a+b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)\right)}{{\left(d+e\,x\right)}^{5/2}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((x^3*(a + b*asinh(1/(c*x))))/(d + e*x)^(5/2),x)
```

```
[Out] int((x^3*(a + b*asinh(1/(c*x))))/(d + e*x)^(5/2), x)
```

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

$$\int \frac{x^{3} \left(a + b \operatorname{acsch}{\left(c x \right)}\right)}{\left(d + e x\right)^{\frac{5}{2}}}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**3*(a+b*acsch(c*x))/(e*x+d)**(5/2),x)
```

```
[Out] Integral(x**3*(a + b*acsch(c*x))/(d + e*x)**(5/2), x)
```

## 3.70 $\int \frac{x^2\left(a+b\,\mathrm{csch}^{-1}(cx)\right)}{(d+ex)^{5/2}}\,dx$

**Optimal**. Leaf size=569

$$-\frac{2d^2\left(a+b\,\mathrm{csch}^{-1}(cx)\right)}{3e^3(d+ex)^{3/2}}+\frac{4d\left(a+b\,\mathrm{csch}^{-1}(cx)\right)}{e^3\sqrt{d+ex}}+\frac{2\sqrt{d+ex}\left(a+b\,\mathrm{csch}^{-1}(cx)\right)}{e^3}-\frac{4bd\left(c^2x^2+1\right)}{3cex\sqrt{\frac{1}{c^2x^2}+1}\left(c^2d^2+e^2\right)\sqrt{d+}}$$

```
[Out] -2/3*d^2*(a+b*arccsch(c*x))/e^3/(e*x+d)^(3/2)+4*d*(a+b*arccsch(c*x))/e^3/(e
*x+d)^(1/2)-4/3*b*d*(c^2*x^2+1)/c/e/(c^2*d^2+e^2)/x/(1+1/c^2/x^2)^(1/2)/(e*
x+d)^(1/2)+2*(a+b*arccsch(c*x))*(e*x+d)^(1/2)/e^3-32/3*b*d*EllipticPi(1/2*(
1-(-c^2)^(1/2)*x)^(1/2)*2^(1/2),2,2^(1/2)*(e/(d*(-c^2)^(1/2)+e))^(1/2))*(c^
2*x^2+1)^(1/2)*((e*x+d)*(-c^2)^(1/2)/(d*(-c^2)^(1/2)+e))^(1/2)/c/e^3/x/(1+1
/c^2/x^2)^(1/2)/(e*x+d)^(1/2)+4/3*b*d*EllipticE(1/2*(1-(-c^2)^(1/2)*x)^(1/2
)*2^(1/2),(-2*e*(-c^2)^(1/2)/(c^2*d-e*(-c^2)^(1/2)))^(1/2))*(-c^2)^(1/2)*(e
*x+d)^(1/2)*(c^2*x^2+1)^(1/2)/c/e^2/(c^2*d^2+e^2)/x/(1+1/c^2/x^2)^(1/2)/(c^
2*(e*x+d)/(c^2*d-e*(-c^2)^(1/2)))^(1/2)+4*b*c*EllipticF(1/2*(1-(-c^2)^(1/2)
*x)^(1/2)*2^(1/2),(-2*e*(-c^2)^(1/2)/(c^2*d-e*(-c^2)^(1/2)))^(1/2))*(c^2*x^
2+1)^(1/2)*(c^2*(e*x+d)/(c^2*d-e*(-c^2)^(1/2)))^(1/2)/(-c^2)^(3/2)/e^2/x/(1
+1/c^2/x^2)^(1/2)/(e*x+d)^(1/2)
```

**Rubi [A]** time = 2.50, antiderivative size = 569, normalized size of antiderivative = 1.00, number of steps used = 25, number of rules used = 17, integrand size = 21, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.810, Rules used = {43, 6310, 12, 6721, 6742, 745, 21, 719, 424, 958, 932, 168, 538, 537, 835, 844, 419}

$$-\frac{2d^2\left(a+b\,\mathrm{csch}^{-1}(cx)\right)}{3e^3(d+ex)^{3/2}}+\frac{4d\left(a+b\,\mathrm{csch}^{-1}(cx)\right)}{e^3\sqrt{d+ex}}+\frac{2\sqrt{d+ex}\left(a+b\,\mathrm{csch}^{-1}(cx)\right)}{e^3}-\frac{4bd\left(c^2x^2+1\right)}{3cex\sqrt{\frac{1}{c^2x^2}+1}\left(c^2d^2+e^2\right)\sqrt{d+}}$$

Antiderivative was successfully verified.

```
[In] Int[(x^2*(a + b*ArcCsch[c*x]))/(d + e*x)^(5/2),x]
```

```
[Out] (-4*b*d*(1 + c^2*x^2))/(3*c*e*(c^2*d^2 + e^2)*Sqrt[1 + 1/(c^2*x^2)]*x*Sqrt[
d + e*x]) - (2*d^2*(a + b*ArcCsch[c*x]))/(3*e^3*(d + e*x)^(3/2)) + (4*d*(a
+ b*ArcCsch[c*x]))/(e^3*Sqrt[d + e*x]) + (2*Sqrt[d + e*x]*(a + b*ArcCsch[c*
x]))/e^3 + (4*b*Sqrt[-c^2]*d*Sqrt[d + e*x]*Sqrt[1 + c^2*x^2]*EllipticE[ArcS
in[Sqrt[1 - Sqrt[-c^2]*x]/Sqrt[2]], (-2*Sqrt[-c^2]*e)/(c^2*d - Sqrt[-c^2]*e
)])/(3*c*e^2*(c^2*d^2 + e^2)*Sqrt[1 + 1/(c^2*x^2)]*x*Sqrt[(c^2*(d + e*x))/(
```

```
c^2*d - Sqrt[-c^2]*e)]) + (4*b*c*Sqrt[(c^2*(d + e*x))/(c^2*d - Sqrt[-c^2]*e
)]*Sqrt[1 + c^2*x^2]*EllipticF[ArcSin[Sqrt[1 - Sqrt[-c^2]*x]/Sqrt[2]], (-2*
Sqrt[-c^2]*e)/(c^2*d - Sqrt[-c^2]*e)])/((-c^2)^(3/2)*e^2*Sqrt[1 + 1/(c^2*x^
2)]*x*Sqrt[d + e*x]) - (32*b*d*Sqrt[(Sqrt[-c^2]*(d + e*x))/(Sqrt[-c^2]*d +
e)]*Sqrt[1 + c^2*x^2]*EllipticPi[2, ArcSin[Sqrt[1 - Sqrt[-c^2]*x]/Sqrt[2]],
 (2*e)/(Sqrt[-c^2]*d + e)])/(3*c*e^3*Sqrt[1 + 1/(c^2*x^2)]*x*Sqrt[d + e*x])
```

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 21

```
Int[(u_.)*((a_) + (b_.)*(v_))^(m_.)*((c_) + (d_.)*(v_))^(n_.), x_Symbol] :>
 Dist[(b/d)^m, Int[u*(c + d*v)^(m + n), x], x] /; FreeQ[{a, b, c, d, n}, x]
 && EqQ[b*c - a*d, 0] && IntegerQ[m] && ( !IntegerQ[n] || SimplerQ[c + d*x,
 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 168

```
Int[1/(((a_.) + (b_.)*(x_))*Sqrt[(c_.) + (d_.)*(x_)]*Sqrt[(e_.) + (f_.)*(x_
)]*Sqrt[(g_.) + (h_.)*(x_)]), x_Symbol] :> Dist[-2, Subst[Int[1/(Simp[b*c -
 a*d - b*x^2, x]*Sqrt[Simp[(d*e - c*f)/d + (f*x^2)/d, x]]*Sqrt[Simp[(d*g -
c*h)/d + (h*x^2)/d, x]]), x], x, Sqrt[c + d*x]], x] /; FreeQ[{a, b, c, d, e
, f, g, h}, x] && GtQ[(d*e - c*f)/d, 0]
```

Rule 419

```
Int[1/(Sqrt[(a_) + (b_.)*(x_)^2]*Sqrt[(c_) + (d_.)*(x_)^2]), x_Symbol] :> S
imp[(1*EllipticF[ArcSin[Rt[-(d/c), 2]*x], (b*c)/(a*d)])/(Sqrt[a]*Sqrt[c]*Rt
[-(d/c), 2]), x] /; FreeQ[{a, b, c, d}, x] && NegQ[d/c] && GtQ[c, 0] && GtQ
[a, 0] &&  !(NegQ[b/a] && SimplerSqrtQ[-(b/a), -(d/c)])
```

Rule 424

```
Int[Sqrt[(a_) + (b_.)*(x_)^2]/Sqrt[(c_) + (d_.)*(x_)^2], x_Symbol] :> Simp[
(Sqrt[a]*EllipticE[ArcSin[Rt[-(d/c), 2]*x], (b*c)/(a*d)])/(Sqrt[c]*Rt[-(d/c
```

```
), 2]), x] /; FreeQ[{a, b, c, d}, x] && NegQ[d/c] && GtQ[c, 0] && GtQ[a, 0]
```

Rule 537

```
Int[1/(((a_) + (b_.)*(x_)^2)*Sqrt[(c_) + (d_.)*(x_)^2]*Sqrt[(e_) + (f_.)*(x
_)^2]), x_Symbol] :> Simp[(1*EllipticPi[(b*c)/(a*d), ArcSin[Rt[-(d/c), 2]*x
], (c*f)/(d*e)])/(a*Sqrt[c]*Sqrt[e]*Rt[-(d/c), 2]), x] /; FreeQ[{a, b, c, d
, e, f}, x] &&  !GtQ[d/c, 0] && GtQ[c, 0] && GtQ[e, 0] &&  !( !GtQ[f/e, 0]
&& SimplerSqrtQ[-(f/e), -(d/c)])
```

Rule 538

```
Int[1/(((a_) + (b_.)*(x_)^2)*Sqrt[(c_) + (d_.)*(x_)^2]*Sqrt[(e_) + (f_.)*(x
_)^2]), x_Symbol] :> Dist[Sqrt[1 + (d*x^2)/c]/Sqrt[c + d*x^2], Int[1/((a +
b*x^2)*Sqrt[1 + (d*x^2)/c]*Sqrt[e + f*x^2]), x], x] /; FreeQ[{a, b, c, d, e
, f}, x] &&  !GtQ[c, 0]
```

Rule 719

```
Int[((d_) + (e_.)*(x_))^(m_)/Sqrt[(a_) + (c_.)*(x_)^2], x_Symbol] :> Dist[(
2*a*Rt[-(c/a), 2]*(d + e*x)^m*Sqrt[1 + (c*x^2)/a])/(c*Sqrt[a + c*x^2]*((c*(
d + e*x))/(c*d - a*e*Rt[-(c/a), 2]))^m), Subst[Int[(1 + (2*a*e*Rt[-(c/a), 2
]*x^2)/(c*d - a*e*Rt[-(c/a), 2]))^m/Sqrt[1 - x^2], x], x, Sqrt[(1 - Rt[-(c/
a), 2]*x)/2]], x] /; FreeQ[{a, c, d, e}, x] && NeQ[c*d^2 + a*e^2, 0] && EqQ
[m^2, 1/4]
```

Rule 745

```
Int[((d_) + (e_.)*(x_))^(m_)*((a_) + (c_.)*(x_)^2)^(p_), x_Symbol] :> Simp[
(e*(d + e*x)^(m + 1)*(a + c*x^2)^(p + 1))/((m + 1)*(c*d^2 + a*e^2)), x] + D
ist[c/((m + 1)*(c*d^2 + a*e^2)), Int[(d + e*x)^(m + 1)*Simp[d*(m + 1) - e*(
m + 2*p + 3)*x, x]*(a + c*x^2)^p, x], x] /; FreeQ[{a, c, d, e, m, p}, x] &&
 NeQ[c*d^2 + a*e^2, 0] && NeQ[m, -1] && ((LtQ[m, -1] && IntQuadraticQ[a, 0,
 c, d, e, m, p, x]) || (SumSimplerQ[m, 1] && IntegerQ[p]) || ILtQ[Simplify[
m + 2*p + 3], 0])
```

Rule 835

```
Int[((d_.) + (e_.)*(x_))^(m_)*((f_.) + (g_.)*(x_))*((a_) + (c_.)*(x_)^2)^(p
_.), x_Symbol] :> Simp[((e*f - d*g)*(d + e*x)^(m + 1)*(a + c*x^2)^(p + 1))/
((m + 1)*(c*d^2 + a*e^2)), x] + Dist[1/((m + 1)*(c*d^2 + a*e^2)), Int[(d +
e*x)^(m + 1)*(a + c*x^2)^p*Simp[(c*d*f + a*e*g)*(m + 1) - c*(e*f - d*g)*(m
+ 2*p + 3)*x, x], x], x] /; FreeQ[{a, c, d, e, f, g, p}, x] && NeQ[c*d^2 +
a*e^2, 0] && LtQ[m, -1] && (IntegerQ[m] || IntegerQ[p] || IntegersQ[2*m, 2*
```

```
p])
```

Rule 844

```
Int[((d_.) + (e_.)*(x_))^(m_)*((f_.) + (g_.)*(x_))*((a_) + (c_.)*(x_)^2)^(p
_.), x_Symbol] :> Dist[g/e, Int[(d + e*x)^(m + 1)*(a + c*x^2)^p, x], x] + D
ist[(e*f - d*g)/e, Int[(d + e*x)^m*(a + c*x^2)^p, x], x] /; FreeQ[{a, c, d,
 e, f, g, m, p}, x] && NeQ[c*d^2 + a*e^2, 0] &&  !IGtQ[m, 0]
```

Rule 932

```
Int[1/(((d_.) + (e_.)*(x_))*Sqrt[(f_.) + (g_.)*(x_)]*Sqrt[(a_) + (c_.)*(x_)
^2]), x_Symbol] :> With[{q = Rt[-(c/a), 2]}, Dist[1/Sqrt[a], Int[1/((d + e*
x)*Sqrt[f + g*x]*Sqrt[1 - q*x]*Sqrt[1 + q*x]), x], x]] /; FreeQ[{a, c, d, e
, f, g}, x] && NeQ[e*f - d*g, 0] && NeQ[c*d^2 + a*e^2, 0] && GtQ[a, 0]
```

Rule 958

```
Int[((f_.) + (g_.)*(x_))^(n_)/(((d_.) + (e_.)*(x_))*Sqrt[(a_) + (c_.)*(x_)^
2]), x_Symbol] :> Int[ExpandIntegrand[1/(Sqrt[f + g*x]*Sqrt[a + c*x^2]), (f
 + g*x)^(n + 1/2)/(d + e*x), x], x] /; FreeQ[{a, c, d, e, f, g}, x] && NeQ[
e*f - d*g, 0] && NeQ[c*d^2 + a*e^2, 0] && IntegerQ[n + 1/2]
```

Rule 6310

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))*(u_), x_Symbol] :> With[{v = IntHid
e[u, x]}, Dist[a + b*ArcCsch[c*x], v, x] + Dist[b/c, Int[SimplifyIntegrand[
v/(x^2*Sqrt[1 + 1/(c^2*x^2)]), x], x], x] /; InverseFunctionFreeQ[v, x]] /;
 FreeQ[{a, b, c}, x]
```

Rule 6721

```
Int[(u_.)*((a_.) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Dist[(b^IntPart[p]*(
a + b*x^n)^FracPart[p])/(x^(n*FracPart[p])*(1 + a/(x^n*b))^FracPart[p]), In
t[u*x^(n*p)*(1 + a/(x^n*b))^p, x], x] /; FreeQ[{a, b, p}, x] &&  !IntegerQ[
p] && ILtQ[n, 0] &&  !RationalFunctionQ[u, x] && IntegerQ[p + 1/2]
```

Rule 6742

```
Int[u_, x_Symbol] :> With[{v = ExpandIntegrand[u, x]}, Int[v, x] /; SumQ[v]
]
```

Rubi steps

$$\int \frac{x^2 \left(a + b\text{csch}^{-1}(cx)\right)}{(d + ex)^{5/2}}\, dx = -\frac{2d^2 \left(a + b\text{csch}^{-1}(cx)\right)}{3e^3(d + ex)^{3/2}} + \frac{4d \left(a + b\text{csch}^{-1}(cx)\right)}{e^3\sqrt{d + ex}} + \frac{2\sqrt{d + ex}\, \left(a + b\text{csch}^{-1}(cx)\right)}{e^3} +$$

$$= -\frac{2d^2 \left(a + b\text{csch}^{-1}(cx)\right)}{3e^3(d + ex)^{3/2}} + \frac{4d \left(a + b\text{csch}^{-1}(cx)\right)}{e^3\sqrt{d + ex}} + \frac{2\sqrt{d + ex}\, \left(a + b\text{csch}^{-1}(cx)\right)}{e^3} +$$

$$= -\frac{2d^2 \left(a + b\text{csch}^{-1}(cx)\right)}{3e^3(d + ex)^{3/2}} + \frac{4d \left(a + b\text{csch}^{-1}(cx)\right)}{e^3\sqrt{d + ex}} + \frac{2\sqrt{d + ex}\, \left(a + b\text{csch}^{-1}(cx)\right)}{e^3} +$$

$$= -\frac{2d^2 \left(a + b\text{csch}^{-1}(cx)\right)}{3e^3(d + ex)^{3/2}} + \frac{4d \left(a + b\text{csch}^{-1}(cx)\right)}{e^3\sqrt{d + ex}} + \frac{2\sqrt{d + ex}\, \left(a + b\text{csch}^{-1}(cx)\right)}{e^3} +$$

$$= -\frac{2d^2 \left(a + b\text{csch}^{-1}(cx)\right)}{3e^3(d + ex)^{3/2}} + \frac{4d \left(a + b\text{csch}^{-1}(cx)\right)}{e^3\sqrt{d + ex}} + \frac{2\sqrt{d + ex}\, \left(a + b\text{csch}^{-1}(cx)\right)}{e^3} +$$

$$= -\frac{12bd \left(1 + c^2x^2\right)}{ce \left(c^2d^2 + e^2\right) \sqrt{1 + \frac{1}{c^2x^2}}\, x\sqrt{d + ex}} - \frac{2d^2 \left(a + b\text{csch}^{-1}(cx)\right)}{3e^3(d + ex)^{3/2}} + \frac{4d \left(a + b\text{csch}^{-1}(c\right.}{e^3\sqrt{d + ex}}$$

$$= -\frac{12bd \left(1 + c^2x^2\right)}{ce \left(c^2d^2 + e^2\right) \sqrt{1 + \frac{1}{c^2x^2}}\, x\sqrt{d + ex}} - \frac{2d^2 \left(a + b\text{csch}^{-1}(cx)\right)}{3e^3(d + ex)^{3/2}} + \frac{4d \left(a + b\text{csch}^{-1}(c\right.}{e^3\sqrt{d + ex}}$$

$$= -\frac{4bd \left(1 + c^2x^2\right)}{3ce \left(c^2d^2 + e^2\right) \sqrt{1 + \frac{1}{c^2x^2}}\, x\sqrt{d + ex}} - \frac{2d^2 \left(a + b\text{csch}^{-1}(cx)\right)}{3e^3(d + ex)^{3/2}} + \frac{4d \left(a + b\text{csch}^{-1}\right.}{e^3\sqrt{d + ex}}$$

$$= -\frac{4bd \left(1 + c^2x^2\right)}{3ce \left(c^2d^2 + e^2\right) \sqrt{1 + \frac{1}{c^2x^2}}\, x\sqrt{d + ex}} - \frac{2d^2 \left(a + b\text{csch}^{-1}(cx)\right)}{3e^3(d + ex)^{3/2}} + \frac{4d \left(a + b\text{csch}^{-1}\right.}{e^3\sqrt{d + ex}}$$

$$= -\frac{4bd \left(1 + c^2x^2\right)}{3ce \left(c^2d^2 + e^2\right) \sqrt{1 + \frac{1}{c^2x^2}}\, x\sqrt{d + ex}} - \frac{2d^2 \left(a + b\text{csch}^{-1}(cx)\right)}{3e^3(d + ex)^{3/2}} + \frac{4d \left(a + b\text{csch}^{-1}\right.}{e^3\sqrt{d + ex}}$$

**Mathematica [C]** time = 14.38, size = 1076, normalized size = 1.89

$$b\left(-\frac{c^3\left(\frac{d}{x}+e\right)^3\left(-\frac{4c\sqrt{1+\frac{1}{c^2x^2}}\,d}{3e^2(c^2d^2+e^2)}+\frac{2\operatorname{csch}^{-1}(cx)}{3e\left(\frac{d}{x}+e\right)^2}-\frac{16\operatorname{csch}^{-1}(cx)}{3e^3}+\frac{4\left(2c^2\operatorname{csch}^{-1}(cx)d^2+ce\sqrt{1+\frac{1}{c^2x^2}}\,d+2e^2\operatorname{csch}^{-1}(cx)\right)}{3e^2(c^2d^2+e^2)\left(\frac{d}{x}+e\right)}\right)x^3}{(d+ex)^{5/2}}-\frac{2\left(\frac{d}{x}+e\right)^{5/2}(cx)^{5/2}\left(-\frac{\sqrt{2}\left(3e^3+3c^2d^2e\right)\sqrt{icx+\cdots}}{\sqrt{1+\cdots}}\cdots\right.}{\cdots}\right.$$

Antiderivative was successfully verified.

```
[In] Integrate[(x^2*(a + b*ArcCsch[c*x]))/(d + e*x)^(5/2),x]
```

```
[Out] -((a*d^3*(1 + (e*x)/d)^(5/2)*Beta[-((e*x)/d), 3, -3/2])/(e^3*(d + e*x)^(5/2
))) + (b*(-((c^3*(e + d/x)^3*x^3*((-4*c*d*Sqrt[1 + 1/(c^2*x^2)])/(3*e^2*(c^
2*d^2 + e^2)) - (16*ArcCsch[c*x])/(3*e^3) + (2*ArcCsch[c*x])/(3*e*(e + d/x)
^2) + (4*(c*d*e*Sqrt[1 + 1/(c^2*x^2)] + 2*c^2*d^2*ArcCsch[c*x] + 2*e^2*ArcC
sch[c*x]))/(3*e^2*(c^2*d^2 + e^2)*(e + d/x))))/(d + e*x)^(5/2)) - (2*(e + d
/x)^(5/2)*(c*x)^(5/2)*(-((Sqrt[2]*(3*c^2*d^2*e + 3*e^3)*Sqrt[1 + I*c*x]*(I
+ c*x)*Sqrt[(c*d + c*e*x)/(c*d - I*e)]*EllipticF[ArcSin[Sqrt[-((e*(I + c*x)
)/(c*d - I*e))]], (I*c*d + e)/(2*e)])/(Sqrt[1 + 1/(c^2*x^2)]*Sqrt[e + d/x]*
(c*x)^(3/2)*Sqrt[(e*(1 - I*c*x))/(I*c*d + e)])) + (I*Sqrt[2]*(c*d - I*e)*(8
*c^3*d^3 + 9*c*d*e^2)*Sqrt[1 + I*c*x]*Sqrt[(e*(I + c*x)*(c*d + c*e*x))/(I*c
*d + e)^2]*EllipticPi[1 + (I*c*d)/e, ArcSin[Sqrt[-((e*(I + c*x))/(c*d - I*e
))]], (I*c*d + e)/(2*e)])/(e*Sqrt[1 + 1/(c^2*x^2)]*Sqrt[e + d/x]*(c*x)^(3/2
)) - (2*c*d*e*Cosh[2*ArcCsch[c*x]]*(-((c*d + c*e*x)*(1 + c^2*x^2)) + (c*x*(
c*d*Sqrt[2 + (2*I)*c*x]*(I + c*x)*Sqrt[(c*d + c*e*x)/(c*d - I*e)]*EllipticF
[ArcSin[Sqrt[-((e*(I + c*x))/(c*d - I*e))]], (I*c*d + e)/(2*e)] + 2*Sqrt[-(
(e*(-I + c*x))/(c*d + I*e))]*(I + c*x)*Sqrt[(c*d + c*e*x)/(c*d - I*e)]*((c*
d + I*e)*EllipticE[ArcSin[Sqrt[(c*d + c*e*x)/(c*d - I*e)]], (c*d - I*e)/(c*
d + I*e)] - I*e*EllipticF[ArcSin[Sqrt[(c*d + c*e*x)/(c*d - I*e)]], (c*d - I
*e)/(c*d + I*e)]) + (I*c*d + e)*Sqrt[2 + (2*I)*c*x]*Sqrt[-((e*(I + c*x))/(c
*d - I*e))]*Sqrt[(e*(I + c*x)*(c*d + c*e*x))/(I*c*d + e)^2]*EllipticPi[1 +
(I*c*d)/e, ArcSin[Sqrt[-((e*(I + c*x))/(c*d - I*e))]], (I*c*d + e)/(2*e)]))
/(2*Sqrt[-((e*(I + c*x))/(c*d - I*e))])))/(Sqrt[1 + 1/(c^2*x^2)]*Sqrt[e + d
/x]*Sqrt[c*x]*(2 + c^2*x^2))))/(3*e^3*(c^2*d^2 + e^2)*(d + e*x)^(5/2))))/c^
3
```

**fricas [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*(a+b*arccsch(c*x))/(e*x+d)^(5/2),x, algorithm="fricas")
[Out] Timed out
```

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

$$\int \frac{(b \operatorname{arcsch}(cx) + a)x^2}{(ex + d)^{\frac{5}{2}}}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*(a+b*arccsch(c*x))/(e*x+d)^(5/2),x, algorithm="giac")
[Out] integrate((b*arccsch(c*x) + a)*x^2/(e*x + d)^(5/2), x)
```

**maple [C]** time = 0.08, size = 2497, normalized size = 4.39

result too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^2*(a+b*arccsch(c*x))/(e*x+d)^(5/2),x)
[Out] 2/e^3*(a*((e*x+d)^(1/2)+2*d/(e*x+d)^(1/2)-1/3*d^2/(e*x+d)^(3/2))+b*((e*x+d)
^(1/2)*arccsch(c*x)+2*arccsch(c*x)*d/(e*x+d)^(1/2)-1/3*arccsch(c*x)*d^2/(e*
x+d)^(3/2)-2/3/c*(8*I*(-(I*(e*x+d)*c*e+(e*x+d)*c^2*d-c^2*d^2-e^2)/(c^2*d^2+
e^2))^(1/2)*((I*(e*x+d)*c*e-(e*x+d)*c^2*d+c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2)
*EllipticPi((e*x+d)^(1/2)*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2),1/(I*e+c*d)/c*(
c^2*d^2+e^2)/d,(-(I*e-c*d)*c/(c^2*d^2+e^2))^(1/2)/((I*e+c*d)*c/(c^2*d^2+e^2
))^(1/2))*(e*x+d)^(1/2)*c^2*d^2*e+I*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2)*(e*x+
d)^2*c^2*d*e-3*I*(-(I*(e*x+d)*c*e+(e*x+d)*c^2*d-c^2*d^2-e^2)/(c^2*d^2+e^2))
^(1/2)*((I*(e*x+d)*c*e-(e*x+d)*c^2*d+c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2)*Elli
pticF((e*x+d)^(1/2)*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2),(-(2*I*c*d*e-c^2*d^2+
e^2)/(c^2*d^2+e^2))^(1/2))*(e*x+d)^(1/2)*c^2*d^2*e-((I*e+c*d)*c/(c^2*d^2+e^
2))^(1/2)*(e*x+d)^2*c^3*d^2+4*(-(I*(e*x+d)*c*e+(e*x+d)*c^2*d-c^2*d^2-e^2)/(
c^2*d^2+e^2))^(1/2)*((I*(e*x+d)*c*e-(e*x+d)*c^2*d+c^2*d^2+e^2)/(c^2*d^2+e^2
))^(1/2)*EllipticF((e*x+d)^(1/2)*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2),(-(2*I*c
*d*e-c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2))*(e*x+d)^(1/2)*c^3*d^3-8*(-(I*(e*x+d
)*c*e+(e*x+d)*c^2*d-c^2*d^2-e^2)/(c^2*d^2+e^2))^(1/2)*((I*(e*x+d)*c*e-(e*x+
d)*c^2*d+c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2)*EllipticPi((e*x+d)^(1/2)*((I*e+c
```

```
*d)*c/(c^2*d^2+e^2))^(1/2),1/(I*e+c*d)/c*(c^2*d^2+e^2)/d,(-(I*e-c*d)*c/(c^2
*d^2+e^2))^(1/2)/((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2))*(e*x+d)^(1/2)*c^3*d^3-(
-(I*(e*x+d)*c*e+(e*x+d)*c^2*d-c^2*d^2-e^2)/(c^2*d^2+e^2))^(1/2)*((I*(e*x+d)
*c*e-(e*x+d)*c^2*d+c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2)*EllipticE((e*x+d)^(1/2
)*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2),(-(2*I*c*d*e-c^2*d^2+e^2)/(c^2*d^2+e^2)
)^(1/2))*(e*x+d)^(1/2)*c^3*d^3+I*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2)*c^2*d^3*
e+2*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2)*(e*x+d)*c^3*d^3-2*I*((I*e+c*d)*c/(c^2
*d^2+e^2))^(1/2)*(e*x+d)*c^2*d^2*e+8*I*(-(I*(e*x+d)*c*e+(e*x+d)*c^2*d-c^2*d
^2-e^2)/(c^2*d^2+e^2))^(1/2)*((I*(e*x+d)*c*e-(e*x+d)*c^2*d+c^2*d^2+e^2)/(c^
2*d^2+e^2))^(1/2)*EllipticPi((e*x+d)^(1/2)*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2
),1/(I*e+c*d)/c*(c^2*d^2+e^2)/d,(-(I*e-c*d)*c/(c^2*d^2+e^2))^(1/2)/((I*e+c*
d)*c/(c^2*d^2+e^2))^(1/2))*(e*x+d)^(1/2)*e^3+I*((I*e+c*d)*c/(c^2*d^2+e^2))^
(1/2)*d*e^3-((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2)*c^3*d^4+4*(-(I*(e*x+d)*c*e+(e
*x+d)*c^2*d-c^2*d^2-e^2)/(c^2*d^2+e^2))^(1/2)*((I*(e*x+d)*c*e-(e*x+d)*c^2*d
+c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2)*EllipticF((e*x+d)^(1/2)*((I*e+c*d)*c/(c^
2*d^2+e^2))^(1/2),(-(2*I*c*d*e-c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2))*(e*x+d)^(
1/2)*c*d*e^2-8*(-(I*(e*x+d)*c*e+(e*x+d)*c^2*d-c^2*d^2-e^2)/(c^2*d^2+e^2))^(
1/2)*((I*(e*x+d)*c*e-(e*x+d)*c^2*d+c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2)*Ellipt
icPi((e*x+d)^(1/2)*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2),1/(I*e+c*d)/c*(c^2*d^2
+e^2)/d,(-(I*e-c*d)*c/(c^2*d^2+e^2))^(1/2)/((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2
))*(e*x+d)^(1/2)*c*d*e^2-(-(I*(e*x+d)*c*e+(e*x+d)*c^2*d-c^2*d^2-e^2)/(c^2*d
^2+e^2))^(1/2)*((I*(e*x+d)*c*e-(e*x+d)*c^2*d+c^2*d^2+e^2)/(c^2*d^2+e^2))^(1
/2)*EllipticE((e*x+d)^(1/2)*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2),(-(2*I*c*d*e-
c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2))*(e*x+d)^(1/2)*c*d*e^2-3*I*(-(I*(e*x+d)*c
*e+(e*x+d)*c^2*d-c^2*d^2-e^2)/(c^2*d^2+e^2))^(1/2)*((I*(e*x+d)*c*e-(e*x+d)*
c^2*d+c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2)*EllipticF((e*x+d)^(1/2)*((I*e+c*d)*
c/(c^2*d^2+e^2))^(1/2),(-(2*I*c*d*e-c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2))*(e*x
+d)^(1/2)*e^3-((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2)*c*d^2*e^2)/(((e*x+d)^2*c^2-
2*(e*x+d)*c^2*d+c^2*d^2+e^2)/c^2/x^2/e^2)^(1/2)/x/(c^2*d^2+e^2)/(e*x+d)^(1/
2)/((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2)/(I*e-c*d))
```

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

$$\frac{1}{3}\,b\left(\frac{2\left(3\,e^{2}x^{2}+12\,dex+8\,d^{2}\right)\log\left(\sqrt{c^{2}x^{2}+1}\,+1\right)}{\left(e^{4}x+de^{3}\right)\sqrt{ex+d}}+3\int\frac{2\left(3\,c^{2}e^{2}x^{3}+12\,c^{2}dex^{2}\right.}{3\left(\left(c^{2}e^{4}x^{3}+c^{2}de^{3}x^{2}+e^{4}x+de^{3}\right)\sqrt{c^{2}x^{2}+1}\,\sqrt{ex+d}\,+\right.}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*(a+b*arccsch(c*x))/(e*x+d)^(5/2),x, algorithm="maxima")
```

```
[Out] 1/3*b*(2*(3*e^2*x^2 + 12*d*e*x + 8*d^2)*log(sqrt(c^2*x^2 + 1) + 1)/((e^4*x
+ d*e^3)*sqrt(e*x + d)) + 3*integrate(2/3*(3*c^2*e^2*x^3 + 12*c^2*d*e*x^2 +
 8*c^2*d^2*x)/((c^2*e^4*x^3 + c^2*d*e^3*x^2 + e^4*x + d*e^3)*sqrt(c^2*x^2 +
 1)*sqrt(e*x + d) + (c^2*e^4*x^3 + c^2*d*e^3*x^2 + e^4*x + d*e^3)*sqrt(e*x
```

```
+ d)), x) - 3*integrate(1/3*(30*c^2*d*e^2*x^3 + 3*(e^3*log(c) + 2*e^3)*c^2*
x^4 + 16*c^2*d^3*x + (40*c^2*d^2*e + 3*e^3*log(c))*x^2 + 3*(c^2*e^3*x^4 + e
^3*x^2)*log(x))/((c^2*e^5*x^4 + 2*c^2*d*e^4*x^3 + 2*d*e^4*x + d^2*e^3 + (c^
2*d^2*e^3 + e^5)*x^2)*sqrt(e*x + d)), x)) + 2/3*a*(3*sqrt(e*x + d)/e^3 + 6*
d/(sqrt(e*x + d)*e^3) - d^2/((e*x + d)^(3/2)*e^3))
```

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

$$\int \frac{x^2\,\left(a+b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)\right)}{{\left(d+e\,x\right)}^{5/2}} \,d x$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((x^2*(a + b*asinh(1/(c*x))))/(d + e*x)^(5/2),x)
[Out] int((x^2*(a + b*asinh(1/(c*x))))/(d + e*x)^(5/2), x)
```

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

$$\int \frac{x^{2} \left(a + b \operatorname{acsch}{\left(c x \right)}\right)}{\left(d + e x\right)^{\frac{5}{2}}}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**2*(a+b*acsch(c*x))/(e*x+d)**(5/2),x)
[Out] Integral(x**2*(a + b*acsch(c*x))/(d + e*x)**(5/2), x)
```

# 3.71 $\int \frac{x\left(a+b\,\mathrm{csch}^{-1}(cx)\right)}{(d+ex)^{5/2}}\,dx$

**Optimal**. Leaf size=393

$$-\frac{2\left(a+b\,\mathrm{csch}^{-1}(cx)\right)}{e^2\sqrt{d+ex}}+\frac{2d\left(a+b\,\mathrm{csch}^{-1}(cx)\right)}{3e^2(d+ex)^{3/2}}+\frac{4b\left(c^2x^2+1\right)}{3cx\sqrt{\frac{1}{c^2x^2}+1}\left(c^2d^2+e^2\right)\sqrt{d+ex}}-\frac{4b\sqrt{-c^2}\sqrt{c^2x^2+1}\sqrt{d+ex}\,E\Big(}{3cex\sqrt{\frac{1}{c^2x^2}+1}\,\left(c^2\right.}$$

```
[Out] 2/3*d*(a+b*arccsch(c*x))/e^2/(e*x+d)^(3/2)-2*(a+b*arccsch(c*x))/e^2/(e*x+d)
^(1/2)+4/3*b*(c^2*x^2+1)/c/(c^2*d^2+e^2)/x/(1+1/c^2/x^2)^(1/2)/(e*x+d)^(1/2
)+8/3*b*EllipticPi(1/2*(1-(-c^2)^(1/2)*x)^(1/2)*2^(1/2),2,2^(1/2)*(e/(d*(-c
^2)^(1/2)+e))^(1/2))*(c^2*x^2+1)^(1/2)*((e*x+d)*(-c^2)^(1/2)/(d*(-c^2)^(1/2
)+e))^(1/2)/c/e^2/x/(1+1/c^2/x^2)^(1/2)/(e*x+d)^(1/2)-4/3*b*EllipticE(1/2*(
1-(-c^2)^(1/2)*x)^(1/2)*2^(1/2),(-2*e*(-c^2)^(1/2)/(c^2*d-e*(-c^2)^(1/2)))^
(1/2))*(-c^2)^(1/2)*(e*x+d)^(1/2)*(c^2*x^2+1)^(1/2)/c/e/(c^2*d^2+e^2)/x/(1+
1/c^2/x^2)^(1/2)/(c^2*(e*x+d)/(c^2*d-e*(-c^2)^(1/2)))^(1/2)
```

**Rubi [A]** time = 2.19, antiderivative size = 393, normalized size of antiderivative = 1.00, number of steps used = 19, number of rules used = 14, integrand size = 19, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.737, Rules used = {43, 6310, 12, 6721, 6742, 745, 21, 719, 424, 958, 932, 168, 538, 537}

$$-\frac{2\left(a+b\,\mathrm{csch}^{-1}(cx)\right)}{e^2\sqrt{d+ex}}+\frac{2d\left(a+b\,\mathrm{csch}^{-1}(cx)\right)}{3e^2(d+ex)^{3/2}}+\frac{4b\left(c^2x^2+1\right)}{3cx\sqrt{\frac{1}{c^2x^2}+1}\left(c^2d^2+e^2\right)\sqrt{d+ex}}-\frac{4b\sqrt{-c^2}\sqrt{c^2x^2+1}\sqrt{d+ex}\,E\Big(}{3cex\sqrt{\frac{1}{c^2x^2}+1}\,\left(c^2\right.}$$

Antiderivative was successfully verified.

```
[In] Int[(x*(a + b*ArcCsch[c*x]))/(d + e*x)^(5/2),x]
```

```
[Out] (4*b*(1 + c^2*x^2))/(3*c*(c^2*d^2 + e^2)*Sqrt[1 + 1/(c^2*x^2)]*x*Sqrt[d + e
*x]) + (2*d*(a + b*ArcCsch[c*x]))/(3*e^2*(d + e*x)^(3/2)) - (2*(a + b*ArcCs
ch[c*x]))/(e^2*Sqrt[d + e*x]) - (4*b*Sqrt[-c^2]*Sqrt[d + e*x]*Sqrt[1 + c^2*
x^2]*EllipticE[ArcSin[Sqrt[1 - Sqrt[-c^2]*x]/Sqrt[2]], (-2*Sqrt[-c^2]*e)/(c
^2*d - Sqrt[-c^2]*e)])/(3*c*e*(c^2*d^2 + e^2)*Sqrt[1 + 1/(c^2*x^2)]*x*Sqrt[
(c^2*(d + e*x))/(c^2*d - Sqrt[-c^2]*e)]) + (8*b*Sqrt[(Sqrt[-c^2]*(d + e*x))
/(Sqrt[-c^2]*d + e)]*Sqrt[1 + c^2*x^2]*EllipticPi[2, ArcSin[Sqrt[1 - Sqrt[-
c^2]*x]/Sqrt[2]], (2*e)/(Sqrt[-c^2]*d + e)])/(3*c*e^2*Sqrt[1 + 1/(c^2*x^2)]
*x*Sqrt[d + e*x])
```

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 21

```
Int[(u_.)*((a_) + (b_.)*(v_))^(m_.)*((c_) + (d_.)*(v_))^(n_.), x_Symbol] :>
 Dist[(b/d)^m, Int[u*(c + d*v)^(m + n), x], x] /; FreeQ[{a, b, c, d, n}, x]
 && EqQ[b*c - a*d, 0] && IntegerQ[m] && ( !IntegerQ[n] || SimplerQ[c + d*x,
 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 168

```
Int[1/(((a_.) + (b_.)*(x_))*Sqrt[(c_.) + (d_.)*(x_)]*Sqrt[(e_.) + (f_.)*(x_
)]*Sqrt[(g_.) + (h_.)*(x_)]), x_Symbol] :> Dist[-2, Subst[Int[1/(Simp[b*c -
 a*d - b*x^2, x]*Sqrt[Simp[(d*e - c*f)/d + (f*x^2)/d, x]]*Sqrt[Simp[(d*g -
c*h)/d + (h*x^2)/d, x]]), x], x, Sqrt[c + d*x]], x] /; FreeQ[{a, b, c, d, e
, f, g, h}, x] && GtQ[(d*e - c*f)/d, 0]
```

Rule 424

```
Int[Sqrt[(a_) + (b_.)*(x_)^2]/Sqrt[(c_) + (d_.)*(x_)^2], x_Symbol] :> Simp[
(Sqrt[a]*EllipticE[ArcSin[Rt[-(d/c), 2]*x], (b*c)/(a*d)])/(Sqrt[c]*Rt[-(d/c
), 2]), x] /; FreeQ[{a, b, c, d}, x] && NegQ[d/c] && GtQ[c, 0] && GtQ[a, 0]
```

Rule 537

```
Int[1/(((a_) + (b_.)*(x_)^2)*Sqrt[(c_) + (d_.)*(x_)^2]*Sqrt[(e_) + (f_.)*(x
_)^2]), x_Symbol] :> Simp[(1*EllipticPi[(b*c)/(a*d), ArcSin[Rt[-(d/c), 2]*x
], (c*f)/(d*e)])/(a*Sqrt[c]*Sqrt[e]*Rt[-(d/c), 2]), x] /; FreeQ[{a, b, c, d
, e, f}, x] &&  !GtQ[d/c, 0] && GtQ[c, 0] && GtQ[e, 0] &&  !( !GtQ[f/e, 0]
&& SimplerSqrtQ[-(f/e), -(d/c)])
```

Rule 538

```
Int[1/(((a_) + (b_.)*(x_)^2)*Sqrt[(c_) + (d_.)*(x_)^2]*Sqrt[(e_) + (f_.)*(x
_)^2]), x_Symbol] :> Dist[Sqrt[1 + (d*x^2)/c]/Sqrt[c + d*x^2], Int[1/((a +
b*x^2)*Sqrt[1 + (d*x^2)/c]*Sqrt[e + f*x^2]), x], x] /; FreeQ[{a, b, c, d, e
```

```
, f}, x] &&  !GtQ[c, 0]
```

Rule 719

```
Int[((d_) + (e_.)*(x_))^(m_)/Sqrt[(a_) + (c_.)*(x_)^2], x_Symbol] :> Dist[(
2*a*Rt[-(c/a), 2]*(d + e*x)^m*Sqrt[1 + (c*x^2)/a])/(c*Sqrt[a + c*x^2]*((c*(
d + e*x))/(c*d - a*e*Rt[-(c/a), 2]))^m), Subst[Int[(1 + (2*a*e*Rt[-(c/a), 2
]*x^2)/(c*d - a*e*Rt[-(c/a), 2]))^m/Sqrt[1 - x^2], x], x, Sqrt[(1 - Rt[-(c/
a), 2]*x)/2]], x] /; FreeQ[{a, c, d, e}, x] && NeQ[c*d^2 + a*e^2, 0] && EqQ
[m^2, 1/4]
```

Rule 745

```
Int[((d_) + (e_.)*(x_))^(m_)*((a_) + (c_.)*(x_)^2)^(p_), x_Symbol] :> Simp[
(e*(d + e*x)^(m + 1)*(a + c*x^2)^(p + 1))/((m + 1)*(c*d^2 + a*e^2)), x] + D
ist[c/((m + 1)*(c*d^2 + a*e^2)), Int[(d + e*x)^(m + 1)*Simp[d*(m + 1) - e*(
m + 2*p + 3)*x, x]*(a + c*x^2)^p, x], x] /; FreeQ[{a, c, d, e, m, p}, x] &&
 NeQ[c*d^2 + a*e^2, 0] && NeQ[m, -1] && ((LtQ[m, -1] && IntQuadraticQ[a, 0,
 c, d, e, m, p, x]) || (SumSimplerQ[m, 1] && IntegerQ[p]) || ILtQ[Simplify[
m + 2*p + 3], 0])
```

Rule 932

```
Int[1/(((d_.) + (e_.)*(x_))*Sqrt[(f_.) + (g_.)*(x_)]*Sqrt[(a_) + (c_.)*(x_)
^2]), x_Symbol] :> With[{q = Rt[-(c/a), 2]}, Dist[1/Sqrt[a], Int[1/((d + e*
x)*Sqrt[f + g*x]*Sqrt[1 - q*x]*Sqrt[1 + q*x]), x], x]] /; FreeQ[{a, c, d, e
, f, g}, x] && NeQ[e*f - d*g, 0] && NeQ[c*d^2 + a*e^2, 0] && GtQ[a, 0]
```

Rule 958

```
Int[((f_.) + (g_.)*(x_))^(n_)/(((d_.) + (e_.)*(x_))*Sqrt[(a_) + (c_.)*(x_)^
2]), x_Symbol] :> Int[ExpandIntegrand[1/(Sqrt[f + g*x]*Sqrt[a + c*x^2]), (f
 + g*x)^(n + 1/2)/(d + e*x), x], x] /; FreeQ[{a, c, d, e, f, g}, x] && NeQ[
e*f - d*g, 0] && NeQ[c*d^2 + a*e^2, 0] && IntegerQ[n + 1/2]
```

Rule 6310

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))*(u_), x_Symbol] :> With[{v = IntHid
e[u, x]}, Dist[a + b*ArcCsch[c*x], v, x] + Dist[b/c, Int[SimplifyIntegrand[
v/(x^2*Sqrt[1 + 1/(c^2*x^2)]), x], x], x] /; InverseFunctionFreeQ[v, x]] /;
 FreeQ[{a, b, c}, x]
```

Rule 6721

```
Int[(u_.)*((a_.) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Dist[(b^IntPart[p]*(
a + b*x^n)^FracPart[p])/(x^(n*FracPart[p])*(1 + a/(x^n*b))^FracPart[p]), In
t[u*x^(n*p)*(1 + a/(x^n*b))^p, x], x] /; FreeQ[{a, b, p}, x] &&  !IntegerQ[
p] && ILtQ[n, 0] &&  !RationalFunctionQ[u, x] && IntegerQ[p + 1/2]
```

Rule 6742

```
Int[u_, x_Symbol] :> With[{v = ExpandIntegrand[u, x]}, Int[v, x] /; SumQ[v]
]
```

Rubi steps

$$\int \frac{x\left(a+b\text{csch}^{-1}(cx)\right)}{(d+ex)^{5/2}}\,dx = \frac{2d\left(a+b\text{csch}^{-1}(cx)\right)}{3e^2(d+ex)^{3/2}} - \frac{2\left(a+b\text{csch}^{-1}(cx)\right)}{e^2\sqrt{d+ex}} + \frac{b\int \frac{2(-2d-3ex)}{3e^2\sqrt{1+\frac{1}{c^2x^2}}\,x^2(d+ex)^{3/2}}\,dx}{c}$$

$$= \frac{2d\left(a+b\text{csch}^{-1}(cx)\right)}{3e^2(d+ex)^{3/2}} - \frac{2\left(a+b\text{csch}^{-1}(cx)\right)}{e^2\sqrt{d+ex}} + \frac{(2b)\int \frac{-2d-3ex}{\sqrt{1+\frac{1}{c^2x^2}}\,x^2(d+ex)^{3/2}}\,dx}{3ce^2}$$

$$= \frac{2d\left(a+b\text{csch}^{-1}(cx)\right)}{3e^2(d+ex)^{3/2}} - \frac{2\left(a+b\text{csch}^{-1}(cx)\right)}{e^2\sqrt{d+ex}} + \frac{\left(2b\sqrt{1+c^2x^2}\right)\int \frac{-2d-3ex}{x(d+ex)^{3/2}\sqrt{1+c^2x^2}}\,dx}{3ce^2\sqrt{1+\frac{1}{c^2x^2}}\,x}$$

$$= \frac{2d\left(a+b\text{csch}^{-1}(cx)\right)}{3e^2(d+ex)^{3/2}} - \frac{2\left(a+b\text{csch}^{-1}(cx)\right)}{e^2\sqrt{d+ex}} + \frac{\left(2b\sqrt{1+c^2x^2}\right)\int \left(-\frac{3e}{(d+ex)^{3/2}\sqrt{1+c^2x^2}} - \right.}{3ce^2\sqrt{1+\frac{1}{c^2x^2}}\,x}$$

$$= \frac{2d\left(a+b\text{csch}^{-1}(cx)\right)}{3e^2(d+ex)^{3/2}} - \frac{2\left(a+b\text{csch}^{-1}(cx)\right)}{e^2\sqrt{d+ex}} - \frac{\left(4bd\sqrt{1+c^2x^2}\right)\int \frac{1}{x(d+ex)^{3/2}\sqrt{1+c^2x^2}}\,dx}{3ce^2\sqrt{1+\frac{1}{c^2x^2}}\,x}$$

$$= \frac{4b\left(1+c^2x^2\right)}{c\left(c^2d^2+e^2\right)\sqrt{1+\frac{1}{c^2x^2}}\,x\sqrt{d+ex}} + \frac{2d\left(a+b\text{csch}^{-1}(cx)\right)}{3e^2(d+ex)^{3/2}} - \frac{2\left(a+b\text{csch}^{-1}(cx)\right)}{e^2\sqrt{d+ex}} - $$

$$= \frac{4b\left(1+c^2x^2\right)}{c\left(c^2d^2+e^2\right)\sqrt{1+\frac{1}{c^2x^2}}\,x\sqrt{d+ex}} + \frac{2d\left(a+b\text{csch}^{-1}(cx)\right)}{3e^2(d+ex)^{3/2}} - \frac{2\left(a+b\text{csch}^{-1}(cx)\right)}{e^2\sqrt{d+ex}} - $$

$$= \frac{4b\left(1+c^2x^2\right)}{3c\left(c^2d^2+e^2\right)\sqrt{1+\frac{1}{c^2x^2}}\,x\sqrt{d+ex}} + \frac{2d\left(a+b\text{csch}^{-1}(cx)\right)}{3e^2(d+ex)^{3/2}} - \frac{2\left(a+b\text{csch}^{-1}(cx)\right)}{e^2\sqrt{d+ex}} - $$

$$= \frac{4b\left(1+c^2x^2\right)}{3c\left(c^2d^2+e^2\right)\sqrt{1+\frac{1}{c^2x^2}}\,x\sqrt{d+ex}} + \frac{2d\left(a+b\text{csch}^{-1}(cx)\right)}{3e^2(d+ex)^{3/2}} - \frac{2\left(a+b\text{csch}^{-1}(cx)\right)}{e^2\sqrt{d+ex}} - $$

$$= \frac{4b\left(1+c^2x^2\right)}{3c\left(c^2d^2+e^2\right)\sqrt{1+\frac{1}{c^2x^2}}\,x\sqrt{d+ex}} + \frac{2d\left(a+b\text{csch}^{-1}(cx)\right)}{3e^2(d+ex)^{3/2}} - \frac{2\left(a+b\text{csch}^{-1}(cx)\right)}{e^2\sqrt{d+ex}} - $$

**Mathematica** [C] time = 2.51, size = 390, normalized size = 0.99

$$\frac{2}{3}\left(-\frac{a(2d+3ex)}{e^2(d+ex)^{3/2}}+\frac{2bcx\sqrt{\frac{1}{c^2x^2}+1}}{\left(c^2d^2+e^2\right)\sqrt{d+ex}}+\frac{2ib\sqrt{-\frac{c}{cd-ie}}\sqrt{-\frac{e(cx-i)}{cd+ie}}\sqrt{-\frac{e(cx+i)}{cd-ie}}\left(-cdF\left(i\sinh^{-1}\left(\sqrt{-\frac{c}{cd-ie}}\sqrt{d+ex}\right)\right.\right.}{}\right.$$

Antiderivative was successfully verified.

```
[In] Integrate[(x*(a + b*ArcCsch[c*x]))/(d + e*x)^(5/2),x]
```

```
[Out] (2*((2*b*c*Sqrt[1 + 1/(c^2*x^2)]*x)/((c^2*d^2 + e^2)*Sqrt[d + e*x]) - (a*(2
*d + 3*e*x))/(e^2*(d + e*x)^(3/2)) - (b*(2*d + 3*e*x)*ArcCsch[c*x])/(e^2*(d
 + e*x)^(3/2)) + ((2*I)*b*Sqrt[-(c/(c*d - I*e))]*Sqrt[-((e*(-I + c*x))/(c*d
 + I*e))]*Sqrt[-((e*(I + c*x))/(c*d - I*e))]*(c*d*EllipticE[I*ArcSinh[Sqrt[
-(c/(c*d - I*e))]*Sqrt[d + e*x]], (c*d - I*e)/(c*d + I*e)] - c*d*EllipticF[
I*ArcSinh[Sqrt[-(c/(c*d - I*e))]*Sqrt[d + e*x]], (c*d - I*e)/(c*d + I*e)] +
 2*(c*d - I*e)*EllipticPi[1 - (I*e)/(c*d), I*ArcSinh[Sqrt[-(c/(c*d - I*e))]
*Sqrt[d + e*x]], (c*d - I*e)/(c*d + I*e)]))/(c^2*d*e^2*Sqrt[1 + 1/(c^2*x^2)
]*x)))/3
```

**fricas** [F] time = 8.18, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{(bx\,\text{arcsch}\,(cx)+ax)\sqrt{ex+d}}{e^3x^3+3\,de^2x^2+3\,d^2ex+d^3},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*(a+b*arccsch(c*x))/(e*x+d)^(5/2),x, algorithm="fricas")
```

```
[Out] integral((b*x*arccsch(c*x) + a*x)*sqrt(e*x + d)/(e^3*x^3 + 3*d*e^2*x^2 + 3*
d^2*e*x + d^3), x)
```

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

$$\int\frac{(b\,\text{arcsch}\,(cx)+a)x}{(ex+d)^{\frac{5}{2}}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*(a+b*arccsch(c*x))/(e*x+d)^(5/2),x, algorithm="giac")
```

```
[Out] integrate((b*arccsch(c*x) + a)*x/(e*x + d)^(5/2), x)
```

**maple** [C] time = 0.08, size = 2107, normalized size = 5.36

result too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x*(a+b*arccsch(c*x))/(e*x+d)^(5/2),x)
```

```
[Out] 2/e^2*(a*(-1/(e*x+d)^(1/2)+1/3*d/(e*x+d)^(3/2))+b*(-1/(e*x+d)^(1/2)*arccsch
(c*x)+1/3*arccsch(c*x)*d/(e*x+d)^(3/2)+2/3/c*(2*I*(-(I*(e*x+d)*c*e+(e*x+d)*
c^2*d-c^2*d^2-e^2)/(c^2*d^2+e^2))^(1/2)*((I*(e*x+d)*c*e-(e*x+d)*c^2*d+c^2*d
^2+e^2)/(c^2*d^2+e^2))^(1/2)*EllipticPi((e*x+d)^(1/2)*((I*e+c*d)*c/(c^2*d^2
+e^2))^(1/2),1/(I*e+c*d)/c*(c^2*d^2+e^2)/d,(-(I*e-c*d)*c/(c^2*d^2+e^2))^(1/
2)/((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2))*(e*x+d)^(1/2)*c^2*d^2*e+I*((I*e+c*d)*
c/(c^2*d^2+e^2))^(1/2)*(e*x+d)^2*c^2*d*e-((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2)*
(e*x+d)^2*c^3*d^2-2*(-(I*(e*x+d)*c*e+(e*x+d)*c^2*d-c^2*d^2-e^2)/(c^2*d^2+e^
2))^(1/2)*((I*(e*x+d)*c*e-(e*x+d)*c^2*d+c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2)*E
llipticPi((e*x+d)^(1/2)*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2),1/(I*e+c*d)/c*(c^
2*d^2+e^2)/d,(-(I*e-c*d)*c/(c^2*d^2+e^2))^(1/2)/((I*e+c*d)*c/(c^2*d^2+e^2))
^(1/2))*(e*x+d)^(1/2)*c^3*d^3+(-(I*(e*x+d)*c*e+(e*x+d)*c^2*d-c^2*d^2-e^2)/(
c^2*d^2+e^2))^(1/2)*((I*(e*x+d)*c*e-(e*x+d)*c^2*d+c^2*d^2+e^2)/(c^2*d^2+e^2
))^(1/2)*EllipticF((e*x+d)^(1/2)*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2),(-(2*I*c
*d*e-c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2))*(e*x+d)^(1/2)*c^3*d^3-(-(I*(e*x+d)*
c*e+(e*x+d)*c^2*d-c^2*d^2-e^2)/(c^2*d^2+e^2))^(1/2)*((I*(e*x+d)*c*e-(e*x+d)
*c^2*d+c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2)*EllipticE((e*x+d)^(1/2)*((I*e+c*d)
*c/(c^2*d^2+e^2))^(1/2),(-(2*I*c*d*e-c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2))*(e*
x+d)^(1/2)*c^3*d^3-2*I*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2)*(e*x+d)*c^2*d^2*e+
2*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2)*(e*x+d)*c^3*d^3+2*I*(-(I*(e*x+d)*c*e+(e
*x+d)*c^2*d-c^2*d^2-e^2)/(c^2*d^2+e^2))^(1/2)*((I*(e*x+d)*c*e-(e*x+d)*c^2*d
+c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2)*EllipticPi((e*x+d)^(1/2)*((I*e+c*d)*c/(c
^2*d^2+e^2))^(1/2),1/(I*e+c*d)/c*(c^2*d^2+e^2)/d,(-(I*e-c*d)*c/(c^2*d^2+e^2
))^(1/2)/((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2))*(e*x+d)^(1/2)*e^3+I*((I*e+c*d)*
c/(c^2*d^2+e^2))^(1/2)*c^2*d^3*e-((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2)*c^3*d^4-
2*(-(I*(e*x+d)*c*e+(e*x+d)*c^2*d-c^2*d^2-e^2)/(c^2*d^2+e^2))^(1/2)*((I*(e*x
+d)*c*e-(e*x+d)*c^2*d+c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2)*EllipticPi((e*x+d)^
(1/2)*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2),1/(I*e+c*d)/c*(c^2*d^2+e^2)/d,(-(I*
e-c*d)*c/(c^2*d^2+e^2))^(1/2)/((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2))*(e*x+d)^(1
/2)*c*d*e^2+(-(I*(e*x+d)*c*e+(e*x+d)*c^2*d-c^2*d^2-e^2)/(c^2*d^2+e^2))^(1/2
)*((I*(e*x+d)*c*e-(e*x+d)*c^2*d+c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2)*EllipticF
((e*x+d)^(1/2)*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2),(-(2*I*c*d*e-c^2*d^2+e^2)/
(c^2*d^2+e^2))^(1/2))*(e*x+d)^(1/2)*c*d*e^2-(-(I*(e*x+d)*c*e+(e*x+d)*c^2*d-
c^2*d^2-e^2)/(c^2*d^2+e^2))^(1/2)*((I*(e*x+d)*c*e-(e*x+d)*c^2*d+c^2*d^2+e^2
)/(c^2*d^2+e^2))^(1/2)*EllipticE((e*x+d)^(1/2)*((I*e+c*d)*c/(c^2*d^2+e^2))^
(1/2),(-(2*I*c*d*e-c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2))*(e*x+d)^(1/2)*c*d*e^2
+I*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2)*d*e^3-((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2
)*c*d^2*e^2)/(((e*x+d)^2*c^2-2*(e*x+d)*c^2*d+c^2*d^2+e^2)/c^2/x^2/e^2)^(1/2
)/x/d/((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2)/(c^2*d^2+e^2)/(e*x+d)^(1/2)/(I*e-c*
d)))
```

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

$$-\frac{1}{3}\,b\left(\frac{2\,(3\,ex+2\,d)\log\left(\sqrt{c^2x^2+1}+1\right)}{\left(e^3x+de^2\right)\sqrt{ex+d}}+3\int\frac{2\left(3\,c^2ex^2+2\,c^2dx\right)}{3\left(\left(c^2e^3x^3+c^2de^2x^2+e^3x+de^2\right)\sqrt{c^2x^2+1}\,\sqrt{ex+d}+\left(c^2e^3x^3\right.\right.}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*(a+b*arccsch(c*x))/(e*x+d)^(5/2),x, algorithm="maxima")
```

```
[Out] -1/3*b*(2*(3*e*x + 2*d)*log(sqrt(c^2*x^2 + 1) + 1)/((e^3*x + d*e^2)*sqrt(e*
x + d)) + 3*integrate(2/3*(3*c^2*e*x^2 + 2*c^2*d*x)/((c^2*e^3*x^3 + c^2*d*e
^2*x^2 + e^3*x + d*e^2)*sqrt(c^2*x^2 + 1)*sqrt(e*x + d) + (c^2*e^3*x^3 + c^
2*d*e^2*x^2 + e^3*x + d*e^2)*sqrt(e*x + d)), x) + 3*integrate(-1/3*(10*c^2*
d*e*x^2 - 3*(e^2*log(c) - 2*e^2)*c^2*x^3 + (4*c^2*d^2 - 3*e^2*log(c))*x - 3
*(c^2*e^2*x^3 + e^2*x)*log(x))/((c^2*e^4*x^4 + 2*c^2*d*e^3*x^3 + 2*d*e^3*x
+ d^2*e^2 + (c^2*d^2*e^2 + e^4)*x^2)*sqrt(e*x + d)), x)) - 2/3*a*(3/(sqrt(e
*x + d)*e^2) - d/((e*x + d)^(3/2)*e^2))
```

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

$$\int\frac{x\,\left(a+b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)\right)}{{\left(d+e\,x\right)}^{5/2}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((x*(a + b*asinh(1/(c*x))))/(d + e*x)^(5/2),x)
```

```
[Out] int((x*(a + b*asinh(1/(c*x))))/(d + e*x)^(5/2), x)
```

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

$$\int\frac{x\,(a+b\,\mathrm{acsch}\,(cx))}{(d+ex)^{\frac{5}{2}}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*(a+b*acsch(c*x))/(e*x+d)**(5/2),x)
```

```
[Out] Integral(x*(a + b*acsch(c*x))/(d + e*x)**(5/2), x)
```

# 3.72 $\int \frac{a+b\,\mathbf{csch}^{-1}(cx)}{(d+ex)^{5/2}}\,dx$

**Optimal**. Leaf size=369

$$-\frac{2\left(a+b\text{csch}^{-1}(cx)\right)}{3e(d+ex)^{3/2}}-\frac{4be\left(c^2x^2+1\right)}{3cdx\sqrt{\frac{1}{c^2x^2}+1}\left(c^2d^2+e^2\right)\sqrt{d+ex}}+\frac{4b\sqrt{-c^2}\sqrt{c^2x^2+1}\sqrt{d+ex}\,E\left(\sin^{-1}\left(\frac{\sqrt{1-\sqrt{-c^2}\,x}}{\sqrt{2}}\right)|-\right.}{3cdx\sqrt{\frac{1}{c^2x^2}+1}\left(c^2d^2+e^2\right)\sqrt{\frac{d+ex}{\frac{e}{\sqrt{-c^2}}+d}}}$$

```
[Out] -2/3*(a+b*arccsch(c*x))/e/(e*x+d)^(3/2)-4/3*b*e*(c^2*x^2+1)/c/d/(c^2*d^2+e^
2)/x/(1+1/c^2/x^2)^(1/2)/(e*x+d)^(1/2)+4/3*b*EllipticE(1/2*(1-(-c^2)^(1/2)*
x)^(1/2)*2^(1/2),(-2*e*(-c^2)^(1/2)/(c^2*d-e*(-c^2)^(1/2)))^(1/2))*(-c^2)^(
1/2)*(e*x+d)^(1/2)*(c^2*x^2+1)^(1/2)/c/d/(c^2*d^2+e^2)/x/(1+1/c^2/x^2)^(1/2
)/((e*x+d)/(d+e/(-c^2)^(1/2)))^(1/2)+4/3*b*EllipticPi(1/2*(1-(-c^2)^(1/2)*x
)^(1/2)*2^(1/2),2,2^(1/2)*(e/(d*(-c^2)^(1/2)+e))^(1/2))*(c^2*x^2+1)^(1/2)*(
(e*x+d)*(-c^2)^(1/2)/(d*(-c^2)^(1/2)+e))^(1/2)/c/d/e/x/(1+1/c^2/x^2)^(1/2)/
(e*x+d)^(1/2)
```

**Rubi [A]** time = 0.57, antiderivative size = 369, normalized size of antiderivative = 1.00, number of steps used = 12, number of rules used = 11, integrand size = 18, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.611, Rules used = {6290, 1574, 958, 745, 21, 719, 424, 933, 168, 538, 537}

$$-\frac{2\left(a+b\text{csch}^{-1}(cx)\right)}{3e(d+ex)^{3/2}}-\frac{4be\left(c^2x^2+1\right)}{3cdx\sqrt{\frac{1}{c^2x^2}+1}\left(c^2d^2+e^2\right)\sqrt{d+ex}}+\frac{4b\sqrt{-c^2}\sqrt{c^2x^2+1}\sqrt{d+ex}\,E\left(\sin^{-1}\left(\frac{\sqrt{1-\sqrt{-c^2}\,x}}{\sqrt{2}}\right)|-\right.}{3cdx\sqrt{\frac{1}{c^2x^2}+1}\left(c^2d^2+e^2\right)\sqrt{\frac{d+ex}{\frac{e}{\sqrt{-c^2}}+d}}}$$

Antiderivative was successfully verified.

```
[In] Int[(a + b*ArcCsch[c*x])/(d + e*x)^(5/2),x]
```

```
[Out] (-4*b*e*(1 + c^2*x^2))/(3*c*d*(c^2*d^2 + e^2)*Sqrt[1 + 1/(c^2*x^2)]*x*Sqrt[
d + e*x]) - (2*(a + b*ArcCsch[c*x]))/(3*e*(d + e*x)^(3/2)) + (4*b*Sqrt[-c^2
]*Sqrt[d + e*x]*Sqrt[1 + c^2*x^2]*EllipticE[ArcSin[Sqrt[1 - Sqrt[-c^2]*x]/S
qrt[2]], (-2*Sqrt[-c^2]*e)/(c^2*d - Sqrt[-c^2]*e)])/(3*c*d*(c^2*d^2 + e^2)*
Sqrt[1 + 1/(c^2*x^2)]*x*Sqrt[(d + e*x)/(d + e/Sqrt[-c^2])]) + (4*b*Sqrt[(Sq
rt[-c^2]*(d + e*x))/(Sqrt[-c^2]*d + e)]*Sqrt[1 + c^2*x^2]*EllipticPi[2, Arc
Sin[Sqrt[1 - Sqrt[-c^2]*x]/Sqrt[2]], (2*e)/(Sqrt[-c^2]*d + e)])/(3*c*d*e*Sq
rt[1 + 1/(c^2*x^2)]*x*Sqrt[d + e*x])
```

Rule 21

```
Int[(u_.)*((a_) + (b_.)*(v_))^(m_.)*((c_) + (d_.)*(v_))^(n_.), x_Symbol] :>
 Dist[(b/d)^m, Int[u*(c + d*v)^(m + n), x], x] /; FreeQ[{a, b, c, d, n}, x]
```

```
&& EqQ[b*c - a*d, 0] && IntegerQ[m] && ( !IntegerQ[n] || SimplerQ[c + d*x,
a + b*x])
```

Rule 168

```
Int[1/(((a_.) + (b_.)*(x_))*Sqrt[(c_.) + (d_.)*(x_)]*Sqrt[(e_.) + (f_.)*(x_
)]*Sqrt[(g_.) + (h_.)*(x_)]), x_Symbol] :> Dist[-2, Subst[Int[1/(Simp[b*c -
 a*d - b*x^2, x]*Sqrt[Simp[(d*e - c*f)/d + (f*x^2)/d, x]]*Sqrt[Simp[(d*g -
c*h)/d + (h*x^2)/d, x]]), x], x, Sqrt[c + d*x]], x] /; FreeQ[{a, b, c, d, e
, f, g, h}, x] && GtQ[(d*e - c*f)/d, 0]
```

Rule 424

```
Int[Sqrt[(a_) + (b_.)*(x_)^2]/Sqrt[(c_) + (d_.)*(x_)^2], x_Symbol] :> Simp[
(Sqrt[a]*EllipticE[ArcSin[Rt[-(d/c), 2]*x], (b*c)/(a*d)])/(Sqrt[c]*Rt[-(d/c
), 2]), x] /; FreeQ[{a, b, c, d}, x] && NegQ[d/c] && GtQ[c, 0] && GtQ[a, 0]
```

Rule 537

```
Int[1/(((a_) + (b_.)*(x_)^2)*Sqrt[(c_) + (d_.)*(x_)^2]*Sqrt[(e_) + (f_.)*(x
_)^2]), x_Symbol] :> Simp[(1*EllipticPi[(b*c)/(a*d), ArcSin[Rt[-(d/c), 2]*x
], (c*f)/(d*e)])/(a*Sqrt[c]*Sqrt[e]*Rt[-(d/c), 2]), x] /; FreeQ[{a, b, c, d
, e, f}, x] &&  !GtQ[d/c, 0] && GtQ[c, 0] && GtQ[e, 0] &&  !( !GtQ[f/e, 0]
&& SimplerSqrtQ[-(f/e), -(d/c)])
```

Rule 538

```
Int[1/(((a_) + (b_.)*(x_)^2)*Sqrt[(c_) + (d_.)*(x_)^2]*Sqrt[(e_) + (f_.)*(x
_)^2]), x_Symbol] :> Dist[Sqrt[1 + (d*x^2)/c]/Sqrt[c + d*x^2], Int[1/((a +
b*x^2)*Sqrt[1 + (d*x^2)/c]*Sqrt[e + f*x^2]), x], x] /; FreeQ[{a, b, c, d, e
, f}, x] &&  !GtQ[c, 0]
```

Rule 719

```
Int[((d_) + (e_.)*(x_))^(m_)/Sqrt[(a_) + (c_.)*(x_)^2], x_Symbol] :> Dist[(
2*a*Rt[-(c/a), 2]*(d + e*x)^m*Sqrt[1 + (c*x^2)/a])/(c*Sqrt[a + c*x^2]*((c*(
d + e*x))/(c*d - a*e*Rt[-(c/a), 2]))^m), Subst[Int[(1 + (2*a*e*Rt[-(c/a), 2
]*x^2)/(c*d - a*e*Rt[-(c/a), 2]))^m/Sqrt[1 - x^2], x], x, Sqrt[(1 - Rt[-(c/
a), 2]*x)/2]], x] /; FreeQ[{a, c, d, e}, x] && NeQ[c*d^2 + a*e^2, 0] && EqQ
[m^2, 1/4]
```

Rule 745

```
Int[((d_) + (e_.)*(x_))^(m_)*((a_) + (c_.)*(x_)^2)^(p_), x_Symbol] :> Simp[
(e*(d + e*x)^(m + 1)*(a + c*x^2)^(p + 1))/((m + 1)*(c*d^2 + a*e^2)), x] + D
```

```
ist[c/((m + 1)*(c*d^2 + a*e^2)), Int[(d + e*x)^(m + 1)*Simp[d*(m + 1) - e*(
m + 2*p + 3)*x, x]*(a + c*x^2)^p, x], x] /; FreeQ[{a, c, d, e, m, p}, x] &&
 NeQ[c*d^2 + a*e^2, 0] && NeQ[m, -1] && ((LtQ[m, -1] && IntQuadraticQ[a, 0,
 c, d, e, m, p, x]) || (SumSimplerQ[m, 1] && IntegerQ[p]) || ILtQ[Simplify[
m + 2*p + 3], 0])
```

Rule 933

```
Int[1/(((d_.) + (e_.)*(x_))*Sqrt[(f_.) + (g_.)*(x_)]*Sqrt[(a_) + (c_.)*(x_)
^2]), x_Symbol] :> With[{q = Rt[-(c/a), 2]}, Dist[Sqrt[1 + (c*x^2)/a]/Sqrt[
a + c*x^2], Int[1/((d + e*x)*Sqrt[f + g*x]*Sqrt[1 - q*x]*Sqrt[1 + q*x]), x]
, x]] /; FreeQ[{a, c, d, e, f, g}, x] && NeQ[e*f - d*g, 0] && NeQ[c*d^2 + a
*e^2, 0] &&  !GtQ[a, 0]
```

Rule 958

```
Int[((f_.) + (g_.)*(x_))^(n_)/(((d_.) + (e_.)*(x_))*Sqrt[(a_) + (c_.)*(x_)^
2]), x_Symbol] :> Int[ExpandIntegrand[1/(Sqrt[f + g*x]*Sqrt[a + c*x^2]), (f
 + g*x)^(n + 1/2)/(d + e*x), x], x] /; FreeQ[{a, c, d, e, f, g}, x] && NeQ[
e*f - d*g, 0] && NeQ[c*d^2 + a*e^2, 0] && IntegerQ[n + 1/2]
```

Rule 1574

```
Int[(x_)^(m_.)*((a_.) + (c_.)*(x_)^(mn2_.))^(p_)*((d_) + (e_.)*(x_)^(n_.))^
(q_.), x_Symbol] :> Dist[(x^(2*n*FracPart[p])*(a + c/x^(2*n))^FracPart[p])/
(c + a*x^(2*n))^FracPart[p], Int[x^(m - 2*n*p)*(d + e*x^n)^q*(c + a*x^(2*n)
)^p, x], x] /; FreeQ[{a, c, d, e, m, n, p, q}, x] && EqQ[mn2, -2*n] &&  !In
tegerQ[p] &&  !IntegerQ[q] && PosQ[n]
```

Rule 6290

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))*((d_.) + (e_.)*(x_))^(m_.), x_Symbo
l] :> Simp[((d + e*x)^(m + 1)*(a + b*ArcCsch[c*x]))/(e*(m + 1)), x] + Dist[
b/(c*e*(m + 1)), Int[(d + e*x)^(m + 1)/(x^2*Sqrt[1 + 1/(c^2*x^2)]), x], x]
/; FreeQ[{a, b, c, d, e, m}, x] && NeQ[m, -1]
```

Rubi steps

$$\int \frac{a+b\operatorname{csch}^{-1}(cx)}{(d+ex)^{5/2}}\,dx = -\frac{2\left(a+b\operatorname{csch}^{-1}(cx)\right)}{3e(d+ex)^{3/2}} - \frac{(2b)\int \frac{1}{\sqrt{1+\frac{1}{c^2x^2}}\,x^2(d+ex)^{3/2}}\,dx}{3ce}$$

$$= -\frac{2\left(a+b\operatorname{csch}^{-1}(cx)\right)}{3e(d+ex)^{3/2}} - \frac{\left(2b\sqrt{\frac{1}{c^2}+x^2}\right)\int \frac{1}{x(d+ex)^{3/2}\sqrt{\frac{1}{c^2}+x^2}}\,dx}{3ce\sqrt{1+\frac{1}{c^2x^2}}\,x}$$

$$= -\frac{2\left(a+b\operatorname{csch}^{-1}(cx)\right)}{3e(d+ex)^{3/2}} - \frac{\left(2b\sqrt{\frac{1}{c^2}+x^2}\right)\int \left(-\frac{e}{d(d+ex)^{3/2}\sqrt{\frac{1}{c^2}+x^2}} + \frac{1}{dx\sqrt{d+ex}\sqrt{\frac{1}{c^2}+x^2}}\right)dx}{3ce\sqrt{1+\frac{1}{c^2x^2}}\,x}$$

$$= -\frac{2\left(a+b\operatorname{csch}^{-1}(cx)\right)}{3e(d+ex)^{3/2}} + \frac{\left(2b\sqrt{\frac{1}{c^2}+x^2}\right)\int \frac{1}{(d+ex)^{3/2}\sqrt{\frac{1}{c^2}+x^2}}\,dx}{3cd\sqrt{1+\frac{1}{c^2x^2}}\,x} - \frac{\left(2b\sqrt{\frac{1}{c^2}+x^2}\right)\int \frac{1}{x\sqrt{d+ex}\ \ldots}}{3cde\sqrt{1+\frac{1}{c^2x^2}}\ \ldots}$$

$$= -\frac{4be\left(1+c^2x^2\right)}{3cd\left(c^2d^2+e^2\right)\sqrt{1+\frac{1}{c^2x^2}}\,x\sqrt{d+ex}} - \frac{2\left(a+b\operatorname{csch}^{-1}(cx)\right)}{3e(d+ex)^{3/2}} - \frac{\left(4bc\sqrt{\frac{1}{c^2}+x^2}\right)\int \frac{-\ldots}{\sqrt{d+ex}\ldots}}{3d\left(c^2d^2+e^2\right)\sqrt{1+\ldots}}$$

$$= -\frac{4be\left(1+c^2x^2\right)}{3cd\left(c^2d^2+e^2\right)\sqrt{1+\frac{1}{c^2x^2}}\,x\sqrt{d+ex}} - \frac{2\left(a+b\operatorname{csch}^{-1}(cx)\right)}{3e(d+ex)^{3/2}} + \frac{\left(2bc\sqrt{\frac{1}{c^2}+x^2}\right)\int \frac{\sqrt{d+e\ldots}}{\sqrt{\frac{1}{c^2}+\ldots}}}{3d\left(c^2d^2+e^2\right)\sqrt{1+\frac{\ldots}{c^2\ldots}}}$$

$$= -\frac{4be\left(1+c^2x^2\right)}{3cd\left(c^2d^2+e^2\right)\sqrt{1+\frac{1}{c^2x^2}}\,x\sqrt{d+ex}} - \frac{2\left(a+b\operatorname{csch}^{-1}(cx)\right)}{3e(d+ex)^{3/2}} + \frac{\left(4b\sqrt{-c^2}\sqrt{d+ex}\sqrt{1+\ldots}\right.}{3cd\left(c\ldots\right.}$$

$$= -\frac{4be\left(1+c^2x^2\right)}{3cd\left(c^2d^2+e^2\right)\sqrt{1+\frac{1}{c^2x^2}}\,x\sqrt{d+ex}} - \frac{2\left(a+b\operatorname{csch}^{-1}(cx)\right)}{3e(d+ex)^{3/2}} + \frac{4b\sqrt{-c^2}\sqrt{d+ex}\sqrt{1+\ldots}}{3cd\left(c^2d^2\ldots\right.}$$

**Mathematica [C]** time = 14.10, size = 892, normalized size = 2.42

$$b\left(\frac{2\left(\frac{d}{x}+e\right)^{5/2}(cx)^{5/2}\left(\frac{i\sqrt{2}\,cd(cd-ie)\sqrt{icx+1}\sqrt{\frac{e(cx+i)(cd+cex)}{(icd+e)^2}}\,\Pi\left(\frac{icd}{e}+1;\sin^{-1}\left(\sqrt{-\frac{e(cx+i)}{cd-ie}}\right)\middle|\frac{icd+e}{2e}\right)}{e\sqrt{1+\frac{1}{c^2x^2}}\sqrt{\frac{d}{x}+e}\,(cx)^{3/2}}+\frac{2e\cosh\left(2\operatorname{csch}^{-1}(cx)\right)\left(cx\left(cd\sqrt{2icx+2}\,(cx+i)\sqrt{\frac{cd+cex}{cd-ie}}\,F\left(\sin^{-1}\left(\sqrt{-\frac{e(cx\cdots}{cd-\cdots}}\right.\right.\right.\right.}{\cdots}\right.}{\cdots}\right.$$

Antiderivative was successfully verified.

```
[In] Integrate[(a + b*ArcCsch[c*x])/(d + e*x)^(5/2),x]
```

```
[Out] (-2*a)/(3*e*(d + e*x)^(3/2)) + (b*(-((c^3*(e + d/x)^3*x^3*((-4*Sqrt[1 + 1/(
c^2*x^2)])/(3*c*d*(c^2*d^2 + e^2)) + (2*ArcCsch[c*x])/(3*c^2*d^2*e) + (2*e*
ArcCsch[c*x])/(3*c^2*d^2*(e + d/x)^2) - (4*(-(c*d*e*Sqrt[1 + 1/(c^2*x^2)])
+ c^2*d^2*ArcCsch[c*x] + e^2*ArcCsch[c*x]))/(3*c^2*d^2*(c^2*d^2 + e^2)*(e +
 d/x))))/(d + e*x)^(5/2)) + (2*(e + d/x)^(5/2)*(c*x)^(5/2)*((I*Sqrt[2]*c*d*
(c*d - I*e)*Sqrt[1 + I*c*x]*Sqrt[(e*(I + c*x)*(c*d + c*e*x))/(I*c*d + e)^2]
*EllipticPi[1 + (I*c*d)/e, ArcSin[Sqrt[-((e*(I + c*x))/(c*d - I*e))]], (I*c
*d + e)/(2*e)])/(e*Sqrt[1 + 1/(c^2*x^2)]*Sqrt[e + d/x]*(c*x)^(3/2)) + (2*e*
Cosh[2*ArcCsch[c*x]]*(-((c*d + c*e*x)*(1 + c^2*x^2)) + (c*x*(c*d*Sqrt[2 + (
2*I)*c*x]*(I + c*x)*Sqrt[(c*d + c*e*x)/(c*d - I*e)]*EllipticF[ArcSin[Sqrt[-
((e*(I + c*x))/(c*d - I*e))]], (I*c*d + e)/(2*e)] + 2*Sqrt[-((e*(-I + c*x))
/(c*d + I*e))]*(I + c*x)*Sqrt[(c*d + c*e*x)/(c*d - I*e)]*((c*d + I*e)*Ellip
ticE[ArcSin[Sqrt[(c*d + c*e*x)/(c*d - I*e)]], (c*d - I*e)/(c*d + I*e)] - I*
e*EllipticF[ArcSin[Sqrt[(c*d + c*e*x)/(c*d - I*e)]], (c*d - I*e)/(c*d + I*e
)]) + (I*c*d + e)*Sqrt[2 + (2*I)*c*x]*Sqrt[-((e*(I + c*x))/(c*d - I*e))]*Sq
rt[(e*(I + c*x)*(c*d + c*e*x))/(I*c*d + e)^2]*EllipticPi[1 + (I*c*d)/e, Arc
Sin[Sqrt[-((e*(I + c*x))/(c*d - I*e))]], (I*c*d + e)/(2*e)]))/(2*Sqrt[-((e*
(I + c*x))/(c*d - I*e))])))/(c*d*Sqrt[1 + 1/(c^2*x^2)]*Sqrt[e + d/x]*Sqrt[c
*x]*(2 + c^2*x^2))))/(3*e*(c^2*d^2 + e^2)*(d + e*x)^(5/2))))/c
```

**fricas [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*arccsch(c*x))/(e*x+d)^(5/2),x, algorithm="fricas")

[Out] Timed out

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

$$\int \frac{b \operatorname{arcsch}(cx) + a}{(ex + d)^{\frac{5}{2}}} \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

[In] integrate((a+b*arccsch(c*x))/(e*x+d)^(5/2),x, algorithm="giac")

[Out] integrate((b*arccsch(c*x) + a)/(e*x + d)^(5/2), x)

**maple [C]** time = 0.07, size = 2079, normalized size = 5.63

result too large to display

Verification of antiderivative is not currently implemented for this CAS.

[In] int((a+b*arccsch(c*x))/(e*x+d)^(5/2),x)

[Out] 2/e*(-1/3/(e*x+d)^(3/2)*a+b*(-1/3/(e*x+d)^(3/2)*arccsch(c*x)-2/3/c*(-I*(-(I*(e*x+d)*c*e+(e*x+d)*c^2*d-c^2*d^2-e^2)/(c^2*d^2+e^2))^(1/2)*((I*(e*x+d)*c*e-(e*x+d)*c^2*d+c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2)*EllipticPi((e*x+d)^(1/2)*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2),1/(I*e+c*d)/c*(c^2*d^2+e^2)/d,(-(I*e-c*d)*c/(c^2*d^2+e^2))^(1/2)/((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2))*(e*x+d)^(1/2)*e^3-((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2)*(e*x+d)^2*c^3*d^2+I*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2)*d*e^3+(-(I*(e*x+d)*c*e+(e*x+d)*c^2*d-c^2*d^2-e^2)/(c^2*d^2+e^2))^(1/2)*((I*(e*x+d)*c*e-(e*x+d)*c^2*d+c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2)*EllipticPi((e*x+d)^(1/2)*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2),1/(I*e+c*d)/c*(c^2*d^2+e^2)/d,(-(I*e-c*d)*c/(c^2*d^2+e^2))^(1/2)/((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2))*(e*x+d)^(1/2)*c^3*d^3+(-(I*(e*x+d)*c*e+(e*x+d)*c^2*d-c^2*d^2-e^2)/(c^2*d^2+e^2))^(1/2)*((I*(e*x+d)*c*e-(e*x+d)*c^2*d+c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2)*EllipticF((e*x+d)^(1/2)*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2),(-(2*I*c*d*e-c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2))*(e*x+d)^(1/2)*c^3*d^3-(-(I*(e*x+d)*c*e+(e*x+d)*c^2*d-c^2*d^2-e^2)/(c^2*d^2+e^2))^(1/2)*((I*(e*x+d)*c*e-(e*x+d)*c^2*d+c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2)*EllipticE((e*x+d)^(1/2)*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2),(-(2*I*c*d*e-c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2))*(e*x+d)^(1/2)*c^3*d^3-2*I*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2)*(e*x+d)*c^2*d^2*e+2*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2)*(e*x+d)*c^3*d^3-I*(-(I*(e*x+d)*c*e+(e*x+d)*c^2*d-c^2*d^2-e^2)/(c^2*d^2+e^2))^(1/2)*((I*(e*x+d)*c*e-(e*x+d)*c^2*d+c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2)*EllipticPi((e*x+d)^(1/2)*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2),1/(I*e+c*d)/c*(c^2*d^2+e^2)/d,(-(I*e-c*d)*c/(c^2*d^2+e^2))^(1/2)/((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2))*(e*x+d)^(1/2)*c^2*d^2*e-((I*e+c*

```
d)*c/(c^2*d^2+e^2))^(1/2)*c^3*d^4+I*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2)*c^2*d
^3*e+(-(I*(e*x+d)*c*e+(e*x+d)*c^2*d-c^2*d^2-e^2)/(c^2*d^2+e^2))^(1/2)*((I*(
e*x+d)*c*e-(e*x+d)*c^2*d+c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2)*EllipticPi((e*x+
d)^(1/2)*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2),1/(I*e+c*d)/c*(c^2*d^2+e^2)/d,(-
(I*e-c*d)*c/(c^2*d^2+e^2))^(1/2)/((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2))*(e*x+d)
^(1/2)*c*d*e^2+(-(I*(e*x+d)*c*e+(e*x+d)*c^2*d-c^2*d^2-e^2)/(c^2*d^2+e^2))^(
1/2)*((I*(e*x+d)*c*e-(e*x+d)*c^2*d+c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2)*Ellipt
icF((e*x+d)^(1/2)*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2),(-(2*I*c*d*e-c^2*d^2+e^
2)/(c^2*d^2+e^2))^(1/2))*(e*x+d)^(1/2)*c*d*e^2-(-(I*(e*x+d)*c*e+(e*x+d)*c^2
*d-c^2*d^2-e^2)/(c^2*d^2+e^2))^(1/2)*((I*(e*x+d)*c*e-(e*x+d)*c^2*d+c^2*d^2+
e^2)/(c^2*d^2+e^2))^(1/2)*EllipticE((e*x+d)^(1/2)*((I*e+c*d)*c/(c^2*d^2+e^2
))^(1/2),(-(2*I*c*d*e-c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2))*(e*x+d)^(1/2)*c*d*
e^2+I*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2)*(e*x+d)^2*c^2*d*e-((I*e+c*d)*c/(c^2
*d^2+e^2))^(1/2)*c*d^2*e^2)/(((e*x+d)^2*c^2-2*(e*x+d)*c^2*d+c^2*d^2+e^2)/c^
2/x^2/e^2)^(1/2)/x/d^2/((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2)/(c^2*d^2+e^2)/(e*x
+d)^(1/2)/(I*e-c*d)))
```

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

$$-\frac{1}{3}\left(6\,c^2\int\frac{x}{3\left(\left(c^2e^2x^3+c^2dex^2+e^2x+de\right)\sqrt{c^2x^2+1}\,\sqrt{ex+d}+\left(c^2e^2x^3+c^2dex^2+e^2x+de\right)\sqrt{ex+d}\right)}\,dx+\frac{2\,\mathrm{lo}}{(e}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))/(e*x+d)^(5/2),x, algorithm="maxima")
```

```
[Out] -1/3*(6*c^2*integrate(1/3*x/((c^2*e^2*x^3 + c^2*d*e*x^2 + e^2*x + d*e)*sqrt
(c^2*x^2 + 1)*sqrt(e*x + d) + (c^2*e^2*x^3 + c^2*d*e*x^2 + e^2*x + d*e)*sqr
t(e*x + d)), x) + 2*log(sqrt(c^2*x^2 + 1) + 1)/((e^2*x + d*e)*sqrt(e*x + d)
) + 3*integrate(1/3*((3*e*log(c) - 2*e)*c^2*x^2 - 2*c^2*d*x + 3*e*log(c) +
3*(c^2*e*x^2 + e)*log(x))/((c^2*e^3*x^4 + 2*c^2*d*e^2*x^3 + 2*d*e^2*x + d^2
*e + (c^2*d^2*e + e^3)*x^2)*sqrt(e*x + d)), x))*b - 2/3*a/((e*x + d)^(3/2)*
e)
```

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

$$\int \frac{a+b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)}{{\left(d+e\,x\right)}^{5/2}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a + b*asinh(1/(c*x)))/(d + e*x)^(5/2),x)
```

```
[Out] int((a + b*asinh(1/(c*x)))/(d + e*x)^(5/2), x)
```

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

$$\int \frac{a + b\operatorname{acsch}(cx)}{(d + ex)^{\frac{5}{2}}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*acsch(c*x))/(e*x+d)**(5/2),x)
```

```
[Out] Integral((a + b*acsch(c*x))/(d + e*x)**(5/2), x)
```

# 3.73 $\int \frac{a+b\text{csch}^{-1}(cx)}{x(d+ex)^{5/2}}\,dx$

**Optimal**. Leaf size=24

$$\text{Int}\left(\frac{a+b\text{csch}^{-1}(cx)}{x(d+ex)^{5/2}},x\right)$$

```
[Out] Unintegrable((a+b*arccsch(c*x))/x/(e*x+d)^(5/2),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 = {}

$$\int \frac{a+b\text{csch}^{-1}(cx)}{x(d+ex)^{5/2}}\,dx$$

Verification is Not applicable to the result.

```
[In] Int[(a + b*ArcCsch[c*x])/(x*(d + e*x)^(5/2)),x]
```

```
[Out] Defer[Int][(a + b*ArcCsch[c*x])/(x*(d + e*x)^(5/2)), x]
```

Rubi steps

$$\int \frac{a+b\text{csch}^{-1}(cx)}{x(d+ex)^{5/2}}\,dx=\int \frac{a+b\text{csch}^{-1}(cx)}{x(d+ex)^{5/2}}\,dx$$

**Mathematica [A]** time = 28.84, size = 0, normalized size = 0.00

$$\int \frac{a+b\text{csch}^{-1}(cx)}{x(d+ex)^{5/2}}\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[(a + b*ArcCsch[c*x])/(x*(d + e*x)^(5/2)),x]
```

```
[Out] Integrate[(a + b*ArcCsch[c*x])/(x*(d + e*x)^(5/2)), x]
```

**fricas [A]** time = 3.64, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{\sqrt{ex+d}\,(b\,\text{arcsch}\,(cx)+a)}{e^3x^4+3\,de^2x^3+3\,d^2ex^2+d^3x},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))/x/(e*x+d)^(5/2),x, algorithm="fricas")
```

```
[Out] integral(sqrt(e*x + d)*(b*arccsch(c*x) + a)/(e^3*x^4 + 3*d*e^2*x^3 + 3*d^2*
e*x^2 + d^3*x), x)
```

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

$$\int \frac{b \operatorname{arcsch}(cx) + a}{(ex+d)^{\frac{5}{2}} x} \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))/x/(e*x+d)^(5/2),x, algorithm="giac")
```

```
[Out] integrate((b*arccsch(c*x) + a)/((e*x + d)^(5/2)*x), x)
```

**maple** [F(-2)] time = 180.00, size = 0, normalized size = 0.00

$$\int \frac{a + b \operatorname{arccsch}(cx)}{x (ex+d)^{\frac{5}{2}}} \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a+b*arccsch(c*x))/x/(e*x+d)^(5/2),x)
```

```
[Out] int((a+b*arccsch(c*x))/x/(e*x+d)^(5/2),x)
```

**maxima** [A] time = 0.00, size = 0, normalized size = 0.00

$$-\frac{1}{3} b \left( \frac{\left( \frac{3 e \log\left(\frac{\sqrt{ex+d}-\sqrt{d}}{\sqrt{ex+d}+\sqrt{d}}\right)}{d^{\frac{5}{2}}} + \frac{2(3(ex+d)e+de)}{(ex+d)^{\frac{3}{2}} d^2} \right) \log(c)}{e} + 3 \int \frac{\log(x)}{\sqrt{ex+d}\, e^2 x^3 + 2\sqrt{ex+d}\, dex^2 + \sqrt{ex+d}\, d^2 x} \, dx - 3 \int \frac{}{\sqrt{}} \right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))/x/(e*x+d)^(5/2),x, algorithm="maxima")
```

```
[Out] -1/3*b*((3*e*log((sqrt(e*x + d) - sqrt(d))/(sqrt(e*x + d) + sqrt(d)))/d^(5/
2) + 2*(3*(e*x + d)*e + d*e)/((e*x + d)^(3/2)*d^2))*log(c)/e + 3*integrate(
log(x)/(sqrt(e*x + d)*e^2*x^3 + 2*sqrt(e*x + d)*d*e*x^2 + sqrt(e*x + d)*d^2
*x), x) - 3*integrate(log(sqrt(c^2*x^2 + 1) + 1)/(sqrt(e*x + d)*e^2*x^3 + 2
*sqrt(e*x + d)*d*e*x^2 + sqrt(e*x + d)*d^2*x), x)) + 1/3*a*(3*log((sqrt(e*x
 + d) - sqrt(d))/(sqrt(e*x + d) + sqrt(d)))/d^(5/2) + 2*(3*e*x + 4*d)/((e*x
 + d)^(3/2)*d^2))
```

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

$$\int \frac{a+b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)}{x\,{\left(d+e\,x\right)}^{5/2}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a + b*asinh(1/(c*x)))/(x*(d + e*x)^(5/2)),x)
[Out] int((a + b*asinh(1/(c*x)))/(x*(d + e*x)^(5/2)), 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*acsch(c*x))/x/(e*x+d)**(5/2),x)
[Out] Timed out
```

## 3.74 $\int \frac{a+b\text{csch}^{-1}(cx)}{x^2(d+ex)^{5/2}}\,dx$

**Optimal**. Leaf size=24

$$\text{Int}\left(\frac{a+b\text{csch}^{-1}(cx)}{x^2(d+ex)^{5/2}},x\right)$$

```
[Out] Unintegrable((a+b*arccsch(c*x))/x^2/(e*x+d)^(5/2),x)
```

**Rubi [A]** time = 0.11, 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 = {}

$$\int \frac{a+b\text{csch}^{-1}(cx)}{x^2(d+ex)^{5/2}}\,dx$$

Verification is Not applicable to the result.

```
[In] Int[(a + b*ArcCsch[c*x])/(x^2*(d + e*x)^(5/2)),x]
```

```
[Out] Defer[Int][(a + b*ArcCsch[c*x])/(x^2*(d + e*x)^(5/2)), x]
```

Rubi steps

$$\int \frac{a+b\text{csch}^{-1}(cx)}{x^2(d+ex)^{5/2}}\,dx=\int \frac{a+b\text{csch}^{-1}(cx)}{x^2(d+ex)^{5/2}}\,dx$$

**Mathematica [A]** time = 28.47, size = 0, normalized size = 0.00

$$\int \frac{a+b\text{csch}^{-1}(cx)}{x^2(d+ex)^{5/2}}\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[(a + b*ArcCsch[c*x])/(x^2*(d + e*x)^(5/2)),x]
```

```
[Out] Integrate[(a + b*ArcCsch[c*x])/(x^2*(d + e*x)^(5/2)), x]
```

**fricas [A]** time = 2.04, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{\sqrt{ex+d}\,(b\,\text{arcsch}\,(cx)+a)}{e^3x^5+3\,de^2x^4+3\,d^2ex^3+d^3x^2},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))/x^2/(e*x+d)^(5/2),x, algorithm="fricas")
```

```
[Out] integral(sqrt(e*x + d)*(b*arccsch(c*x) + a)/(e^3*x^5 + 3*d*e^2*x^4 + 3*d^2*
e*x^3 + d^3*x^2), x)
```

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

$$\int \frac{b \operatorname{arcsch}(cx) + a}{(ex+d)^{\frac{5}{2}} x^2}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))/x^2/(e*x+d)^(5/2),x, algorithm="giac")
```

```
[Out] integrate((b*arccsch(c*x) + a)/((e*x + d)^(5/2)*x^2), x)
```

**maple [F(-2)]** time = 180.00, size = 0, normalized size = 0.00

$$\int \frac{a + b \operatorname{arccsch}(cx)}{x^2 (ex+d)^{\frac{5}{2}}}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a+b*arccsch(c*x))/x^2/(e*x+d)^(5/2),x)
```

```
[Out] int((a+b*arccsch(c*x))/x^2/(e*x+d)^(5/2),x)
```

**maxima [A]** time = 0.00, size = 0, normalized size = 0.00

$$\frac{1}{6} b \left( \frac{\left( \frac{2\left(15 (ex+d)^2 e^2 - 10 (ex+d) d e^2 - 2 d^2 e^2\right)}{(ex+d)^{\frac{5}{2}} d^3 - (ex+d)^{\frac{3}{2}} d^4} + \frac{15 e^2 \log\left(\frac{\sqrt{ex+d} - \sqrt{d}}{\sqrt{ex+d} + \sqrt{d}}\right)}{d^{\frac{7}{2}}} \right) \log(c)}{e} - 6 \int \frac{\log(x)}{\sqrt{ex+d}\, e^2 x^4 + 2 \sqrt{ex+d}\, d e x^3 + \sqrt{ex+d}\, d$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))/x^2/(e*x+d)^(5/2),x, algorithm="maxima")
```

```
[Out] 1/6*b*((2*(15*(e*x + d)^2*e^2 - 10*(e*x + d)*d*e^2 - 2*d^2*e^2)/((e*x + d)^
(5/2)*d^3 - (e*x + d)^(3/2)*d^4) + 15*e^2*log((sqrt(e*x + d) - sqrt(d))/(sq
rt(e*x + d) + sqrt(d)))/d^(7/2))*log(c)/e - 6*integrate(log(x)/(sqrt(e*x +
d)*e^2*x^4 + 2*sqrt(e*x + d)*d*e*x^3 + sqrt(e*x + d)*d^2*x^2), x) + 6*integ
rate(log(sqrt(c^2*x^2 + 1) + 1)/(sqrt(e*x + d)*e^2*x^4 + 2*sqrt(e*x + d)*d*
e*x^3 + sqrt(e*x + d)*d^2*x^2), x)) - 1/6*a*(2*(15*(e*x + d)^2*e - 10*(e*x
```

```
+ d)*d*e - 2*d^2*e)/((e*x + d)^(5/2)*d^3 - (e*x + d)^(3/2)*d^4) + 15*e*log(
(sqrt(e*x + d) - sqrt(d))/(sqrt(e*x + d) + sqrt(d)))/d^(7/2))
```

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

$$\int \frac{a + b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)}{x^2\,(d + e\,x)^{5/2}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a + b*asinh(1/(c*x)))/(x^2*(d + e*x)^(5/2)),x)
[Out] int((a + b*asinh(1/(c*x)))/(x^2*(d + e*x)^(5/2)), 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*acsch(c*x))/x**2/(e*x+d)**(5/2),x)
[Out] Timed out
```

## 3.75 $\int \frac{a+b\textbf{csch}^{-1}(cx)}{(d+ex)^{7/2}}\,dx$

**Optimal**. Leaf size=648

$$-\frac{2\left(a+b\text{csch}^{-1}(cx)\right)}{5e(d+ex)^{5/2}}-\frac{4be\left(c^2x^2+1\right)}{5cd^2x\sqrt{\frac{1}{c^2x^2}+1}\left(c^2d^2+e^2\right)\sqrt{d+ex}}-\frac{16bce\left(c^2x^2+1\right)}{15x\sqrt{\frac{1}{c^2x^2}+1}\left(c^2d^2+e^2\right)^2\sqrt{d+ex}}-\frac{4b\cdots}{15cdx\sqrt{\frac{1}{c^2x^2}+\cdots}}$$

```
[Out] -2/5*(a+b*arccsch(c*x))/e/(e*x+d)^(5/2)-4/15*b*e*(c^2*x^2+1)/c/d/(c^2*d^2+e
^2)/x/(e*x+d)^(3/2)/(1+1/c^2/x^2)^(1/2)-16/15*b*c*e*(c^2*x^2+1)/(c^2*d^2+e^
2)^2/x/(1+1/c^2/x^2)^(1/2)/(e*x+d)^(1/2)-4/5*b*e*(c^2*x^2+1)/c/d^2/(c^2*d^2
+e^2)/x/(1+1/c^2/x^2)^(1/2)/(e*x+d)^(1/2)-4/15*b*c*(7*c^2*d^2+3*e^2)*Ellipt
icE(1/2*(1-(-c^2)^(1/2)*x)^(1/2)*2^(1/2),2^(1/2)*(e*(-c^2)^(1/2)/(-c^2*d+e*
(-c^2)^(1/2)))^(1/2))*(e*x+d)^(1/2)*(c^2*x^2+1)^(1/2)/d^2/(c^2*d^2+e^2)^2/x
/(-c^2)^(1/2)/(1+1/c^2/x^2)^(1/2)/((e*x+d)/(d+e/(-c^2)^(1/2)))^(1/2)-4/15*b
*EllipticF(1/2*(1-(-c^2)^(1/2)*x)^(1/2)*2^(1/2),(-2*e*(-c^2)^(1/2)/(c^2*d-e
*(-c^2)^(1/2)))^(1/2))*(-c^2)^(1/2)*(c^2*x^2+1)^(1/2)*((e*x+d)/(d+e/(-c^2)^
(1/2)))^(1/2)/c/d/(c^2*d^2+e^2)/x/(1+1/c^2/x^2)^(1/2)/(e*x+d)^(1/2)+4/5*b*E
llipticPi(1/2*(1-(-c^2)^(1/2)*x)^(1/2)*2^(1/2),2,2^(1/2)*(e/(d*(-c^2)^(1/2)
+e))^(1/2))*(c^2*x^2+1)^(1/2)*((e*x+d)*(-c^2)^(1/2)/(d*(-c^2)^(1/2)+e))^(1/
2)/c/d^2/e/x/(1+1/c^2/x^2)^(1/2)/(e*x+d)^(1/2)
```

**Rubi [A]** time = 1.04, antiderivative size = 785, normalized size of antiderivative = 1.21, number of steps used = 19, number of rules used = 14, integrand size = 18, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.778, Rules used = {6290, 1574, 958, 745, 835, 844, 719, 424, 419, 21, 933, 168, 538, 537}

$$-\frac{2\left(a+b\text{csch}^{-1}(cx)\right)}{5e(d+ex)^{5/2}}-\frac{4be\left(c^2x^2+1\right)}{5cd^2x\sqrt{\frac{1}{c^2x^2}+1}\left(c^2d^2+e^2\right)\sqrt{d+ex}}-\frac{16bce\left(c^2x^2+1\right)}{15x\sqrt{\frac{1}{c^2x^2}+1}\left(c^2d^2+e^2\right)^2\sqrt{d+ex}}-\frac{4b\cdots}{15cdx\sqrt{\frac{1}{c^2x^2}+\cdots}}$$

Antiderivative was successfully verified.

```
[In] Int[(a + b*ArcCsch[c*x])/(d + e*x)^(7/2),x]
```

```
[Out] (-4*b*e*(1 + c^2*x^2))/(15*c*d*(c^2*d^2 + e^2)*Sqrt[1 + 1/(c^2*x^2)]*x*(d +
 e*x)^(3/2)) - (16*b*c*e*(1 + c^2*x^2))/(15*(c^2*d^2 + e^2)^2*Sqrt[1 + 1/(c
^2*x^2)]*x*Sqrt[d + e*x]) - (4*b*e*(1 + c^2*x^2))/(5*c*d^2*(c^2*d^2 + e^2)*
Sqrt[1 + 1/(c^2*x^2)]*x*Sqrt[d + e*x]) - (2*(a + b*ArcCsch[c*x]))/(5*e*(d +
 e*x)^(5/2)) + (16*b*c*Sqrt[-c^2]*Sqrt[d + e*x]*Sqrt[1 + c^2*x^2]*EllipticE
```

```
[ArcSin[Sqrt[1 - Sqrt[-c^2]*x]/Sqrt[2]], (-2*Sqrt[-c^2]*e)/(c^2*d - Sqrt[-c
^2]*e)])/(15*(c^2*d^2 + e^2)^2*Sqrt[1 + 1/(c^2*x^2)]*x*Sqrt[(d + e*x)/(d +
e/Sqrt[-c^2])]) + (4*b*Sqrt[-c^2]*Sqrt[d + e*x]*Sqrt[1 + c^2*x^2]*EllipticE
[ArcSin[Sqrt[1 - Sqrt[-c^2]*x]/Sqrt[2]], (-2*Sqrt[-c^2]*e)/(c^2*d - Sqrt[-c
^2]*e)])/(5*c*d^2*(c^2*d^2 + e^2)*Sqrt[1 + 1/(c^2*x^2)]*x*Sqrt[(d + e*x)/(d
 + e/Sqrt[-c^2])]) - (4*b*Sqrt[-c^2]*Sqrt[(d + e*x)/(d + e/Sqrt[-c^2])]*Sqr
t[1 + c^2*x^2]*EllipticF[ArcSin[Sqrt[1 - Sqrt[-c^2]*x]/Sqrt[2]], (-2*Sqrt[-
c^2]*e)/(c^2*d - Sqrt[-c^2]*e)])/(15*c*d*(c^2*d^2 + e^2)*Sqrt[1 + 1/(c^2*x^
2)]*x*Sqrt[d + e*x]) + (4*b*Sqrt[(Sqrt[-c^2]*(d + e*x))/(Sqrt[-c^2]*d + e)]
*Sqrt[1 + c^2*x^2]*EllipticPi[2, ArcSin[Sqrt[1 - Sqrt[-c^2]*x]/Sqrt[2]], (2
*e)/(Sqrt[-c^2]*d + e)])/(5*c*d^2*e*Sqrt[1 + 1/(c^2*x^2)]*x*Sqrt[d + e*x])
```

Rule 21

```
Int[(u_.)*((a_) + (b_.)*(v_))^(m_.)*((c_) + (d_.)*(v_))^(n_.), x_Symbol] :>
 Dist[(b/d)^m, Int[u*(c + d*v)^(m + n), x], x] /; FreeQ[{a, b, c, d, n}, x]
 && EqQ[b*c - a*d, 0] && IntegerQ[m] && ( !IntegerQ[n] || SimplerQ[c + d*x,
 a + b*x])
```

Rule 168

```
Int[1/(((a_.) + (b_.)*(x_))*Sqrt[(c_.) + (d_.)*(x_)]*Sqrt[(e_.) + (f_.)*(x_
)]*Sqrt[(g_.) + (h_.)*(x_)]), x_Symbol] :> Dist[-2, Subst[Int[1/(Simp[b*c -
 a*d - b*x^2, x]*Sqrt[Simp[(d*e - c*f)/d + (f*x^2)/d, x]]*Sqrt[Simp[(d*g -
c*h)/d + (h*x^2)/d, x]]), x], x, Sqrt[c + d*x]], x] /; FreeQ[{a, b, c, d, e
, f, g, h}, x] && GtQ[(d*e - c*f)/d, 0]
```

Rule 419

```
Int[1/(Sqrt[(a_) + (b_.)*(x_)^2]*Sqrt[(c_) + (d_.)*(x_)^2]), x_Symbol] :> S
imp[(1*EllipticF[ArcSin[Rt[-(d/c), 2]*x], (b*c)/(a*d)])/(Sqrt[a]*Sqrt[c]*Rt
[-(d/c), 2]), x] /; FreeQ[{a, b, c, d}, x] && NegQ[d/c] && GtQ[c, 0] && GtQ
[a, 0] &&  !(NegQ[b/a] && SimplerSqrtQ[-(b/a), -(d/c)])
```

Rule 424

```
Int[Sqrt[(a_) + (b_.)*(x_)^2]/Sqrt[(c_) + (d_.)*(x_)^2], x_Symbol] :> Simp[
(Sqrt[a]*EllipticE[ArcSin[Rt[-(d/c), 2]*x], (b*c)/(a*d)])/(Sqrt[c]*Rt[-(d/c
), 2]), x] /; FreeQ[{a, b, c, d}, x] && NegQ[d/c] && GtQ[c, 0] && GtQ[a, 0]
```

Rule 537

```
Int[1/(((a_) + (b_.)*(x_)^2)*Sqrt[(c_) + (d_.)*(x_)^2]*Sqrt[(e_) + (f_.)*(x
_)^2]), x_Symbol] :> Simp[(1*EllipticPi[(b*c)/(a*d), ArcSin[Rt[-(d/c), 2]*x
], (c*f)/(d*e)])/(a*Sqrt[c]*Sqrt[e]*Rt[-(d/c), 2]), x] /; FreeQ[{a, b, c, d
, e, f}, x] &&  !GtQ[d/c, 0] && GtQ[c, 0] && GtQ[e, 0] &&  !( !GtQ[f/e, 0]
```

```
&& SimplerSqrtQ[-(f/e), -(d/c)])
```

Rule 538

```
Int[1/(((a_) + (b_.)*(x_)^2)*Sqrt[(c_) + (d_.)*(x_)^2]*Sqrt[(e_) + (f_.)*(x
_)^2]), x_Symbol] :> Dist[Sqrt[1 + (d*x^2)/c]/Sqrt[c + d*x^2], Int[1/((a +
b*x^2)*Sqrt[1 + (d*x^2)/c]*Sqrt[e + f*x^2]), x], x] /; FreeQ[{a, b, c, d, e
, f}, x] &&  !GtQ[c, 0]
```

Rule 719

```
Int[((d_) + (e_.)*(x_))^(m_)/Sqrt[(a_) + (c_.)*(x_)^2], x_Symbol] :> Dist[(
2*a*Rt[-(c/a), 2]*(d + e*x)^m*Sqrt[1 + (c*x^2)/a])/(c*Sqrt[a + c*x^2]*((c*(
d + e*x))/(c*d - a*e*Rt[-(c/a), 2]))^m), Subst[Int[(1 + (2*a*e*Rt[-(c/a), 2
]*x^2)/(c*d - a*e*Rt[-(c/a), 2]))^m/Sqrt[1 - x^2], x], x, Sqrt[(1 - Rt[-(c/
a), 2]*x)/2]], x] /; FreeQ[{a, c, d, e}, x] && NeQ[c*d^2 + a*e^2, 0] && EqQ
[m^2, 1/4]
```

Rule 745

```
Int[((d_) + (e_.)*(x_))^(m_)*((a_) + (c_.)*(x_)^2)^(p_), x_Symbol] :> Simp[
(e*(d + e*x)^(m + 1)*(a + c*x^2)^(p + 1))/((m + 1)*(c*d^2 + a*e^2)), x] + D
ist[c/((m + 1)*(c*d^2 + a*e^2)), Int[(d + e*x)^(m + 1)*Simp[d*(m + 1) - e*(
m + 2*p + 3)*x, x]*(a + c*x^2)^p, x], x] /; FreeQ[{a, c, d, e, m, p}, x] &&
 NeQ[c*d^2 + a*e^2, 0] && NeQ[m, -1] && ((LtQ[m, -1] && IntQuadraticQ[a, 0,
 c, d, e, m, p, x]) || (SumSimplerQ[m, 1] && IntegerQ[p]) || ILtQ[Simplify[
m + 2*p + 3], 0])
```

Rule 835

```
Int[((d_.) + (e_.)*(x_))^(m_)*((f_.) + (g_.)*(x_))*((a_) + (c_.)*(x_)^2)^(p
_.), x_Symbol] :> Simp[((e*f - d*g)*(d + e*x)^(m + 1)*(a + c*x^2)^(p + 1))/
((m + 1)*(c*d^2 + a*e^2)), x] + Dist[1/((m + 1)*(c*d^2 + a*e^2)), Int[(d +
e*x)^(m + 1)*(a + c*x^2)^p*Simp[(c*d*f + a*e*g)*(m + 1) - c*(e*f - d*g)*(m
+ 2*p + 3)*x, x], x], x] /; FreeQ[{a, c, d, e, f, g, p}, x] && NeQ[c*d^2 +
a*e^2, 0] && LtQ[m, -1] && (IntegerQ[m] || IntegerQ[p] || IntegersQ[2*m, 2*
p])
```

Rule 844

```
Int[((d_.) + (e_.)*(x_))^(m_)*((f_.) + (g_.)*(x_))*((a_) + (c_.)*(x_)^2)^(p
_.), x_Symbol] :> Dist[g/e, Int[(d + e*x)^(m + 1)*(a + c*x^2)^p, x], x] + D
ist[(e*f - d*g)/e, Int[(d + e*x)^m*(a + c*x^2)^p, x], x] /; FreeQ[{a, c, d,
 e, f, g, m, p}, x] && NeQ[c*d^2 + a*e^2, 0] &&  !IGtQ[m, 0]
```

Rule 933

```
Int[1/(((d_.) + (e_.)*(x_))*Sqrt[(f_.) + (g_.)*(x_)]*Sqrt[(a_) + (c_.)*(x_)
^2]), x_Symbol] :> With[{q = Rt[-(c/a), 2]}, Dist[Sqrt[1 + (c*x^2)/a]/Sqrt[
a + c*x^2], Int[1/((d + e*x)*Sqrt[f + g*x]*Sqrt[1 - q*x]*Sqrt[1 + q*x]), x]
, x]] /; FreeQ[{a, c, d, e, f, g}, x] && NeQ[e*f - d*g, 0] && NeQ[c*d^2 + a
*e^2, 0] &&  !GtQ[a, 0]
```

Rule 958

```
Int[((f_.) + (g_.)*(x_))^(n_)/(((d_.) + (e_.)*(x_))*Sqrt[(a_) + (c_.)*(x_)^
2]), x_Symbol] :> Int[ExpandIntegrand[1/(Sqrt[f + g*x]*Sqrt[a + c*x^2]), (f
 + g*x)^(n + 1/2)/(d + e*x), x], x] /; FreeQ[{a, c, d, e, f, g}, x] && NeQ[
e*f - d*g, 0] && NeQ[c*d^2 + a*e^2, 0] && IntegerQ[n + 1/2]
```

Rule 1574

```
Int[(x_)^(m_.)*((a_.) + (c_.)*(x_)^(mn2_.))^(p_)*((d_) + (e_.)*(x_)^(n_.))^
(q_.), x_Symbol] :> Dist[(x^(2*n*FracPart[p])*(a + c/x^(2*n))^FracPart[p])/
(c + a*x^(2*n))^FracPart[p], Int[x^(m - 2*n*p)*(d + e*x^n)^q*(c + a*x^(2*n)
)^p, x], x] /; FreeQ[{a, c, d, e, m, n, p, q}, x] && EqQ[mn2, -2*n] &&  !In
tegerQ[p] &&  !IntegerQ[q] && PosQ[n]
```

Rule 6290

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))*((d_.) + (e_.)*(x_))^(m_.), x_Symbo
l] :> Simp[((d + e*x)^(m + 1)*(a + b*ArcCsch[c*x]))/(e*(m + 1)), x] + Dist[
b/(c*e*(m + 1)), Int[(d + e*x)^(m + 1)/(x^2*Sqrt[1 + 1/(c^2*x^2)]), x], x]
 /; FreeQ[{a, b, c, d, e, m}, x] && NeQ[m, -1]
```

Rubi steps

$$\int \frac{a+b\,\text{csch}^{-1}(cx)}{(d+ex)^{7/2}}\,dx = -\frac{2\left(a+b\,\text{csch}^{-1}(cx)\right)}{5e(d+ex)^{5/2}} - \frac{(2b)\int \frac{1}{\sqrt{1+\frac{1}{c^2x^2}}\,x^2(d+ex)^{5/2}}\,dx}{5ce}$$

$$= -\frac{2\left(a+b\,\text{csch}^{-1}(cx)\right)}{5e(d+ex)^{5/2}} - \frac{\left(2b\sqrt{\frac{1}{c^2}+x^2}\right)\int \frac{1}{x(d+ex)^{5/2}\sqrt{\frac{1}{c^2}+x^2}}\,dx}{5ce\sqrt{1+\frac{1}{c^2x^2}}\,x}$$

$$= -\frac{2\left(a+b\,\text{csch}^{-1}(cx)\right)}{5e(d+ex)^{5/2}} - \frac{\left(2b\sqrt{\frac{1}{c^2}+x^2}\right)\int \left(-\frac{e}{d(d+ex)^{5/2}\sqrt{\frac{1}{c^2}+x^2}} - \frac{e}{d^2(d+ex)^{3/2}\sqrt{\frac{1}{c^2}+x^2}} + \frac{\cdots}{d^2x\sqrt{d+\cdots}}\right.}{5ce\sqrt{1+\frac{1}{c^2x^2}}\,x}$$

$$= -\frac{2\left(a+b\,\text{csch}^{-1}(cx)\right)}{5e(d+ex)^{5/2}} + \frac{\left(2b\sqrt{\frac{1}{c^2}+x^2}\right)\int \frac{1}{(d+ex)^{3/2}\sqrt{\frac{1}{c^2}+x^2}}\,dx}{5cd^2\sqrt{1+\frac{1}{c^2x^2}}\,x} + \frac{\left(2b\sqrt{\frac{1}{c^2}+x^2}\right)\int \frac{1}{(d+ex)^{5/2}\sqrt{\cdots}}}{5cd\sqrt{1+\frac{1}{c^2x^2}}\,x}$$

$$= -\frac{4be\left(1+c^2x^2\right)}{15cd\left(c^2d^2+e^2\right)\sqrt{1+\frac{1}{c^2x^2}}\,x(d+ex)^{3/2}} - \frac{4be\left(1+c^2x^2\right)}{5cd^2\left(c^2d^2+e^2\right)\sqrt{1+\frac{1}{c^2x^2}}\,x\sqrt{d+ex}} - \frac{2\left(a\cdots\right.}{5\cdots}$$

$$= -\frac{4be\left(1+c^2x^2\right)}{15cd\left(c^2d^2+e^2\right)\sqrt{1+\frac{1}{c^2x^2}}\,x(d+ex)^{3/2}} - \frac{16bce\left(1+c^2x^2\right)}{15\left(c^2d^2+e^2\right)^2\sqrt{1+\frac{1}{c^2x^2}}\,x\sqrt{d+ex}} - \frac{\cdots}{5cd^2\left(\cdots\right.}$$

$$= -\frac{4be\left(1+c^2x^2\right)}{15cd\left(c^2d^2+e^2\right)\sqrt{1+\frac{1}{c^2x^2}}\,x(d+ex)^{3/2}} - \frac{16bce\left(1+c^2x^2\right)}{15\left(c^2d^2+e^2\right)^2\sqrt{1+\frac{1}{c^2x^2}}\,x\sqrt{d+ex}} - \frac{\cdots}{5cd^2\left(\cdots\right.}$$

$$= -\frac{4be\left(1+c^2x^2\right)}{15cd\left(c^2d^2+e^2\right)\sqrt{1+\frac{1}{c^2x^2}}\,x(d+ex)^{3/2}} - \frac{16bce\left(1+c^2x^2\right)}{15\left(c^2d^2+e^2\right)^2\sqrt{1+\frac{1}{c^2x^2}}\,x\sqrt{d+ex}} - \frac{\cdots}{5cd^2\left(\cdots\right.}$$

$$\frac{4be\left(1+c^2x^2\right)}{\cdots} \qquad \frac{16bce\left(1+c^2x^2\right)}{\cdots}$$

**Mathematica [C]** time = 14.49, size = 1217, normalized size = 1.88

$$b\left(\frac{2\left(\frac{d}{x}+e\right)^{7/2}(cx)^{7/2}\left(-\frac{\sqrt{2}\left(e^3+c^2d^2e\right)\sqrt{icx+1}\,(cx+i)\sqrt{\frac{cd+cex}{cd-ie}}\,F\left(\sin^{-1}\left(\sqrt{-\frac{e(cx+i)}{cd-ie}}\right)\middle|\frac{icd+e}{2e}\right)}{\sqrt{1+\frac{1}{c^2x^2}}\sqrt{\frac{d}{x}+e}\,(cx)^{3/2}\sqrt{\frac{e(1-icx)}{icd+e}}}+\frac{i\sqrt{2}\,(cd-ie)\left(3c^3d^3-cde^2\right)\sqrt{icx+1}\sqrt{\frac{e(cx+i)(cd+cex)}{(icd+e)^2}}\,\Pi\left(\frac{icd}{e}+1;\sin^{-1}\left(\sqrt{-\frac{e(c\ldots}{cd\ldots}}\right.\right.}{e\sqrt{1+\frac{1}{c^2x^2}}\sqrt{\frac{d}{x}+e}\,(cx)^{3/2}}\ldots\right.}{\ldots}\right.$$

Warning: Unable to verify antiderivative.

```
[In] Integrate[(a + b*ArcCsch[c*x])/(d + e*x)^(7/2),x]
```

```
[Out] (-2*a)/(5*e*(d + e*x)^(5/2)) + (b*(-((c^4*(e + d/x)^4*x^4*((-4*(7*c^2*d^2 +
 3*e^2)*Sqrt[1 + 1/(c^2*x^2)])/(15*c^2*d^2*(c^2*d^2 + e^2)^2) + (2*ArcCsch[
c*x])/(5*c^3*d^3*e) - (2*e^2*ArcCsch[c*x])/(5*c^3*d^3*(e + d/x)^3) + (2*(-2
*c*d*e^2*Sqrt[1 + 1/(c^2*x^2)] + 9*c^2*d^2*e*ArcCsch[c*x] + 9*e^3*ArcCsch[c
*x]))/(15*c^3*d^3*(c^2*d^2 + e^2)*(e + d/x)^2) - (2*(-16*c^3*d^3*e*Sqrt[1 +
 1/(c^2*x^2)] - 8*c*d*e^3*Sqrt[1 + 1/(c^2*x^2)] + 9*c^4*d^4*ArcCsch[c*x] +
18*c^2*d^2*e^2*ArcCsch[c*x] + 9*e^4*ArcCsch[c*x]))/(15*c^3*d^3*(c^2*d^2 + e
^2)^2*(e + d/x))))/(d + e*x)^(7/2)) + (2*(e + d/x)^(7/2)*(c*x)^(7/2)*(-((Sq
rt[2]*(c^2*d^2*e + e^3)*Sqrt[1 + I*c*x]*(I + c*x)*Sqrt[(c*d + c*e*x)/(c*d -
 I*e)]*EllipticF[ArcSin[Sqrt[-((e*(I + c*x))/(c*d - I*e))]], (I*c*d + e)/(2
*e)])/(Sqrt[1 + 1/(c^2*x^2)]*Sqrt[e + d/x]*(c*x)^(3/2)*Sqrt[(e*(1 - I*c*x))
/(I*c*d + e)])) + (I*Sqrt[2]*(c*d - I*e)*(3*c^3*d^3 - c*d*e^2)*Sqrt[1 + I*c
*x]*Sqrt[(e*(I + c*x)*(c*d + c*e*x))/(I*c*d + e)^2]*EllipticPi[1 + (I*c*d)/
e, ArcSin[Sqrt[-((e*(I + c*x))/(c*d - I*e))]], (I*c*d + e)/(2*e)])/(e*Sqrt[
1 + 1/(c^2*x^2)]*Sqrt[e + d/x]*(c*x)^(3/2)) - (2*(-7*c^2*d^2*e - 3*e^3)*Cos
h[2*ArcCsch[c*x]]*(-((c*d + c*e*x)*(1 + c^2*x^2)) + (c*x*(c*d*Sqrt[2 + (2*I
)*c*x]*(I + c*x)*Sqrt[(c*d + c*e*x)/(c*d - I*e)]*EllipticF[ArcSin[Sqrt[-((e
*(I + c*x))/(c*d - I*e))]], (I*c*d + e)/(2*e)] + 2*Sqrt[-((e*(-I + c*x))/(c
*d + I*e))]*(I + c*x)*Sqrt[(c*d + c*e*x)/(c*d - I*e)]*((c*d + I*e)*Elliptic
E[ArcSin[Sqrt[(c*d + c*e*x)/(c*d - I*e)]], (c*d - I*e)/(c*d + I*e)] - I*e*E
llipticF[ArcSin[Sqrt[(c*d + c*e*x)/(c*d - I*e)]], (c*d - I*e)/(c*d + I*e)])
 + (I*c*d + e)*Sqrt[2 + (2*I)*c*x]*Sqrt[-((e*(I + c*x))/(c*d - I*e))]*Sqrt[
(e*(I + c*x)*(c*d + c*e*x))/(I*c*d + e)^2]*EllipticPi[1 + (I*c*d)/e, ArcSin
[Sqrt[-((e*(I + c*x))/(c*d - I*e))]], (I*c*d + e)/(2*e)]))/(2*Sqrt[-((e*(I
```

```
+ c*x))/(c*d - I*e))]])))/(c*d*Sqrt[1 + 1/(c^2*x^2)]*Sqrt[e + d/x]*Sqrt[c*x]
*(2 + c^2*x^2))))/(15*c*d*e*(c^2*d^2 + e^2)^2*(d + e*x)^(7/2))))/c
```

**fricas [F]** time = 9.39, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{\sqrt{ex+d}\,(b\,\text{arcsch}\,(cx)+a)}{e^4x^4+4\,de^3x^3+6\,d^2e^2x^2+4\,d^3ex+d^4},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))/(e*x+d)^(7/2),x, algorithm="fricas")
```

```
[Out] integral(sqrt(e*x + d)*(b*arccsch(c*x) + a)/(e^4*x^4 + 4*d*e^3*x^3 + 6*d^2*
e^2*x^2 + 4*d^3*e*x + d^4), x)
```

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

$$\int \frac{b\,\text{arcsch}\,(cx)+a}{(ex+d)^{\frac{7}{2}}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))/(e*x+d)^(7/2),x, algorithm="giac")
```

```
[Out] integrate((b*arccsch(c*x) + a)/(e*x + d)^(7/2), x)
```

**maple [C]** time = 0.11, size = 3782, normalized size = 5.84

output too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a+b*arccsch(c*x))/(e*x+d)^(7/2),x)
```

```
[Out] 2/e*(-1/5*a/(e*x+d)^(5/2)+b*(-1/5/(e*x+d)^(5/2)*arccsch(c*x)-2/15/c*(3*(-(I
*(e*x+d)*c*e+(e*x+d)*c^2*d-c^2*d^2-e^2)/(c^2*d^2+e^2))^(1/2)*((I*(e*x+d)*c*
e-(e*x+d)*c^2*d+c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2)*EllipticPi((e*x+d)^(1/2)*
((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2),1/(I*e+c*d)/c*(c^2*d^2+e^2)/d,(-(I*e-c*d)
*c/(c^2*d^2+e^2))^(1/2)/((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2))*(e*x+d)^(3/2)*c^
5*d^5+I*(-(I*(e*x+d)*c*e+(e*x+d)*c^2*d-c^2*d^2-e^2)/(c^2*d^2+e^2))^(1/2)*((
I*(e*x+d)*c*e-(e*x+d)*c^2*d+c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2)*EllipticF((e*
x+d)^(1/2)*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2),(-(2*I*c*d*e-c^2*d^2+e^2)/(c^2
*d^2+e^2))^(1/2))*(e*x+d)^(3/2)*c^2*d^2*e^3-6*I*(-(I*(e*x+d)*c*e+(e*x+d)*c^
2*d-c^2*d^2-e^2)/(c^2*d^2+e^2))^(1/2)*((I*(e*x+d)*c*e-(e*x+d)*c^2*d+c^2*d^2
+e^2)/(c^2*d^2+e^2))^(1/2)*EllipticPi((e*x+d)^(1/2)*((I*e+c*d)*c/(c^2*d^2+e
^2))^(1/2),1/(I*e+c*d)/c*(c^2*d^2+e^2)/d,(-(I*e-c*d)*c/(c^2*d^2+e^2))^(1/2)
```

```
/((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2))*(e*x+d)^(3/2)*c^2*d^2*e^3-3*I*(-(I*(e*x
+d)*c*e+(e*x+d)*c^2*d-c^2*d^2-e^2)/(c^2*d^2+e^2))^(1/2)*((I*(e*x+d)*c*e-(e*
x+d)*c^2*d+c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2)*EllipticPi((e*x+d)^(1/2)*((I*e
+c*d)*c/(c^2*d^2+e^2))^(1/2),1/(I*e+c*d)/c*(c^2*d^2+e^2)/d,(-(I*e-c*d)*c/(c
^2*d^2+e^2))^(1/2)/((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2))*(e*x+d)^(3/2)*c^4*d^4
*e+I*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2)*c^4*d^6*e+2*I*((I*e+c*d)*c/(c^2*d^2+
e^2))^(1/2)*c^2*d^4*e^3-2*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2)*c^3*d^5*e^2+I*(
(I*e+c*d)*c/(c^2*d^2+e^2))^(1/2)*d^2*e^5-((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2)*
c*d^3*e^4-((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2)*c^5*d^7+7*I*((I*e+c*d)*c/(c^2*d
^2+e^2))^(1/2)*(e*x+d)^3*c^4*d^3*e-13*I*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2)*(
e*x+d)^2*c^4*d^4*e+3*I*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2)*(e*x+d)^3*c^2*d*e^
3+5*I*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2)*(e*x+d)*c^4*d^5*e-5*I*((I*e+c*d)*c/
(c^2*d^2+e^2))^(1/2)*(e*x+d)^2*c^2*d^2*e^3+8*I*((I*e+c*d)*c/(c^2*d^2+e^2))^
(1/2)*(e*x+d)*c^2*d^3*e^3-3*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2)*(e*x+d)*c*d^2
*e^4+3*I*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2)*(e*x+d)*d*e^5-3*((I*e+c*d)*c/(c^
2*d^2+e^2))^(1/2)*(e*x+d)^3*c^3*d^2*e^2+I*(-(I*(e*x+d)*c*e+(e*x+d)*c^2*d-c^
2*d^2-e^2)/(c^2*d^2+e^2))^(1/2)*((I*(e*x+d)*c*e-(e*x+d)*c^2*d+c^2*d^2+e^2)/
(c^2*d^2+e^2))^(1/2)*EllipticF((e*x+d)^(1/2)*((I*e+c*d)*c/(c^2*d^2+e^2))^(1
/2),(-(2*I*c*d*e-c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2))*(e*x+d)^(3/2)*c^4*d^4*e
+5*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2)*(e*x+d)^2*c^3*d^3*e^2-8*((I*e+c*d)*c/(
c^2*d^2+e^2))^(1/2)*(e*x+d)*c^3*d^4*e^2+6*(-(I*(e*x+d)*c*e+(e*x+d)*c^2*d-c^
2*d^2-e^2)/(c^2*d^2+e^2))^(1/2)*((I*(e*x+d)*c*e-(e*x+d)*c^2*d+c^2*d^2+e^2)/
(c^2*d^2+e^2))^(1/2)*EllipticF((e*x+d)^(1/2)*((I*e+c*d)*c/(c^2*d^2+e^2))^(1
/2),(-(2*I*c*d*e-c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2))*(e*x+d)^(3/2)*c^5*d^5-7
*(-(I*(e*x+d)*c*e+(e*x+d)*c^2*d-c^2*d^2-e^2)/(c^2*d^2+e^2))^(1/2)*((I*(e*x+
d)*c*e-(e*x+d)*c^2*d+c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2)*EllipticE((e*x+d)^(1
/2)*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2),(-(2*I*c*d*e-c^2*d^2+e^2)/(c^2*d^2+e^
2))^(1/2))*(e*x+d)^(3/2)*c^5*d^5-3*I*(-(I*(e*x+d)*c*e+(e*x+d)*c^2*d-c^2*d^2
-e^2)/(c^2*d^2+e^2))^(1/2)*((I*(e*x+d)*c*e-(e*x+d)*c^2*d+c^2*d^2+e^2)/(c^2*
d^2+e^2))^(1/2)*EllipticPi((e*x+d)^(1/2)*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2),
1/(I*e+c*d)/c*(c^2*d^2+e^2)/d,(-(I*e-c*d)*c/(c^2*d^2+e^2))^(1/2)/((I*e+c*d)
*c/(c^2*d^2+e^2))^(1/2))*(e*x+d)^(3/2)*e^5-7*((I*e+c*d)*c/(c^2*d^2+e^2))^(1
/2)*(e*x+d)^3*c^5*d^4+13*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2)*(e*x+d)^2*c^5*d^
5-5*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2)*(e*x+d)*c^5*d^6+9*(-(I*(e*x+d)*c*e+(e
*x+d)*c^2*d-c^2*d^2-e^2)/(c^2*d^2+e^2))^(1/2)*((I*(e*x+d)*c*e-(e*x+d)*c^2*d
+c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2)*EllipticF((e*x+d)^(1/2)*((I*e+c*d)*c/(c^
2*d^2+e^2))^(1/2),(-(2*I*c*d*e-c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2))*(e*x+d)^(
3/2)*c^3*d^3*e^2-10*(-(I*(e*x+d)*c*e+(e*x+d)*c^2*d-c^2*d^2-e^2)/(c^2*d^2+e^
2))^(1/2)*((I*(e*x+d)*c*e-(e*x+d)*c^2*d+c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2)*E
llipticE((e*x+d)^(1/2)*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2),(-(2*I*c*d*e-c^2*d
^2+e^2)/(c^2*d^2+e^2))^(1/2))*(e*x+d)^(3/2)*c^3*d^3*e^2+3*(-(I*(e*x+d)*c*e+
(e*x+d)*c^2*d-c^2*d^2-e^2)/(c^2*d^2+e^2))^(1/2)*((I*(e*x+d)*c*e-(e*x+d)*c^2
*d+c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2)*EllipticPi((e*x+d)^(1/2)*((I*e+c*d)*c/
(c^2*d^2+e^2))^(1/2),1/(I*e+c*d)/c*(c^2*d^2+e^2)/d,(-(I*e-c*d)*c/(c^2*d^2+e
^2))^(1/2)/((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2))*(e*x+d)^(3/2)*c*d*e^4+3*(-(I*
```

```
(e*x+d)*c*e+(e*x+d)*c^2*d-c^2*d^2-e^2)/(c^2*d^2+e^2))^(1/2)*((I*(e*x+d)*c*e
-(e*x+d)*c^2*d+c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2)*EllipticF((e*x+d)^(1/2)*((
I*e+c*d)*c/(c^2*d^2+e^2))^(1/2),(-(2*I*c*d*e-c^2*d^2+e^2)/(c^2*d^2+e^2))^(1
/2))*(e*x+d)^(3/2)*c*d*e^4-3*(-(I*(e*x+d)*c*e+(e*x+d)*c^2*d-c^2*d^2-e^2)/(c
^2*d^2+e^2))^(1/2)*((I*(e*x+d)*c*e-(e*x+d)*c^2*d+c^2*d^2+e^2)/(c^2*d^2+e^2)
)^(1/2)*EllipticE((e*x+d)^(1/2)*((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2),(-(2*I*c*
d*e-c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2))*(e*x+d)^(3/2)*c*d*e^4+6*(-(I*(e*x+d)
*c*e+(e*x+d)*c^2*d-c^2*d^2-e^2)/(c^2*d^2+e^2))^(1/2)*((I*(e*x+d)*c*e-(e*x+d
)*c^2*d+c^2*d^2+e^2)/(c^2*d^2+e^2))^(1/2)*EllipticPi((e*x+d)^(1/2)*((I*e+c*
d)*c/(c^2*d^2+e^2))^(1/2),1/(I*e+c*d)/c*(c^2*d^2+e^2)/d,(-(I*e-c*d)*c/(c^2*
d^2+e^2))^(1/2)/((I*e+c*d)*c/(c^2*d^2+e^2))^(1/2))*(e*x+d)^(3/2)*c^3*d^3*e^
2)/(((e*x+d)^2*c^2-2*(e*x+d)*c^2*d+c^2*d^2+e^2)/c^2/x^2/e^2)^(1/2)/x/d^3/((
I*e+c*d)*c/(c^2*d^2+e^2))^(1/2)/(c^2*d^2+e^2)^2/(e*x+d)^(3/2)/(I*e-c*d)))
```

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

$$-\frac{1}{5}\left(10\,c^2\int\frac{x}{5\left(\left(c^2e^3x^4+2\,c^2de^2x^3+2\,de^2x+d^2e+\left(c^2d^2e+e^3\right)x^2\right)\sqrt{c^2x^2+1}\,\sqrt{ex+d}+\left(c^2e^3x^4+2\,c^2de^2x^3+2\right.\right.}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))/(e*x+d)^(7/2),x, algorithm="maxima")
```

```
[Out] -1/5*(10*c^2*integrate(1/5*x/((c^2*e^3*x^4 + 2*c^2*d*e^2*x^3 + 2*d*e^2*x +
d^2*e + (c^2*d^2*e + e^3)*x^2)*sqrt(c^2*x^2 + 1)*sqrt(e*x + d) + (c^2*e^3*x
^4 + 2*c^2*d*e^2*x^3 + 2*d*e^2*x + d^2*e + (c^2*d^2*e + e^3)*x^2)*sqrt(e*x
+ d)), x) + 2*log(sqrt(c^2*x^2 + 1) + 1)/((e^3*x^2 + 2*d*e^2*x + d^2*e)*sqr
t(e*x + d)) + 5*integrate(1/5*((5*e*log(c) - 2*e)*c^2*x^2 - 2*c^2*d*x + 5*e
*log(c) + 5*(c^2*e*x^2 + e)*log(x))/((c^2*e^4*x^5 + 3*c^2*d*e^3*x^4 + 3*d^2
*e^2*x + d^3*e + (3*c^2*d^2*e^2 + e^4)*x^3 + (c^2*d^3*e + 3*d*e^3)*x^2)*sqr
t(e*x + d)), x))*b - 2/5*a/((e*x + d)^(5/2)*e)
```

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

$$\int \frac{a+b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)}{(d+e\,x)^{7/2}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a + b*asinh(1/(c*x)))/(d + e*x)^(7/2),x)
```

```
[Out] int((a + b*asinh(1/(c*x)))/(d + e*x)^(7/2), 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*acsch(c*x))/(e*x+d)**(7/2),x)
```

```
[Out] Timed out
```

# 3.76 $\int x^4 \left(d+ex^2\right) \left(a+b\text{csch}^{-1}(cx)\right) \, dx$

**Optimal**. Leaf size=214

$$\frac{1}{5}dx^5 \left(a+b\text{csch}^{-1}(cx)\right)+\frac{1}{7}ex^7 \left(a+b\text{csch}^{-1}(cx)\right)+\frac{bex^6\sqrt{-c^2x^2-1}}{42c\sqrt{-c^2x^2}}-\frac{bx\left(42c^2d-25e\right)\tan^{-1}\left(\frac{cx}{\sqrt{-c^2x^2-1}}\right)}{560c^6\sqrt{-c^2x^2}}-\frac{bx^2\sqrt{-c^2}}{5}$$

```
[Out] 1/5*d*x^5*(a+b*arccsch(c*x))+1/7*e*x^7*(a+b*arccsch(c*x))-1/560*b*(42*c^2*d
-25*e)*x*arctan(c*x/(-c^2*x^2-1)^(1/2))/c^6/(-c^2*x^2)^(1/2)-1/560*b*(42*c^
2*d-25*e)*x^2*(-c^2*x^2-1)^(1/2)/c^5/(-c^2*x^2)^(1/2)+1/840*b*(42*c^2*d-25*
e)*x^4*(-c^2*x^2-1)^(1/2)/c^3/(-c^2*x^2)^(1/2)+1/42*b*e*x^6*(-c^2*x^2-1)^(1
/2)/c/(-c^2*x^2)^(1/2)
```

**Rubi [A]** time = 0.13, antiderivative size = 214, 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 = {14, 6302, 12, 459, 321, 217, 203}

$$\frac{1}{5}dx^5 \left(a+b\text{csch}^{-1}(cx)\right)+\frac{1}{7}ex^7 \left(a+b\text{csch}^{-1}(cx)\right)+\frac{bx^4\sqrt{-c^2x^2-1}\left(42c^2d-25e\right)}{840c^3\sqrt{-c^2x^2}}-\frac{bx^2\sqrt{-c^2x^2-1}\left(42c^2d-25e\right)}{560c^5\sqrt{-c^2x^2}}-$$

Antiderivative was successfully verified.

```
[In] Int[x^4*(d + e*x^2)*(a + b*ArcCsch[c*x]),x]
```

```
[Out] -(b*(42*c^2*d - 25*e)*x^2*Sqrt[-1 - c^2*x^2])/(560*c^5*Sqrt[-(c^2*x^2)]) +
(b*(42*c^2*d - 25*e)*x^4*Sqrt[-1 - c^2*x^2])/(840*c^3*Sqrt[-(c^2*x^2)]) + (
b*e*x^6*Sqrt[-1 - c^2*x^2])/(42*c*Sqrt[-(c^2*x^2)]) + (d*x^5*(a + b*ArcCsch
[c*x]))/5 + (e*x^7*(a + b*ArcCsch[c*x]))/7 - (b*(42*c^2*d - 25*e)*x*ArcTan[
(c*x)/Sqrt[-1 - c^2*x^2]])/(560*c^6*Sqrt[-(c^2*x^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 14

```
Int[(u_)*((c_.)*(x_))^(m_.), x_Symbol] :> Int[ExpandIntegrand[(c*x)^m*u, x]
, x] /; FreeQ[{c, m}, x] && SumQ[u] &&  !LinearQ[u, x] &&  !MatchQ[u, (a_)
+ (b_.)*(v_) /; FreeQ[{a, b}, x] && InverseFunctionQ[v]]
```

Rule 203

```
Int[((a_) + (b_.)*(x_)^2)^(-1), x_Symbol] :> Simp[(1*ArcTan[(Rt[b, 2]*x)/Rt
[a, 2]])/(Rt[a, 2]*Rt[b, 2]), x] /; FreeQ[{a, b}, x] && PosQ[a/b] && (GtQ[a
```

```
, 0] || GtQ[b, 0])
```

Rule 217

```
Int[1/Sqrt[(a_) + (b_.)*(x_)^2], x_Symbol] :> Subst[Int[1/(1 - b*x^2), x],
x, x/Sqrt[a + b*x^2]] /; FreeQ[{a, b}, x] &&  !GtQ[a, 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 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 6302

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))*((f_.)*(x_))^(m_.)*((d_.) + (e_.)*(
x_)^2)^(p_.), x_Symbol] :> With[{u = IntHide[(f*x)^m*(d + e*x^2)^p, x]}, Di
st[a + b*ArcCsch[c*x], u, x] - Dist[(b*c*x)/Sqrt[-(c^2*x^2)], Int[SimplifyI
ntegrand[u/(x*Sqrt[-1 - c^2*x^2]), x], x], x]] /; FreeQ[{a, b, c, d, e, f,
m, p}, x] && ((IGtQ[p, 0] &&  !(ILtQ[(m - 1)/2, 0] && GtQ[m + 2*p + 3, 0]))
 || (IGtQ[(m + 1)/2, 0] &&  !(ILtQ[p, 0] && GtQ[m + 2*p + 3, 0])) || (ILtQ[
(m + 2*p + 1)/2, 0] &&  !ILtQ[(m - 1)/2, 0]))
```

Rubi steps

$$\int x^4 \left(d+ex^2\right)\left(a+b\text{csch}^{-1}(cx)\right)\,dx = \frac{1}{5}dx^5\left(a+b\text{csch}^{-1}(cx)\right)+\frac{1}{7}ex^7\left(a+b\text{csch}^{-1}(cx)\right)-\frac{(bcx)\int\frac{x^4\left(7d+5ex^2\right)}{35\sqrt{-1-c^2x^2}}\,dx}{\sqrt{-c^2x^2}}$$

$$=\frac{1}{5}dx^5\left(a+b\text{csch}^{-1}(cx)\right)+\frac{1}{7}ex^7\left(a+b\text{csch}^{-1}(cx)\right)-\frac{(bcx)\int\frac{x^4\left(7d+5ex^2\right)}{\sqrt{-1-c^2x^2}}\,dx}{35\sqrt{-c^2x^2}}$$

$$=\frac{bex^6\sqrt{-1-c^2x^2}}{42c\sqrt{-c^2x^2}}+\frac{1}{5}dx^5\left(a+b\text{csch}^{-1}(cx)\right)+\frac{1}{7}ex^7\left(a+b\text{csch}^{-1}(cx)\right)-$$

$$=\frac{b\left(42c^2d-25e\right)x^4\sqrt{-1-c^2x^2}}{840c^3\sqrt{-c^2x^2}}+\frac{bex^6\sqrt{-1-c^2x^2}}{42c\sqrt{-c^2x^2}}+\frac{1}{5}dx^5\left(a+b\text{csch}^{-1}(c\right.$$

$$=-\frac{b\left(42c^2d-25e\right)x^2\sqrt{-1-c^2x^2}}{560c^5\sqrt{-c^2x^2}}+\frac{b\left(42c^2d-25e\right)x^4\sqrt{-1-c^2x^2}}{840c^3\sqrt{-c^2x^2}}+\frac{bex^6}{42c}$$

$$=-\frac{b\left(42c^2d-25e\right)x^2\sqrt{-1-c^2x^2}}{560c^5\sqrt{-c^2x^2}}+\frac{b\left(42c^2d-25e\right)x^4\sqrt{-1-c^2x^2}}{840c^3\sqrt{-c^2x^2}}+\frac{bex^6}{42c}$$

$$=-\frac{b\left(42c^2d-25e\right)x^2\sqrt{-1-c^2x^2}}{560c^5\sqrt{-c^2x^2}}+\frac{b\left(42c^2d-25e\right)x^4\sqrt{-1-c^2x^2}}{840c^3\sqrt{-c^2x^2}}+\frac{bex^6}{42c}$$

**Mathematica [A]** time = 0.23, size = 138, normalized size = 0.64

$$\frac{48ac^7x^5\left(7d+5ex^2\right)+48bc^7x^5\text{csch}^{-1}(cx)\left(7d+5ex^2\right)+3b\left(42c^2d-25e\right)\log\left(x\left(\sqrt{\frac{1}{c^2x^2}+1}+1\right)\right)+bc^2x^2\sqrt{\frac{1}{c^2x^2}}}{1680c^7}$$

Antiderivative was successfully verified.

```
[In] Integrate[x^4*(d + e*x^2)*(a + b*ArcCsch[c*x]),x]
```

```
[Out] (48*a*c^7*x^5*(7*d + 5*e*x^2) + b*c^2*Sqrt[1 + 1/(c^2*x^2)]*x^2*(75*e - 2*c
^2*(63*d + 25*e*x^2) + c^4*(84*d*x^2 + 40*e*x^4)) + 48*b*c^7*x^5*(7*d + 5*e
*x^2)*ArcCsch[c*x] + 3*b*(42*c^2*d - 25*e)*Log[(1 + Sqrt[1 + 1/(c^2*x^2)])*
x])/(1680*c^7)
```

**fricas [A]** time = 1.95, size = 295, normalized size = 1.38

$$240\,ac^7ex^7+336\,ac^7dx^5+48\left(7\,bc^7d+5\,bc^7e\right)\log\left(cx\sqrt{\frac{c^2x^2+1}{c^2x^2}}-cx+1\right)-3\left(42\,bc^2d-25\,be\right)\log\left(cx\sqrt{\frac{c^2x^2+1}{c^2x^2}}-\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^4*(e*x^2+d)*(a+b*arccsch(c*x)),x, algorithm="fricas")
```

```
[Out] 1/1680*(240*a*c^7*e*x^7 + 336*a*c^7*d*x^5 + 48*(7*b*c^7*d + 5*b*c^7*e)*log(
c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) - c*x + 1) - 3*(42*b*c^2*d - 25*b*e)*log(
c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) - c*x) - 48*(7*b*c^7*d + 5*b*c^7*e)*log(c
*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) - c*x - 1) + 48*(5*b*c^7*e*x^7 + 7*b*c^7*d
*x^5 - 7*b*c^7*d - 5*b*c^7*e)*log((c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) + 1)/(
c*x)) + (40*b*c^6*e*x^6 + 2*(42*b*c^6*d - 25*b*c^4*e)*x^4 - 3*(42*b*c^4*d -
 25*b*c^2*e)*x^2)*sqrt((c^2*x^2 + 1)/(c^2*x^2)))/c^7
```

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

$$\int \left(ex^2 + d\right)(b \operatorname{arcsch}(cx) + a)x^4\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^4*(e*x^2+d)*(a+b*arccsch(c*x)),x, algorithm="giac")
```

```
[Out] integrate((e*x^2 + d)*(b*arccsch(c*x) + a)*x^4, x)
```

**maple [A]** time = 0.05, size = 211, normalized size = 0.99

$$\frac{\frac{a\left(\frac{1}{7}e\,c^7x^7+\frac{1}{5}c^7x^5d\right)}{c^2}+\frac{b\left(\frac{\operatorname{arccsch}(cx)e\,c^7x^7}{7}+\frac{\operatorname{arccsch}(cx)c^7x^5d}{5}+\frac{\sqrt{c^2x^2+1}\,\left(40e\,c^5x^5\sqrt{c^2x^2+1}+84c^5d\,x^3\sqrt{c^2x^2+1}-50e\,c^3x^3\sqrt{c^2x^2+1}-126c^3dx\sqrt{c^2x^2+1}+126c^2d\operatorname{arcsi}\right.}{1680\sqrt{\frac{c^2x^2+1}{c^2x^2}}\,cx}\right.}{c^2}}{c^5}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^4*(e*x^2+d)*(a+b*arccsch(c*x)),x)
```

```
[Out] 1/c^5*(a/c^2*(1/7*e*c^7*x^7+1/5*c^7*x^5*d)+b/c^2*(1/7*arccsch(c*x)*e*c^7*x^
7+1/5*arccsch(c*x)*c^7*x^5*d+1/1680*(c^2*x^2+1)^(1/2)*(40*e*c^5*x^5*(c^2*x^
2+1)^(1/2)+84*c^5*d*x^3*(c^2*x^2+1)^(1/2)-50*e*c^3*x^3*(c^2*x^2+1)^(1/2)-12
6*c^3*d*x*(c^2*x^2+1)^(1/2)+126*c^2*d*arcsinh(c*x)+75*e*c*x*(c^2*x^2+1)^(1/
2)-75*e*arcsinh(c*x))/((c^2*x^2+1)/c^2/x^2)^(1/2)/c/x))
```

**maxima [A]** time = 0.37, size = 289, normalized size = 1.35

$$\frac{1}{7}aex^7+\frac{1}{5}adx^5+\frac{1}{80}\left(16\,x^5\,\mathrm{arcsch}\,(cx)-\frac{\frac{2\left(3\left(\frac{1}{c^2x^2}+1\right)^{\frac{3}{2}}-5\sqrt{\frac{1}{c^2x^2}+1}\right)}{c^4\left(\frac{1}{c^2x^2}+1\right)^2-2\,c^4\left(\frac{1}{c^2x^2}+1\right)+c^4}-\frac{3\,\log\left(\sqrt{\frac{1}{c^2x^2}+1}+1\right)}{c^4}+\frac{3\,\log\left(\sqrt{\frac{1}{c^2x^2}+1}-1\right)}{c^4}}{c}\right)bd+\frac{1}{672}\Bigg($$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^4*(e*x^2+d)*(a+b*arccsch(c*x)),x, algorithm="maxima")
```

```
[Out] 1/7*a*e*x^7 + 1/5*a*d*x^5 + 1/80*(16*x^5*arccsch(c*x) - (2*(3*(1/(c^2*x^2)
+ 1)^(3/2) - 5*sqrt(1/(c^2*x^2) + 1))/(c^4*(1/(c^2*x^2) + 1)^2 - 2*c^4*(1/(
c^2*x^2) + 1) + c^4) - 3*log(sqrt(1/(c^2*x^2) + 1) + 1)/c^4 + 3*log(sqrt(1/
(c^2*x^2) + 1) - 1)/c^4)/c)*b*d + 1/672*(96*x^7*arccsch(c*x) + (2*(15*(1/(c
^2*x^2) + 1)^(5/2) - 40*(1/(c^2*x^2) + 1)^(3/2) + 33*sqrt(1/(c^2*x^2) + 1))
/(c^6*(1/(c^2*x^2) + 1)^3 - 3*c^6*(1/(c^2*x^2) + 1)^2 + 3*c^6*(1/(c^2*x^2)
+ 1) - c^6) - 15*log(sqrt(1/(c^2*x^2) + 1) + 1)/c^6 + 15*log(sqrt(1/(c^2*x^
2) + 1) - 1)/c^6)/c)*b*e
```

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

$$\int x^4\,\left(e\,x^2+d\right)\,\left(a+b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^4*(d + e*x^2)*(a + b*asinh(1/(c*x))),x)
```

```
[Out] int(x^4*(d + e*x^2)*(a + b*asinh(1/(c*x))), x)
```

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

$$\int x^4\,(a+b\,\mathrm{acsch}\,(cx))\left(d+ex^2\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**4*(e*x**2+d)*(a+b*acsch(c*x)),x)
```

```
[Out] Integral(x**4*(a + b*acsch(c*x))*(d + e*x**2), x)
```

# 3.77 $\int x^2 \left(d+ex^2\right) \left(a+b\,\text{csch}^{-1}(cx)\right) \, dx$

**Optimal**. Leaf size=167

$$\frac{1}{3}dx^3\left(a+b\text{csch}^{-1}(cx)\right)+\frac{1}{5}ex^5\left(a+b\text{csch}^{-1}(cx)\right)+\frac{bex^4\sqrt{-c^2x^2-1}}{20c\sqrt{-c^2x^2}}+\frac{bx\left(20c^2d-9e\right)\tan^{-1}\left(\frac{cx}{\sqrt{-c^2x^2-1}}\right)}{120c^4\sqrt{-c^2x^2}}+\frac{bx^2\sqrt{-c}}{1}$$

```
[Out] 1/3*d*x^3*(a+b*arccsch(c*x))+1/5*e*x^5*(a+b*arccsch(c*x))+1/120*b*(20*c^2*d
-9*e)*x*arctan(c*x/(-c^2*x^2-1)^(1/2))/c^4/(-c^2*x^2)^(1/2)+1/120*b*(20*c^2
*d-9*e)*x^2*(-c^2*x^2-1)^(1/2)/c^3/(-c^2*x^2)^(1/2)+1/20*b*e*x^4*(-c^2*x^2-
1)^(1/2)/c/(-c^2*x^2)^(1/2)
```

**Rubi [A]** time = 0.11, antiderivative size = 167, normalized size of antiderivative = 1.00, number of steps used = 6, number of rules used = 7, integrand size = 19, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.368, Rules used = {14, 6302, 12, 459, 321, 217, 203}

$$\frac{1}{3}dx^3\left(a+b\text{csch}^{-1}(cx)\right)+\frac{1}{5}ex^5\left(a+b\text{csch}^{-1}(cx)\right)+\frac{bx^2\sqrt{-c^2x^2-1}\left(20c^2d-9e\right)}{120c^3\sqrt{-c^2x^2}}+\frac{bx\left(20c^2d-9e\right)\tan^{-1}\left(\frac{cx}{\sqrt{-c^2x^2-1}}\right)}{120c^4\sqrt{-c^2x^2}}$$

Antiderivative was successfully verified.

```
[In] Int[x^2*(d + e*x^2)*(a + b*ArcCsch[c*x]),x]
```

```
[Out] (b*(20*c^2*d - 9*e)*x^2*Sqrt[-1 - c^2*x^2])/(120*c^3*Sqrt[-(c^2*x^2)]) + (b
*e*x^4*Sqrt[-1 - c^2*x^2])/(20*c*Sqrt[-(c^2*x^2)]) + (d*x^3*(a + b*ArcCsch[
c*x]))/3 + (e*x^5*(a + b*ArcCsch[c*x]))/5 + (b*(20*c^2*d - 9*e)*x*ArcTan[(c
*x)/Sqrt[-1 - c^2*x^2]])/(120*c^4*Sqrt[-(c^2*x^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 14

```
Int[(u_)*((c_.)*(x_))^(m_.), x_Symbol] :> Int[ExpandIntegrand[(c*x)^m*u, x]
, x] /; FreeQ[{c, m}, x] && SumQ[u] &&  !LinearQ[u, x] &&  !MatchQ[u, (a_)
+ (b_.)*(v_) /; FreeQ[{a, b}, x] && InverseFunctionQ[v]]
```

Rule 203

```
Int[((a_) + (b_.)*(x_)^2)^(-1), x_Symbol] :> Simp[(1*ArcTan[(Rt[b, 2]*x)/Rt
[a, 2]])/(Rt[a, 2]*Rt[b, 2]), x] /; FreeQ[{a, b}, x] && PosQ[a/b] && (GtQ[a
```

```
, 0] || GtQ[b, 0])
```

Rule 217

```
Int[1/Sqrt[(a_) + (b_.)*(x_)^2], x_Symbol] :> Subst[Int[1/(1 - b*x^2), x],
x, x/Sqrt[a + b*x^2]] /; FreeQ[{a, b}, x] &&  !GtQ[a, 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 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 6302

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))*((f_.)*(x_))^(m_.)*((d_.) + (e_.)*(
x_)^2)^(p_.), x_Symbol] :> With[{u = IntHide[(f*x)^m*(d + e*x^2)^p, x]}, Di
st[a + b*ArcCsch[c*x], u, x] - Dist[(b*c*x)/Sqrt[-(c^2*x^2)], Int[SimplifyI
ntegrand[u/(x*Sqrt[-1 - c^2*x^2]), x], x], x]] /; FreeQ[{a, b, c, d, e, f,
m, p}, x] && ((IGtQ[p, 0] &&  !(ILtQ[(m - 1)/2, 0] && GtQ[m + 2*p + 3, 0]))
 || (IGtQ[(m + 1)/2, 0] &&  !(ILtQ[p, 0] && GtQ[m + 2*p + 3, 0])) || (ILtQ[
(m + 2*p + 1)/2, 0] &&  !ILtQ[(m - 1)/2, 0]))
```

Rubi steps

$$\int x^2\left(d+ex^2\right)\left(a+b\text{csch}^{-1}(cx)\right)\,dx = \frac{1}{3}dx^3\left(a+b\text{csch}^{-1}(cx)\right)+\frac{1}{5}ex^5\left(a+b\text{csch}^{-1}(cx)\right)-\frac{(bcx)\int\frac{x^2\left(5d+3ex^2\right)}{15\sqrt{-1-c^2x^2}}\,d}{\sqrt{-c^2x^2}}$$

$$=\frac{1}{3}dx^3\left(a+b\text{csch}^{-1}(cx)\right)+\frac{1}{5}ex^5\left(a+b\text{csch}^{-1}(cx)\right)-\frac{(bcx)\int\frac{x^2\left(5d+3ex^2\right)}{\sqrt{-1-c^2x^2}}\,d}{15\sqrt{-c^2x^2}}$$

$$=\frac{bex^4\sqrt{-1-c^2x^2}}{20c\sqrt{-c^2x^2}}+\frac{1}{3}dx^3\left(a+b\text{csch}^{-1}(cx)\right)+\frac{1}{5}ex^5\left(a+b\text{csch}^{-1}(cx)\right)-$$

$$=\frac{b\left(20c^2d-9e\right)x^2\sqrt{-1-c^2x^2}}{120c^3\sqrt{-c^2x^2}}+\frac{bex^4\sqrt{-1-c^2x^2}}{20c\sqrt{-c^2x^2}}+\frac{1}{3}dx^3\left(a+b\text{csch}^{-1}(c\right.$$

$$=\frac{b\left(20c^2d-9e\right)x^2\sqrt{-1-c^2x^2}}{120c^3\sqrt{-c^2x^2}}+\frac{bex^4\sqrt{-1-c^2x^2}}{20c\sqrt{-c^2x^2}}+\frac{1}{3}dx^3\left(a+b\text{csch}^{-1}(c\right.$$

$$=\frac{b\left(20c^2d-9e\right)x^2\sqrt{-1-c^2x^2}}{120c^3\sqrt{-c^2x^2}}+\frac{bex^4\sqrt{-1-c^2x^2}}{20c\sqrt{-c^2x^2}}+\frac{1}{3}dx^3\left(a+b\text{csch}^{-1}(c\right.$$

**Mathematica [A]** time = 0.17, size = 119, normalized size = 0.71

$$\frac{c^2x^2\left(8ac^3x\left(5d+3ex^2\right)+b\sqrt{\frac{1}{c^2x^2}+1}\left(c^2\left(20d+6ex^2\right)-9e\right)\right)+8bc^5x^3\text{csch}^{-1}(cx)\left(5d+3ex^2\right)+b\left(9e-20c^2d\right)}{120c^5}$$

Antiderivative was successfully verified.

```
[In] Integrate[x^2*(d + e*x^2)*(a + b*ArcCsch[c*x]),x]
```

```
[Out] (c^2*x^2*(8*a*c^3*x*(5*d + 3*e*x^2) + b*Sqrt[1 + 1/(c^2*x^2)]*(-9*e + c^2*(
20*d + 6*e*x^2))) + 8*b*c^5*x^3*(5*d + 3*e*x^2)*ArcCsch[c*x] + b*(-20*c^2*d
 + 9*e)*Log[(1 + Sqrt[1 + 1/(c^2*x^2)])*x])/(120*c^5)
```

**fricas [A]** time = 3.02, size = 273, normalized size = 1.63

$$\frac{24\,ac^5ex^5+40\,ac^5dx^3+8\left(5\,bc^5d+3\,bc^5e\right)\log\left(cx\sqrt{\frac{c^2x^2+1}{c^2x^2}}-cx+1\right)+\left(20\,bc^2d-9\,be\right)\log\left(cx\sqrt{\frac{c^2x^2+1}{c^2x^2}}-cx\right)-}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*(e*x^2+d)*(a+b*arccsch(c*x)),x, algorithm="fricas")
```

```
[Out] 1/120*(24*a*c^5*e*x^5 + 40*a*c^5*d*x^3 + 8*(5*b*c^5*d + 3*b*c^5*e)*log(c*x*
sqrt((c^2*x^2 + 1)/(c^2*x^2)) - c*x + 1) + (20*b*c^2*d - 9*b*e)*log(c*x*sqr
t((c^2*x^2 + 1)/(c^2*x^2)) - c*x) - 8*(5*b*c^5*d + 3*b*c^5*e)*log(c*x*sqrt(
(c^2*x^2 + 1)/(c^2*x^2)) - c*x - 1) + 8*(3*b*c^5*e*x^5 + 5*b*c^5*d*x^3 - 5*
b*c^5*d - 3*b*c^5*e)*log((c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) + 1)/(c*x)) + (
6*b*c^4*e*x^4 + (20*b*c^4*d - 9*b*c^2*e)*x^2)*sqrt((c^2*x^2 + 1)/(c^2*x^2))
)/c^5
```

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

$$\int \left(ex^2+d\right)\left(b\,\mathrm{arcsch}\left(cx\right)+a\right)x^2\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*(e*x^2+d)*(a+b*arccsch(c*x)),x, algorithm="giac")
```

```
[Out] integrate((e*x^2 + d)*(b*arccsch(c*x) + a)*x^2, x)
```

**maple [A]** time = 0.05, size = 171, normalized size = 1.02

$$\frac{\frac{a\left(\frac{1}{5}c^5x^5e+\frac{1}{3}c^5x^3d\right)}{c^2}+\frac{b\left(\frac{\mathrm{arccsch}(cx)c^5x^5e}{5}+\frac{\mathrm{arccsch}(cx)c^5x^3d}{3}-\frac{\sqrt{c^2x^2+1}\,\left(-6e\,c^3x^3\,\sqrt{c^2x^2+1}-20c^3dx\,\sqrt{c^2x^2+1}+20c^2d\,\mathrm{arcsinh}(cx)+9ecx\,\sqrt{c^2x^2+1}-9e\,\mathrm{arcsinh}(cx)\right)}{120\sqrt{\frac{c^2x^2+1}{c^2x^2}}\,cx}\right)}{c^2}}{c^3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^2*(e*x^2+d)*(a+b*arccsch(c*x)),x)
```

```
[Out] 1/c^3*(a/c^2*(1/5*c^5*x^5*e+1/3*c^5*x^3*d)+b/c^2*(1/5*arccsch(c*x)*c^5*x^5*
e+1/3*arccsch(c*x)*c^5*x^3*d-1/120*(c^2*x^2+1)^(1/2)*(-6*e*c^3*x^3*(c^2*x^2
+1)^(1/2)-20*c^3*d*x*(c^2*x^2+1)^(1/2)+20*c^2*d*arcsinh(c*x)+9*e*c*x*(c^2*x
^2+1)^(1/2)-9*e*arcsinh(c*x))/((c^2*x^2+1)/c^2/x^2)^(1/2)/c/x))
```

**maxima [A]** time = 0.38, size = 227, normalized size = 1.36

$$\frac{1}{5}aex^5+\frac{1}{3}adx^3+\frac{1}{12}\left(4\,x^3\,\mathrm{arcsch}\left(cx\right)+\frac{\frac{2\sqrt{\frac{1}{c^2x^2}+1}}{c^2\left(\frac{1}{c^2x^2}+1\right)-c^2}-\frac{\log\left(\sqrt{\frac{1}{c^2x^2}+1}+1\right)}{c^2}+\frac{\log\left(\sqrt{\frac{1}{c^2x^2}+1}-1\right)}{c^2}}{c}\right)bd+\frac{1}{80}\left(16\,x^5\,\mathrm{arcsch}\left(cx\right)\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*(e*x^2+d)*(a+b*arccsch(c*x)),x, algorithm="maxima")
```

```
[Out] 1/5*a*e*x^5 + 1/3*a*d*x^3 + 1/12*(4*x^3*arccsch(c*x) + (2*sqrt(1/(c^2*x^2)
+ 1)/(c^2*(1/(c^2*x^2) + 1) - c^2) - log(sqrt(1/(c^2*x^2) + 1) + 1)/c^2 + l
og(sqrt(1/(c^2*x^2) + 1) - 1)/c^2)/c)*b*d + 1/80*(16*x^5*arccsch(c*x) - (2*
(3*(1/(c^2*x^2) + 1)^(3/2) - 5*sqrt(1/(c^2*x^2) + 1))/(c^4*(1/(c^2*x^2) + 1
)^2 - 2*c^4*(1/(c^2*x^2) + 1) + c^4) - 3*log(sqrt(1/(c^2*x^2) + 1) + 1)/c^4
 + 3*log(sqrt(1/(c^2*x^2) + 1) - 1)/c^4)/c)*b*e
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.01

$$\int x^2\,\left(e\,x^2+d\right)\,\left(a+b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^2*(d + e*x^2)*(a + b*asinh(1/(c*x))),x)
```

```
[Out] int(x^2*(d + e*x^2)*(a + b*asinh(1/(c*x))), x)
```

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

$$\int x^{2} \left(a + b \operatorname{acsch}{\left(c x \right)}\right) \left(d + e x^{2}\right)\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**2*(e*x**2+d)*(a+b*acsch(c*x)),x)
```

```
[Out] Integral(x**2*(a + b*acsch(c*x))*(d + e*x**2), x)
```

# 3.78 $\int \left(d+ex^2\right)\left(a+b\mathbf{csch}^{-1}(cx)\right)\,dx$

**Optimal**. Leaf size=115

$$dx\left(a+b\text{csch}^{-1}(cx)\right)+\frac{1}{3}ex^3\left(a+b\text{csch}^{-1}(cx)\right)-\frac{bx\left(6c^2d-e\right)\tan^{-1}\left(\frac{cx}{\sqrt{-c^2x^2-1}}\right)}{6c^2\sqrt{-c^2x^2}}+\frac{bex^2\sqrt{-c^2x^2-1}}{6c\sqrt{-c^2x^2}}$$

```
[Out] d*x*(a+b*arccsch(c*x))+1/3*e*x^3*(a+b*arccsch(c*x))-1/6*b*(6*c^2*d-e)*x*arc
tan(c*x/(-c^2*x^2-1)^(1/2))/c^2/(-c^2*x^2)^(1/2)+1/6*b*e*x^2*(-c^2*x^2-1)^(
1/2)/c/(-c^2*x^2)^(1/2)
```

**Rubi [A]** time = 0.06, antiderivative size = 115, 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 = {6292, 12, 388, 217, 203}

$$dx\left(a+b\text{csch}^{-1}(cx)\right)+\frac{1}{3}ex^3\left(a+b\text{csch}^{-1}(cx)\right)-\frac{bx\left(6c^2d-e\right)\tan^{-1}\left(\frac{cx}{\sqrt{-c^2x^2-1}}\right)}{6c^2\sqrt{-c^2x^2}}+\frac{bex^2\sqrt{-c^2x^2-1}}{6c\sqrt{-c^2x^2}}$$

Antiderivative was successfully verified.

```
[In] Int[(d + e*x^2)*(a + b*ArcCsch[c*x]),x]
```

```
[Out] (b*e*x^2*Sqrt[-1 - c^2*x^2])/(6*c*Sqrt[-(c^2*x^2)]) + d*x*(a + b*ArcCsch[c*
x]) + (e*x^3*(a + b*ArcCsch[c*x]))/3 - (b*(6*c^2*d - e)*x*ArcTan[(c*x)/Sqrt
[-1 - c^2*x^2]])/(6*c^2*Sqrt[-(c^2*x^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 203

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

Rule 217

```
Int[1/Sqrt[(a_) + (b_.)*(x_)^2], x_Symbol] :> Subst[Int[1/(1 - b*x^2), x],
x, x/Sqrt[a + b*x^2]] /; FreeQ[{a, b}, x] &&  !GtQ[a, 0]
```

Rule 388

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

Rule 6292

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))*((d_.) + (e_.)*(x_)^2)^(p_.), x_Sym
bol] :> With[{u = IntHide[(d + e*x^2)^p, x]}, Dist[a + b*ArcCsch[c*x], u, x
] - Dist[(b*c*x)/Sqrt[-(c^2*x^2)], Int[SimplifyIntegrand[u/(x*Sqrt[-1 - c^2
*x^2]), x], x], x]] /; FreeQ[{a, b, c, d, e}, x] && (IGtQ[p, 0] || ILtQ[p +
 1/2, 0])
```

Rubi steps

$$\begin{aligned}\int \left(d+ex^2\right)\left(a+b\text{csch}^{-1}(cx)\right)dx &= dx\left(a+b\text{csch}^{-1}(cx)\right)+\frac{1}{3}ex^3\left(a+b\text{csch}^{-1}(cx)\right)-\frac{(bcx)\int \frac{3d+ex^2}{3\sqrt{-1-c^2x^2}}\,dx}{\sqrt{-c^2x^2}}\\
&= dx\left(a+b\text{csch}^{-1}(cx)\right)+\frac{1}{3}ex^3\left(a+b\text{csch}^{-1}(cx)\right)-\frac{(bcx)\int \frac{3d+ex^2}{\sqrt{-1-c^2x^2}}\,dx}{3\sqrt{-c^2x^2}}\\
&= \frac{bex^2\sqrt{-1-c^2x^2}}{6c\sqrt{-c^2x^2}}+dx\left(a+b\text{csch}^{-1}(cx)\right)+\frac{1}{3}ex^3\left(a+b\text{csch}^{-1}(cx)\right)-\frac{(bc\,(6\\
&= \frac{bex^2\sqrt{-1-c^2x^2}}{6c\sqrt{-c^2x^2}}+dx\left(a+b\text{csch}^{-1}(cx)\right)+\frac{1}{3}ex^3\left(a+b\text{csch}^{-1}(cx)\right)-\frac{(bc\,(6\\
&= \frac{bex^2\sqrt{-1-c^2x^2}}{6c\sqrt{-c^2x^2}}+dx\left(a+b\text{csch}^{-1}(cx)\right)+\frac{1}{3}ex^3\left(a+b\text{csch}^{-1}(cx)\right)-\frac{b\,(6d\end{aligned}$$

**Mathematica [A]** time = 0.26, size = 135, normalized size = 1.17

$$adx+\frac{1}{3}aex^3+\frac{bdx\sqrt{\frac{1}{c^2x^2}+1}\,\sinh^{-1}(cx)}{\sqrt{c^2x^2+1}}+\frac{bex^2\sqrt{\frac{c^2x^2+1}{c^2x^2}}}{6c}-\frac{be\log\left(x\left(\sqrt{\frac{c^2x^2+1}{c^2x^2}}+1\right)\right)}{6c^3}+bdx\text{csch}^{-1}(cx)+\frac{1}{3}bex^3\text{csch}^{-1}$$

Antiderivative was successfully verified.

```
[In] Integrate[(d + e*x^2)*(a + b*ArcCsch[c*x]),x]
```

```
[Out] a*d*x + (a*e*x^3)/3 + (b*e*x^2*Sqrt[(1 + c^2*x^2)/(c^2*x^2)])/(6*c) + b*d*x
*ArcCsch[c*x] + (b*e*x^3*ArcCsch[c*x])/3 + (b*d*Sqrt[1 + 1/(c^2*x^2)]*x*Arc
Sinh[c*x])/Sqrt[1 + c^2*x^2] - (b*e*Log[x*(1 + Sqrt[(1 + c^2*x^2)/(c^2*x^2)
])])/(6*c^3)
```

**fricas [B]** time = 1.01, size = 245, normalized size = 2.13

$$\frac{2\,ac^3ex^3 + bc^2ex^2\sqrt{\frac{c^2x^2+1}{c^2x^2}} + 6\,ac^3dx + 2\left(3\,bc^3d + bc^3e\right)\log\left(cx\sqrt{\frac{c^2x^2+1}{c^2x^2}} - cx + 1\right) - \left(6\,bc^2d - be\right)\log\left(cx\sqrt{\frac{c^2x^2+1}{c^2x^2}}\right.}{6\,c^3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((e*x^2+d)*(a+b*arccsch(c*x)),x, algorithm="fricas")
```

```
[Out] 1/6*(2*a*c^3*e*x^3 + b*c^2*e*x^2*sqrt((c^2*x^2 + 1)/(c^2*x^2)) + 6*a*c^3*d*
x + 2*(3*b*c^3*d + b*c^3*e)*log(c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) - c*x + 1
) - (6*b*c^2*d - b*e)*log(c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) - c*x) - 2*(3*b
*c^3*d + b*c^3*e)*log(c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) - c*x - 1) + 2*(b*c
^3*e*x^3 + 3*b*c^3*d*x - 3*b*c^3*d - b*c^3*e)*log((c*x*sqrt((c^2*x^2 + 1)/(
c^2*x^2)) + 1)/(c*x)))/c^3
```

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

$$\int\left(ex^2 + d\right)\left(b\operatorname{arcsch}\left(cx\right) + a\right)dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((e*x^2+d)*(a+b*arccsch(c*x)),x, algorithm="giac")
```

```
[Out] integrate((e*x^2 + d)*(b*arccsch(c*x) + a), x)
```

**maple [A]** time = 0.06, size = 126, normalized size = 1.10

$$\frac{\frac{a\left(\frac{1}{3}e\,c^3x^3+x\,c^3d\right)}{c^2}+\frac{b\left(\frac{\operatorname{arccsch}(cx)e\,c^3x^3}{3}+\operatorname{arccsch}(cx)c^3dx+\frac{\sqrt{c^2x^2+1}\,\left(6c^2d\operatorname{arcsinh}(cx)+ecx\sqrt{c^2x^2+1}-e\operatorname{arcsinh}(cx)\right)}{6\sqrt{\frac{c^2x^2+1}{c^2x^2}}\,cx}\right)}{c^2}}{c}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((e*x^2+d)*(a+b*arccsch(c*x)),x)
```

```
[Out] 1/c*(a/c^2*(1/3*e*c^3*x^3+x*c^3*d)+b/c^2*(1/3*arccsch(c*x)*e*c^3*x^3+arccsc
h(c*x)*c^3*d*x+1/6*(c^2*x^2+1)^(1/2)*(6*c^2*d*arcsinh(c*x)+e*c*x*(c^2*x^2+1
)^(1/2)-e*arcsinh(c*x))/((c^2*x^2+1)/c^2/x^2)^(1/2)/c/x))
```

**maxima [A]** time = 0.35, size = 148, normalized size = 1.29

$$\frac{1}{3}\,aex^3+\frac{1}{12}\left(4\,x^3\,\mathrm{arcsch}\,(cx)+\frac{\frac{2\sqrt{\frac{1}{c^2x^2}+1}}{c^2\left(\frac{1}{c^2x^2}+1\right)-c^2}-\frac{\log\left(\sqrt{\frac{1}{c^2x^2}+1}+1\right)}{c^2}+\frac{\log\left(\sqrt{\frac{1}{c^2x^2}+1}-1\right)}{c^2}}{c}\right)be+adx+\frac{\left(2\,cx\,\mathrm{arcsch}\,(cx)+\log\right.}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((e*x^2+d)*(a+b*arccsch(c*x)),x, algorithm="maxima")
```

```
[Out] 1/3*a*e*x^3 + 1/12*(4*x^3*arccsch(c*x) + (2*sqrt(1/(c^2*x^2) + 1)/(c^2*(1/(
c^2*x^2) + 1) - c^2) - log(sqrt(1/(c^2*x^2) + 1) + 1)/c^2 + log(sqrt(1/(c^2
*x^2) + 1) - 1)/c^2)/c)*b*e + a*d*x + 1/2*(2*c*x*arccsch(c*x) + log(sqrt(1/
(c^2*x^2) + 1) + 1) - log(sqrt(1/(c^2*x^2) + 1) - 1))*b*d/c
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.01

$$\int \left(e\,x^2+d\right)\,\left(a+b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)\right) \,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((d + e*x^2)*(a + b*asinh(1/(c*x))),x)
```

```
[Out] int((d + e*x^2)*(a + b*asinh(1/(c*x))), x)
```

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

$$\int (a+b\,\mathrm{acsch}\,(cx))\left(d+ex^2\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((e*x**2+d)*(a+b*acsch(c*x)),x)
```

```
[Out] Integral((a + b*acsch(c*x))*(d + e*x**2), x)
```

## 3.79 $\int \frac{(d+ex^2)(a+b\,\mathrm{csch}^{-1}(cx))}{x^2}\,dx$

**Optimal**. Leaf size=91

$$-\frac{d\left(a+b\operatorname{csch}^{-1}(cx)\right)}{x}+ex\left(a+b\operatorname{csch}^{-1}(cx)\right)+\frac{bcd\sqrt{-c^2x^2-1}}{\sqrt{-c^2x^2}}-\frac{bex\tan^{-1}\left(\frac{cx}{\sqrt{-c^2x^2-1}}\right)}{\sqrt{-c^2x^2}}$$

```
[Out] -d*(a+b*arccsch(c*x))/x+e*x*(a+b*arccsch(c*x))-b*e*x*arctan(c*x/(-c^2*x^2-1
)^(1/2))/(-c^2*x^2)^(1/2)+b*c*d*(-c^2*x^2-1)^(1/2)/(-c^2*x^2)^(1/2)
```

**Rubi** [A] time = 0.07, antiderivative size = 91, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 5, integrand size = 19, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.263, Rules used = {14, 6302, 451, 217, 203}

$$-\frac{d\left(a+b\operatorname{csch}^{-1}(cx)\right)}{x}+ex\left(a+b\operatorname{csch}^{-1}(cx)\right)+\frac{bcd\sqrt{-c^2x^2-1}}{\sqrt{-c^2x^2}}-\frac{bex\tan^{-1}\left(\frac{cx}{\sqrt{-c^2x^2-1}}\right)}{\sqrt{-c^2x^2}}$$

Antiderivative was successfully verified.

```
[In] Int[((d + e*x^2)*(a + b*ArcCsch[c*x]))/x^2,x]
```

```
[Out] (b*c*d*Sqrt[-1 - c^2*x^2])/Sqrt[-(c^2*x^2)] - (d*(a + b*ArcCsch[c*x]))/x +
e*x*(a + b*ArcCsch[c*x]) - (b*e*x*ArcTan[(c*x)/Sqrt[-1 - c^2*x^2]])/Sqrt[-(
c^2*x^2)]
```

Rule 14

```
Int[(u_)*((c_.)*(x_))^(m_.), x_Symbol] :> Int[ExpandIntegrand[(c*x)^m*u, x]
, x] /; FreeQ[{c, m}, x] && SumQ[u] &&  !LinearQ[u, x] &&  !MatchQ[u, (a_)
+ (b_.)*(v_) /; FreeQ[{a, b}, x] && InverseFunctionQ[v]]
```

Rule 203

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

Rule 217

```
Int[1/Sqrt[(a_) + (b_.)*(x_)^2], x_Symbol] :> Subst[Int[1/(1 - b*x^2), x],
x, x/Sqrt[a + b*x^2]] /; FreeQ[{a, b}, x] &&  !GtQ[a, 0]
```

Rule 451

```
Int[((e_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_.)*((c_) + (d_.)*(x_)^(n
_)), x_Symbol] :> Simp[(c*(e*x)^(m + 1)*(a + b*x^n)^(p + 1))/(a*e*(m + 1)),
 x] + Dist[d/e^n, Int[(e*x)^(m + n)*(a + b*x^n)^p, x], x] /; FreeQ[{a, b, c
, d, e, m, n, p}, x] && NeQ[b*c - a*d, 0] && EqQ[m + n*(p + 1) + 1, 0] && (
IntegerQ[n] || GtQ[e, 0]) && ((GtQ[n, 0] && LtQ[m, -1]) || (LtQ[n, 0] && Gt
Q[m + n, -1]))
```

Rule 6302

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))*((f_.)*(x_))^(m_.)*((d_.) + (e_.)*(
x_)^2)^(p_.), x_Symbol] :> With[{u = IntHide[(f*x)^m*(d + e*x^2)^p, x]}, Di
st[a + b*ArcCsch[c*x], u, x] - Dist[(b*c*x)/Sqrt[-(c^2*x^2)], Int[SimplifyI
ntegrand[u/(x*Sqrt[-1 - c^2*x^2]), x], x], x]] /; FreeQ[{a, b, c, d, e, f,
m, p}, x] && ((IGtQ[p, 0] &&  !(ILtQ[(m - 1)/2, 0] && GtQ[m + 2*p + 3, 0]))
 || (IGtQ[(m + 1)/2, 0] &&  !(ILtQ[p, 0] && GtQ[m + 2*p + 3, 0])) || (ILtQ[
(m + 2*p + 1)/2, 0] &&  !ILtQ[(m - 1)/2, 0]))
```

Rubi steps

$$\int \frac{\left(d+ex^2\right)\left(a+b\operatorname{csch}^{-1}(cx)\right)}{x^2}\,dx = -\frac{d\left(a+b\operatorname{csch}^{-1}(cx)\right)}{x}+ex\left(a+b\operatorname{csch}^{-1}(cx)\right)-\frac{(bcx)\int\frac{-d+ex^2}{x^2\sqrt{-1-c^2x^2}}\,dx}{\sqrt{-c^2x^2}}$$

$$=\frac{bcd\sqrt{-1-c^2x^2}}{\sqrt{-c^2x^2}}-\frac{d\left(a+b\operatorname{csch}^{-1}(cx)\right)}{x}+ex\left(a+b\operatorname{csch}^{-1}(cx)\right)-\frac{(bcex)\int -}{\sqrt{-c}}$$

$$=\frac{bcd\sqrt{-1-c^2x^2}}{\sqrt{-c^2x^2}}-\frac{d\left(a+b\operatorname{csch}^{-1}(cx)\right)}{x}+ex\left(a+b\operatorname{csch}^{-1}(cx)\right)-\frac{(bcex)\,\mathrm{Sub}}{}$$

$$=\frac{bcd\sqrt{-1-c^2x^2}}{\sqrt{-c^2x^2}}-\frac{d\left(a+b\operatorname{csch}^{-1}(cx)\right)}{x}+ex\left(a+b\operatorname{csch}^{-1}(cx)\right)-\frac{bex\tan^{-1}}{\sqrt{-}}$$

**Mathematica [A]** time = 0.13, size = 89, normalized size = 0.98

$$-\frac{ad}{x}+aex+bcd\sqrt{\frac{c^2x^2+1}{c^2x^2}}+\frac{bex\sqrt{\frac{1}{c^2x^2}+1}\,\sinh^{-1}(cx)}{\sqrt{c^2x^2+1}}-\frac{bd\operatorname{csch}^{-1}(cx)}{x}+bex\operatorname{csch}^{-1}(cx)$$

Antiderivative was successfully verified.

```
[In] Integrate[((d + e*x^2)*(a + b*ArcCsch[c*x]))/x^2,x]
```

```
[Out] -((a*d)/x) + a*e*x + b*c*d*Sqrt[(1 + c^2*x^2)/(c^2*x^2)] - (b*d*ArcCsch[c*x
])/x + b*e*x*ArcCsch[c*x] + (b*e*Sqrt[1 + 1/(c^2*x^2)]*x*ArcSinh[c*x])/Sqrt
[1 + c^2*x^2]
```

**fricas [B]** time = 0.80, size = 222, normalized size = 2.44

$$\frac{bc^2dx\sqrt{\frac{c^2x^2+1}{c^2x^2}} + bc^2dx + acex^2 - bex\log\left(cx\sqrt{\frac{c^2x^2+1}{c^2x^2}} - cx\right) - acd - (bcd - bce)x\log\left(cx\sqrt{\frac{c^2x^2+1}{c^2x^2}} - cx + 1\right) + (bcd}{cx}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((e*x^2+d)*(a+b*arccsch(c*x))/x^2,x, algorithm="fricas")
```

```
[Out] (b*c^2*d*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) + b*c^2*d*x + a*c*e*x^2 - b*e*x*lo
g(c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) - c*x) - a*c*d - (b*c*d - b*c*e)*x*log(
c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) - c*x + 1) + (b*c*d - b*c*e)*x*log(c*x*sq
rt((c^2*x^2 + 1)/(c^2*x^2)) - c*x - 1) + (b*c*e*x^2 - b*c*d + (b*c*d - b*c*
e)*x)*log((c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) + 1)/(c*x)))/(c*x)
```

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

$$\int \frac{\left(ex^2 + d\right)(b\,\mathrm{arcsch}\,(cx) + a)}{x^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((e*x^2+d)*(a+b*arccsch(c*x))/x^2,x, algorithm="giac")
```

```
[Out] integrate((e*x^2 + d)*(b*arccsch(c*x) + a)/x^2, x)
```

**maple [A]** time = 0.07, size = 107, normalized size = 1.18

$$c\left(\frac{a\left(cxe - \frac{cd}{x}\right)}{c^2} + \frac{b\left(\mathrm{arccsch}\,(cx)\,cxe - \frac{\mathrm{arccsch}(cx)cd}{x} + \frac{\sqrt{c^2x^2+1}\,\left(c^2d\sqrt{c^2x^2+1} + e\,\mathrm{arcsinh}(cx)cx\right)}{c^2x^2\sqrt{\frac{c^2x^2+1}{c^2x^2}}}\right)}{c^2}\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((e*x^2+d)*(a+b*arccsch(c*x))/x^2,x)
```

```
[Out] c*(a/c^2*(c*x*e-c*d/x)+b/c^2*(arccsch(c*x)*c*x*e-arccsch(c*x)*c*d/x+(c^2*x^
2+1)^(1/2)*(c^2*d*(c^2*x^2+1)^(1/2)+e*arcsinh(c*x)*c*x)/c^2/x^2/((c^2*x^2+1
)/c^2/x^2)^(1/2)))
```

**maxima [A]** time = 0.37, size = 84, normalized size = 0.92

$$\left(c\sqrt{\frac{1}{c^2x^2}+1}-\frac{\operatorname{arcsch}(cx)}{x}\right)bd+aex+\frac{\left(2\,cx\operatorname{arcsch}(cx)+\log\left(\sqrt{\frac{1}{c^2x^2}+1}+1\right)-\log\left(\sqrt{\frac{1}{c^2x^2}+1}-1\right)\right)be}{2\,c}-\frac{ad}{x}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((e*x^2+d)*(a+b*arccsch(c*x))/x^2,x, algorithm="maxima")
```

```
[Out] (c*sqrt(1/(c^2*x^2) + 1) - arccsch(c*x)/x)*b*d + a*e*x + 1/2*(2*c*x*arccsch
(c*x) + log(sqrt(1/(c^2*x^2) + 1) + 1) - log(sqrt(1/(c^2*x^2) + 1) - 1))*b*
e/c - a*d/x
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.01

$$\int \frac{\left(e\,x^2+d\right)\,\left(a+b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)\right)}{x^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(((d + e*x^2)*(a + b*asinh(1/(c*x))))/x^2,x)
```

```
[Out] int(((d + e*x^2)*(a + b*asinh(1/(c*x))))/x^2, x)
```

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

$$\int \frac{(a+b\operatorname{acsch}(cx))\left(d+ex^2\right)}{x^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((e*x**2+d)*(a+b*acsch(c*x))/x**2,x)
```

```
[Out] Integral((a + b*acsch(c*x))*(d + e*x**2)/x**2, x)
```

# 3.80 $\int \frac{(d+ex^2)(a+b\,\mathbf{csch}^{-1}(cx))}{x^4}\,dx$

**Optimal**. Leaf size=109

$$-\frac{d\left(a+b\operatorname{csch}^{-1}(cx)\right)}{3x^3}-\frac{e\left(a+b\operatorname{csch}^{-1}(cx)\right)}{x}-\frac{bc\sqrt{-c^2x^2-1}\,\left(2c^2d-9e\right)}{9\sqrt{-c^2x^2}}+\frac{bcd\sqrt{-c^2x^2-1}}{9x^2\sqrt{-c^2x^2}}$$

```
[Out] -1/3*d*(a+b*arccsch(c*x))/x^3-e*(a+b*arccsch(c*x))/x-1/9*b*c*(2*c^2*d-9*e)*
(-c^2*x^2-1)^(1/2)/(-c^2*x^2)^(1/2)+1/9*b*c*d*(-c^2*x^2-1)^(1/2)/x^2/(-c^2*
x^2)^(1/2)
```

**Rubi [A]** time = 0.08, antiderivative size = 109, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 5, integrand size = 19, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.263, Rules used = {14, 6302, 12, 453, 264}

$$-\frac{d\left(a+b\operatorname{csch}^{-1}(cx)\right)}{3x^3}-\frac{e\left(a+b\operatorname{csch}^{-1}(cx)\right)}{x}-\frac{bc\sqrt{-c^2x^2-1}\,\left(2c^2d-9e\right)}{9\sqrt{-c^2x^2}}+\frac{bcd\sqrt{-c^2x^2-1}}{9x^2\sqrt{-c^2x^2}}$$

Antiderivative was successfully verified.

```
[In] Int[((d + e*x^2)*(a + b*ArcCsch[c*x]))/x^4,x]
```

```
[Out] -(b*c*(2*c^2*d - 9*e)*Sqrt[-1 - c^2*x^2])/(9*Sqrt[-(c^2*x^2)]) + (b*c*d*Sqr
t[-1 - c^2*x^2])/(9*x^2*Sqrt[-(c^2*x^2)]) - (d*(a + b*ArcCsch[c*x]))/(3*x^3
) - (e*(a + b*ArcCsch[c*x]))/x
```

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 14

```
Int[(u_)*((c_.)*(x_))^(m_.), x_Symbol] :> Int[ExpandIntegrand[(c*x)^m*u, x]
, x] /; FreeQ[{c, m}, x] && SumQ[u] &&  !LinearQ[u, x] &&  !MatchQ[u, (a_)
+ (b_.)*(v_) /; FreeQ[{a, b}, x] && InverseFunctionQ[v]]
```

Rule 264

```
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] /; FreeQ[{a, b, c, m, n,
 p}, x] && EqQ[(m + 1)/n + p + 1, 0] && NeQ[m, -1]
```

Rule 453

```
Int[((e_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_.)*((c_) + (d_.)*(x_)^(n
_)), x_Symbol] :> Simp[(c*(e*x)^(m + 1)*(a + b*x^n)^(p + 1))/(a*e*(m + 1)),
 x] + Dist[(a*d*(m + 1) - b*c*(m + n*(p + 1) + 1))/(a*e^n*(m + 1)), Int[(e*
x)^(m + n)*(a + b*x^n)^p, x], x] /; FreeQ[{a, b, c, d, e, p}, x] && NeQ[b*c
 - a*d, 0] && (IntegerQ[n] || GtQ[e, 0]) && ((GtQ[n, 0] && LtQ[m, -1]) || (
LtQ[n, 0] && GtQ[m + n, -1])) &&  !ILtQ[p, -1]
```

Rule 6302

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))*((f_.)*(x_))^(m_.)*((d_.) + (e_.)*(
x_)^2)^(p_.), x_Symbol] :> With[{u = IntHide[(f*x)^m*(d + e*x^2)^p, x]}, Di
st[a + b*ArcCsch[c*x], u, x] - Dist[(b*c*x)/Sqrt[-(c^2*x^2)], Int[SimplifyI
ntegrand[u/(x*Sqrt[-1 - c^2*x^2]), x], x], x]] /; FreeQ[{a, b, c, d, e, f,
m, p}, x] && ((IGtQ[p, 0] &&  !(ILtQ[(m - 1)/2, 0] && GtQ[m + 2*p + 3, 0]))
 || (IGtQ[(m + 1)/2, 0] &&  !(ILtQ[p, 0] && GtQ[m + 2*p + 3, 0])) || (ILtQ[
(m + 2*p + 1)/2, 0] &&  !ILtQ[(m - 1)/2, 0]))
```

Rubi steps

$$\int \frac{\left(d+ex^2\right)\left(a+b\operatorname{csch}^{-1}(cx)\right)}{x^4}\,dx = -\frac{d\left(a+b\operatorname{csch}^{-1}(cx)\right)}{3x^3}-\frac{e\left(a+b\operatorname{csch}^{-1}(cx)\right)}{x}-\frac{(bcx)\int\frac{-d-3ex^2}{3x^4\sqrt{-1-c^2x^2}}\,dx}{\sqrt{-c^2x^2}}$$
$$= -\frac{d\left(a+b\operatorname{csch}^{-1}(cx)\right)}{3x^3}-\frac{e\left(a+b\operatorname{csch}^{-1}(cx)\right)}{x}-\frac{(bcx)\int\frac{-d-3ex^2}{x^4\sqrt{-1-c^2x^2}}\,dx}{3\sqrt{-c^2x^2}}$$
$$= \frac{bcd\sqrt{-1-c^2x^2}}{9x^2\sqrt{-c^2x^2}}-\frac{d\left(a+b\operatorname{csch}^{-1}(cx)\right)}{3x^3}-\frac{e\left(a+b\operatorname{csch}^{-1}(cx)\right)}{x}-\frac{\left(bc\left(2c^2d-\right.\right.}{}$$
$$= -\frac{bc\left(2c^2d-9e\right)\sqrt{-1-c^2x^2}}{9\sqrt{-c^2x^2}}+\frac{bcd\sqrt{-1-c^2x^2}}{9x^2\sqrt{-c^2x^2}}-\frac{d\left(a+b\operatorname{csch}^{-1}(cx)\right)}{3x^3}-\frac{e\left(\right.}{}$$

**Mathematica [A]** time = 0.08, size = 68, normalized size = 0.62

$$\frac{-3a\left(d+3ex^2\right)+bcx\sqrt{\frac{1}{c^2x^2}+1}\left(-2c^2dx^2+d+9ex^2\right)-3b\operatorname{csch}^{-1}(cx)\left(d+3ex^2\right)}{9x^3}$$

Antiderivative was successfully verified.

```
[In] Integrate[((d + e*x^2)*(a + b*ArcCsch[c*x]))/x^4,x]
```

```
[Out] (-3*a*(d + 3*e*x^2) + b*c*Sqrt[1 + 1/(c^2*x^2)]*x*(d - 2*c^2*d*x^2 + 9*e*x^
2) - 3*b*(d + 3*e*x^2)*ArcCsch[c*x])/(9*x^3)
```

**fricas [A]** time = 0.95, size = 105, normalized size = 0.96

$$-\frac{9\,aex^2+3\,ad+3\left(3\,bex^2+bd\right)\log\left(\frac{cx\sqrt{\frac{c^2x^2+1}{c^2x^2}}+1}{cx}\right)-\left(bcdx-\left(2\,bc^3d-9\,bce\right)x^3\right)\sqrt{\frac{c^2x^2+1}{c^2x^2}}}{9\,x^3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((e*x^2+d)*(a+b*arccsch(c*x))/x^4,x, algorithm="fricas")
```

```
[Out] -1/9*(9*a*e*x^2 + 3*a*d + 3*(3*b*e*x^2 + b*d)*log((c*x*sqrt((c^2*x^2 + 1)/(
c^2*x^2)) + 1)/(c*x)) - (b*c*d*x - (2*b*c^3*d - 9*b*c*e)*x^3)*sqrt((c^2*x^2
 + 1)/(c^2*x^2)))/x^3
```

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

$$\int\frac{\left(ex^2+d\right)\left(b\operatorname{arcsch}\left(cx\right)+a\right)}{x^4}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((e*x^2+d)*(a+b*arccsch(c*x))/x^4,x, algorithm="giac")
```

```
[Out] integrate((e*x^2 + d)*(b*arccsch(c*x) + a)/x^4, x)
```

**maple [A]** time = 0.07, size = 122, normalized size = 1.12

$$c^3\left(\frac{a\left(-\frac{e}{cx}-\frac{d}{3c\,x^3}\right)}{c^2}+\frac{b\left(-\frac{\operatorname{arccsch}(cx)e}{cx}-\frac{\operatorname{arccsch}(cx)d}{3c\,x^3}-\frac{\left(c^2x^2+1\right)\left(2c^4d\,x^2-9c^2x^2e-c^2d\right)}{9\sqrt{\frac{c^2x^2+1}{c^2x^2}}\;c^4x^4}\right)}{c^2}\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((e*x^2+d)*(a+b*arccsch(c*x))/x^4,x)
```

```
[Out] c^3*(a/c^2*(-e/c/x-1/3/c*d/x^3)+b/c^2*(-arccsch(c*x)*e/c/x-1/3*arccsch(c*x)
/c*d/x^3-1/9*(c^2*x^2+1)*(2*c^4*d*x^2-9*c^2*e*x^2-c^2*d)/((c^2*x^2+1)/c^2/x
^2)^(1/2)/c^4/x^4))
```

**maxima** [A] time = 0.35, size = 91, normalized size = 0.83

$$\left(c\sqrt{\frac{1}{c^2x^2}+1}-\frac{\operatorname{arcsch}(cx)}{x}\right)be+\frac{1}{9}bd\left(\frac{c^4\left(\frac{1}{c^2x^2}+1\right)^{\frac{3}{2}}-3c^4\sqrt{\frac{1}{c^2x^2}+1}}{c}-\frac{3\operatorname{arcsch}(cx)}{x^3}\right)-\frac{ae}{x}-\frac{ad}{3x^3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((e*x^2+d)*(a+b*arccsch(c*x))/x^4,x, algorithm="maxima")
```

```
[Out] (c*sqrt(1/(c^2*x^2) + 1) - arccsch(c*x)/x)*b*e + 1/9*b*d*((c^4*(1/(c^2*x^2)
 + 1)^(3/2) - 3*c^4*sqrt(1/(c^2*x^2) + 1))/c - 3*arccsch(c*x)/x^3) - a*e/x
- 1/3*a*d/x^3
```

**mupad** [F] time = 0.00, size = -1, normalized size = -0.01

$$\int \frac{\left(e\,x^2+d\right)\,\left(a+b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)\right)}{x^4}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(((d + e*x^2)*(a + b*asinh(1/(c*x))))/x^4,x)
```

```
[Out] int(((d + e*x^2)*(a + b*asinh(1/(c*x))))/x^4, x)
```

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

$$\int \frac{(a+b\operatorname{acsch}(cx))\left(d+ex^2\right)}{x^4}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((e*x**2+d)*(a+b*acsch(c*x))/x**4,x)
```

```
[Out] Integral((a + b*acsch(c*x))*(d + e*x**2)/x**4, x)
```

# 3.81 $\int \frac{(d+ex^2)(a+b\,\mathrm{csch}^{-1}(cx))}{x^6}\,dx$

**Optimal**. Leaf size=158

$$-\frac{d\left(a+b\,\mathrm{csch}^{-1}(cx)\right)}{5x^5}-\frac{e\left(a+b\,\mathrm{csch}^{-1}(cx)\right)}{3x^3}-\frac{bc\sqrt{-c^2x^2-1}\,\left(12c^2d-25e\right)}{225x^2\sqrt{-c^2x^2}}+\frac{bcd\sqrt{-c^2x^2-1}}{25x^4\sqrt{-c^2x^2}}+\frac{2bc^3\sqrt{-c^2x^2-1}\,\left(12c\right.}{225\sqrt{-c^2x^2}}$$

```
[Out] -1/5*d*(a+b*arccsch(c*x))/x^5-1/3*e*(a+b*arccsch(c*x))/x^3+2/225*b*c^3*(12*
c^2*d-25*e)*(-c^2*x^2-1)^(1/2)/(-c^2*x^2)^(1/2)+1/25*b*c*d*(-c^2*x^2-1)^(1/
2)/x^4/(-c^2*x^2)^(1/2)-1/225*b*c*(12*c^2*d-25*e)*(-c^2*x^2-1)^(1/2)/x^2/(-
c^2*x^2)^(1/2)
```

**Rubi [A]** time = 0.10, antiderivative size = 158, normalized size of antiderivative = 1.00, number of steps used = 5, number of rules used = 6, integrand size = 19, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.316, Rules used = {14, 6302, 12, 453, 271, 264}

$$-\frac{d\left(a+b\,\mathrm{csch}^{-1}(cx)\right)}{5x^5}-\frac{e\left(a+b\,\mathrm{csch}^{-1}(cx)\right)}{3x^3}+\frac{2bc^3\sqrt{-c^2x^2-1}\,\left(12c^2d-25e\right)}{225\sqrt{-c^2x^2}}-\frac{bc\sqrt{-c^2x^2-1}\,\left(12c^2d-25e\right)}{225x^2\sqrt{-c^2x^2}}+\frac{bcd\sqrt{}}{25x^4}$$

Antiderivative was successfully verified.

```
[In] Int[((d + e*x^2)*(a + b*ArcCsch[c*x]))/x^6,x]
```

```
[Out] (2*b*c^3*(12*c^2*d - 25*e)*Sqrt[-1 - c^2*x^2])/(225*Sqrt[-(c^2*x^2)]) + (b*
c*d*Sqrt[-1 - c^2*x^2])/(25*x^4*Sqrt[-(c^2*x^2)]) - (b*c*(12*c^2*d - 25*e)*
Sqrt[-1 - c^2*x^2])/(225*x^2*Sqrt[-(c^2*x^2)]) - (d*(a + b*ArcCsch[c*x]))/(
5*x^5) - (e*(a + b*ArcCsch[c*x]))/(3*x^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 14

```
Int[(u_)*((c_.)*(x_))^(m_.), x_Symbol] :> Int[ExpandIntegrand[(c*x)^m*u, x]
, x] /; FreeQ[{c, m}, x] && SumQ[u] &&  !LinearQ[u, x] &&  !MatchQ[u, (a_)
+ (b_.)*(v_) /; FreeQ[{a, b}, x] && InverseFunctionQ[v]]
```

Rule 264

```
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] /; FreeQ[{a, b, c, m, n,
```

```
p}, x] && EqQ[(m + 1)/n + p + 1, 0] && NeQ[m, -1]
```

Rule 271

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

Rule 453

```
Int[((e_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_.)*((c_) + (d_.)*(x_)^(n
_)), x_Symbol] :> Simp[(c*(e*x)^(m + 1)*(a + b*x^n)^(p + 1))/(a*e*(m + 1)),
 x] + Dist[(a*d*(m + 1) - b*c*(m + n*(p + 1) + 1))/(a*e^n*(m + 1)), Int[(e*
x)^(m + n)*(a + b*x^n)^p, x], x] /; FreeQ[{a, b, c, d, e, p}, x] && NeQ[b*c
 - a*d, 0] && (IntegerQ[n] || GtQ[e, 0]) && ((GtQ[n, 0] && LtQ[m, -1]) || (
LtQ[n, 0] && GtQ[m + n, -1])) &&  !ILtQ[p, -1]
```

Rule 6302

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))*((f_.)*(x_))^(m_.)*((d_.) + (e_.)*(
x_)^2)^(p_.), x_Symbol] :> With[{u = IntHide[(f*x)^m*(d + e*x^2)^p, x]}, Di
st[a + b*ArcCsch[c*x], u, x] - Dist[(b*c*x)/Sqrt[-(c^2*x^2)], Int[SimplifyI
ntegrand[u/(x*Sqrt[-1 - c^2*x^2]), x], x], x]] /; FreeQ[{a, b, c, d, e, f,
m, p}, x] && ((IGtQ[p, 0] &&  !(ILtQ[(m - 1)/2, 0] && GtQ[m + 2*p + 3, 0]))
 || (IGtQ[(m + 1)/2, 0] &&  !(ILtQ[p, 0] && GtQ[m + 2*p + 3, 0])) || (ILtQ[
(m + 2*p + 1)/2, 0] &&  !ILtQ[(m - 1)/2, 0]))
```

Rubi steps

$$\int \frac{(d+ex^2)(a+b\text{csch}^{-1}(cx))}{x^6}\,dx = -\frac{d(a+b\text{csch}^{-1}(cx))}{5x^5} - \frac{e(a+b\text{csch}^{-1}(cx))}{3x^3} - \frac{(bcx)\int \frac{-3d-5ex^2}{15x^6\sqrt{-1-c^2x^2}}\,dx}{\sqrt{-c^2x^2}}$$

$$= -\frac{d(a+b\text{csch}^{-1}(cx))}{5x^5} - \frac{e(a+b\text{csch}^{-1}(cx))}{3x^3} - \frac{(bcx)\int \frac{-3d-5ex^2}{x^6\sqrt{-1-c^2x^2}}\,dx}{15\sqrt{-c^2x^2}}$$

$$= \frac{bcd\sqrt{-1-c^2x^2}}{25x^4\sqrt{-c^2x^2}} - \frac{d(a+b\text{csch}^{-1}(cx))}{5x^5} - \frac{e(a+b\text{csch}^{-1}(cx))}{3x^3} - \frac{(bc(12c^2d-$$

$$= \frac{bcd\sqrt{-1-c^2x^2}}{25x^4\sqrt{-c^2x^2}} - \frac{bc(12c^2d-25e)\sqrt{-1-c^2x^2}}{225x^2\sqrt{-c^2x^2}} - \frac{d(a+b\text{csch}^{-1}(cx))}{5x^5} - \frac{e(a$$

$$= \frac{2bc^3(12c^2d-25e)\sqrt{-1-c^2x^2}}{225\sqrt{-c^2x^2}} + \frac{bcd\sqrt{-1-c^2x^2}}{25x^4\sqrt{-c^2x^2}} - \frac{bc(12c^2d-25e)\sqrt{-1-}}{225x^2\sqrt{-c^2x^2}}$$

**Mathematica [A]** time = 0.12, size = 93, normalized size = 0.59

$$\frac{-15a(3d+5ex^2)+bcx\sqrt{\frac{1}{c^2x^2}+1}\,(25ex^2(1-2c^2x^2)+3d(8c^4x^4-4c^2x^2+3))-15b\text{csch}^{-1}(cx)(3d+5ex^2)}{225x^5}$$

Antiderivative was successfully verified.

```
[In] Integrate[((d + e*x^2)*(a + b*ArcCsch[c*x]))/x^6,x]
```

```
[Out] (-15*a*(3*d + 5*e*x^2) + b*c*Sqrt[1 + 1/(c^2*x^2)]*x*(25*e*x^2*(1 - 2*c^2*x
^2) + 3*d*(3 - 4*c^2*x^2 + 8*c^4*x^4)) - 15*b*(3*d + 5*e*x^2)*ArcCsch[c*x])
/(225*x^5)
```

**fricas [A]** time = 0.95, size = 127, normalized size = 0.80

$$-\frac{75\,aex^2+45\,ad+15\,(5\,bex^2+3\,bd)\log\left(\frac{cx\sqrt{\frac{c^2x^2+1}{c^2x^2}}+1}{cx}\right)-\left(2\left(12\,bc^5d-25\,bc^3e\right)x^5+9\,bcdx-\left(12\,bc^3d-25\,bce\right)x\right.}{225\,x^5}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((e*x^2+d)*(a+b*arccsch(c*x))/x^6,x, algorithm="fricas")
```

```
[Out] -1/225*(75*a*e*x^2 + 45*a*d + 15*(5*b*e*x^2 + 3*b*d)*log((c*x*sqrt((c^2*x^2
 + 1)/(c^2*x^2)) + 1)/(c*x)) - (2*(12*b*c^5*d - 25*b*c^3*e)*x^5 + 9*b*c*d*x
 - (12*b*c^3*d - 25*b*c*e)*x^3)*sqrt((c^2*x^2 + 1)/(c^2*x^2)))/x^5
```

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

$$\int \frac{\left(ex^2+d\right)\left(b\,\mathrm{arcsch}\,(cx)+a\right)}{x^6}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((e*x^2+d)*(a+b*arccsch(c*x))/x^6,x, algorithm="giac")
```

```
[Out] integrate((e*x^2 + d)*(b*arccsch(c*x) + a)/x^6, x)
```

**maple** [A] time = 0.06, size = 140, normalized size = 0.89

$$c^5\left(\frac{a\left(-\frac{e}{3c^3x^3}-\frac{d}{5c^3x^5}\right)}{c^2}+\frac{b\left(-\frac{\mathrm{arccsch}(cx)e}{3c^3x^3}-\frac{\mathrm{arccsch}(cx)d}{5c^3x^5}+\frac{\left(c^2x^2+1\right)\left(24c^6d\,x^4-50c^4e\,x^4-12c^4d\,x^2+25c^2x^2e+9c^2d\right)}{225\sqrt{\frac{c^2x^2+1}{c^2x^2}}\,c^6x^6}\right)}{c^2}\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((e*x^2+d)*(a+b*arccsch(c*x))/x^6,x)
```

```
[Out] c^5*(a/c^2*(-1/3*e/c^3/x^3-1/5/c^3*d/x^5)+b/c^2*(-1/3*arccsch(c*x)*e/c^3/x^
3-1/5*arccsch(c*x)/c^3*d/x^5+1/225*(c^2*x^2+1)*(24*c^6*d*x^4-50*c^4*e*x^4-1
2*c^4*d*x^2+25*c^2*e*x^2+9*c^2*d)/((c^2*x^2+1)/c^2/x^2)^(1/2)/c^6/x^6))
```

**maxima** [A] time = 0.32, size = 132, normalized size = 0.84

$$\frac{1}{75}\,bd\left(\frac{3\,c^6\left(\frac{1}{c^2x^2}+1\right)^{\frac{5}{2}}-10\,c^6\left(\frac{1}{c^2x^2}+1\right)^{\frac{3}{2}}+15\,c^6\sqrt{\frac{1}{c^2x^2}+1}}{c}-\frac{15\,\mathrm{arcsch}\,(cx)}{x^5}\right)+\frac{1}{9}\,be\left(\frac{c^4\left(\frac{1}{c^2x^2}+1\right)^{\frac{3}{2}}-3\,c^4\sqrt{\frac{1}{c^2x^2}}\right.}{c}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((e*x^2+d)*(a+b*arccsch(c*x))/x^6,x, algorithm="maxima")
```

```
[Out] 1/75*b*d*((3*c^6*(1/(c^2*x^2) + 1)^(5/2) - 10*c^6*(1/(c^2*x^2) + 1)^(3/2) +
 15*c^6*sqrt(1/(c^2*x^2) + 1))/c - 15*arccsch(c*x)/x^5) + 1/9*b*e*((c^4*(1/
(c^2*x^2) + 1)^(3/2) - 3*c^4*sqrt(1/(c^2*x^2) + 1))/c - 3*arccsch(c*x)/x^3)
 - 1/3*a*e/x^3 - 1/5*a*d/x^5
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.01

$$\int \frac{\left(e\,x^2+d\right)\,\left(a+b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)\right)}{x^6}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(((d + e*x^2)*(a + b*asinh(1/(c*x))))/x^6,x)
[Out] int(((d + e*x^2)*(a + b*asinh(1/(c*x))))/x^6, x)
```

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

$$\int \frac{(a+b\,\mathrm{acsch}\,(cx))\left(d+ex^2\right)}{x^6}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((e*x**2+d)*(a+b*acsch(c*x))/x**6,x)
[Out] Integral((a + b*acsch(c*x))*(d + e*x**2)/x**6, x)
```

# 3.82 $\int \frac{(d+ex^2)(a+b\,\text{csch}^{-1}(cx))}{x^8}\,dx$

**Optimal**. Leaf size=205

$$-\frac{d\left(a+b\text{csch}^{-1}(cx)\right)}{7x^7}-\frac{e\left(a+b\text{csch}^{-1}(cx)\right)}{5x^5}-\frac{bc\sqrt{-c^2x^2-1}\,\left(30c^2d-49e\right)}{1225x^4\sqrt{-c^2x^2}}+\frac{bcd\sqrt{-c^2x^2-1}}{49x^6\sqrt{-c^2x^2}}-\frac{8bc^5\sqrt{-c^2x^2-1}\,(3\ldots}{3675\sqrt{-c^2\ldots}}$$

```
[Out] -1/7*d*(a+b*arccsch(c*x))/x^7-1/5*e*(a+b*arccsch(c*x))/x^5-8/3675*b*c^5*(30
*c^2*d-49*e)*(-c^2*x^2-1)^(1/2)/(-c^2*x^2)^(1/2)+1/49*b*c*d*(-c^2*x^2-1)^(1
/2)/x^6/(-c^2*x^2)^(1/2)-1/1225*b*c*(30*c^2*d-49*e)*(-c^2*x^2-1)^(1/2)/x^4/
(-c^2*x^2)^(1/2)+4/3675*b*c^3*(30*c^2*d-49*e)*(-c^2*x^2-1)^(1/2)/x^2/(-c^2*
x^2)^(1/2)
```

**Rubi [A]** time = 0.12, antiderivative size = 205, 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 = {14, 6302, 12, 453, 271, 264}

$$-\frac{d\left(a+b\text{csch}^{-1}(cx)\right)}{7x^7}-\frac{e\left(a+b\text{csch}^{-1}(cx)\right)}{5x^5}-\frac{8bc^5\sqrt{-c^2x^2-1}\,\left(30c^2d-49e\right)}{3675\sqrt{-c^2x^2}}+\frac{4bc^3\sqrt{-c^2x^2-1}\,\left(30c^2d-49e\right)}{3675x^2\sqrt{-c^2x^2}}-\frac{bc\ldots}{\ldots}$$

Antiderivative was successfully verified.

```
[In] Int[((d + e*x^2)*(a + b*ArcCsch[c*x]))/x^8,x]
```

```
[Out] (-8*b*c^5*(30*c^2*d - 49*e)*Sqrt[-1 - c^2*x^2])/(3675*Sqrt[-(c^2*x^2)]) + (
b*c*d*Sqrt[-1 - c^2*x^2])/(49*x^6*Sqrt[-(c^2*x^2)]) - (b*c*(30*c^2*d - 49*e
)*Sqrt[-1 - c^2*x^2])/(1225*x^4*Sqrt[-(c^2*x^2)]) + (4*b*c^3*(30*c^2*d - 49
*e)*Sqrt[-1 - c^2*x^2])/(3675*x^2*Sqrt[-(c^2*x^2)]) - (d*(a + b*ArcCsch[c*x
]))/(7*x^7) - (e*(a + b*ArcCsch[c*x]))/(5*x^5)
```

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 14

```
Int[(u_)*((c_.)*(x_))^(m_.), x_Symbol] :> Int[ExpandIntegrand[(c*x)^m*u, x]
, x] /; FreeQ[{c, m}, x] && SumQ[u] &&  !LinearQ[u, x] &&  !MatchQ[u, (a_)
+ (b_.)*(v_) /; FreeQ[{a, b}, x] && InverseFunctionQ[v]]
```

Rule 264

```
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] /; FreeQ[{a, b, c, m, n,
```

```
p}, x] && EqQ[(m + 1)/n + p + 1, 0] && NeQ[m, -1]
```

Rule 271

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

Rule 453

```
Int[((e_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_.)*((c_) + (d_.)*(x_)^(n
_)), x_Symbol] :> Simp[(c*(e*x)^(m + 1)*(a + b*x^n)^(p + 1))/(a*e*(m + 1)),
 x] + Dist[(a*d*(m + 1) - b*c*(m + n*(p + 1) + 1))/(a*e^n*(m + 1)), Int[(e*
x)^(m + n)*(a + b*x^n)^p, x], x] /; FreeQ[{a, b, c, d, e, p}, x] && NeQ[b*c
 - a*d, 0] && (IntegerQ[n] || GtQ[e, 0]) && ((GtQ[n, 0] && LtQ[m, -1]) || (
LtQ[n, 0] && GtQ[m + n, -1])) &&  !ILtQ[p, -1]
```

Rule 6302

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))*((f_.)*(x_))^(m_.)*((d_.) + (e_.)*(
x_)^2)^(p_.), x_Symbol] :> With[{u = IntHide[(f*x)^m*(d + e*x^2)^p, x]}, Di
st[a + b*ArcCsch[c*x], u, x] - Dist[(b*c*x)/Sqrt[-(c^2*x^2)], Int[SimplifyI
ntegrand[u/(x*Sqrt[-1 - c^2*x^2]), x], x], x]] /; FreeQ[{a, b, c, d, e, f,
m, p}, x] && ((IGtQ[p, 0] &&  !(ILtQ[(m - 1)/2, 0] && GtQ[m + 2*p + 3, 0]))
 || (IGtQ[(m + 1)/2, 0] &&  !(ILtQ[p, 0] && GtQ[m + 2*p + 3, 0])) || (ILtQ[
(m + 2*p + 1)/2, 0] &&  !ILtQ[(m - 1)/2, 0]))
```

Rubi steps

$$\int \frac{(d+ex^2)(a+b\operatorname{csch}^{-1}(cx))}{x^8}\,dx = -\frac{d(a+b\operatorname{csch}^{-1}(cx))}{7x^7} - \frac{e(a+b\operatorname{csch}^{-1}(cx))}{5x^5} - \frac{(bcx)\int \frac{-5d-7ex^2}{35x^8\sqrt{-1-c^2x^2}}\,dx}{\sqrt{-c^2x^2}}$$

$$= -\frac{d(a+b\operatorname{csch}^{-1}(cx))}{7x^7} - \frac{e(a+b\operatorname{csch}^{-1}(cx))}{5x^5} - \frac{(bcx)\int \frac{-5d-7ex^2}{x^8\sqrt{-1-c^2x^2}}\,dx}{35\sqrt{-c^2x^2}}$$

$$= \frac{bcd\sqrt{-1-c^2x^2}}{49x^6\sqrt{-c^2x^2}} - \frac{d(a+b\operatorname{csch}^{-1}(cx))}{7x^7} - \frac{e(a+b\operatorname{csch}^{-1}(cx))}{5x^5} - \frac{(bc(30c^2d}{}$$

$$= \frac{bcd\sqrt{-1-c^2x^2}}{49x^6\sqrt{-c^2x^2}} - \frac{bc(30c^2d-49e)\sqrt{-1-c^2x^2}}{1225x^4\sqrt{-c^2x^2}} - \frac{d(a+b\operatorname{csch}^{-1}(cx))}{7x^7} - \frac{e}{}$$

$$= \frac{bcd\sqrt{-1-c^2x^2}}{49x^6\sqrt{-c^2x^2}} - \frac{bc(30c^2d-49e)\sqrt{-1-c^2x^2}}{1225x^4\sqrt{-c^2x^2}} + \frac{4bc^3(30c^2d-49e)\sqrt{-1}}{3675x^2\sqrt{-c^2x^2}}$$

$$= -\frac{8bc^5(30c^2d-49e)\sqrt{-1-c^2x^2}}{3675\sqrt{-c^2x^2}} + \frac{bcd\sqrt{-1-c^2x^2}}{49x^6\sqrt{-c^2x^2}} - \frac{bc(30c^2d-49e)\sqrt{-}}{1225x^4\sqrt{-c^2x}}$$

**Mathematica** [**A**] time = 0.15, size = 109, normalized size = 0.53

$$\frac{-105a(5d+7ex^2)+bcx\sqrt{\frac{1}{c^2x^2}+1}\left(49ex^2(8c^4x^4-4c^2x^2+3)-15d(16c^6x^6-8c^4x^4+6c^2x^2-5)\right)-105b\operatorname{csch}}{3675x^7}$$

Antiderivative was successfully verified.

```
[In] Integrate[((d + e*x^2)*(a + b*ArcCsch[c*x]))/x^8,x]
```

```
[Out] (-105*a*(5*d + 7*e*x^2) + b*c*Sqrt[1 + 1/(c^2*x^2)]*x*(49*e*x^2*(3 - 4*c^2*
x^2 + 8*c^4*x^4) - 15*d*(-5 + 6*c^2*x^2 - 8*c^4*x^4 + 16*c^6*x^6)) - 105*b*
(5*d + 7*e*x^2)*ArcCsch[c*x])/(3675*x^7)
```

**fricas** [**A**] time = 1.04, size = 146, normalized size = 0.71

$$-\frac{735\,aex^2+525\,ad+105\left(7\,bex^2+5\,bd\right)\log\left(\frac{cx\sqrt{\frac{c^2x^2+1}{c^2x^2}}+1}{cx}\right)+\left(8\left(30\,bc^7d-49\,bc^5e\right)x^7-4\left(30\,bc^5d-49\,bc^3e\right)x^5\right.}{3675\,x^7}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((e*x^2+d)*(a+b*arccsch(c*x))/x^8,x, algorithm="fricas")
```

```
[Out] -1/3675*(735*a*e*x^2 + 525*a*d + 105*(7*b*e*x^2 + 5*b*d)*log((c*x*sqrt((c^2
*x^2 + 1)/(c^2*x^2)) + 1)/(c*x)) + (8*(30*b*c^7*d - 49*b*c^5*e)*x^7 - 4*(30
*b*c^5*d - 49*b*c^3*e)*x^5 - 75*b*c*d*x + 3*(30*b*c^3*d - 49*b*c*e)*x^3)*sq
rt((c^2*x^2 + 1)/(c^2*x^2)))/x^7
```

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

$$\int \frac{(ex^2+d)(b\operatorname{arcsch}(cx)+a)}{x^8}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((e*x^2+d)*(a+b*arccsch(c*x))/x^8,x, algorithm="giac")
```

```
[Out] integrate((e*x^2 + d)*(b*arccsch(c*x) + a)/x^8, x)
```

**maple [A]** time = 0.06, size = 158, normalized size = 0.77

$$c^7\left(\frac{a\left(-\frac{d}{7c^5x^7}-\frac{e}{5c^5x^5}\right)}{c^2}+\frac{b\left(-\frac{\operatorname{arccsch}(cx)d}{7c^5x^7}-\frac{\operatorname{arccsch}(cx)e}{5c^5x^5}-\frac{(c^2x^2+1)(240c^8dx^6-392c^6ex^6-120c^6dx^4+196c^4ex^4+90c^4dx^2-147c^2x^2e-75c^2}{3675\sqrt{\frac{c^2x^2+1}{c^2x^2}}\,c^8x^8}\right.}{c^2}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((e*x^2+d)*(a+b*arccsch(c*x))/x^8,x)
```

```
[Out] c^7*(a/c^2*(-1/7/c^5*d/x^7-1/5*e/c^5/x^5)+b/c^2*(-1/7*arccsch(c*x)/c^5*d/x^
7-1/5*arccsch(c*x)*e/c^5/x^5-1/3675*(c^2*x^2+1)*(240*c^8*d*x^6-392*c^6*e*x^
6-120*c^6*d*x^4+196*c^4*e*x^4+90*c^4*d*x^2-147*c^2*e*x^2-75*c^2*d)/((c^2*x^
2+1)/c^2/x^2)^(1/2)/c^8/x^8))
```

**maxima [A]** time = 0.33, size = 165, normalized size = 0.80

$$\frac{1}{245}bd\left(\frac{5c^8\left(\frac{1}{c^2x^2}+1\right)^{\frac{7}{2}}-21c^8\left(\frac{1}{c^2x^2}+1\right)^{\frac{5}{2}}+35c^8\left(\frac{1}{c^2x^2}+1\right)^{\frac{3}{2}}-35c^8\sqrt{\frac{1}{c^2x^2}+1}}{c}-\frac{35\operatorname{arcsch}(cx)}{x^7}\right)+\frac{1}{75}be\left(\frac{3c^6\left(\frac{1}{c^2}\right.}{}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((e*x^2+d)*(a+b*arccsch(c*x))/x^8,x, algorithm="maxima")
```

```
[Out] 1/245*b*d*((5*c^8*(1/(c^2*x^2) + 1)^(7/2) - 21*c^8*(1/(c^2*x^2) + 1)^(5/2)
+ 35*c^8*(1/(c^2*x^2) + 1)^(3/2) - 35*c^8*sqrt(1/(c^2*x^2) + 1))/c - 35*arc
csch(c*x)/x^7) + 1/75*b*e*((3*c^6*(1/(c^2*x^2) + 1)^(5/2) - 10*c^6*(1/(c^2*
x^2) + 1)^(3/2) + 15*c^6*sqrt(1/(c^2*x^2) + 1))/c - 15*arccsch(c*x)/x^5) -
1/5*a*e/x^5 - 1/7*a*d/x^7
```

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

$$\int \frac{\left(e\,x^2+d\right)\,\left(a+b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)\right)}{x^8}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(((d + e*x^2)*(a + b*asinh(1/(c*x))))/x^8,x)
```

```
[Out] int(((d + e*x^2)*(a + b*asinh(1/(c*x))))/x^8, x)
```

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

$$\int \frac{(a+b\,\mathrm{acsch}\,(cx))\left(d+ex^2\right)}{x^8}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((e*x**2+d)*(a+b*acsch(c*x))/x**8,x)
```

```
[Out] Integral((a + b*acsch(c*x))*(d + e*x**2)/x**8, x)
```

# 3.83 $\int x^5\left(d+ex^2\right)\left(a+b\,\mathbf{csch}^{-1}(cx)\right)\,dx$

**Optimal**. Leaf size=204

$$\frac{1}{6}dx^6\left(a+b\text{csch}^{-1}(cx)\right)+\frac{1}{8}ex^8\left(a+b\text{csch}^{-1}(cx)\right)+\frac{bx\left(-c^2x^2-1\right)^{5/2}\left(4c^2d-9e\right)}{120c^7\sqrt{-c^2x^2}}+\frac{bx\left(-c^2x^2-1\right)^{3/2}\left(8c^2d-9e\right)}{72c^7\sqrt{-c^2x^2}}+\cdots$$

```
[Out] 1/6*d*x^6*(a+b*arccsch(c*x))+1/8*e*x^8*(a+b*arccsch(c*x))+1/72*b*(8*c^2*d-9
*e)*x*(-c^2*x^2-1)^(3/2)/c^7/(-c^2*x^2)^(1/2)+1/120*b*(4*c^2*d-9*e)*x*(-c^2
*x^2-1)^(5/2)/c^7/(-c^2*x^2)^(1/2)-1/56*b*e*x*(-c^2*x^2-1)^(7/2)/c^7/(-c^2*
x^2)^(1/2)+1/24*b*(4*c^2*d-3*e)*x*(-c^2*x^2-1)^(1/2)/c^7/(-c^2*x^2)^(1/2)
```

**Rubi [A]** time = 0.16, antiderivative size = 204, normalized size of antiderivative = 1.00, number of steps used = 5, number of rules used = 5, integrand size = 19, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.263, Rules used = {14, 6302, 12, 446, 77}

$$\frac{1}{6}dx^6\left(a+b\text{csch}^{-1}(cx)\right)+\frac{1}{8}ex^8\left(a+b\text{csch}^{-1}(cx)\right)+\frac{bx\left(-c^2x^2-1\right)^{5/2}\left(4c^2d-9e\right)}{120c^7\sqrt{-c^2x^2}}+\frac{bx\left(-c^2x^2-1\right)^{3/2}\left(8c^2d-9e\right)}{72c^7\sqrt{-c^2x^2}}+\cdots$$

Antiderivative was successfully verified.

```
[In] Int[x^5*(d + e*x^2)*(a + b*ArcCsch[c*x]),x]
```

```
[Out] (b*(4*c^2*d - 3*e)*x*Sqrt[-1 - c^2*x^2])/(24*c^7*Sqrt[-(c^2*x^2)]) + (b*(8*
c^2*d - 9*e)*x*(-1 - c^2*x^2)^(3/2))/(72*c^7*Sqrt[-(c^2*x^2)]) + (b*(4*c^2*
d - 9*e)*x*(-1 - c^2*x^2)^(5/2))/(120*c^7*Sqrt[-(c^2*x^2)]) - (b*e*x*(-1 -
c^2*x^2)^(7/2))/(56*c^7*Sqrt[-(c^2*x^2)]) + (d*x^6*(a + b*ArcCsch[c*x]))/6
+ (e*x^8*(a + b*ArcCsch[c*x]))/8
```

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 14

```
Int[(u_)*((c_.)*(x_))^(m_.), x_Symbol] :> Int[ExpandIntegrand[(c*x)^m*u, x]
, x] /; FreeQ[{c, m}, x] && SumQ[u] &&  !LinearQ[u, x] &&  !MatchQ[u, (a_)
+ (b_.)*(v_) /; FreeQ[{a, b}, x] && InverseFunctionQ[v]]
```

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 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 6302

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))*((f_.)*(x_))^(m_.)*((d_.) + (e_.)*(
x_)^2)^(p_.), x_Symbol] :> With[{u = IntHide[(f*x)^m*(d + e*x^2)^p, x]}, Di
st[a + b*ArcCsch[c*x], u, x] - Dist[(b*c*x)/Sqrt[-(c^2*x^2)], Int[SimplifyI
ntegrand[u/(x*Sqrt[-1 - c^2*x^2]), x], x], x]] /; FreeQ[{a, b, c, d, e, f,
m, p}, x] && ((IGtQ[p, 0] &&  !(ILtQ[(m - 1)/2, 0] && GtQ[m + 2*p + 3, 0]))
 || (IGtQ[(m + 1)/2, 0] &&  !(ILtQ[p, 0] && GtQ[m + 2*p + 3, 0])) || (ILtQ[
(m + 2*p + 1)/2, 0] &&  !ILtQ[(m - 1)/2, 0]))
```

Rubi steps

$$\int x^5\left(d+ex^2\right)\left(a+b\,\mathrm{csch}^{-1}(cx)\right)dx=\frac{1}{6}dx^6\left(a+b\,\mathrm{csch}^{-1}(cx)\right)+\frac{1}{8}ex^8\left(a+b\,\mathrm{csch}^{-1}(cx)\right)-\frac{(bcx)\int\frac{x^5\left(4d+3ex^2\right)}{24\sqrt{-1-c^2x^2}}\,d}{\sqrt{-c^2x^2}}$$

$$=\frac{1}{6}dx^6\left(a+b\,\mathrm{csch}^{-1}(cx)\right)+\frac{1}{8}ex^8\left(a+b\,\mathrm{csch}^{-1}(cx)\right)-\frac{(bcx)\int\frac{x^5\left(4d+3ex^2\right)}{\sqrt{-1-c^2x^2}}\,d}{24\sqrt{-c^2x^2}}$$

$$=\frac{1}{6}dx^6\left(a+b\,\mathrm{csch}^{-1}(cx)\right)+\frac{1}{8}ex^8\left(a+b\,\mathrm{csch}^{-1}(cx)\right)-\frac{(bcx)\,\mathrm{Subst}\left(\int\frac{x^2(4d}{\sqrt{-1}}\right.}{48\sqrt{-c^2}}$$

$$=\frac{1}{6}dx^6\left(a+b\,\mathrm{csch}^{-1}(cx)\right)+\frac{1}{8}ex^8\left(a+b\,\mathrm{csch}^{-1}(cx)\right)-\frac{(bcx)\,\mathrm{Subst}\left(\int\left(\frac{4c}{c^6\sqrt{}}\right.\right.}{}$$

$$=\frac{b\left(4c^2d-3e\right)x\sqrt{-1-c^2x^2}}{24c^7\sqrt{-c^2x^2}}+\frac{b\left(8c^2d-9e\right)x\left(-1-c^2x^2\right)^{3/2}}{72c^7\sqrt{-c^2x^2}}+\frac{b\left(4c^2d-\right.}{12}$$

**Mathematica [A]** time = 0.25, size = 114, normalized size = 0.56

$$\frac{x\left(105ax^5\left(4d+3ex^2\right)+\frac{b\sqrt{\frac{1}{c^2x^2}+1}\left(c^6\left(84dx^4+45ex^6\right)-2c^4\left(56dx^2+27ex^4\right)+8c^2\left(28d+9ex^2\right)-144e\right)}{c^7}+105bx^5\text{csch}^{-1}(cx)\left(4d+3ex^2\right)\right)}{2520}$$

Antiderivative was successfully verified.

```
[In] Integrate[x^5*(d + e*x^2)*(a + b*ArcCsch[c*x]),x]
```

```
[Out] (x*(105*a*x^5*(4*d + 3*e*x^2) + (b*Sqrt[1 + 1/(c^2*x^2)]*(-144*e + 8*c^2*(2
8*d + 9*e*x^2) - 2*c^4*(56*d*x^2 + 27*e*x^4) + c^6*(84*d*x^4 + 45*e*x^6)))/
c^7 + 105*b*x^5*(4*d + 3*e*x^2)*ArcCsch[c*x]))/2520
```

**fricas [A]** time = 0.82, size = 165, normalized size = 0.81

$$\frac{315\,ac^7ex^8+420\,ac^7dx^6+105\left(3\,bc^7ex^8+4\,bc^7dx^6\right)\log\left(\frac{cx\sqrt{\frac{c^2x^2+1}{c^2x^2}}+1}{cx}\right)+\left(45\,bc^6ex^7+6\left(14\,bc^6d-9\,bc^4e\right)x^5-8\left(\cdots\right.\right.}{2520\,c^7}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^5*(e*x^2+d)*(a+b*arccsch(c*x)),x, algorithm="fricas")
```

```
[Out] 1/2520*(315*a*c^7*e*x^8 + 420*a*c^7*d*x^6 + 105*(3*b*c^7*e*x^8 + 4*b*c^7*d*
x^6)*log((c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) + 1)/(c*x)) + (45*b*c^6*e*x^7 +
 6*(14*b*c^6*d - 9*b*c^4*e)*x^5 - 8*(14*b*c^4*d - 9*b*c^2*e)*x^3 + 16*(14*b
*c^2*d - 9*b*e)*x)*sqrt((c^2*x^2 + 1)/(c^2*x^2)))/c^7
```

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

$$\int\left(ex^2+d\right)\left(b\,\text{arcsch}\left(cx\right)+a\right)x^5\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^5*(e*x^2+d)*(a+b*arccsch(c*x)),x, algorithm="giac")
```

```
[Out] integrate((e*x^2 + d)*(b*arccsch(c*x) + a)*x^5, x)
```

**maple [A]** time = 0.06, size = 152, normalized size = 0.75

$$\frac{\frac{a\left(\frac{1}{8}e\,c^8x^8+\frac{1}{6}c^8d\,x^6\right)}{c^2}+\frac{b\left(\frac{\text{arccsch}(cx)e\,c^8x^8}{8}+\frac{\text{arccsch}(cx)c^8x^6d}{6}+\frac{\left(c^2x^2+1\right)\left(45c^6e\,x^6+84c^6d\,x^4-54c^4e\,x^4-112c^4d\,x^2+72c^2x^2e+224c^2d-144e\right)}{2520\sqrt{\frac{c^2x^2+1}{c^2x^2}}\,cx}\right)}{c^2}}{c^6}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^5*(e*x^2+d)*(a+b*arccsch(c*x)),x)
```

```
[Out] 1/c^6*(a/c^2*(1/8*e*c^8*x^8+1/6*c^8*d*x^6)+b/c^2*(1/8*arccsch(c*x)*e*c^8*x^
8+1/6*arccsch(c*x)*c^8*x^6*d+1/2520*(c^2*x^2+1)*(45*c^6*e*x^6+84*c^6*d*x^4-
54*c^4*e*x^4-112*c^4*d*x^2+72*c^2*e*x^2+224*c^2*d-144*e)/((c^2*x^2+1)/c^2/x
^2)^(1/2)/c/x))
```

**maxima** [A] time = 0.34, size = 176, normalized size = 0.86

$$\frac{1}{8}aex^8+\frac{1}{6}adx^6+\frac{1}{90}\left(15\,x^6\,\mathrm{arcsch}\,(cx)+\frac{3\,c^4x^5\left(\frac{1}{c^2x^2}+1\right)^{\frac{5}{2}}-10\,c^2x^3\left(\frac{1}{c^2x^2}+1\right)^{\frac{3}{2}}+15\,x\sqrt{\frac{1}{c^2x^2}+1}}{c^5}\right)bd+\frac{1}{280}\left(35\,x\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^5*(e*x^2+d)*(a+b*arccsch(c*x)),x, algorithm="maxima")
```

```
[Out] 1/8*a*e*x^8 + 1/6*a*d*x^6 + 1/90*(15*x^6*arccsch(c*x) + (3*c^4*x^5*(1/(c^2*
x^2) + 1)^(5/2) - 10*c^2*x^3*(1/(c^2*x^2) + 1)^(3/2) + 15*x*sqrt(1/(c^2*x^2
) + 1))/c^5)*b*d + 1/280*(35*x^8*arccsch(c*x) + (5*c^6*x^7*(1/(c^2*x^2) + 1
)^(7/2) - 21*c^4*x^5*(1/(c^2*x^2) + 1)^(5/2) + 35*c^2*x^3*(1/(c^2*x^2) + 1)
^(3/2) - 35*x*sqrt(1/(c^2*x^2) + 1))/c^7)*b*e
```

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

$$\int x^5\,\left(e\,x^2+d\right)\,\left(a+b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^5*(d + e*x^2)*(a + b*asinh(1/(c*x))),x)
```

```
[Out] int(x^5*(d + e*x^2)*(a + b*asinh(1/(c*x))), x)
```

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

$$\int x^5\left(a+b\,\mathrm{acsch}\,(cx)\right)\left(d+ex^2\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**5*(e*x**2+d)*(a+b*acsch(c*x)),x)
```

```
[Out] Integral(x**5*(a + b*acsch(c*x))*(d + e*x**2), x)
```

## 3.84 $\int x^3 \left(d+ex^2\right)\left(a+b\,\mathbf{csch}^{-1}(cx)\right)\,dx$

**Optimal**. Leaf size=159

$$\frac{1}{4}dx^4\left(a+b\text{csch}^{-1}(cx)\right)+\frac{1}{6}ex^6\left(a+b\text{csch}^{-1}(cx)\right)-\frac{bx\left(-c^2x^2-1\right)^{3/2}\left(3c^2d-4e\right)}{36c^5\sqrt{-c^2x^2}}-\frac{bx\sqrt{-c^2x^2-1}\left(3c^2d-2e\right)}{12c^5\sqrt{-c^2x^2}}+\frac{bex}{3}$$

```
[Out] 1/4*d*x^4*(a+b*arccsch(c*x))+1/6*e*x^6*(a+b*arccsch(c*x))-1/36*b*(3*c^2*d-4
*e)*x*(-c^2*x^2-1)^(3/2)/c^5/(-c^2*x^2)^(1/2)+1/30*b*e*x*(-c^2*x^2-1)^(5/2)
/c^5/(-c^2*x^2)^(1/2)-1/12*b*(3*c^2*d-2*e)*x*(-c^2*x^2-1)^(1/2)/c^5/(-c^2*x
^2)^(1/2)
```

**Rubi [A]** time = 0.13, antiderivative size = 159, normalized size of antiderivative = 1.00, number of steps used = 5, number of rules used = 5, integrand size = 19, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.263, Rules used = {14, 6302, 12, 446, 77}

$$\frac{1}{4}dx^4\left(a+b\text{csch}^{-1}(cx)\right)+\frac{1}{6}ex^6\left(a+b\text{csch}^{-1}(cx)\right)-\frac{bx\left(-c^2x^2-1\right)^{3/2}\left(3c^2d-4e\right)}{36c^5\sqrt{-c^2x^2}}-\frac{bx\sqrt{-c^2x^2-1}\left(3c^2d-2e\right)}{12c^5\sqrt{-c^2x^2}}+\frac{bex}{3}$$

Antiderivative was successfully verified.

```
[In] Int[x^3*(d + e*x^2)*(a + b*ArcCsch[c*x]),x]
```

```
[Out] -(b*(3*c^2*d - 2*e)*x*Sqrt[-1 - c^2*x^2])/(12*c^5*Sqrt[-(c^2*x^2)]) - (b*(3
*c^2*d - 4*e)*x*(-1 - c^2*x^2)^(3/2))/(36*c^5*Sqrt[-(c^2*x^2)]) + (b*e*x*(-
1 - c^2*x^2)^(5/2))/(30*c^5*Sqrt[-(c^2*x^2)]) + (d*x^4*(a + b*ArcCsch[c*x])
)/4 + (e*x^6*(a + b*ArcCsch[c*x]))/6
```

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 14

```
Int[(u_)*((c_.)*(x_))^(m_.), x_Symbol] :> Int[ExpandIntegrand[(c*x)^m*u, x]
, x] /; FreeQ[{c, m}, x] && SumQ[u] &&  !LinearQ[u, x] &&  !MatchQ[u, (a_)
+ (b_.)*(v_) /; FreeQ[{a, b}, x] && InverseFunctionQ[v]]
```

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 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 6302

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))*((f_.)*(x_))^(m_.)*((d_.) + (e_.)*(
x_)^2)^(p_.), x_Symbol] :> With[{u = IntHide[(f*x)^m*(d + e*x^2)^p, x]}, Di
st[a + b*ArcCsch[c*x], u, x] - Dist[(b*c*x)/Sqrt[-(c^2*x^2)], Int[SimplifyI
ntegrand[u/(x*Sqrt[-1 - c^2*x^2]), x], x], x]] /; FreeQ[{a, b, c, d, e, f,
m, p}, x] && ((IGtQ[p, 0] &&  !(ILtQ[(m - 1)/2, 0] && GtQ[m + 2*p + 3, 0]))
 || (IGtQ[(m + 1)/2, 0] &&  !(ILtQ[p, 0] && GtQ[m + 2*p + 3, 0])) || (ILtQ[
(m + 2*p + 1)/2, 0] &&  !ILtQ[(m - 1)/2, 0]))
```

Rubi steps

$$\int x^3\left(d+ex^2\right)\left(a+b\text{csch}^{-1}(cx)\right)dx = \frac{1}{4}dx^4\left(a+b\text{csch}^{-1}(cx)\right)+\frac{1}{6}ex^6\left(a+b\text{csch}^{-1}(cx)\right)-\frac{(bcx)\int\frac{x^3\left(3d+2ex^2\right)}{12\sqrt{-1-c^2x^2}}\,d\ldots}{\sqrt{-c^2x^2}}$$

$$=\frac{1}{4}dx^4\left(a+b\text{csch}^{-1}(cx)\right)+\frac{1}{6}ex^6\left(a+b\text{csch}^{-1}(cx)\right)-\frac{(bcx)\int\frac{x^3\left(3d+2ex^2\right)}{\sqrt{-1-c^2x^2}}\,d\ldots}{12\sqrt{-c^2x^2}}$$

$$=\frac{1}{4}dx^4\left(a+b\text{csch}^{-1}(cx)\right)+\frac{1}{6}ex^6\left(a+b\text{csch}^{-1}(cx)\right)-\frac{(bcx)\,\text{Subst}\left(\int\frac{x(3d\ldots}{\sqrt{-1\ldots}}\ldots\right.}{24\sqrt{-c^2\ldots}}$$

$$=\frac{1}{4}dx^4\left(a+b\text{csch}^{-1}(cx)\right)+\frac{1}{6}ex^6\left(a+b\text{csch}^{-1}(cx)\right)-\frac{(bcx)\,\text{Subst}\left(\int\left(\frac{-3\ldots}{c^4\sqrt{\ldots}}\right.\right.}{\ldots}$$

$$=-\frac{b\left(3c^2d-2e\right)x\sqrt{-1-c^2x^2}}{12c^5\sqrt{-c^2x^2}}-\frac{b\left(3c^2d-4e\right)x\left(-1-c^2x^2\right)^{3/2}}{36c^5\sqrt{-c^2x^2}}+\frac{bex\left(-1\ldots\right.}{30c^5\sqrt{\ldots}}$$

**Mathematica [A]** time = 0.21, size = 97, normalized size = 0.61

$$\frac{1}{180}x\left(15ax^3\left(3d+2ex^2\right)+\frac{b\sqrt{\frac{1}{c^2x^2}+1}\left(3c^4\left(5dx^2+2ex^4\right)-2c^2\left(15d+4ex^2\right)+16e\right)}{c^5}+15bx^3\text{csch}^{-1}(cx)\left(3d+2e\right.\right.$$

Antiderivative was successfully verified.

```
[In] Integrate[x^3*(d + e*x^2)*(a + b*ArcCsch[c*x]),x]
```

```
[Out] (x*(15*a*x^3*(3*d + 2*e*x^2) + (b*Sqrt[1 + 1/(c^2*x^2)]*(16*e - 2*c^2*(15*d
 + 4*e*x^2) + 3*c^4*(5*d*x^2 + 2*e*x^4)))/c^5 + 15*b*x^3*(3*d + 2*e*x^2)*Ar
cCsch[c*x]))/180
```

**fricas [A]** time = 0.89, size = 144, normalized size = 0.91

$$\frac{30\,ac^5ex^6+45\,ac^5dx^4+15\left(2\,bc^5ex^6+3\,bc^5dx^4\right)\log\left(\frac{cx\sqrt{\frac{c^2x^2+1}{c^2x^2}}+1}{cx}\right)+\left(6\,bc^4ex^5+\left(15\,bc^4d-8\,bc^2e\right)x^3-2\left(15\,bc^2\right.\right.}{180\,c^5}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^3*(e*x^2+d)*(a+b*arccsch(c*x)),x, algorithm="fricas")
```

```
[Out] 1/180*(30*a*c^5*e*x^6 + 45*a*c^5*d*x^4 + 15*(2*b*c^5*e*x^6 + 3*b*c^5*d*x^4)
*log((c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) + 1)/(c*x)) + (6*b*c^4*e*x^5 + (15*
b*c^4*d - 8*b*c^2*e)*x^3 - 2*(15*b*c^2*d - 8*b*e)*x)*sqrt((c^2*x^2 + 1)/(c^
2*x^2)))/c^5
```

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

$$\int\left(ex^2+d\right)(b\,\text{arcsch}\,(cx)+a)x^3\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^3*(e*x^2+d)*(a+b*arccsch(c*x)),x, algorithm="giac")
```

```
[Out] integrate((e*x^2 + d)*(b*arccsch(c*x) + a)*x^3, x)
```

**maple [A]** time = 0.05, size = 134, normalized size = 0.84

$$\frac{\frac{a\left(\frac{1}{6}c^6e\,x^6+\frac{1}{4}c^6d\,x^4\right)}{c^2}+\frac{b\left(\frac{\text{arccsch}(cx)c^6x^6e}{6}+\frac{\text{arccsch}(cx)c^6x^4d}{4}+\frac{\left(c^2x^2+1\right)\left(6c^4e\,x^4+15c^4d\,x^2-8c^2x^2e-30c^2d+16e\right)}{180\sqrt{\frac{c^2x^2+1}{c^2x^2}}\,cx}\right)}{c^2}}{c^4}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^3*(e*x^2+d)*(a+b*arccsch(c*x)),x)
```

```
[Out] 1/c^4*(a/c^2*(1/6*c^6*e*x^6+1/4*c^6*d*x^4)+b/c^2*(1/6*arccsch(c*x)*c^6*x^6*
e+1/4*arccsch(c*x)*c^6*x^4*d+1/180*(c^2*x^2+1)*(6*c^4*e*x^4+15*c^4*d*x^2-8*
c^2*e*x^2-30*c^2*d+16*e)/((c^2*x^2+1)/c^2/x^2)^(1/2)/c/x))
```

**maxima [A]** time = 0.31, size = 137, normalized size = 0.86

$$\frac{1}{6}\,aex^6+\frac{1}{4}\,adx^4+\frac{1}{12}\left(3\,x^4\operatorname{arcsch}(cx)+\frac{c^2x^3\left(\frac{1}{c^2x^2}+1\right)^{\frac{3}{2}}-3\,x\sqrt{\frac{1}{c^2x^2}+1}}{c^3}\right)bd+\frac{1}{90}\left(15\,x^6\operatorname{arcsch}(cx)+\frac{3\,c^4x^5\left(\frac{1}{c^2x^2}\right.}{}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^3*(e*x^2+d)*(a+b*arccsch(c*x)),x, algorithm="maxima")
```

```
[Out] 1/6*a*e*x^6 + 1/4*a*d*x^4 + 1/12*(3*x^4*arccsch(c*x) + (c^2*x^3*(1/(c^2*x^2
) + 1)^(3/2) - 3*x*sqrt(1/(c^2*x^2) + 1))/c^3)*b*d + 1/90*(15*x^6*arccsch(c
*x) + (3*c^4*x^5*(1/(c^2*x^2) + 1)^(5/2) - 10*c^2*x^3*(1/(c^2*x^2) + 1)^(3/
2) + 15*x*sqrt(1/(c^2*x^2) + 1))/c^5)*b*e
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.01

$$\int x^3\,\left(e\,x^2+d\right)\,\left(a+b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^3*(d + e*x^2)*(a + b*asinh(1/(c*x))),x)
```

```
[Out] int(x^3*(d + e*x^2)*(a + b*asinh(1/(c*x))), x)
```

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

$$\int x^3\,(a+b\operatorname{acsch}(cx))\left(d+ex^2\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**3*(e*x**2+d)*(a+b*acsch(c*x)),x)
```

```
[Out] Integral(x**3*(a + b*acsch(c*x))*(d + e*x**2), x)
```

# 3.85 $\int x\left(d+ex^2\right)\left(a+b\mathbf{csch}^{-1}(cx)\right)\,dx$

**Optimal**. Leaf size=146

$$\frac{\left(d+ex^2\right)^2\left(a+b\text{csch}^{-1}(cx)\right)}{4e}-\frac{bcd^2x\tan^{-1}\left(\sqrt{-c^2x^2-1}\right)}{4e\sqrt{-c^2x^2}}+\frac{bx\sqrt{-c^2x^2-1}\left(2c^2d-e\right)}{4c^3\sqrt{-c^2x^2}}-\frac{bex\left(-c^2x^2-1\right)^{3/2}}{12c^3\sqrt{-c^2x^2}}$$

```
[Out] 1/4*(e*x^2+d)^2*(a+b*arccsch(c*x))/e-1/12*b*e*x*(-c^2*x^2-1)^(3/2)/c^3/(-c^
2*x^2)^(1/2)-1/4*b*c*d^2*x*arctan((-c^2*x^2-1)^(1/2))/e/(-c^2*x^2)^(1/2)+1/
4*b*(2*c^2*d-e)*x*(-c^2*x^2-1)^(1/2)/c^3/(-c^2*x^2)^(1/2)
```

**Rubi [A]** time = 0.11, antiderivative size = 146, normalized size of antiderivative = 1.00, number of steps used = 6, number of rules used = 5, integrand size = 17, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.294, Rules used = {6300, 446, 88, 63, 205}

$$\frac{\left(d+ex^2\right)^2\left(a+b\text{csch}^{-1}(cx)\right)}{4e}-\frac{bcd^2x\tan^{-1}\left(\sqrt{-c^2x^2-1}\right)}{4e\sqrt{-c^2x^2}}+\frac{bx\sqrt{-c^2x^2-1}\left(2c^2d-e\right)}{4c^3\sqrt{-c^2x^2}}-\frac{bex\left(-c^2x^2-1\right)^{3/2}}{12c^3\sqrt{-c^2x^2}}$$

Antiderivative was successfully verified.

```
[In] Int[x*(d + e*x^2)*(a + b*ArcCsch[c*x]),x]
```

```
[Out] (b*(2*c^2*d - e)*x*Sqrt[-1 - c^2*x^2])/(4*c^3*Sqrt[-(c^2*x^2)]) - (b*e*x*(-
1 - c^2*x^2)^(3/2))/(12*c^3*Sqrt[-(c^2*x^2)]) + ((d + e*x^2)^2*(a + b*ArcCs
ch[c*x]))/(4*e) - (b*c*d^2*x*ArcTan[Sqrt[-1 - c^2*x^2]])/(4*e*Sqrt[-(c^2*x^
2)])
```

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 88

```
Int[((a_.) + (b_.)*(x_))^(m_.)*((c_.) + (d_.)*(x_))^(n_.)*((e_.) + (f_.)*(x
_))^(p_.), x_Symbol] :> Int[ExpandIntegrand[(a + b*x)^m*(c + d*x)^n*(e + f*
x)^p, x], x] /; FreeQ[{a, b, c, d, e, f, p}, x] && IntegersQ[m, n] && (Inte
gerQ[p] || (GtQ[m, 0] && GeQ[n, -1]))
```

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 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 6300

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))*(x_)*((d_.) + (e_.)*(x_)^2)^(p_.),
x_Symbol] :> Simp[((d + e*x^2)^(p + 1)*(a + b*ArcCsch[c*x]))/(2*e*(p + 1)),
 x] - Dist[(b*c*x)/(2*e*(p + 1)*Sqrt[-(c^2*x^2)]), Int[(d + e*x^2)^(p + 1)/
(x*Sqrt[-1 - c^2*x^2]), x], x] /; FreeQ[{a, b, c, d, e, p}, x] && NeQ[p, -1
]
```

Rubi steps

$$\int x\left(d+ex^2\right)\left(a+b\text{csch}^{-1}(cx)\right)dx=\frac{\left(d+ex^2\right)^2\left(a+b\text{csch}^{-1}(cx)\right)}{4e}-\frac{(bcx)\int\frac{\left(d+ex^2\right)^2}{x\sqrt{-1-c^2x^2}}dx}{4e\sqrt{-c^2x^2}}$$

$$=\frac{\left(d+ex^2\right)^2\left(a+b\text{csch}^{-1}(cx)\right)}{4e}-\frac{(bcx)\,\text{Subst}\left(\int\frac{(d+ex)^2}{x\sqrt{-1-c^2x}}dx,x,x^2\right)}{8e\sqrt{-c^2x^2}}$$

$$=\frac{\left(d+ex^2\right)^2\left(a+b\text{csch}^{-1}(cx)\right)}{4e}-\frac{(bcx)\,\text{Subst}\left(\int\left(-\frac{e\left(-2c^2d+e\right)}{c^2\sqrt{-1-c^2x}}+\frac{d^2}{x\sqrt{-1-c^2x}}-\right.\right.}{8e\sqrt{-c^2x^2}}$$

$$=\frac{b\left(2c^2d-e\right)x\sqrt{-1-c^2x^2}}{4c^3\sqrt{-c^2x^2}}-\frac{bex\left(-1-c^2x^2\right)^{3/2}}{12c^3\sqrt{-c^2x^2}}+\frac{\left(d+ex^2\right)^2\left(a+b\text{csch}^{-1}\right.}{4e}$$

$$=\frac{b\left(2c^2d-e\right)x\sqrt{-1-c^2x^2}}{4c^3\sqrt{-c^2x^2}}-\frac{bex\left(-1-c^2x^2\right)^{3/2}}{12c^3\sqrt{-c^2x^2}}+\frac{\left(d+ex^2\right)^2\left(a+b\text{csch}^{-1}\right.}{4e}$$

$$=\frac{b\left(2c^2d-e\right)x\sqrt{-1-c^2x^2}}{4c^3\sqrt{-c^2x^2}}-\frac{bex\left(-1-c^2x^2\right)^{3/2}}{12c^3\sqrt{-c^2x^2}}+\frac{\left(d+ex^2\right)^2\left(a+b\text{csch}^{-1}\right.}{4e}$$

**Mathematica [A]** time = 0.10, size = 77, normalized size = 0.53

$$\frac{x\left(3ac^3x\left(2d+ex^2\right)+3bc^3x\text{csch}^{-1}(cx)\left(2d+ex^2\right)+b\sqrt{\frac{1}{c^2x^2}+1}\left(c^2\left(6d+ex^2\right)-2e\right)\right)}{12c^3}$$

Antiderivative was successfully verified.

```
[In] Integrate[x*(d + e*x^2)*(a + b*ArcCsch[c*x]),x]
```

```
[Out] (x*(3*a*c^3*x*(2*d + e*x^2) + b*Sqrt[1 + 1/(c^2*x^2)]*(-2*e + c^2*(6*d + e*
x^2)) + 3*b*c^3*x*(2*d + e*x^2)*ArcCsch[c*x]))/(12*c^3)
```

**fricas [A]** time = 1.13, size = 123, normalized size = 0.84

$$\frac{3\,ac^3ex^4+6\,ac^3dx^2+3\left(bc^3ex^4+2\,bc^3dx^2\right)\log\left(\frac{cx\sqrt{\frac{c^2x^2+1}{c^2x^2}}+1}{cx}\right)+\left(bc^2ex^3+2\left(3\,bc^2d-be\right)x\right)\sqrt{\frac{c^2x^2+1}{c^2x^2}}}{12\,c^3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*(e*x^2+d)*(a+b*arccsch(c*x)),x, algorithm="fricas")
```

```
[Out] 1/12*(3*a*c^3*e*x^4 + 6*a*c^3*d*x^2 + 3*(b*c^3*e*x^4 + 2*b*c^3*d*x^2)*log((
c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) + 1)/(c*x)) + (b*c^2*e*x^3 + 2*(3*b*c^2*d
 - b*e)*x)*sqrt((c^2*x^2 + 1)/(c^2*x^2)))/c^3
```

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

$$\int\left(ex^2+d\right)(b\,\text{arcsch}\,(cx)+a)x\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*(e*x^2+d)*(a+b*arccsch(c*x)),x, algorithm="giac")
```

```
[Out] integrate((e*x^2 + d)*(b*arccsch(c*x) + a)*x, x)
```

**maple [A]** time = 0.05, size = 115, normalized size = 0.79

$$\frac{\frac{a\left(\frac{1}{4}c^4e\,x^4+\frac{1}{2}c^4d\,x^2\right)}{c^2}+\frac{b\left(\frac{\text{arccsch}(cx)c^4x^4e}{4}+\frac{\text{arccsch}(cx)c^4x^2d}{2}+\frac{\left(c^2x^2+1\right)\left(c^2x^2e+6c^2d-2e\right)}{12\sqrt{\frac{c^2x^2+1}{c^2x^2}}\,cx}\right)}{c^2}}{c^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x*(e*x^2+d)*(a+b*arccsch(c*x)),x)
```

```
[Out] 1/c^2*(a/c^2*(1/4*c^4*e*x^4+1/2*c^4*d*x^2)+b/c^2*(1/4*arccsch(c*x)*c^4*x^4*
e+1/2*arccsch(c*x)*c^4*x^2*d+1/12*(c^2*x^2+1)*(c^2*e*x^2+6*c^2*d-2*e)/((c^2
*x^2+1)/c^2/x^2)^(1/2)/c/x))
```

**maxima [A]** time = 0.34, size = 95, normalized size = 0.65

$$\frac{1}{4}aex^4+\frac{1}{2}adx^2+\frac{1}{2}\left(x^2\operatorname{arcsch}(cx)+\frac{x\sqrt{\frac{1}{c^2x^2}+1}}{c}\right)bd+\frac{1}{12}\left(3x^4\operatorname{arcsch}(cx)+\frac{c^2x^3\left(\frac{1}{c^2x^2}+1\right)^{\frac{3}{2}}-3x\sqrt{\frac{1}{c^2x^2}+1}}{c^3}\right)be$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*(e*x^2+d)*(a+b*arccsch(c*x)),x, algorithm="maxima")
```

```
[Out] 1/4*a*e*x^4 + 1/2*a*d*x^2 + 1/2*(x^2*arccsch(c*x) + x*sqrt(1/(c^2*x^2) + 1)
/c)*b*d + 1/12*(3*x^4*arccsch(c*x) + (c^2*x^3*(1/(c^2*x^2) + 1)^(3/2) - 3*x
*sqrt(1/(c^2*x^2) + 1))/c^3)*b*e
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.01

$$\int x\,\left(e\,x^2+d\right)\,\left(a+b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x*(d + e*x^2)*(a + b*asinh(1/(c*x))),x)
```

```
[Out] int(x*(d + e*x^2)*(a + b*asinh(1/(c*x))), x)
```

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

$$\int x\left(a+b\operatorname{acsch}(cx)\right)\left(d+ex^2\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*(e*x**2+d)*(a+b*acsch(c*x)),x)
```

```
[Out] Integral(x*(a + b*acsch(c*x))*(d + e*x**2), x)
```

## 3.86 $\int \frac{(d+ex^2)(a+b\,\mathbf{csch}^{-1}(cx))}{x}\,dx$

**Optimal**. Leaf size=115

$$-d\log\left(\frac{1}{x}\right)\left(a+b\text{csch}^{-1}(cx)\right)+\frac{1}{2}ex^2\left(a+b\text{csch}^{-1}(cx)\right)+\frac{bex\sqrt{\frac{1}{c^2x^2}+1}}{2c}-\frac{1}{2}bd\text{Li}_2\left(e^{2\text{csch}^{-1}(cx)}\right)+\frac{1}{2}bd\text{csch}^{-1}(cx)^2-bd$$

```
[Out] 1/2*b*d*arccsch(c*x)^2+1/2*e*x^2*(a+b*arccsch(c*x))-b*d*arccsch(c*x)*ln(1-(
1/c/x+(1+1/c^2/x^2)^(1/2))^2)+b*d*arccsch(c*x)*ln(1/x)-d*(a+b*arccsch(c*x))
*ln(1/x)-1/2*b*d*polylog(2,(1/c/x+(1+1/c^2/x^2)^(1/2))^2)+1/2*b*e*x*(1+1/c^
2/x^2)^(1/2)/c
```

**Rubi [A]** time = 0.29, antiderivative size = 115, normalized size of antiderivative = 1.00, number of steps used = 11, number of rules used = 11, integrand size = 19, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.579, Rules used = {6304, 14, 5789, 6742, 264, 2325, 5659, 3716, 2190, 2279, 2391}

$$-\frac{1}{2}bd\text{PolyLog}\left(2,e^{2\text{csch}^{-1}(cx)}\right)-d\log\left(\frac{1}{x}\right)\left(a+b\text{csch}^{-1}(cx)\right)+\frac{1}{2}ex^2\left(a+b\text{csch}^{-1}(cx)\right)+\frac{bex\sqrt{\frac{1}{c^2x^2}+1}}{2c}+\frac{1}{2}bd\text{csch}^{-1}($$

Antiderivative was successfully verified.

```
[In] Int[((d + e*x^2)*(a + b*ArcCsch[c*x]))/x,x]
```

```
[Out] (b*e*Sqrt[1 + 1/(c^2*x^2)]*x)/(2*c) + (b*d*ArcCsch[c*x]^2)/2 + (e*x^2*(a +
b*ArcCsch[c*x]))/2 - b*d*ArcCsch[c*x]*Log[1 - E^(2*ArcCsch[c*x])] + b*d*Arc
Csch[c*x]*Log[x^(-1)] - d*(a + b*ArcCsch[c*x])*Log[x^(-1)] - (b*d*PolyLog[2
, E^(2*ArcCsch[c*x])])/2
```

Rule 14

```
Int[(u_)*((c_.)*(x_))^(m_.), x_Symbol] :> Int[ExpandIntegrand[(c*x)^m*u, x]
, x] /; FreeQ[{c, m}, x] && SumQ[u] &&  !LinearQ[u, x] &&  !MatchQ[u, (a_)
+ (b_.)*(v_) /; FreeQ[{a, b}, x] && InverseFunctionQ[v]]
```

Rule 264

```
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] /; FreeQ[{a, b, c, m, n,
 p}, x] && EqQ[(m + 1)/n + p + 1, 0] && NeQ[m, -1]
```

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 2325

```
Int[((a_.) + Log[(c_.)*(x_)^(n_.)]*(b_.))/Sqrt[(d_) + (e_.)*(x_)^2], x_Symb
ol] :> Simp[(ArcSinh[(Rt[e, 2]*x)/Sqrt[d]]*(a + b*Log[c*x^n]))/Rt[e, 2], x]
 - Dist[(b*n)/Rt[e, 2], Int[ArcSinh[(Rt[e, 2]*x)/Sqrt[d]]/x, x], x] /; Free
Q[{a, b, c, d, e, n}, x] && GtQ[d, 0] && PosQ[e]
```

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 3716

```
Int[((c_.) + (d_.)*(x_))^(m_.)*tan[(e_.) + Pi*(k_.) + (Complex[0, fz_])*(f_
.)*(x_)], x_Symbol] :> -Simp[(I*(c + d*x)^(m + 1))/(d*(m + 1)), x] + Dist[2
*I, Int[((c + d*x)^m*E^(2*(-(I*e) + f*fz*x)))/(E^(2*I*k*Pi)*(1 + E^(2*(-(I*
e) + f*fz*x))/E^(2*I*k*Pi))), x], x] /; FreeQ[{c, d, e, f, fz}, x] && Integ
erQ[4*k] && IGtQ[m, 0]
```

Rule 5659

```
Int[((a_.) + ArcSinh[(c_.)*(x_)]*(b_.))^(n_.)/(x_), x_Symbol] :> Subst[Int[
(a + b*x)^n/Tanh[x], x], x, ArcSinh[c*x]] /; FreeQ[{a, b, c}, x] && IGtQ[n,
 0]
```

Rule 5789

```
Int[((a_.) + ArcSinh[(c_.)*(x_)]*(b_.))*((f_.)*(x_))^(m_.)*((d_) + (e_.)*(x
_)^2)^(p_.), x_Symbol] :> With[{u = IntHide[(f*x)^m*(d + e*x^2)^p, x]}, Dis
t[a + b*ArcSinh[c*x], u, x] - Dist[b*c, Int[SimplifyIntegrand[u/Sqrt[1 + c^
2*x^2], x], x], x]] /; FreeQ[{a, b, c, d, e, f, m}, x] && NeQ[e, c^2*d] &&
```

```
IntegerQ[p] && (GtQ[p, 0] || (IGtQ[(m - 1)/2, 0] && LeQ[m + p, 0]))
```

Rule 6304

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))^(n_.)*(x_)^(m_.)*((d_.) + (e_.)*(x_
)^2)^(p_.), x_Symbol] :> -Subst[Int[((e + d*x^2)^p*(a + b*ArcSinh[x/c])^n)/
x^(m + 2*(p + 1)), x], x, 1/x] /; FreeQ[{a, b, c, d, e, n}, x] && IGtQ[n, 0
] && IntegersQ[m, p]
```

Rule 6742

```
Int[u_, x_Symbol] :> With[{v = ExpandIntegrand[u, x]}, Int[v, x] /; SumQ[v]
]
```

Rubi steps

$$\int \frac{\left(d+ex^2\right)\left(a+b\text{csch}^{-1}(cx)\right)}{x}\,dx = -\text{Subst}\left(\int \frac{\left(e+dx^2\right)\left(a+b\sinh^{-1}\left(\frac{x}{c}\right)\right)}{x^3}\,dx, x, \frac{1}{x}\right)$$

$$= \frac{1}{2}ex^2\left(a+b\text{csch}^{-1}(cx)\right) - d\left(a+b\text{csch}^{-1}(cx)\right)\log\left(\frac{1}{x}\right) + \frac{b\,\text{Subst}\left(\int \frac{-\frac{e}{2x^2}+d}{\sqrt{1+\cdots}}\right.}{c}$$

$$= \frac{1}{2}ex^2\left(a+b\text{csch}^{-1}(cx)\right) - d\left(a+b\text{csch}^{-1}(cx)\right)\log\left(\frac{1}{x}\right) + \frac{b\,\text{Subst}\left(\int\left(-\frac{}{2x^2\sqrt{\cdots}}\right.\right.}{}$$

$$= \frac{1}{2}ex^2\left(a+b\text{csch}^{-1}(cx)\right) - d\left(a+b\text{csch}^{-1}(cx)\right)\log\left(\frac{1}{x}\right) + \frac{(bd)\,\text{Subst}\left(\int \frac{\log\cdots}{\sqrt{1\cdots}}\right.}{c}$$

$$= \frac{be\sqrt{1+\frac{1}{c^2x^2}}\,x}{2c} + \frac{1}{2}ex^2\left(a+b\text{csch}^{-1}(cx)\right) + bd\text{csch}^{-1}(cx)\log\left(\frac{1}{x}\right) - d\left(a+b\cdots\right.$$

$$= \frac{be\sqrt{1+\frac{1}{c^2x^2}}\,x}{2c} + \frac{1}{2}ex^2\left(a+b\text{csch}^{-1}(cx)\right) + bd\text{csch}^{-1}(cx)\log\left(\frac{1}{x}\right) - d\left(a+b\cdots\right.$$

$$= \frac{be\sqrt{1+\frac{1}{c^2x^2}}\,x}{2c} + \frac{1}{2}bd\text{csch}^{-1}(cx)^2 + \frac{1}{2}ex^2\left(a+b\text{csch}^{-1}(cx)\right) + bd\text{csch}^{-1}(cx\cdots$$

$$= \frac{be\sqrt{1+\frac{1}{c^2x^2}}\,x}{2c} + \frac{1}{2}bd\text{csch}^{-1}(cx)^2 + \frac{1}{2}ex^2\left(a+b\text{csch}^{-1}(cx)\right) - bd\text{csch}^{-1}(cx\cdots$$

$$= \frac{be\sqrt{1+\frac{1}{c^2x^2}}\,x}{2c} + \frac{1}{2}bd\text{csch}^{-1}(cx)^2 + \frac{1}{2}ex^2\left(a+b\text{csch}^{-1}(cx)\right) - bd\text{csch}^{-1}(cx\cdots$$

$$= \frac{be\sqrt{1+\frac{1}{c^2x^2}}\,x}{2c} + \frac{1}{2}bd\text{csch}^{-1}(cx)^2 + \frac{1}{2}ex^2\left(a+b\text{csch}^{-1}(cx)\right) - bd\text{csch}^{-1}(cx\cdots$$

**Mathematica [A]** time = 0.14, size = 93, normalized size = 0.81

$$\frac{2acd\log(x) + acex^2 + bex\sqrt{\frac{1}{c^2x^2}+1} + bc\text{csch}^{-1}(cx)\left(ex^2 - 2d\log\left(1-e^{-2\text{csch}^{-1}(cx)}\right)\right) + bcd\text{Li}_2\left(e^{-2\text{csch}^{-1}(cx)}\right) - b\cdots}{2c}$$

Warning: Unable to verify antiderivative.

```
[In] Integrate[((d + e*x^2)*(a + b*ArcCsch[c*x]))/x,x]
```

```
[Out] (b*e*Sqrt[1 + 1/(c^2*x^2)]*x + a*c*e*x^2 - b*c*d*ArcCsch[c*x]^2 + b*c*ArcCs
ch[c*x]*(e*x^2 - 2*d*Log[1 - E^(-2*ArcCsch[c*x])]) + 2*a*c*d*Log[x] + b*c*d
*PolyLog[2, E^(-2*ArcCsch[c*x])])/(2*c)
```

**fricas [F]** time = 0.95, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{aex^2 + ad + \left(bex^2 + bd\right)\operatorname{arcsch}(cx)}{x}, x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((e*x^2+d)*(a+b*arccsch(c*x))/x,x, algorithm="fricas")
```

```
[Out] integral((a*e*x^2 + a*d + (b*e*x^2 + b*d)*arccsch(c*x))/x, x)
```

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

$$\int \frac{\left(ex^2 + d\right)(b\operatorname{arcsch}(cx) + a)}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((e*x^2+d)*(a+b*arccsch(c*x))/x,x, algorithm="giac")
```

```
[Out] integrate((e*x^2 + d)*(b*arccsch(c*x) + a)/x, x)
```

**maple [F]** time = 0.11, size = 0, normalized size = 0.00

$$\int \frac{\left(e\,x^2 + d\right)(a + b\operatorname{arccsch}(cx))}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((e*x^2+d)*(a+b*arccsch(c*x))/x,x)
```

```
[Out] int((e*x^2+d)*(a+b*arccsch(c*x))/x,x)
```

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

$$2\,bc^2d\int \frac{x\log(x)}{2\left(\sqrt{c^2x^2+1}\,c^2x^2 + c^2x^2 + \sqrt{c^2x^2+1} + 1\right)}\,dx - \frac{1}{2}\,bex^2\log(c) - \frac{1}{2}\,bex^2\log(x) + \frac{1}{2}\,aex^2 - bd\log(c)\log(x) -$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((e*x^2+d)*(a+b*arccsch(c*x))/x,x, algorithm="maxima")
```

```
[Out] 2*b*c^2*d*integrate(1/2*x*log(x)/(sqrt(c^2*x^2 + 1)*c^2*x^2 + c^2*x^2 + sqr
t(c^2*x^2 + 1) + 1), x) - 1/2*b*e*x^2*log(c) - 1/2*b*e*x^2*log(x) + 1/2*a*e
*x^2 - b*d*log(c)*log(x) - 1/2*b*d*log(x)^2 - 1/4*(2*log(c^2*x^2 + 1)*log(x
) + dilog(-c^2*x^2))*b*d + a*d*log(x) + 1/2*(b*e*x^2 + 2*b*d*log(x))*log(sq
rt(c^2*x^2 + 1) + 1) + 1/4*b*e*(2*sqrt(c^2*x^2 + 1) - log(c^2*x^2 + 1))/c^2
 + 1/4*b*e*log(c^2*x^2 + 1)/c^2
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.01

$$\int \frac{\left(e\,x^2+d\right)\,\left(a+b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)\right)}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(((d + e*x^2)*(a + b*asinh(1/(c*x))))/x,x)
```

```
[Out] int(((d + e*x^2)*(a + b*asinh(1/(c*x))))/x, x)
```

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

$$\int \frac{\left(a + b \operatorname{acsch}{\left(c x \right)}\right) \left(d + e x^{2}\right)}{x}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((e*x**2+d)*(a+b*acsch(c*x))/x,x)
```

```
[Out] Integral((a + b*acsch(c*x))*(d + e*x**2)/x, x)
```

## 3.87 $\int \frac{(d+ex^2)(a+b\,\mathbf{csch}^{-1}(cx))}{x^3}\,dx$

**Optimal**. Leaf size=128

$$-\frac{d\left(a+b\operatorname{csch}^{-1}(cx)\right)}{2x^2}-e\log\left(\frac{1}{x}\right)\left(a+b\operatorname{csch}^{-1}(cx)\right)+\frac{bcd\sqrt{\frac{1}{c^2x^2}+1}}{4x}-\frac{1}{4}bc^2d\operatorname{csch}^{-1}(cx)-\frac{1}{2}be\operatorname{Li}_2\left(e^{2\operatorname{csch}^{-1}(cx)}\right)+\frac{1}{2}bec$$

```
[Out] -1/4*b*c^2*d*arccsch(c*x)+1/2*b*e*arccsch(c*x)^2-1/2*d*(a+b*arccsch(c*x))/x
^2-b*e*arccsch(c*x)*ln(1-(1/c/x+(1+1/c^2/x^2)^(1/2))^2)+b*e*arccsch(c*x)*ln
(1/x)-e*(a+b*arccsch(c*x))*ln(1/x)-1/2*b*e*polylog(2,(1/c/x+(1+1/c^2/x^2)^(
1/2))^2)+1/4*b*c*d*(1+1/c^2/x^2)^(1/2)/x
```

**Rubi [A]** time = 0.30, antiderivative size = 128, normalized size of antiderivative = 1.00, number of steps used = 13, number of rules used = 13, integrand size = 19, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.684, Rules used = {6304, 14, 5789, 12, 6742, 321, 215, 2325, 5659, 3716, 2190, 2279, 2391}

$$-\frac{1}{2}be\operatorname{PolyLog}\left(2,e^{2\operatorname{csch}^{-1}(cx)}\right)-\frac{d\left(a+b\operatorname{csch}^{-1}(cx)\right)}{2x^2}-e\log\left(\frac{1}{x}\right)\left(a+b\operatorname{csch}^{-1}(cx)\right)+\frac{bcd\sqrt{\frac{1}{c^2x^2}+1}}{4x}-\frac{1}{4}bc^2d\operatorname{csch}^{-1}(cx$$

Antiderivative was successfully verified.

```
[In] Int[((d + e*x^2)*(a + b*ArcCsch[c*x]))/x^3,x]
```

```
[Out] (b*c*d*Sqrt[1 + 1/(c^2*x^2)])/(4*x) - (b*c^2*d*ArcCsch[c*x])/4 + (b*e*ArcCs
ch[c*x]^2)/2 - (d*(a + b*ArcCsch[c*x]))/(2*x^2) - b*e*ArcCsch[c*x]*Log[1 -
E^(2*ArcCsch[c*x])] + b*e*ArcCsch[c*x]*Log[x^(-1)] - e*(a + b*ArcCsch[c*x])
*Log[x^(-1)] - (b*e*PolyLog[2, E^(2*ArcCsch[c*x])])/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 14

```
Int[(u_)*((c_.)*(x_))^(m_.), x_Symbol] :> Int[ExpandIntegrand[(c*x)^m*u, x]
, x] /; FreeQ[{c, m}, x] && SumQ[u] &&  !LinearQ[u, x] &&  !MatchQ[u, (a_)
+ (b_.)*(v_) /; FreeQ[{a, b}, x] && InverseFunctionQ[v]]
```

Rule 215

```
Int[1/Sqrt[(a_) + (b_.)*(x_)^2], x_Symbol] :> Simp[ArcSinh[(Rt[b, 2]*x)/Sqr
t[a]]/Rt[b, 2], x] /; FreeQ[{a, b}, x] && GtQ[a, 0] && PosQ[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 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 2325

```
Int[((a_.) + Log[(c_.)*(x_)^(n_.)]*(b_.))/Sqrt[(d_) + (e_.)*(x_)^2], x_Symb
ol] :> Simp[(ArcSinh[(Rt[e, 2]*x)/Sqrt[d]]*(a + b*Log[c*x^n]))/Rt[e, 2], x]
 - Dist[(b*n)/Rt[e, 2], Int[ArcSinh[(Rt[e, 2]*x)/Sqrt[d]]/x, x], x] /; Free
Q[{a, b, c, d, e, n}, x] && GtQ[d, 0] && PosQ[e]
```

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 3716

```
Int[((c_.) + (d_.)*(x_))^(m_.)*tan[(e_.) + Pi*(k_.) + (Complex[0, fz_])*(f_
.)*(x_)], x_Symbol] :> -Simp[(I*(c + d*x)^(m + 1))/(d*(m + 1)), x] + Dist[2
*I, Int[((c + d*x)^m*E^(2*(-(I*e) + f*fz*x)))/(E^(2*I*k*Pi)*(1 + E^(2*(-(I*
e) + f*fz*x))/E^(2*I*k*Pi))), x], x] /; FreeQ[{c, d, e, f, fz}, x] && Integ
erQ[4*k] && IGtQ[m, 0]
```

Rule 5659

```
Int[((a_.) + ArcSinh[(c_.)*(x_)]*(b_.))^(n_.)/(x_), x_Symbol] :> Subst[Int[
```

```
(a + b*x)^n/Tanh[x], x], x, ArcSinh[c*x]] /; FreeQ[{a, b, c}, x] && IGtQ[n,
 0]
```

Rule 5789

```
Int[((a_.) + ArcSinh[(c_.)*(x_)]*(b_.))*((f_.)*(x_))^(m_.)*((d_) + (e_.)*(x
_)^2)^(p_.), x_Symbol] :> With[{u = IntHide[(f*x)^m*(d + e*x^2)^p, x]}, Dis
t[a + b*ArcSinh[c*x], u, x] - Dist[b*c, Int[SimplifyIntegrand[u/Sqrt[1 + c^
2*x^2], x], x], x]] /; FreeQ[{a, b, c, d, e, f, m}, x] && NeQ[e, c^2*d] &&
IntegerQ[p] && (GtQ[p, 0] || (IGtQ[(m - 1)/2, 0] && LeQ[m + p, 0]))
```

Rule 6304

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))^(n_.)*(x_)^(m_.)*((d_.) + (e_.)*(x_
)^2)^(p_.), x_Symbol] :> -Subst[Int[((e + d*x^2)^p*(a + b*ArcSinh[x/c])^n)/
x^(m + 2*(p + 1)), x], x, 1/x] /; FreeQ[{a, b, c, d, e, n}, x] && IGtQ[n, 0
] && IntegersQ[m, p]
```

Rule 6742

```
Int[u_, x_Symbol] :> With[{v = ExpandIntegrand[u, x]}, Int[v, x] /; SumQ[v]
]
```

Rubi steps

$$\int \frac{\left(d+ex^2\right)\left(a+b\text{csch}^{-1}(cx)\right)}{x^3}\,dx = -\text{Subst}\left(\int \frac{\left(e+dx^2\right)\left(a+b\sinh^{-1}\left(\frac{x}{c}\right)\right)}{x}\,dx, x, \frac{1}{x}\right)$$

$$= -\frac{d\left(a+b\text{csch}^{-1}(cx)\right)}{2x^2} - e\left(a+b\text{csch}^{-1}(cx)\right)\log\left(\frac{1}{x}\right) + \frac{b\,\text{Subst}\left(\int \frac{dx^2+2e\log}{2\sqrt{1+\frac{x^2}{c^2}}}\right.}{c}$$

$$= -\frac{d\left(a+b\text{csch}^{-1}(cx)\right)}{2x^2} - e\left(a+b\text{csch}^{-1}(cx)\right)\log\left(\frac{1}{x}\right) + \frac{b\,\text{Subst}\left(\int \frac{dx^2+2e\log}{\sqrt{1+\frac{x^2}{c^2}}}\right.}{2c}$$

$$= -\frac{d\left(a+b\text{csch}^{-1}(cx)\right)}{2x^2} - e\left(a+b\text{csch}^{-1}(cx)\right)\log\left(\frac{1}{x}\right) + \frac{b\,\text{Subst}\left(\int\left(\frac{dx^2}{\sqrt{1+\frac{x^2}{c^2}}}\right.\right.}{2}$$

$$= -\frac{d\left(a+b\text{csch}^{-1}(cx)\right)}{2x^2} - e\left(a+b\text{csch}^{-1}(cx)\right)\log\left(\frac{1}{x}\right) + \frac{(bd)\,\text{Subst}\left(\int \frac{x^2}{\sqrt{1+\frac{x^2}{c^2}}}\right.}{2c}$$

$$= \frac{bcd\sqrt{1+\frac{1}{c^2x^2}}}{4x} - \frac{d\left(a+b\text{csch}^{-1}(cx)\right)}{2x^2} + be\text{csch}^{-1}(cx)\log\left(\frac{1}{x}\right) - e\left(a+b\text{csc}\right.$$

$$= \frac{bcd\sqrt{1+\frac{1}{c^2x^2}}}{4x} - \frac{1}{4}bc^2d\text{csch}^{-1}(cx) - \frac{d\left(a+b\text{csch}^{-1}(cx)\right)}{2x^2} + be\text{csch}^{-1}(cx)\log$$

$$= \frac{bcd\sqrt{1+\frac{1}{c^2x^2}}}{4x} - \frac{1}{4}bc^2d\text{csch}^{-1}(cx) + \frac{1}{2}be\text{csch}^{-1}(cx)^2 - \frac{d\left(a+b\text{csch}^{-1}(cx)\right)}{2x^2}$$

$$= \frac{bcd\sqrt{1+\frac{1}{c^2x^2}}}{4x} - \frac{1}{4}bc^2d\text{csch}^{-1}(cx) + \frac{1}{2}be\text{csch}^{-1}(cx)^2 - \frac{d\left(a+b\text{csch}^{-1}(cx)\right)}{2x^2}$$

$$= \frac{bcd\sqrt{1+\frac{1}{c^2x^2}}}{4x} - \frac{1}{4}bc^2d\text{csch}^{-1}(cx) + \frac{1}{2}be\text{csch}^{-1}(cx)^2 - \frac{d\left(a+b\text{csch}^{-1}(cx)\right)}{2x^2}$$

$$= \frac{bcd\sqrt{1+\frac{1}{c^2x^2}}}{4x} - \frac{1}{4}bc^2d\text{csch}^{-1}(cx) + \frac{1}{2}be\text{csch}^{-1}(cx)^2 - \frac{d\left(a+b\text{csch}^{-1}(cx)\right)}{2x^2}$$

**Mathematica [A]** time = 0.57, size = 138, normalized size = 1.08

$$\frac{1}{4}\left(-\frac{2ad}{x^2}+4ae\log(x)-\frac{bd\left(-c^2x^2+c^2x^2\sqrt{c^2x^2+1}\,\tanh^{-1}\left(\sqrt{c^2x^2+1}\right)-1\right)}{cx^3\sqrt{\frac{1}{c^2x^2}+1}}-\frac{2bd\text{csch}^{-1}(cx)}{x^2}+2be\text{Li}_2\left(e^{-2\text{csch}^{-1}}\right.\right.$$

Warning: Unable to verify antiderivative.

```
[In] Integrate[((d + e*x^2)*(a + b*ArcCsch[c*x]))/x^3,x]
```

```
[Out] ((-2*a*d)/x^2 - (2*b*d*ArcCsch[c*x])/x^2 - (b*d*(-1 - c^2*x^2 + c^2*x^2*Sqr
t[1 + c^2*x^2]*ArcTanh[Sqrt[1 + c^2*x^2]]))/(c*Sqrt[1 + 1/(c^2*x^2)]*x^3) -
 2*b*e*ArcCsch[c*x]*(ArcCsch[c*x] + 2*Log[1 - E^(-2*ArcCsch[c*x])]) + 4*a*e
*Log[x] + 2*b*e*PolyLog[2, E^(-2*ArcCsch[c*x])])/4
```

**fricas [F]** time = 2.67, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{aex^2+ad+\left(bex^2+bd\right)\text{arcsch}\left(cx\right)}{x^3},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((e*x^2+d)*(a+b*arccsch(c*x))/x^3,x, algorithm="fricas")
```

```
[Out] integral((a*e*x^2 + a*d + (b*e*x^2 + b*d)*arccsch(c*x))/x^3, x)
```

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

$$\int\frac{\left(ex^2+d\right)\left(b\,\text{arcsch}\left(cx\right)+a\right)}{x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((e*x^2+d)*(a+b*arccsch(c*x))/x^3,x, algorithm="giac")
```

```
[Out] integrate((e*x^2 + d)*(b*arccsch(c*x) + a)/x^3, x)
```

**maple [F]** time = 0.11, size = 0, normalized size = 0.00

$$\int\frac{\left(e\,x^2+d\right)\left(a+b\,\text{arccsch}\left(cx\right)\right)}{x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((e*x^2+d)*(a+b*arccsch(c*x))/x^3,x)
```

```
[Out] int((e*x^2+d)*(a+b*arccsch(c*x))/x^3,x)
```

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

$$-\frac{1}{2}\left(4c^2\int\frac{x^2\log(x)}{c^2x^3+x}\,dx-2c^2\int\frac{x\log(x)}{c^2x^2+\left(c^2x^2+1\right)^{\frac{3}{2}}+1}\,dx-\left(\log\left(c^2x^2+1\right)-2\log(x)\right)\log(c)+\log\left(c^2x^2+1\right.\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((e*x^2+d)*(a+b*arccsch(c*x))/x^3,x, algorithm="maxima")
```

```
[Out] -1/2*(4*c^2*integrate(x^2*log(x)/(c^2*x^3 + x), x) - 2*c^2*integrate(x*log(
x)/(c^2*x^2 + (c^2*x^2 + 1)^(3/2) + 1), x) - (log(c^2*x^2 + 1) - 2*log(x))*
log(c) + log(c^2*x^2 + 1)*log(c) - 2*log(x)*log(sqrt(c^2*x^2 + 1) + 1) + 2*
integrate(log(x)/(c^2*x^3 + x), x))*b*e + 1/8*b*d*((2*c^4*x*sqrt(1/(c^2*x^2
) + 1)/(c^2*x^2*(1/(c^2*x^2) + 1) - 1) - c^3*log(c*x*sqrt(1/(c^2*x^2) + 1)
+ 1) + c^3*log(c*x*sqrt(1/(c^2*x^2) + 1) - 1))/c - 4*arccsch(c*x)/x^2) + a*
e*log(x) - 1/2*a*d/x^2
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.01

$$\int\frac{\left(e\,x^2+d\right)\,\left(a+b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)\right)}{x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(((d + e*x^2)*(a + b*asinh(1/(c*x))))/x^3,x)
```

```
[Out] int(((d + e*x^2)*(a + b*asinh(1/(c*x))))/x^3, x)
```

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

$$\int\frac{(a+b\,\mathrm{acsch}\,(cx))\left(d+ex^2\right)}{x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((e*x**2+d)*(a+b*acsch(c*x))/x**3,x)
```

```
[Out] Integral((a + b*acsch(c*x))*(d + e*x**2)/x**3, x)
```

# 3.88 $\int x^2 \left(d+ex^2\right)^2 \left(a+b\text{csch}^{-1}(cx)\right) \, dx$

**Optimal**. Leaf size=260

$$\frac{1}{3}d^2x^3\left(a+b\text{csch}^{-1}(cx)\right)+\frac{2}{5}dex^5\left(a+b\text{csch}^{-1}(cx)\right)+\frac{1}{7}e^2x^7\left(a+b\text{csch}^{-1}(cx)\right)+\frac{be^2x^6\sqrt{-c^2x^2-1}}{42c\sqrt{-c^2x^2}}+\frac{bex^4\sqrt{-c^2x^2-}}{840c^3}$$

```
[Out] 1/3*d^2*x^3*(a+b*arccsch(c*x))+2/5*d*e*x^5*(a+b*arccsch(c*x))+1/7*e^2*x^7*(
a+b*arccsch(c*x))+1/1680*b*(280*c^4*d^2-252*c^2*d*e+75*e^2)*x*arctan(c*x/(-
c^2*x^2-1)^(1/2))/c^6/(-c^2*x^2)^(1/2)+1/1680*b*(280*c^4*d^2-252*c^2*d*e+75
*e^2)*x^2*(-c^2*x^2-1)^(1/2)/c^5/(-c^2*x^2)^(1/2)+1/840*b*(84*c^2*d-25*e)*e
*x^4*(-c^2*x^2-1)^(1/2)/c^3/(-c^2*x^2)^(1/2)+1/42*b*e^2*x^6*(-c^2*x^2-1)^(1
/2)/c/(-c^2*x^2)^(1/2)
```

**Rubi [A]** time = 0.26, antiderivative size = 260, normalized size of antiderivative = 1.00, number of steps used = 7, number of rules used = 8, integrand size = 21, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.381, Rules used = {270, 6302, 12, 1267, 459, 321, 217, 203}

$$\frac{1}{3}d^2x^3\left(a+b\text{csch}^{-1}(cx)\right)+\frac{2}{5}dex^5\left(a+b\text{csch}^{-1}(cx)\right)+\frac{1}{7}e^2x^7\left(a+b\text{csch}^{-1}(cx)\right)+\frac{bx^2\sqrt{-c^2x^2-1}\left(280c^4d^2-252c^2d\right.}{1680c^5\sqrt{-c^2x^2}}$$

Antiderivative was successfully verified.

```
[In] Int[x^2*(d + e*x^2)^2*(a + b*ArcCsch[c*x]),x]
```

```
[Out] (b*(280*c^4*d^2 - 252*c^2*d*e + 75*e^2)*x^2*Sqrt[-1 - c^2*x^2])/(1680*c^5*S
qrt[-(c^2*x^2)]) + (b*(84*c^2*d - 25*e)*e*x^4*Sqrt[-1 - c^2*x^2])/(840*c^3*
Sqrt[-(c^2*x^2)]) + (b*e^2*x^6*Sqrt[-1 - c^2*x^2])/(42*c*Sqrt[-(c^2*x^2)])
+ (d^2*x^3*(a + b*ArcCsch[c*x]))/3 + (2*d*e*x^5*(a + b*ArcCsch[c*x]))/5 + (
e^2*x^7*(a + b*ArcCsch[c*x]))/7 + (b*(280*c^4*d^2 - 252*c^2*d*e + 75*e^2)*x
*ArcTan[(c*x)/Sqrt[-1 - c^2*x^2]])/(1680*c^6*Sqrt[-(c^2*x^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 203

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

Rule 217

```
Int[1/Sqrt[(a_) + (b_.)*(x_)^2], x_Symbol] :> Subst[Int[1/(1 - b*x^2), x],
x, x/Sqrt[a + b*x^2]] /; FreeQ[{a, b}, x] &&  !GtQ[a, 0]
```

Rule 270

```
Int[((c_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_.), x_Symbol] :> Int[Exp
andIntegrand[(c*x)^m*(a + b*x^n)^p, x], x] /; FreeQ[{a, b, c, m, n}, x] &&
IGtQ[p, 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 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 1267

```
Int[((f_.)*(x_))^(m_.)*((d_) + (e_.)*(x_)^2)^(q_.)*((a_) + (b_.)*(x_)^2 + (
c_.)*(x_)^4)^(p_.), x_Symbol] :> Simp[(c^p*(f*x)^(m + 4*p - 1)*(d + e*x^2)^
(q + 1))/(e*f^(4*p - 1)*(m + 4*p + 2*q + 1)), x] + Dist[1/(e*(m + 4*p + 2*q
 + 1)), Int[(f*x)^m*(d + e*x^2)^q*ExpandToSum[e*(m + 4*p + 2*q + 1)*((a + b
*x^2 + c*x^4)^p - c^p*x^(4*p)) - d*c^p*(m + 4*p - 1)*x^(4*p - 2), x], x], x
] /; FreeQ[{a, b, c, d, e, f, m, q}, x] && NeQ[b^2 - 4*a*c, 0] && IGtQ[p, 0
] &&  !IntegerQ[q] && NeQ[m + 4*p + 2*q + 1, 0]
```

Rule 6302

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))*((f_.)*(x_))^(m_.)*((d_.) + (e_.)*(
x_)^2)^(p_.), x_Symbol] :> With[{u = IntHide[(f*x)^m*(d + e*x^2)^p, x]}, Di
st[a + b*ArcCsch[c*x], u, x] - Dist[(b*c*x)/Sqrt[-(c^2*x^2)], Int[SimplifyI
ntegrand[u/(x*Sqrt[-1 - c^2*x^2]), x], x], x]] /; FreeQ[{a, b, c, d, e, f,
m, p}, x] && ((IGtQ[p, 0] &&  !(ILtQ[(m - 1)/2, 0] && GtQ[m + 2*p + 3, 0]))
 || (IGtQ[(m + 1)/2, 0] &&  !(ILtQ[p, 0] && GtQ[m + 2*p + 3, 0])) || (ILtQ[
```

```
(m + 2*p + 1)/2, 0] &&  !ILtQ[(m - 1)/2, 0]))
```

Rubi steps

$$\int x^2\left(d+ex^2\right)^2\left(a+b\text{csch}^{-1}(cx)\right)dx=\frac{1}{3}d^2x^3\left(a+b\text{csch}^{-1}(cx)\right)+\frac{2}{5}dex^5\left(a+b\text{csch}^{-1}(cx)\right)+\frac{1}{7}e^2x^7\left(a+b\text{csch}\right.$$

$$=\frac{1}{3}d^2x^3\left(a+b\text{csch}^{-1}(cx)\right)+\frac{2}{5}dex^5\left(a+b\text{csch}^{-1}(cx)\right)+\frac{1}{7}e^2x^7\left(a+b\text{csch}\right.$$

$$=\frac{be^2x^6\sqrt{-1-c^2x^2}}{42c\sqrt{-c^2x^2}}+\frac{1}{3}d^2x^3\left(a+b\text{csch}^{-1}(cx)\right)+\frac{2}{5}dex^5\left(a+b\text{csch}^{-1}(cx)\right)$$

$$=\frac{b\left(84c^2d-25e\right)ex^4\sqrt{-1-c^2x^2}}{840c^3\sqrt{-c^2x^2}}+\frac{be^2x^6\sqrt{-1-c^2x^2}}{42c\sqrt{-c^2x^2}}+\frac{1}{3}d^2x^3\left(a+b\text{csch}\right.$$

$$=\frac{b\left(280c^4d^2-252c^2de+75e^2\right)x^2\sqrt{-1-c^2x^2}}{1680c^5\sqrt{-c^2x^2}}+\frac{b\left(84c^2d-25e\right)ex^4\sqrt{-1-}}{840c^3\sqrt{-c^2x^2}}$$

$$=\frac{b\left(280c^4d^2-252c^2de+75e^2\right)x^2\sqrt{-1-c^2x^2}}{1680c^5\sqrt{-c^2x^2}}+\frac{b\left(84c^2d-25e\right)ex^4\sqrt{-1-}}{840c^3\sqrt{-c^2x^2}}$$

$$=\frac{b\left(280c^4d^2-252c^2de+75e^2\right)x^2\sqrt{-1-c^2x^2}}{1680c^5\sqrt{-c^2x^2}}+\frac{b\left(84c^2d-25e\right)ex^4\sqrt{-1-}}{840c^3\sqrt{-c^2x^2}}$$

**Mathematica [A]** time = 0.36, size = 182, normalized size = 0.70

$$\frac{c^2x^2\left(16ac^5x\left(35d^2+42dex^2+15e^2x^4\right)+b\sqrt{\frac{1}{c^2x^2}+1}\left(8c^4\left(35d^2+21dex^2+5e^2x^4\right)-2c^2e\left(126d+25ex^2\right)+75e^2\right.\right.}{1680c}$$

Antiderivative was successfully verified.

```
[In] Integrate[x^2*(d + e*x^2)^2*(a + b*ArcCsch[c*x]),x]
```

```
[Out] (c^2*x^2*(16*a*c^5*x*(35*d^2 + 42*d*e*x^2 + 15*e^2*x^4) + b*Sqrt[1 + 1/(c^2
*x^2)]*(75*e^2 - 2*c^2*e*(126*d + 25*e*x^2) + 8*c^4*(35*d^2 + 21*d*e*x^2 +
5*e^2*x^4))) + 16*b*c^7*x^3*(35*d^2 + 42*d*e*x^2 + 15*e^2*x^4)*ArcCsch[c*x]
 + b*(-280*c^4*d^2 + 252*c^2*d*e - 75*e^2)*Log[(1 + Sqrt[1 + 1/(c^2*x^2)])*
x])/(1680*c^7)
```

**fricas [A]** time = 1.33, size = 388, normalized size = 1.49

$$240\,ac^7e^2x^7 + 672\,ac^7dex^5 + 560\,ac^7d^2x^3 + 16\left(35\,bc^7d^2 + 42\,bc^7de + 15\,bc^7e^2\right)\log\left(cx\sqrt{\frac{c^2x^2+1}{c^2x^2}} - cx + 1\right) + \left(28\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*(e*x^2+d)^2*(a+b*arccsch(c*x)),x, algorithm="fricas")
```

```
[Out] 1/1680*(240*a*c^7*e^2*x^7 + 672*a*c^7*d*e*x^5 + 560*a*c^7*d^2*x^3 + 16*(35*
b*c^7*d^2 + 42*b*c^7*d*e + 15*b*c^7*e^2)*log(c*x*sqrt((c^2*x^2 + 1)/(c^2*x^
2)) - c*x + 1) + (280*b*c^4*d^2 - 252*b*c^2*d*e + 75*b*e^2)*log(c*x*sqrt((c
^2*x^2 + 1)/(c^2*x^2)) - c*x) - 16*(35*b*c^7*d^2 + 42*b*c^7*d*e + 15*b*c^7*
e^2)*log(c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) - c*x - 1) + 16*(15*b*c^7*e^2*x^
7 + 42*b*c^7*d*e*x^5 + 35*b*c^7*d^2*x^3 - 35*b*c^7*d^2 - 42*b*c^7*d*e - 15*
b*c^7*e^2)*log((c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) + 1)/(c*x)) + (40*b*c^6*e
^2*x^6 + 2*(84*b*c^6*d*e - 25*b*c^4*e^2)*x^4 + (280*b*c^6*d^2 - 252*b*c^4*d
*e + 75*b*c^2*e^2)*x^2)*sqrt((c^2*x^2 + 1)/(c^2*x^2)))/c^7
```

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

$$\int \left(ex^2 + d\right)^2 (b\,\mathrm{arcsch}\,(cx) + a)x^2\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*(e*x^2+d)^2*(a+b*arccsch(c*x)),x, algorithm="giac")
```

```
[Out] integrate((e*x^2 + d)^2*(b*arccsch(c*x) + a)*x^2, x)
```

**maple [A]** time = 0.06, size = 286, normalized size = 1.10

$$\frac{\frac{a\left(\frac{1}{7}e^2c^7x^7+\frac{2}{5}c^7de\,x^5+\frac{1}{3}x^3c^7d^2\right)}{c^4} + \frac{b\left(\frac{\mathrm{arccsch}(cx)e^2c^7x^7}{7}+\frac{2\,\mathrm{arccsch}(cx)c^7de\,x^5}{5}+\frac{\mathrm{arccsch}(cx)c^7x^3d^2}{3}+\frac{\sqrt{c^2x^2+1}\left(40e^2c^5x^5\sqrt{c^2x^2+1}+168c^5de\,x^3\sqrt{c^2x^2+1}+280d^2c^5x\right.}{}\right.}{c^4}}{c^3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^2*(e*x^2+d)^2*(a+b*arccsch(c*x)),x)
```

```
[Out] 1/c^3*(a/c^4*(1/7*e^2*c^7*x^7+2/5*c^7*d*e*x^5+1/3*x^3*c^7*d^2)+b/c^4*(1/7*a
rccsch(c*x)*e^2*c^7*x^7+2/5*arccsch(c*x)*c^7*d*e*x^5+1/3*arccsch(c*x)*c^7*x
^3*d^2+1/1680*(c^2*x^2+1)^(1/2)*(40*e^2*c^5*x^5*(c^2*x^2+1)^(1/2)+168*c^5*d
```

```
*e*x^3*(c^2*x^2+1)^(1/2)+280*d^2*c^5*x*(c^2*x^2+1)^(1/2)-280*d^2*c^4*arcsin
h(c*x)-50*e^2*c^3*x^3*(c^2*x^2+1)^(1/2)-252*c^3*d*e*x*(c^2*x^2+1)^(1/2)+252
*c^2*d*e*arcsinh(c*x)+75*e^2*c*x*(c^2*x^2+1)^(1/2)-75*e^2*arcsinh(c*x))/((c
^2*x^2+1)/c^2/x^2)^(1/2)/c/x))
```

**maxima [A]** time = 0.33, size = 396, normalized size = 1.52

$$\frac{1}{7}ae^2x^7+\frac{2}{5}adex^5+\frac{1}{3}ad^2x^3+\frac{1}{12}\left(4x^3\operatorname{arcsch}(cx)+\frac{\frac{2\sqrt{\frac{1}{c^2x^2}+1}}{c^2\left(\frac{1}{c^2x^2}+1\right)-c^2}-\frac{\log\left(\sqrt{\frac{1}{c^2x^2}+1}+1\right)}{c^2}+\frac{\log\left(\sqrt{\frac{1}{c^2x^2}+1}-1\right)}{c^2}}{c}\right)bd^2+\frac{1}{40}\left(16x^5\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*(e*x^2+d)^2*(a+b*arccsch(c*x)),x, algorithm="maxima")
```

```
[Out] 1/7*a*e^2*x^7 + 2/5*a*d*e*x^5 + 1/3*a*d^2*x^3 + 1/12*(4*x^3*arccsch(c*x) +
(2*sqrt(1/(c^2*x^2) + 1)/(c^2*(1/(c^2*x^2) + 1) - c^2) - log(sqrt(1/(c^2*x^
2) + 1) + 1)/c^2 + log(sqrt(1/(c^2*x^2) + 1) - 1)/c^2)/c)*b*d^2 + 1/40*(16*
x^5*arccsch(c*x) - (2*(3*(1/(c^2*x^2) + 1)^(3/2) - 5*sqrt(1/(c^2*x^2) + 1))
/(c^4*(1/(c^2*x^2) + 1)^2 - 2*c^4*(1/(c^2*x^2) + 1) + c^4) - 3*log(sqrt(1/(
c^2*x^2) + 1) + 1)/c^4 + 3*log(sqrt(1/(c^2*x^2) + 1) - 1)/c^4)/c)*b*d*e + 1
/672*(96*x^7*arccsch(c*x) + (2*(15*(1/(c^2*x^2) + 1)^(5/2) - 40*(1/(c^2*x^2
) + 1)^(3/2) + 33*sqrt(1/(c^2*x^2) + 1))/(c^6*(1/(c^2*x^2) + 1)^3 - 3*c^6*(
1/(c^2*x^2) + 1)^2 + 3*c^6*(1/(c^2*x^2) + 1) - c^6) - 15*log(sqrt(1/(c^2*x^
2) + 1) + 1)/c^6 + 15*log(sqrt(1/(c^2*x^2) + 1) - 1)/c^6)/c)*b*e^2
```

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

$$\int x^2\left(e\,x^2+d\right)^2\left(a+b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^2*(d + e*x^2)^2*(a + b*asinh(1/(c*x))),x)
```

```
[Out] int(x^2*(d + e*x^2)^2*(a + b*asinh(1/(c*x))), x)
```

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

$$\int x^2\left(a+b\operatorname{acsch}(cx)\right)\left(d+ex^2\right)^2\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**2*(e*x**2+d)**2*(a+b*acsch(c*x)),x)
```

```
[Out] Integral(x**2*(a + b*acsch(c*x))*(d + e*x**2)**2, x)
```

## 3.89 $\int \left(d+ex^2\right)^2 \left(a+b\,\mathbf{csch}^{-1}(cx)\right)\,dx$

**Optimal**. Leaf size=197

$$d^2x\left(a+b\operatorname{csch}^{-1}(cx)\right)+\frac{2}{3}dex^3\left(a+b\operatorname{csch}^{-1}(cx)\right)+\frac{1}{5}e^2x^5\left(a+b\operatorname{csch}^{-1}(cx)\right)+\frac{be^2x^4\sqrt{-c^2x^2-1}}{20c\sqrt{-c^2x^2}}-\frac{bx\left(120c^4d^2-40c\right.}{12}$$

```
[Out] d^2*x*(a+b*arccsch(c*x))+2/3*d*e*x^3*(a+b*arccsch(c*x))+1/5*e^2*x^5*(a+b*ar
ccsch(c*x))-1/120*b*(120*c^4*d^2-40*c^2*d*e+9*e^2)*x*arctan(c*x/(-c^2*x^2-1
)^(1/2))/c^4/(-c^2*x^2)^(1/2)+1/120*b*(40*c^2*d-9*e)*e*x^2*(-c^2*x^2-1)^(1/
2)/c^3/(-c^2*x^2)^(1/2)+1/20*b*e^2*x^4*(-c^2*x^2-1)^(1/2)/c/(-c^2*x^2)^(1/2
)
```

**Rubi [A]** time = 0.13, antiderivative size = 197, normalized size of antiderivative = 1.00, number of steps used = 6, number of rules used = 7, integrand size = 18, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.389, Rules used = {194, 6292, 12, 1159, 388, 217, 203}

$$d^2x\left(a+b\operatorname{csch}^{-1}(cx)\right)+\frac{2}{3}dex^3\left(a+b\operatorname{csch}^{-1}(cx)\right)+\frac{1}{5}e^2x^5\left(a+b\operatorname{csch}^{-1}(cx)\right)-\frac{bx\left(120c^4d^2-40c^2de+9e^2\right)\tan^{-1}\left(\frac{-}{\sqrt{}}\right.}{120c^4\sqrt{-c^2x^2}}$$

Antiderivative was successfully verified.

```
[In] Int[(d + e*x^2)^2*(a + b*ArcCsch[c*x]),x]
```

```
[Out] (b*(40*c^2*d - 9*e)*e*x^2*Sqrt[-1 - c^2*x^2])/(120*c^3*Sqrt[-(c^2*x^2)]) +
(b*e^2*x^4*Sqrt[-1 - c^2*x^2])/(20*c*Sqrt[-(c^2*x^2)]) + d^2*x*(a + b*ArcCs
ch[c*x]) + (2*d*e*x^3*(a + b*ArcCsch[c*x]))/3 + (e^2*x^5*(a + b*ArcCsch[c*x
]))/5 - (b*(120*c^4*d^2 - 40*c^2*d*e + 9*e^2)*x*ArcTan[(c*x)/Sqrt[-1 - c^2*
x^2]])/(120*c^4*Sqrt[-(c^2*x^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 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 203

```
Int[((a_) + (b_.)*(x_)^2)^(-1), x_Symbol] :> Simp[(1*ArcTan[(Rt[b, 2]*x)/Rt
[a, 2]])/(Rt[a, 2]*Rt[b, 2]), x] /; FreeQ[{a, b}, x] && PosQ[a/b] && (GtQ[a
```

```
, 0] || GtQ[b, 0])
```

Rule 217

```
Int[1/Sqrt[(a_) + (b_.)*(x_)^2], x_Symbol] :> Subst[Int[1/(1 - b*x^2), x],
x, x/Sqrt[a + b*x^2]] /; FreeQ[{a, b}, x] &&  !GtQ[a, 0]
```

Rule 388

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

Rule 1159

```
Int[((d_) + (e_.)*(x_)^2)^(q_)*((a_) + (b_.)*(x_)^2 + (c_.)*(x_)^4)^(p_.),
x_Symbol] :> Simp[(c^p*x^(4*p - 1)*(d + e*x^2)^(q + 1))/(e*(4*p + 2*q + 1))
, x] + Dist[1/(e*(4*p + 2*q + 1)), Int[(d + e*x^2)^q*ExpandToSum[e*(4*p + 2
*q + 1)*(a + b*x^2 + c*x^4)^p - d*c^p*(4*p - 1)*x^(4*p - 2) - e*c^p*(4*p +
2*q + 1)*x^(4*p), x], x], x] /; FreeQ[{a, b, c, d, e, q}, x] && NeQ[b^2 - 4
*a*c, 0] && NeQ[c*d^2 - b*d*e + a*e^2, 0] && IGtQ[p, 0] &&  !LtQ[q, -1]
```

Rule 6292

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))*((d_.) + (e_.)*(x_)^2)^(p_.), x_Sym
bol] :> With[{u = IntHide[(d + e*x^2)^p, x]}, Dist[a + b*ArcCsch[c*x], u, x
] - Dist[(b*c*x)/Sqrt[-(c^2*x^2)], Int[SimplifyIntegrand[u/(x*Sqrt[-1 - c^2
*x^2]), x], x], x]] /; FreeQ[{a, b, c, d, e}, x] && (IGtQ[p, 0] || ILtQ[p +
 1/2, 0])
```

Rubi steps

$$\int \left(d+ex^2\right)^2 \left(a+b\text{csch}^{-1}(cx)\right) dx = d^2x\left(a+b\text{csch}^{-1}(cx)\right)+\frac{2}{3}dex^3\left(a+b\text{csch}^{-1}(cx)\right)+\frac{1}{5}e^2x^5\left(a+b\text{csch}^{-1}(cx\right.$$

$$= d^2x\left(a+b\text{csch}^{-1}(cx)\right)+\frac{2}{3}dex^3\left(a+b\text{csch}^{-1}(cx)\right)+\frac{1}{5}e^2x^5\left(a+b\text{csch}^{-1}(cx\right.$$

$$= \frac{be^2x^4\sqrt{-1-c^2x^2}}{20c\sqrt{-c^2x^2}}+d^2x\left(a+b\text{csch}^{-1}(cx)\right)+\frac{2}{3}dex^3\left(a+b\text{csch}^{-1}(cx)\right)+\frac{1}{5}e$$

$$= \frac{b\left(40c^2d-9e\right)ex^2\sqrt{-1-c^2x^2}}{120c^3\sqrt{-c^2x^2}}+\frac{be^2x^4\sqrt{-1-c^2x^2}}{20c\sqrt{-c^2x^2}}+d^2x\left(a+b\text{csch}^{-1}(cx)\right)$$

$$= \frac{b\left(40c^2d-9e\right)ex^2\sqrt{-1-c^2x^2}}{120c^3\sqrt{-c^2x^2}}+\frac{be^2x^4\sqrt{-1-c^2x^2}}{20c\sqrt{-c^2x^2}}+d^2x\left(a+b\text{csch}^{-1}(cx)\right)$$

$$= \frac{b\left(40c^2d-9e\right)ex^2\sqrt{-1-c^2x^2}}{120c^3\sqrt{-c^2x^2}}+\frac{be^2x^4\sqrt{-1-c^2x^2}}{20c\sqrt{-c^2x^2}}+d^2x\left(a+b\text{csch}^{-1}(cx)\right)$$

**Mathematica** [A] time = 0.23, size = 149, normalized size = 0.76

$$\frac{c^2x\left(8ac^3\left(15d^2+10dex^2+3e^2x^4\right)+bex\sqrt{\frac{1}{c^2x^2}+1}\left(c^2\left(40d+6ex^2\right)-9e\right)\right)+8bc^5x\text{csch}^{-1}(cx)\left(15d^2+10dex^2+3\right.}{120c^5}$$

Antiderivative was successfully verified.

```
[In] Integrate[(d + e*x^2)^2*(a + b*ArcCsch[c*x]),x]
```

```
[Out] (c^2*x*(8*a*c^3*(15*d^2 + 10*d*e*x^2 + 3*e^2*x^4) + b*e*Sqrt[1 + 1/(c^2*x^2
)]*x*(-9*e + c^2*(40*d + 6*e*x^2))) + 8*b*c^5*x*(15*d^2 + 10*d*e*x^2 + 3*e^
2*x^4)*ArcCsch[c*x] + b*(120*c^4*d^2 - 40*c^2*d*e + 9*e^2)*Log[(1 + Sqrt[1
+ 1/(c^2*x^2)])*x])/(120*c^5)
```

**fricas** [B] time = 1.15, size = 353, normalized size = 1.79

$$24\,ac^5e^2x^5+80\,ac^5dex^3+120\,ac^5d^2x+8\left(15\,bc^5d^2+10\,bc^5de+3\,bc^5e^2\right)\log\left(cx\sqrt{\frac{c^2x^2+1}{c^2x^2}}-cx+1\right)-\left(120\,bc^4d^2\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((e*x^2+d)^2*(a+b*arccsch(c*x)),x, algorithm="fricas")
```

```
[Out] 1/120*(24*a*c^5*e^2*x^5 + 80*a*c^5*d*e*x^3 + 120*a*c^5*d^2*x + 8*(15*b*c^5*
d^2 + 10*b*c^5*d*e + 3*b*c^5*e^2)*log(c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) - c
*x + 1) - (120*b*c^4*d^2 - 40*b*c^2*d*e + 9*b*e^2)*log(c*x*sqrt((c^2*x^2 +
1)/(c^2*x^2)) - c*x) - 8*(15*b*c^5*d^2 + 10*b*c^5*d*e + 3*b*c^5*e^2)*log(c*
x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) - c*x - 1) + 8*(3*b*c^5*e^2*x^5 + 10*b*c^5*
d*e*x^3 + 15*b*c^5*d^2*x - 15*b*c^5*d^2 - 10*b*c^5*d*e - 3*b*c^5*e^2)*log((
c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) + 1)/(c*x)) + (6*b*c^4*e^2*x^4 + (40*b*c^
4*d*e - 9*b*c^2*e^2)*x^2)*sqrt((c^2*x^2 + 1)/(c^2*x^2)))/c^5
```

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

$$\int \left(ex^2 + d\right)^2 (b\,\mathrm{arcsch}\,(cx) + a)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((e*x^2+d)^2*(a+b*arccsch(c*x)),x, algorithm="giac")
```

```
[Out] integrate((e*x^2 + d)^2*(b*arccsch(c*x) + a), x)
```

**maple [A]** time = 0.05, size = 217, normalized size = 1.10

$$\frac{\frac{a\left(\frac{1}{5}e^2c^5x^5+\frac{2}{3}c^5de\,x^3+x\,c^5d^2\right)}{c^4}+\frac{b\left(\frac{\mathrm{arccsch}(cx)e^2c^5x^5}{5}+\frac{2\,\mathrm{arccsch}(cx)c^5de\,x^3}{3}+\mathrm{arccsch}(cx)c^5x\,d^2+\frac{\sqrt{c^2x^2+1}\,\left(120d^2c^4\,\mathrm{arcsinh}(cx)+6e^2c^3x^3\,\sqrt{c^2x^2+1}+40c^3dex\,\sqrt{c^2x}\right.}{120\sqrt{\frac{c^2x^2}{c^2x^2}}}\right.}{c^4}}{c}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((e*x^2+d)^2*(a+b*arccsch(c*x)),x)
```

```
[Out] 1/c*(a/c^4*(1/5*e^2*c^5*x^5+2/3*c^5*d*e*x^3+x*c^5*d^2)+b/c^4*(1/5*arccsch(c
*x)*e^2*c^5*x^5+2/3*arccsch(c*x)*c^5*d*e*x^3+arccsch(c*x)*c^5*x*d^2+1/120*(
c^2*x^2+1)^(1/2)*(120*d^2*c^4*arcsinh(c*x)+6*e^2*c^3*x^3*(c^2*x^2+1)^(1/2)+
40*c^3*d*e*x*(c^2*x^2+1)^(1/2)-40*c^2*d*e*arcsinh(c*x)-9*e^2*c*x*(c^2*x^2+1
)^(1/2)+9*e^2*arcsinh(c*x))/((c^2*x^2+1)/c^2/x^2)^(1/2)/c/x))
```

**maxima [A]** time = 0.36, size = 287, normalized size = 1.46

$$\frac{1}{5}\,ae^2x^5+\frac{2}{3}\,adex^3+\frac{1}{6}\left(4\,x^3\,\mathrm{arcsch}\,(cx)+\frac{\frac{2\sqrt{\frac{1}{c^2x^2}+1}}{c^2\left(\frac{1}{c^2x^2}+1\right)-c^2}-\frac{\log\left(\sqrt{\frac{1}{c^2x^2}+1}+1\right)}{c^2}+\frac{\log\left(\sqrt{\frac{1}{c^2x^2}+1}-1\right)}{c^2}}{c}\right)bde+\frac{1}{80}\left(16\,x^5\,\mathrm{arcsch}\,(\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((e*x^2+d)^2*(a+b*arccsch(c*x)),x, algorithm="maxima")
```

```
[Out] 1/5*a*e^2*x^5 + 2/3*a*d*e*x^3 + 1/6*(4*x^3*arccsch(c*x) + (2*sqrt(1/(c^2*x^
2) + 1)/(c^2*(1/(c^2*x^2) + 1) - c^2) - log(sqrt(1/(c^2*x^2) + 1) + 1)/c^2
+ log(sqrt(1/(c^2*x^2) + 1) - 1)/c^2)/c)*b*d*e + 1/80*(16*x^5*arccsch(c*x)
- (2*(3*(1/(c^2*x^2) + 1)^(3/2) - 5*sqrt(1/(c^2*x^2) + 1))/(c^4*(1/(c^2*x^2
) + 1)^2 - 2*c^4*(1/(c^2*x^2) + 1) + c^4) - 3*log(sqrt(1/(c^2*x^2) + 1) + 1
)/c^4 + 3*log(sqrt(1/(c^2*x^2) + 1) - 1)/c^4)/c)*b*e^2 + a*d^2*x + 1/2*(2*c
*x*arccsch(c*x) + log(sqrt(1/(c^2*x^2) + 1) + 1) - log(sqrt(1/(c^2*x^2) + 1
) - 1))*b*d^2/c
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.01

$$\int \left(e\,x^2+d\right)^2\,\left(a+b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)\right) \,d x$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((d + e*x^2)^2*(a + b*asinh(1/(c*x))),x)
```

```
[Out] int((d + e*x^2)^2*(a + b*asinh(1/(c*x))), x)
```

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

$$\int \left(a + b \operatorname{acsch}{\left(c x \right)}\right) \left(d + e x^{2}\right)^{2}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((e*x**2+d)**2*(a+b*acsch(c*x)),x)
```

```
[Out] Integral((a + b*acsch(c*x))*(d + e*x**2)**2, x)
```

# 3.90 $\int \frac{\left(d+ex^2\right)^2\left(a+b\textbf{csch}^{-1}(cx)\right)}{x^2}\,dx$

**Optimal**. Leaf size=170

$$-\frac{d^2\left(a+b\text{csch}^{-1}(cx)\right)}{x}+2dex\left(a+b\text{csch}^{-1}(cx)\right)+\frac{1}{3}e^2x^3\left(a+b\text{csch}^{-1}(cx)\right)+\frac{bcd^2\sqrt{-c^2x^2-1}}{\sqrt{-c^2x^2}}-\frac{bex\left(12c^2d-e\right)\tan}{6c^2\sqrt{-c}}$$

```
[Out] -d^2*(a+b*arccsch(c*x))/x+2*d*e*x*(a+b*arccsch(c*x))+1/3*e^2*x^3*(a+b*arccs
ch(c*x))-1/6*b*(12*c^2*d-e)*e*x*arctan(c*x/(-c^2*x^2-1)^(1/2))/c^2/(-c^2*x^
2)^(1/2)+b*c*d^2*(-c^2*x^2-1)^(1/2)/(-c^2*x^2)^(1/2)+1/6*b*e^2*x^2*(-c^2*x^
2-1)^(1/2)/c/(-c^2*x^2)^(1/2)
```

**Rubi [A]** time = 0.14, antiderivative size = 170, normalized size of antiderivative = 1.00, number of steps used = 6, number of rules used = 7, integrand size = 21, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.333, Rules used = {270, 6302, 12, 1265, 388, 217, 203}

$$-\frac{d^2\left(a+b\text{csch}^{-1}(cx)\right)}{x}+2dex\left(a+b\text{csch}^{-1}(cx)\right)+\frac{1}{3}e^2x^3\left(a+b\text{csch}^{-1}(cx)\right)+\frac{bcd^2\sqrt{-c^2x^2-1}}{\sqrt{-c^2x^2}}-\frac{bex\left(12c^2d-e\right)\tan}{6c^2\sqrt{-c}}$$

Antiderivative was successfully verified.

```
[In] Int[((d + e*x^2)^2*(a + b*ArcCsch[c*x]))/x^2,x]
```

```
[Out] (b*c*d^2*Sqrt[-1 - c^2*x^2])/Sqrt[-(c^2*x^2)] + (b*e^2*x^2*Sqrt[-1 - c^2*x^
2])/(6*c*Sqrt[-(c^2*x^2)]) - (d^2*(a + b*ArcCsch[c*x]))/x + 2*d*e*x*(a + b*
ArcCsch[c*x]) + (e^2*x^3*(a + b*ArcCsch[c*x]))/3 - (b*(12*c^2*d - e)*e*x*Ar
cTan[(c*x)/Sqrt[-1 - c^2*x^2]])/(6*c^2*Sqrt[-(c^2*x^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 203

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

Rule 217

```
Int[1/Sqrt[(a_) + (b_.)*(x_)^2], x_Symbol] :> Subst[Int[1/(1 - b*x^2), x],
x, x/Sqrt[a + b*x^2]] /; FreeQ[{a, b}, x] &&  !GtQ[a, 0]
```

Rule 270

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

Rule 388

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

Rule 1265

```
Int[((f_.)*(x_))^(m_)*((d_) + (e_.)*(x_)^2)^(q_.)*((a_) + (b_.)*(x_)^2 + (c
_.)*(x_)^4)^(p_.), x_Symbol] :> With[{Qx = PolynomialQuotient[(a + b*x^2 +
c*x^4)^p, f*x, x], R = PolynomialRemainder[(a + b*x^2 + c*x^4)^p, f*x, x]},
 Simp[(R*(f*x)^(m + 1)*(d + e*x^2)^(q + 1))/(d*f*(m + 1)), x] + Dist[1/(d*f
^2*(m + 1)), Int[(f*x)^(m + 2)*(d + e*x^2)^q*ExpandToSum[(d*f*(m + 1)*Qx)/x
 - e*R*(m + 2*q + 3), x], x], x]] /; FreeQ[{a, b, c, d, e, f, q}, x] && NeQ
[b^2 - 4*a*c, 0] && IGtQ[p, 0] && LtQ[m, -1]
```

Rule 6302

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))*((f_.)*(x_))^(m_.)*((d_.) + (e_.)*(
x_)^2)^(p_.), x_Symbol] :> With[{u = IntHide[(f*x)^m*(d + e*x^2)^p, x]}, Di
st[a + b*ArcCsch[c*x], u, x] - Dist[(b*c*x)/Sqrt[-(c^2*x^2)], Int[SimplifyI
ntegrand[u/(x*Sqrt[-1 - c^2*x^2]), x], x], x]] /; FreeQ[{a, b, c, d, e, f,
m, p}, x] && ((IGtQ[p, 0] &&  !(ILtQ[(m - 1)/2, 0] && GtQ[m + 2*p + 3, 0]))
 || (IGtQ[(m + 1)/2, 0] &&  !(ILtQ[p, 0] && GtQ[m + 2*p + 3, 0])) || (ILtQ[
(m + 2*p + 1)/2, 0] &&  !ILtQ[(m - 1)/2, 0]))
```

Rubi steps

$$\int \frac{(d+ex^2)^2 (a+b\text{csch}^{-1}(cx))}{x^2}\,dx = -\frac{d^2 (a+b\text{csch}^{-1}(cx))}{x} + 2dex (a+b\text{csch}^{-1}(cx)) + \frac{1}{3}e^2x^3 (a+b\text{csch}^{-1}(cx$$

$$= -\frac{d^2 (a+b\text{csch}^{-1}(cx))}{x} + 2dex (a+b\text{csch}^{-1}(cx)) + \frac{1}{3}e^2x^3 (a+b\text{csch}^{-1}(cx$$

$$= \frac{bcd^2\sqrt{-1-c^2x^2}}{\sqrt{-c^2x^2}} - \frac{d^2 (a+b\text{csch}^{-1}(cx))}{x} + 2dex (a+b\text{csch}^{-1}(cx)) + \frac{1}{3}e^2x$$

$$= \frac{bcd^2\sqrt{-1-c^2x^2}}{\sqrt{-c^2x^2}} + \frac{be^2x^2\sqrt{-1-c^2x^2}}{6c\sqrt{-c^2x^2}} - \frac{d^2 (a+b\text{csch}^{-1}(cx))}{x} + 2dex (a+$$

$$= \frac{bcd^2\sqrt{-1-c^2x^2}}{\sqrt{-c^2x^2}} + \frac{be^2x^2\sqrt{-1-c^2x^2}}{6c\sqrt{-c^2x^2}} - \frac{d^2 (a+b\text{csch}^{-1}(cx))}{x} + 2dex (a+$$

$$= \frac{bcd^2\sqrt{-1-c^2x^2}}{\sqrt{-c^2x^2}} + \frac{be^2x^2\sqrt{-1-c^2x^2}}{6c\sqrt{-c^2x^2}} - \frac{d^2 (a+b\text{csch}^{-1}(cx))}{x} + 2dex (a+$$

**Mathematica [A]** time = 0.22, size = 134, normalized size = 0.79

$$\frac{c^2 \left(2ac(-3d^2+6dex^2+e^2x^4) + bx\sqrt{\frac{1}{c^2x^2}+1}\,(6c^2d^2+e^2x^2)\right) + 2bc^3\text{csch}^{-1}(cx)(-3d^2+6dex^2+e^2x^4) + bex(1}{6c^3x}$$

Antiderivative was successfully verified.

```
[In] Integrate[((d + e*x^2)^2*(a + b*ArcCsch[c*x]))/x^2,x]
```

```
[Out] (c^2*(b*Sqrt[1 + 1/(c^2*x^2)]*x*(6*c^2*d^2 + e^2*x^2) + 2*a*c*(-3*d^2 + 6*d
*e*x^2 + e^2*x^4)) + 2*b*c^3*(-3*d^2 + 6*d*e*x^2 + e^2*x^4)*ArcCsch[c*x] +
b*(12*c^2*d - e)*e*x*Log[(1 + Sqrt[1 + 1/(c^2*x^2)])*x])/(6*c^3*x)
```

**fricas [B]** time = 1.22, size = 347, normalized size = 2.04

$$\frac{2\,ac^3e^2x^4 + 6\,bc^4d^2x + 12\,ac^3dex^2 - 6\,ac^3d^2 - 2\left(3\,bc^3d^2 - 6\,bc^3de - bc^3e^2\right)x\log\left(cx\sqrt{\frac{c^2x^2+1}{c^2x^2}} - cx + 1\right) - \left(12\,bc^2\right.}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((e*x^2+d)^2*(a+b*arccsch(c*x))/x^2,x, algorithm="fricas")
```

```
[Out] 1/6*(2*a*c^3*e^2*x^4 + 6*b*c^4*d^2*x + 12*a*c^3*d*e*x^2 - 6*a*c^3*d^2 - 2*(
3*b*c^3*d^2 - 6*b*c^3*d*e - b*c^3*e^2)*x*log(c*x*sqrt((c^2*x^2 + 1)/(c^2*x^
2)) - c*x + 1) - (12*b*c^2*d*e - b*e^2)*x*log(c*x*sqrt((c^2*x^2 + 1)/(c^2*x
^2)) - c*x) + 2*(3*b*c^3*d^2 - 6*b*c^3*d*e - b*c^3*e^2)*x*log(c*x*sqrt((c^2
*x^2 + 1)/(c^2*x^2)) - c*x - 1) + 2*(b*c^3*e^2*x^4 + 6*b*c^3*d*e*x^2 - 3*b*
c^3*d^2 + (3*b*c^3*d^2 - 6*b*c^3*d*e - b*c^3*e^2)*x)*log((c*x*sqrt((c^2*x^2
 + 1)/(c^2*x^2)) + 1)/(c*x)) + (6*b*c^4*d^2*x + b*c^2*e^2*x^3)*sqrt((c^2*x^
2 + 1)/(c^2*x^2)))/(c^3*x)
```

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

$$\int \frac{\left(ex^2+d\right)^2 (b\,\mathrm{arcsch}\,(cx)+a)}{x^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((e*x^2+d)^2*(a+b*arccsch(c*x))/x^2,x, algorithm="giac")
```

```
[Out] integrate((e*x^2 + d)^2*(b*arccsch(c*x) + a)/x^2, x)
```

**maple [A]** time = 0.06, size = 189, normalized size = 1.11

$$c\left(\frac{a\left(\frac{c^3x^3e^2}{3}+2c^3dex-\frac{d^2c^3}{x}\right)}{c^4}+\frac{b\left(\frac{e^2\mathrm{arccsch}(cx)c^3x^3}{3}+2\,\mathrm{arccsch}\,(cx)\,c^3dex-\frac{\mathrm{arccsch}(cx)d^2c^3}{x}+\frac{\sqrt{c^2x^2+1}\,\left(6d^2c^4\sqrt{c^2x^2+1}+12c^3\right.}{}\right.}{c^4}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((e*x^2+d)^2*(a+b*arccsch(c*x))/x^2,x)
```

```
[Out] c*(a/c^4*(1/3*c^3*x^3*e^2+2*c^3*d*e*x-d^2*c^3/x)+b/c^4*(1/3*e^2*arccsch(c*x
)*c^3*x^3+2*arccsch(c*x)*c^3*d*e*x-arccsch(c*x)*d^2*c^3/x+1/6*(c^2*x^2+1)^(
1/2)*(6*d^2*c^4*(c^2*x^2+1)^(1/2)+12*c^3*d*e*arcsinh(c*x)*x+(c^2*x^2+1)^(1/
2)*c^2*x^2*e^2-arcsinh(c*x)*c*x*e^2)/c^2/x^2/((c^2*x^2+1)/c^2/x^2)^(1/2)))
```

**maxima [A]** time = 0.41, size = 191, normalized size = 1.12

$$\frac{1}{3}ae^2x^3+\left(c\sqrt{\frac{1}{c^2x^2}+1}-\frac{\mathrm{arcsch}\,(cx)}{x}\right)bd^2+\frac{1}{12}\left(4\,x^3\,\mathrm{arcsch}\,(cx)+\frac{\frac{2\sqrt{\frac{1}{c^2x^2}+1}}{c^2\left(\frac{1}{c^2x^2}+1\right)-c^2}-\frac{\log\left(\sqrt{\frac{1}{c^2x^2}+1}+1\right)}{c^2}+\frac{\log\left(\sqrt{\frac{1}{c^2x^2}+1}-1\right)}{c^2}}{c}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((e*x^2+d)^2*(a+b*arccsch(c*x))/x^2,x, algorithm="maxima")
```

```
[Out] 1/3*a*e^2*x^3 + (c*sqrt(1/(c^2*x^2) + 1) - arccsch(c*x)/x)*b*d^2 + 1/12*(4*
x^3*arccsch(c*x) + (2*sqrt(1/(c^2*x^2) + 1)/(c^2*(1/(c^2*x^2) + 1) - c^2) -
 log(sqrt(1/(c^2*x^2) + 1) + 1)/c^2 + log(sqrt(1/(c^2*x^2) + 1) - 1)/c^2)/c
)*b*e^2 + 2*a*d*e*x + (2*c*x*arccsch(c*x) + log(sqrt(1/(c^2*x^2) + 1) + 1)
- log(sqrt(1/(c^2*x^2) + 1) - 1))*b*d*e/c - a*d^2/x
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.01

$$\int \frac{\left(e\,x^2+d\right)^2\,\left(a+b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)\right)}{x^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(((d + e*x^2)^2*(a + b*asinh(1/(c*x))))/x^2,x)
```

```
[Out] int(((d + e*x^2)^2*(a + b*asinh(1/(c*x))))/x^2, x)
```

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

$$\int \frac{(a+b\,\mathrm{acsch}\,(cx))\left(d+ex^2\right)^2}{x^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((e*x**2+d)**2*(a+b*acsch(c*x))/x**2,x)
```

```
[Out] Integral((a + b*acsch(c*x))*(d + e*x**2)**2/x**2, x)
```

## 3.91 $\int \frac{(d+ex^2)^2(a+b\text{csch}^{-1}(cx))}{x^4}\,dx$

**Optimal**. Leaf size=164

$$-\frac{d^2\left(a+b\text{csch}^{-1}(cx)\right)}{3x^3}-\frac{2de\left(a+b\text{csch}^{-1}(cx)\right)}{x}+e^2x\left(a+b\text{csch}^{-1}(cx)\right)+\frac{bcd^2\sqrt{-c^2x^2-1}}{9x^2\sqrt{-c^2x^2}}-\frac{2bcd\sqrt{-c^2x^2-1}\,(c^2d-}{9\sqrt{-c^2x^2}}$$

```
[Out] -1/3*d^2*(a+b*arccsch(c*x))/x^3-2*d*e*(a+b*arccsch(c*x))/x+e^2*x*(a+b*arccs
ch(c*x))-b*e^2*x*arctan(c*x/(-c^2*x^2-1)^(1/2))/(-c^2*x^2)^(1/2)-2/9*b*c*d*
(c^2*d-9*e)*(-c^2*x^2-1)^(1/2)/(-c^2*x^2)^(1/2)+1/9*b*c*d^2*(-c^2*x^2-1)^(1
/2)/x^2/(-c^2*x^2)^(1/2)
```

**Rubi [A]** time = 0.14, antiderivative size = 164, normalized size of antiderivative = 1.00, number of steps used = 6, number of rules used = 7, integrand size = 21, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.333, Rules used = {270, 6302, 12, 1265, 451, 217, 203}

$$-\frac{d^2\left(a+b\text{csch}^{-1}(cx)\right)}{3x^3}-\frac{2de\left(a+b\text{csch}^{-1}(cx)\right)}{x}+e^2x\left(a+b\text{csch}^{-1}(cx)\right)+\frac{bcd^2\sqrt{-c^2x^2-1}}{9x^2\sqrt{-c^2x^2}}-\frac{2bcd\sqrt{-c^2x^2-1}\,(c^2d-}{9\sqrt{-c^2x^2}}$$

Antiderivative was successfully verified.

```
[In] Int[((d + e*x^2)^2*(a + b*ArcCsch[c*x]))/x^4,x]
```

```
[Out] (-2*b*c*d*(c^2*d - 9*e)*Sqrt[-1 - c^2*x^2])/(9*Sqrt[-(c^2*x^2)]) + (b*c*d^2
*Sqrt[-1 - c^2*x^2])/(9*x^2*Sqrt[-(c^2*x^2)]) - (d^2*(a + b*ArcCsch[c*x]))/
(3*x^3) - (2*d*e*(a + b*ArcCsch[c*x]))/x + e^2*x*(a + b*ArcCsch[c*x]) - (b*
e^2*x*ArcTan[(c*x)/Sqrt[-1 - c^2*x^2]])/Sqrt[-(c^2*x^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 203

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

Rule 217

```
Int[1/Sqrt[(a_) + (b_.)*(x_)^2], x_Symbol] :> Subst[Int[1/(1 - b*x^2), x],
x, x/Sqrt[a + b*x^2]] /; FreeQ[{a, b}, x] &&  !GtQ[a, 0]
```

Rule 270

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

Rule 451

```
Int[((e_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_.)*((c_) + (d_.)*(x_)^(n
_)), x_Symbol] :> Simp[(c*(e*x)^(m + 1)*(a + b*x^n)^(p + 1))/(a*e*(m + 1)),
 x] + Dist[d/e^n, Int[(e*x)^(m + n)*(a + b*x^n)^p, x], x] /; FreeQ[{a, b, c
, d, e, m, n, p}, x] && NeQ[b*c - a*d, 0] && EqQ[m + n*(p + 1) + 1, 0] && (
IntegerQ[n] || GtQ[e, 0]) && ((GtQ[n, 0] && LtQ[m, -1]) || (LtQ[n, 0] && Gt
Q[m + n, -1]))
```

Rule 1265

```
Int[((f_.)*(x_))^(m_)*((d_) + (e_.)*(x_)^2)^(q_.)*((a_) + (b_.)*(x_)^2 + (c
_.)*(x_)^4)^(p_.), x_Symbol] :> With[{Qx = PolynomialQuotient[(a + b*x^2 +
c*x^4)^p, f*x, x], R = PolynomialRemainder[(a + b*x^2 + c*x^4)^p, f*x, x]},
 Simp[(R*(f*x)^(m + 1)*(d + e*x^2)^(q + 1))/(d*f*(m + 1)), x] + Dist[1/(d*f
^2*(m + 1)), Int[(f*x)^(m + 2)*(d + e*x^2)^q*ExpandToSum[(d*f*(m + 1)*Qx)/x
 - e*R*(m + 2*q + 3), x], x], x]] /; FreeQ[{a, b, c, d, e, f, q}, x] && NeQ
[b^2 - 4*a*c, 0] && IGtQ[p, 0] && LtQ[m, -1]
```

Rule 6302

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))*((f_.)*(x_))^(m_.)*((d_.) + (e_.)*(
x_)^2)^(p_.), x_Symbol] :> With[{u = IntHide[(f*x)^m*(d + e*x^2)^p, x]}, Di
st[a + b*ArcCsch[c*x], u, x] - Dist[(b*c*x)/Sqrt[-(c^2*x^2)], Int[SimplifyI
ntegrand[u/(x*Sqrt[-1 - c^2*x^2]), x], x], x]] /; FreeQ[{a, b, c, d, e, f,
m, p}, x] && ((IGtQ[p, 0] &&  !(ILtQ[(m - 1)/2, 0] && GtQ[m + 2*p + 3, 0]))
 || (IGtQ[(m + 1)/2, 0] &&  !(ILtQ[p, 0] && GtQ[m + 2*p + 3, 0])) || (ILtQ[
(m + 2*p + 1)/2, 0] &&  !ILtQ[(m - 1)/2, 0]))
```

Rubi steps

$$\int \frac{\left(d+ex^2\right)^2\left(a+b\text{csch}^{-1}(cx)\right)}{x^4}\,dx = -\frac{d^2\left(a+b\text{csch}^{-1}(cx)\right)}{3x^3} - \frac{2de\left(a+b\text{csch}^{-1}(cx)\right)}{x} + e^2x\left(a+b\text{csch}^{-1}(cx)\right) -$$

$$= -\frac{d^2\left(a+b\text{csch}^{-1}(cx)\right)}{3x^3} - \frac{2de\left(a+b\text{csch}^{-1}(cx)\right)}{x} + e^2x\left(a+b\text{csch}^{-1}(cx)\right) -$$

$$= \frac{bcd^2\sqrt{-1-c^2x^2}}{9x^2\sqrt{-c^2x^2}} - \frac{d^2\left(a+b\text{csch}^{-1}(cx)\right)}{3x^3} - \frac{2de\left(a+b\text{csch}^{-1}(cx)\right)}{x} + e^2x\left(a\right.$$

$$= -\frac{2bcd\left(c^2d-9e\right)\sqrt{-1-c^2x^2}}{9\sqrt{-c^2x^2}} + \frac{bcd^2\sqrt{-1-c^2x^2}}{9x^2\sqrt{-c^2x^2}} - \frac{d^2\left(a+b\text{csch}^{-1}(cx)\right)}{3x^3} -$$

$$= -\frac{2bcd\left(c^2d-9e\right)\sqrt{-1-c^2x^2}}{9\sqrt{-c^2x^2}} + \frac{bcd^2\sqrt{-1-c^2x^2}}{9x^2\sqrt{-c^2x^2}} - \frac{d^2\left(a+b\text{csch}^{-1}(cx)\right)}{3x^3} -$$

$$= -\frac{2bcd\left(c^2d-9e\right)\sqrt{-1-c^2x^2}}{9\sqrt{-c^2x^2}} + \frac{bcd^2\sqrt{-1-c^2x^2}}{9x^2\sqrt{-c^2x^2}} - \frac{d^2\left(a+b\text{csch}^{-1}(cx)\right)}{3x^3} -$$

**Mathematica [A]** time = 0.27, size = 123, normalized size = 0.75

$$\frac{bcdx\sqrt{\frac{1}{c^2x^2}+1}\left(-2c^2dx^2+d+18ex^2\right)-3a\left(d^2+6dex^2-3e^2x^4\right)}{9x^3}+\frac{be^2\log\left(x\left(\sqrt{\frac{1}{c^2x^2}+1}+1\right)\right)}{c}-\frac{b\text{csch}^{-1}(cx)\left(d^2\right.}{3x}$$

Antiderivative was successfully verified.

```
[In] Integrate[((d + e*x^2)^2*(a + b*ArcCsch[c*x]))/x^4,x]
```

```
[Out] (b*c*d*Sqrt[1 + 1/(c^2*x^2)]*x*(d - 2*c^2*d*x^2 + 18*e*x^2) - 3*a*(d^2 + 6*
d*e*x^2 - 3*e^2*x^4))/(9*x^3) - (b*(d^2 + 6*d*e*x^2 - 3*e^2*x^4)*ArcCsch[c*
x])/(3*x^3) + (b*e^2*Log[(1 + Sqrt[1 + 1/(c^2*x^2)])*x])/c
```

**fricas [B]** time = 0.92, size = 334, normalized size = 2.04

$$9\,ace^2x^4 - 9\,be^2x^3\log\left(cx\sqrt{\frac{c^2x^2+1}{c^2x^2}}-cx\right) - 18\,acdex^2 - 3\left(bcd^2+6\,bcde-3\,bce^2\right)x^3\log\left(cx\sqrt{\frac{c^2x^2+1}{c^2x^2}}-cx+1\right)+3$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((e*x^2+d)^2*(a+b*arccsch(c*x))/x^4,x, algorithm="fricas")
```

```
[Out] 1/9*(9*a*c*e^2*x^4 - 9*b*e^2*x^3*log(c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) - c*
x) - 18*a*c*d*e*x^2 - 3*(b*c*d^2 + 6*b*c*d*e - 3*b*c*e^2)*x^3*log(c*x*sqrt(
(c^2*x^2 + 1)/(c^2*x^2)) - c*x + 1) + 3*(b*c*d^2 + 6*b*c*d*e - 3*b*c*e^2)*x
^3*log(c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) - c*x - 1) - 3*a*c*d^2 - 2*(b*c^4*
d^2 - 9*b*c^2*d*e)*x^3 + 3*(3*b*c*e^2*x^4 - 6*b*c*d*e*x^2 - b*c*d^2 + (b*c*
d^2 + 6*b*c*d*e - 3*b*c*e^2)*x^3)*log((c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) +
1)/(c*x)) + (b*c^2*d^2*x - 2*(b*c^4*d^2 - 9*b*c^2*d*e)*x^3)*sqrt((c^2*x^2 +
 1)/(c^2*x^2)))/(c*x^3)
```

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

$$\int \frac{\left(ex^2 + d\right)^2 (b \operatorname{arcsch}(cx) + a)}{x^4}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((e*x^2+d)^2*(a+b*arccsch(c*x))/x^4,x, algorithm="giac")
```

```
[Out] integrate((e*x^2 + d)^2*(b*arccsch(c*x) + a)/x^4, x)
```

**maple** [A] time = 0.06, size = 190, normalized size = 1.16

$$c^3 \left( \frac{a\left(cx\,e^2 - \frac{2cde}{x} - \frac{d^2 c}{3x^3}\right)}{c^4} + \frac{b\left(\operatorname{arccsch}(cx)\,cx\,e^2 - \frac{2\operatorname{arccsch}(cx)cde}{x} - \frac{\operatorname{arccsch}(cx)d^2c}{3x^3} + \frac{\sqrt{c^2x^2+1}\left(-2\sqrt{c^2x^2+1}\,c^6x^2d^2+18c^4de\sqrt{\right.}{9\sqrt{}}\right.}{c^4}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((e*x^2+d)^2*(a+b*arccsch(c*x))/x^4,x)
```

```
[Out] c^3*(a/c^4*(c*x*e^2-2*c*d*e/x-1/3*d^2*c/x^3)+b/c^4*(arccsch(c*x)*c*x*e^2-2*
arccsch(c*x)*c*d*e/x-1/3*arccsch(c*x)*d^2*c/x^3+1/9*(c^2*x^2+1)^(1/2)*(-2*(
c^2*x^2+1)^(1/2)*c^6*x^2*d^2+18*c^4*d*e*(c^2*x^2+1)^(1/2)*x^2+d^2*c^4*(c^2*
x^2+1)^(1/2)+9*e^2*arcsinh(c*x)*c^3*x^3)/((c^2*x^2+1)/c^2/x^2)^(1/2)/c^4/x^
4))
```

**maxima** [A] time = 0.33, size = 152, normalized size = 0.93

$$2\left(c\sqrt{\frac{1}{c^2x^2}+1} - \frac{\operatorname{arcsch}(cx)}{x}\right)bde + ae^2x + \frac{1}{9}\,bd^2\left(\frac{c^4\left(\frac{1}{c^2x^2}+1\right)^{\frac{3}{2}} - 3\,c^4\sqrt{\frac{1}{c^2x^2}+1}}{c} - \frac{3\,\operatorname{arcsch}(cx)}{x^3}\right) + \frac{\left(2\,cx\operatorname{arcsch}(\right.}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((e*x^2+d)^2*(a+b*arccsch(c*x))/x^4,x, algorithm="maxima")
```

```
[Out] 2*(c*sqrt(1/(c^2*x^2) + 1) - arccsch(c*x)/x)*b*d*e + a*e^2*x + 1/9*b*d^2*((
c^4*(1/(c^2*x^2) + 1)^(3/2) - 3*c^4*sqrt(1/(c^2*x^2) + 1))/c - 3*arccsch(c*
x)/x^3) + 1/2*(2*c*x*arccsch(c*x) + log(sqrt(1/(c^2*x^2) + 1) + 1) - log(sq
rt(1/(c^2*x^2) + 1) - 1))*b*e^2/c - 2*a*d*e/x - 1/3*a*d^2/x^3
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.01

$$\int \frac{\left(e\,x^2+d\right)^2\,\left(a+b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)\right)}{x^4}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(((d + e*x^2)^2*(a + b*asinh(1/(c*x))))/x^4,x)
```

```
[Out] int(((d + e*x^2)^2*(a + b*asinh(1/(c*x))))/x^4, x)
```

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

$$\int \frac{(a+b\,\mathrm{acsch}\,(cx))\left(d+ex^2\right)^2}{x^4}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((e*x**2+d)**2*(a+b*acsch(c*x))/x**4,x)
```

```
[Out] Integral((a + b*acsch(c*x))*(d + e*x**2)**2/x**4, x)
```

# 3.92 $\int \frac{(d+ex^2)^2 (a+b\operatorname{csch}^{-1}(cx))}{x^6} \, dx$

**Optimal**. Leaf size=189

$$-\frac{d^2 \left(a+b\operatorname{csch}^{-1}(cx)\right)}{5x^5}-\frac{2de \left(a+b\operatorname{csch}^{-1}(cx)\right)}{3x^3}-\frac{e^2 \left(a+b\operatorname{csch}^{-1}(cx)\right)}{x}+\frac{bcd^2\sqrt{-c^2x^2-1}}{25x^4\sqrt{-c^2x^2}}-\frac{2bcd\sqrt{-c^2x^2-1}\,(6c^2d}{225x^2\sqrt{-c^2x^2}}$$

```
[Out] -1/5*d^2*(a+b*arccsch(c*x))/x^5-2/3*d*e*(a+b*arccsch(c*x))/x^3-e^2*(a+b*arc
csch(c*x))/x+1/225*b*c*(24*c^4*d^2-100*c^2*d*e+225*e^2)*(-c^2*x^2-1)^(1/2)/
(-c^2*x^2)^(1/2)+1/25*b*c*d^2*(-c^2*x^2-1)^(1/2)/x^4/(-c^2*x^2)^(1/2)-2/225
*b*c*d*(6*c^2*d-25*e)*(-c^2*x^2-1)^(1/2)/x^2/(-c^2*x^2)^(1/2)
```

**Rubi [A]** time = 0.16, antiderivative size = 189, normalized size of antiderivative = 1.00, number of steps used = 5, number of rules used = 6, integrand size = 21, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.286, Rules used = {270, 6302, 12, 1265, 453, 264}

$$-\frac{d^2 \left(a+b\operatorname{csch}^{-1}(cx)\right)}{5x^5}-\frac{2de \left(a+b\operatorname{csch}^{-1}(cx)\right)}{3x^3}-\frac{e^2 \left(a+b\operatorname{csch}^{-1}(cx)\right)}{x}+\frac{bc\sqrt{-c^2x^2-1}\,\left(24c^4d^2-100c^2de+225e^2\right.}{225\sqrt{-c^2x^2}}$$

Antiderivative was successfully verified.

```
[In] Int[((d + e*x^2)^2*(a + b*ArcCsch[c*x]))/x^6,x]
```

```
[Out] (b*c*(24*c^4*d^2 - 100*c^2*d*e + 225*e^2)*Sqrt[-1 - c^2*x^2])/(225*Sqrt[-(c
^2*x^2)]) + (b*c*d^2*Sqrt[-1 - c^2*x^2])/(25*x^4*Sqrt[-(c^2*x^2)]) - (2*b*c
*d*(6*c^2*d - 25*e)*Sqrt[-1 - c^2*x^2])/(225*x^2*Sqrt[-(c^2*x^2)]) - (d^2*(
a + b*ArcCsch[c*x]))/(5*x^5) - (2*d*e*(a + b*ArcCsch[c*x]))/(3*x^3) - (e^2*
(a + b*ArcCsch[c*x]))/x
```

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 264

```
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] /; FreeQ[{a, b, c, m, n,
 p}, x] && EqQ[(m + 1)/n + p + 1, 0] && NeQ[m, -1]
```

Rule 270

```
Int[((c_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_.), x_Symbol] :> Int[Exp
andIntegrand[(c*x)^m*(a + b*x^n)^p, x], x] /; FreeQ[{a, b, c, m, n}, x] &&
```

```
IGtQ[p, 0]
```

Rule 453

```
Int[((e_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_.)*((c_) + (d_.)*(x_)^(n
_)), x_Symbol] :> Simp[(c*(e*x)^(m + 1)*(a + b*x^n)^(p + 1))/(a*e*(m + 1)),
 x] + Dist[(a*d*(m + 1) - b*c*(m + n*(p + 1) + 1))/(a*e^n*(m + 1)), Int[(e*
x)^(m + n)*(a + b*x^n)^p, x], x] /; FreeQ[{a, b, c, d, e, p}, x] && NeQ[b*c
 - a*d, 0] && (IntegerQ[n] || GtQ[e, 0]) && ((GtQ[n, 0] && LtQ[m, -1]) || (
LtQ[n, 0] && GtQ[m + n, -1])) &&  !ILtQ[p, -1]
```

Rule 1265

```
Int[((f_.)*(x_))^(m_)*((d_) + (e_.)*(x_)^2)^(q_.)*((a_) + (b_.)*(x_)^2 + (c
_.)*(x_)^4)^(p_.), x_Symbol] :> With[{Qx = PolynomialQuotient[(a + b*x^2 +
c*x^4)^p, f*x, x], R = PolynomialRemainder[(a + b*x^2 + c*x^4)^p, f*x, x]},
 Simp[(R*(f*x)^(m + 1)*(d + e*x^2)^(q + 1))/(d*f*(m + 1)), x] + Dist[1/(d*f
^2*(m + 1)), Int[(f*x)^(m + 2)*(d + e*x^2)^q*ExpandToSum[(d*f*(m + 1)*Qx)/x
 - e*R*(m + 2*q + 3), x], x], x]] /; FreeQ[{a, b, c, d, e, f, q}, x] && NeQ
[b^2 - 4*a*c, 0] && IGtQ[p, 0] && LtQ[m, -1]
```

Rule 6302

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))*((f_.)*(x_))^(m_.)*((d_.) + (e_.)*(
x_)^2)^(p_.), x_Symbol] :> With[{u = IntHide[(f*x)^m*(d + e*x^2)^p, x]}, Di
st[a + b*ArcCsch[c*x], u, x] - Dist[(b*c*x)/Sqrt[-(c^2*x^2)], Int[SimplifyI
ntegrand[u/(x*Sqrt[-1 - c^2*x^2]), x], x], x]] /; FreeQ[{a, b, c, d, e, f,
m, p}, x] && ((IGtQ[p, 0] &&  !(ILtQ[(m - 1)/2, 0] && GtQ[m + 2*p + 3, 0]))
 || (IGtQ[(m + 1)/2, 0] &&  !(ILtQ[p, 0] && GtQ[m + 2*p + 3, 0])) || (ILtQ[
(m + 2*p + 1)/2, 0] &&  !ILtQ[(m - 1)/2, 0]))
```

Rubi steps

$$\int \frac{\left(d+ex^2\right)^2\left(a+b\operatorname{csch}^{-1}(cx)\right)}{x^6}\,dx = -\frac{d^2\left(a+b\operatorname{csch}^{-1}(cx)\right)}{5x^5}-\frac{2de\left(a+b\operatorname{csch}^{-1}(cx)\right)}{3x^3}-\frac{e^2\left(a+b\operatorname{csch}^{-1}(cx)\right)}{x}-$$

$$= -\frac{d^2\left(a+b\operatorname{csch}^{-1}(cx)\right)}{5x^5}-\frac{2de\left(a+b\operatorname{csch}^{-1}(cx)\right)}{3x^3}-\frac{e^2\left(a+b\operatorname{csch}^{-1}(cx)\right)}{x}-$$

$$= \frac{bcd^2\sqrt{-1-c^2x^2}}{25x^4\sqrt{-c^2x^2}}-\frac{d^2\left(a+b\operatorname{csch}^{-1}(cx)\right)}{5x^5}-\frac{2de\left(a+b\operatorname{csch}^{-1}(cx)\right)}{3x^3}-\frac{e^2\left(a\right.}{}$$

$$= \frac{bcd^2\sqrt{-1-c^2x^2}}{25x^4\sqrt{-c^2x^2}}-\frac{2bcd\left(6c^2d-25e\right)\sqrt{-1-c^2x^2}}{225x^2\sqrt{-c^2x^2}}-\frac{d^2\left(a+b\operatorname{csch}^{-1}(cx)\right)}{5x^5}$$

$$= \frac{bc\left(24c^4d^2-100c^2de+225e^2\right)\sqrt{-1-c^2x^2}}{225\sqrt{-c^2x^2}}+\frac{bcd^2\sqrt{-1-c^2x^2}}{25x^4\sqrt{-c^2x^2}}-\frac{2bcd\left(6c\right.}{}$$

**Mathematica [A]** time = 0.22, size = 126, normalized size = 0.67

$$\frac{-15a\left(3d^2+10dex^2+15e^2x^4\right)+bcx\sqrt{\frac{1}{c^2x^2}+1}\left(-50dex^2\left(2c^2x^2-1\right)+3d^2\left(8c^4x^4-4c^2x^2+3\right)+225e^2x^4\right)-15}{225x^5}$$

Antiderivative was successfully verified.

```
[In] Integrate[((d + e*x^2)^2*(a + b*ArcCsch[c*x]))/x^6,x]
```

```
[Out] (-15*a*(3*d^2 + 10*d*e*x^2 + 15*e^2*x^4) + b*c*Sqrt[1 + 1/(c^2*x^2)]*x*(225
*e^2*x^4 - 50*d*e*x^2*(-1 + 2*c^2*x^2) + 3*d^2*(3 - 4*c^2*x^2 + 8*c^4*x^4))
 - 15*b*(3*d^2 + 10*d*e*x^2 + 15*e^2*x^4)*ArcCsch[c*x])/(225*x^5)
```

**fricas [A]** time = 0.63, size = 165, normalized size = 0.87

$$-\frac{225\,ae^2x^4+150\,adex^2+45\,ad^2+15\left(15\,be^2x^4+10\,bdex^2+3\,bd^2\right)\log\left(\frac{cx\sqrt{\frac{c^2x^2+1}{c^2x^2}}+1}{cx}\right)-\left(\left(24\,bc^5d^2-100\,bc^3de\right.\right.}{225\,x^5}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((e*x^2+d)^2*(a+b*arccsch(c*x))/x^6,x, algorithm="fricas")
```

```
[Out] -1/225*(225*a*e^2*x^4 + 150*a*d*e*x^2 + 45*a*d^2 + 15*(15*b*e^2*x^4 + 10*b*
d*e*x^2 + 3*b*d^2)*log((c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) + 1)/(c*x)) - ((2
```

```
4*b*c^5*d^2 - 100*b*c^3*d*e + 225*b*c*e^2)*x^5 + 9*b*c*d^2*x - 2*(6*b*c^3*d
^2 - 25*b*c*d*e)*x^3)*sqrt((c^2*x^2 + 1)/(c^2*x^2)))/x^5
```

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

$$\int \frac{\left(ex^2+d\right)^2 (b \operatorname{arcsch}(cx)+a)}{x^6}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((e*x^2+d)^2*(a+b*arccsch(c*x))/x^6,x, algorithm="giac")
```

```
[Out] integrate((e*x^2 + d)^2*(b*arccsch(c*x) + a)/x^6, x)
```

**maple [A]** time = 0.06, size = 191, normalized size = 1.01

$$c^5\left(\frac{a\left(-\frac{e^2}{cx}-\frac{2de}{3c\,x^3}-\frac{d^2}{5c\,x^5}\right)}{c^4}+\frac{b\left(-\frac{\operatorname{arccsch}(cx)e^2}{cx}-\frac{2\operatorname{arccsch}(cx)de}{3c\,x^3}-\frac{\operatorname{arccsch}(cx)d^2}{5c\,x^5}+\frac{(c^2x^2+1)\left(24c^8d^2x^4-100c^6de\,x^4-12c^6d^2x^2+225c^4e^2\right.}{225\sqrt{\frac{c^2x^2+1}{c^2x^2}}\,c^6x^6}\right.}{c^4}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((e*x^2+d)^2*(a+b*arccsch(c*x))/x^6,x)
```

```
[Out] c^5*(a/c^4*(-e^2/c/x-2/3/c*d*e/x^3-1/5*d^2/c/x^5)+b/c^4*(-arccsch(c*x)*e^2/
c/x-2/3*arccsch(c*x)/c*d*e/x^3-1/5*arccsch(c*x)*d^2/c/x^5+1/225*(c^2*x^2+1)
*(24*c^8*d^2*x^4-100*c^6*d*e*x^4-12*c^6*d^2*x^2+225*c^4*e^2*x^4+50*c^4*d*e*
x^2+9*c^4*d^2)/((c^2*x^2+1)/c^2/x^2)^(1/2)/c^6/x^6))
```

**maxima [A]** time = 0.36, size = 175, normalized size = 0.93

$$\left(c\sqrt{\frac{1}{c^2x^2}+1}-\frac{\operatorname{arcsch}(cx)}{x}\right)be^2+\frac{1}{75}\,bd^2\left(\frac{3\,c^6\left(\frac{1}{c^2x^2}+1\right)^{\frac{5}{2}}-10\,c^6\left(\frac{1}{c^2x^2}+1\right)^{\frac{3}{2}}+15\,c^6\sqrt{\frac{1}{c^2x^2}+1}}{c}-\frac{15\operatorname{arcsch}(cx)}{x^5}\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((e*x^2+d)^2*(a+b*arccsch(c*x))/x^6,x, algorithm="maxima")
```

```
[Out] (c*sqrt(1/(c^2*x^2) + 1) - arccsch(c*x)/x)*b*e^2 + 1/75*b*d^2*((3*c^6*(1/(c
^2*x^2) + 1)^(5/2) - 10*c^6*(1/(c^2*x^2) + 1)^(3/2) + 15*c^6*sqrt(1/(c^2*x^
```

```
2) + 1))/c - 15*arccsch(c*x)/x^5) + 2/9*b*d*e*((c^4*(1/(c^2*x^2) + 1)^(3/2)
 - 3*c^4*sqrt(1/(c^2*x^2) + 1))/c - 3*arccsch(c*x)/x^3) - a*e^2/x - 2/3*a*d
*e/x^3 - 1/5*a*d^2/x^5
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.01

$$\int \frac{\left(e\,x^2+d\right)^2\,\left(a+b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)\right)}{x^6}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(((d + e*x^2)^2*(a + b*asinh(1/(c*x))))/x^6,x)
```

```
[Out] int(((d + e*x^2)^2*(a + b*asinh(1/(c*x))))/x^6, x)
```

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

$$\int \frac{(a+b\,\mathrm{acsch}\,(cx))\left(d+ex^2\right)^2}{x^6}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((e*x**2+d)**2*(a+b*acsch(c*x))/x**6,x)
```

```
[Out] Integral((a + b*acsch(c*x))*(d + e*x**2)**2/x**6, x)
```

## 3.93 $\int \frac{(d+ex^2)^2(a+b\text{csch}^{-1}(cx))}{x^8}\,dx$

**Optimal**. Leaf size=249

$$-\frac{d^2\left(a+b\text{csch}^{-1}(cx)\right)}{7x^7}-\frac{2de\left(a+b\text{csch}^{-1}(cx)\right)}{5x^5}-\frac{e^2\left(a+b\text{csch}^{-1}(cx)\right)}{3x^3}+\frac{bcd^2\sqrt{-c^2x^2-1}}{49x^6\sqrt{-c^2x^2}}-\frac{2bcd\sqrt{-c^2x^2-1}\,\left(15c^2d\right.}{1225x^4\sqrt{-c^2x^2}}$$

```
[Out] -1/7*d^2*(a+b*arccsch(c*x))/x^7-2/5*d*e*(a+b*arccsch(c*x))/x^5-1/3*e^2*(a+b
*arccsch(c*x))/x^3-2/11025*b*c^3*(360*c^4*d^2-1176*c^2*d*e+1225*e^2)*(-c^2*
x^2-1)^(1/2)/(-c^2*x^2)^(1/2)+1/49*b*c*d^2*(-c^2*x^2-1)^(1/2)/x^6/(-c^2*x^2
)^(1/2)-2/1225*b*c*d*(15*c^2*d-49*e)*(-c^2*x^2-1)^(1/2)/x^4/(-c^2*x^2)^(1/2
)+1/11025*b*c*(360*c^4*d^2-1176*c^2*d*e+1225*e^2)*(-c^2*x^2-1)^(1/2)/x^2/(-
c^2*x^2)^(1/2)
```

**Rubi [A]** time = 0.20, antiderivative size = 249, normalized size of antiderivative = 1.00, number of steps used = 6, number of rules used = 7, integrand size = 21, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.333, Rules used = {270, 6302, 12, 1265, 453, 271, 264}

$$-\frac{d^2\left(a+b\text{csch}^{-1}(cx)\right)}{7x^7}-\frac{2de\left(a+b\text{csch}^{-1}(cx)\right)}{5x^5}-\frac{e^2\left(a+b\text{csch}^{-1}(cx)\right)}{3x^3}-\frac{2bc^3\sqrt{-c^2x^2-1}\,\left(360c^4d^2-1176c^2de+12\right.}{11025\sqrt{-c^2x^2}}$$

Antiderivative was successfully verified.

```
[In] Int[((d + e*x^2)^2*(a + b*ArcCsch[c*x]))/x^8,x]
```

```
[Out] (-2*b*c^3*(360*c^4*d^2 - 1176*c^2*d*e + 1225*e^2)*Sqrt[-1 - c^2*x^2])/(1102
5*Sqrt[-(c^2*x^2)]) + (b*c*d^2*Sqrt[-1 - c^2*x^2])/(49*x^6*Sqrt[-(c^2*x^2)]
) - (2*b*c*d*(15*c^2*d - 49*e)*Sqrt[-1 - c^2*x^2])/(1225*x^4*Sqrt[-(c^2*x^2
)]) + (b*c*(360*c^4*d^2 - 1176*c^2*d*e + 1225*e^2)*Sqrt[-1 - c^2*x^2])/(110
25*x^2*Sqrt[-(c^2*x^2)]) - (d^2*(a + b*ArcCsch[c*x]))/(7*x^7) - (2*d*e*(a +
 b*ArcCsch[c*x]))/(5*x^5) - (e^2*(a + b*ArcCsch[c*x]))/(3*x^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 264

```
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] /; FreeQ[{a, b, c, m, n,
 p}, x] && EqQ[(m + 1)/n + p + 1, 0] && NeQ[m, -1]
```

Rule 270

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

Rule 271

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

Rule 453

```
Int[((e_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_.)*((c_) + (d_.)*(x_)^(n
_)), x_Symbol] :> Simp[(c*(e*x)^(m + 1)*(a + b*x^n)^(p + 1))/(a*e*(m + 1)),
 x] + Dist[(a*d*(m + 1) - b*c*(m + n*(p + 1) + 1))/(a*e^n*(m + 1)), Int[(e*
x)^(m + n)*(a + b*x^n)^p, x], x] /; FreeQ[{a, b, c, d, e, p}, x] && NeQ[b*c
 - a*d, 0] && (IntegerQ[n] || GtQ[e, 0]) && ((GtQ[n, 0] && LtQ[m, -1]) || (
LtQ[n, 0] && GtQ[m + n, -1])) &&  !ILtQ[p, -1]
```

Rule 1265

```
Int[((f_.)*(x_))^(m_)*((d_) + (e_.)*(x_)^2)^(q_.)*((a_) + (b_.)*(x_)^2 + (c
_.)*(x_)^4)^(p_.), x_Symbol] :> With[{Qx = PolynomialQuotient[(a + b*x^2 +
c*x^4)^p, f*x, x], R = PolynomialRemainder[(a + b*x^2 + c*x^4)^p, f*x, x]},
 Simp[(R*(f*x)^(m + 1)*(d + e*x^2)^(q + 1))/(d*f*(m + 1)), x] + Dist[1/(d*f
^2*(m + 1)), Int[(f*x)^(m + 2)*(d + e*x^2)^q*ExpandToSum[(d*f*(m + 1)*Qx)/x
 - e*R*(m + 2*q + 3), x], x], x]] /; FreeQ[{a, b, c, d, e, f, q}, x] && NeQ
[b^2 - 4*a*c, 0] && IGtQ[p, 0] && LtQ[m, -1]
```

Rule 6302

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))*((f_.)*(x_))^(m_.)*((d_.) + (e_.)*(
x_)^2)^(p_.), x_Symbol] :> With[{u = IntHide[(f*x)^m*(d + e*x^2)^p, x]}, Di
st[a + b*ArcCsch[c*x], u, x] - Dist[(b*c*x)/Sqrt[-(c^2*x^2)], Int[SimplifyI
ntegrand[u/(x*Sqrt[-1 - c^2*x^2]), x], x], x]] /; FreeQ[{a, b, c, d, e, f,
m, p}, x] && ((IGtQ[p, 0] &&  !(ILtQ[(m - 1)/2, 0] && GtQ[m + 2*p + 3, 0]))
 || (IGtQ[(m + 1)/2, 0] &&  !(ILtQ[p, 0] && GtQ[m + 2*p + 3, 0])) || (ILtQ[
(m + 2*p + 1)/2, 0] &&  !ILtQ[(m - 1)/2, 0]))
```

Rubi steps

$$\int \frac{(d+ex^2)^2\left(a+b\operatorname{csch}^{-1}(cx)\right)}{x^8}\,dx = -\frac{d^2\left(a+b\operatorname{csch}^{-1}(cx)\right)}{7x^7} - \frac{2de\left(a+b\operatorname{csch}^{-1}(cx)\right)}{5x^5} - \frac{e^2\left(a+b\operatorname{csch}^{-1}(cx)\right)}{3x^3} - \cdots$$

$$= -\frac{d^2\left(a+b\operatorname{csch}^{-1}(cx)\right)}{7x^7} - \frac{2de\left(a+b\operatorname{csch}^{-1}(cx)\right)}{5x^5} - \frac{e^2\left(a+b\operatorname{csch}^{-1}(cx)\right)}{3x^3} - \cdots$$

$$= \frac{bcd^2\sqrt{-1-c^2x^2}}{49x^6\sqrt{-c^2x^2}} - \frac{d^2\left(a+b\operatorname{csch}^{-1}(cx)\right)}{7x^7} - \frac{2de\left(a+b\operatorname{csch}^{-1}(cx)\right)}{5x^5} - \frac{e^2\left(a+\cdots\right.}{\cdots}$$

$$= \frac{bcd^2\sqrt{-1-c^2x^2}}{49x^6\sqrt{-c^2x^2}} - \frac{2bcd\left(15c^2d-49e\right)\sqrt{-1-c^2x^2}}{1225x^4\sqrt{-c^2x^2}} - \frac{d^2\left(a+b\operatorname{csch}^{-1}(cx)\right)}{7x^7} \cdots$$

$$= \frac{bcd^2\sqrt{-1-c^2x^2}}{49x^6\sqrt{-c^2x^2}} - \frac{2bcd\left(15c^2d-49e\right)\sqrt{-1-c^2x^2}}{1225x^4\sqrt{-c^2x^2}} + \frac{bc\left(360c^4d^2-1176c^2\cdots\right.}{11025\cdots}$$

$$= -\frac{2bc^3\left(360c^4d^2-1176c^2de+1225e^2\right)\sqrt{-1-c^2x^2}}{11025\sqrt{-c^2x^2}} + \frac{bcd^2\sqrt{-1-c^2x^2}}{49x^6\sqrt{-c^2x^2}} - \frac{2b\cdots}{\cdots}$$

**Mathematica** [A] time = 0.26, size = 152, normalized size = 0.61

$$\frac{-105a\left(15d^2+42dex^2+35e^2x^4\right)+bcx\sqrt{\frac{1}{c^2x^2}+1}\left(1225e^2x^4\left(1-2c^2x^2\right)+294dex^2\left(8c^4x^4-4c^2x^2+3\right)-45d^2\left(16\cdots\right.\right.}{11025x^7}$$

Antiderivative was successfully verified.

```
[In] Integrate[((d + e*x^2)^2*(a + b*ArcCsch[c*x]))/x^8,x]
```

```
[Out] (-105*a*(15*d^2 + 42*d*e*x^2 + 35*e^2*x^4) + b*c*Sqrt[1 + 1/(c^2*x^2)]*x*(1
225*e^2*x^4*(1 - 2*c^2*x^2) + 294*d*e*x^2*(3 - 4*c^2*x^2 + 8*c^4*x^4) - 45*
d^2*(-5 + 6*c^2*x^2 - 8*c^4*x^4 + 16*c^6*x^6)) - 105*b*(15*d^2 + 42*d*e*x^2
 + 35*e^2*x^4)*ArcCsch[c*x])/(11025*x^7)
```

**fricas** [A] time = 1.01, size = 197, normalized size = 0.79

$$-\frac{3675\,ae^2x^4+4410\,adex^2+1575\,ad^2+105\left(35\,be^2x^4+42\,bdex^2+15\,bd^2\right)\log\left(\frac{cx\sqrt{\frac{c^2x^2+1}{c^2x^2}}+1}{cx}\right)+\left(2\left(360\,bc^7d^2-1\cdots\right.\right.}{1\cdots}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((e*x^2+d)^2*(a+b*arccsch(c*x))/x^8,x, algorithm="fricas")
```

```
[Out] -1/11025*(3675*a*e^2*x^4 + 4410*a*d*e*x^2 + 1575*a*d^2 + 105*(35*b*e^2*x^4
+ 42*b*d*e*x^2 + 15*b*d^2)*log((c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) + 1)/(c*x
)) + (2*(360*b*c^7*d^2 - 1176*b*c^5*d*e + 1225*b*c^3*e^2)*x^7 - (360*b*c^5*
d^2 - 1176*b*c^3*d*e + 1225*b*c*e^2)*x^5 - 225*b*c*d^2*x + 18*(15*b*c^3*d^2
 - 49*b*c*d*e)*x^3)*sqrt((c^2*x^2 + 1)/(c^2*x^2)))/x^7
```

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

$$\int \frac{\left(ex^2+d\right)^2 (b\,\mathrm{arcsch}\,(cx)+a)}{x^8}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((e*x^2+d)^2*(a+b*arccsch(c*x))/x^8,x, algorithm="giac")
```

```
[Out] integrate((e*x^2 + d)^2*(b*arccsch(c*x) + a)/x^8, x)
```

**maple [A]** time = 0.06, size = 223, normalized size = 0.90

$$c^7\left(\frac{a\left(-\frac{e^2}{3c^3x^3}-\frac{d^2}{7c^3x^7}-\frac{2de}{5c^3x^5}\right)}{c^4}+\frac{b\left(-\frac{\mathrm{arccsch}(cx)e^2}{3c^3x^3}-\frac{\mathrm{arccsch}(cx)d^2}{7c^3x^7}-\frac{2\,\mathrm{arccsch}(cx)de}{5c^3x^5}-\frac{\left(c^2x^2+1\right)\left(720c^{10}d^2x^6-2352c^8de\,x^6-360c^8d^2x\right.}{}\right.}{c^4}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((e*x^2+d)^2*(a+b*arccsch(c*x))/x^8,x)
```

```
[Out] c^7*(a/c^4*(-1/3*e^2/c^3/x^3-1/7*d^2/c^3/x^7-2/5/c^3*d*e/x^5)+b/c^4*(-1/3*a
rccsch(c*x)*e^2/c^3/x^3-1/7*arccsch(c*x)*d^2/c^3/x^7-2/5*arccsch(c*x)/c^3*d
*e/x^5-1/11025*(c^2*x^2+1)*(720*c^10*d^2*x^6-2352*c^8*d*e*x^6-360*c^8*d^2*x
^4+2450*c^6*e^2*x^6+1176*c^6*d*e*x^4+270*c^6*d^2*x^2-1225*c^4*e^2*x^4-882*c
^4*d*e*x^2-225*c^4*d^2)/((c^2*x^2+1)/c^2/x^2)^(1/2)/c^8/x^8))
```

**maxima [A]** time = 0.45, size = 232, normalized size = 0.93

$$\frac{1}{245}\,bd^2\left(\frac{5\,c^8\left(\frac{1}{c^2x^2}+1\right)^{\frac{7}{2}}-21\,c^8\left(\frac{1}{c^2x^2}+1\right)^{\frac{5}{2}}+35\,c^8\left(\frac{1}{c^2x^2}+1\right)^{\frac{3}{2}}-35\,c^8\sqrt{\frac{1}{c^2x^2}+1}}{c}-\frac{35\,\mathrm{arcsch}\,(cx)}{x^7}\right)+\frac{2}{75}\,bde\left(\frac{3\,c^{6}}{}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((e*x^2+d)^2*(a+b*arccsch(c*x))/x^8,x, algorithm="maxima")
```

```
[Out] 1/245*b*d^2*((5*c^8*(1/(c^2*x^2) + 1)^(7/2) - 21*c^8*(1/(c^2*x^2) + 1)^(5/2
) + 35*c^8*(1/(c^2*x^2) + 1)^(3/2) - 35*c^8*sqrt(1/(c^2*x^2) + 1))/c - 35*a
rccsch(c*x)/x^7) + 2/75*b*d*e*((3*c^6*(1/(c^2*x^2) + 1)^(5/2) - 10*c^6*(1/(
c^2*x^2) + 1)^(3/2) + 15*c^6*sqrt(1/(c^2*x^2) + 1))/c - 15*arccsch(c*x)/x^5
) + 1/9*b*e^2*((c^4*(1/(c^2*x^2) + 1)^(3/2) - 3*c^4*sqrt(1/(c^2*x^2) + 1))/
c - 3*arccsch(c*x)/x^3) - 1/3*a*e^2/x^3 - 2/5*a*d*e/x^5 - 1/7*a*d^2/x^7
```

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

$$\int \frac{\left(e\,x^2+d\right)^2\,\left(a+b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)\right)}{x^8}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(((d + e*x^2)^2*(a + b*asinh(1/(c*x))))/x^8,x)
```

```
[Out] int(((d + e*x^2)^2*(a + b*asinh(1/(c*x))))/x^8, x)
```

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

$$\int \frac{\left(a + b \operatorname{acsch}{\left(cx \right)}\right) \left(d + ex^{2}\right)^{2}}{x^{8}}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((e*x**2+d)**2*(a+b*acsch(c*x))/x**8,x)
```

```
[Out] Integral((a + b*acsch(c*x))*(d + e*x**2)**2/x**8, x)
```

# 3.94 $\int x^3 \left(d+ex^2\right)^2 \left(a+b\,\mathbf{csch}^{-1}(cx)\right)\,dx$

**Optimal**. Leaf size=250

$$\frac{1}{4}d^2x^4\left(a+b\text{csch}^{-1}(cx)\right)+\frac{1}{3}dex^6\left(a+b\text{csch}^{-1}(cx)\right)+\frac{1}{8}e^2x^8\left(a+b\text{csch}^{-1}(cx)\right)+\frac{bex\left(-c^2x^2-1\right)^{5/2}\left(8c^2d-9e\right)}{120c^7\sqrt{-c^2x^2}}-b$$

```
[Out] 1/4*d^2*x^4*(a+b*arccsch(c*x))+1/3*d*e*x^6*(a+b*arccsch(c*x))+1/8*e^2*x^8*(
a+b*arccsch(c*x))-1/72*b*(6*c^4*d^2-16*c^2*d*e+9*e^2)*x*(-c^2*x^2-1)^(3/2)/
c^7/(-c^2*x^2)^(1/2)+1/120*b*(8*c^2*d-9*e)*e*x*(-c^2*x^2-1)^(5/2)/c^7/(-c^2
*x^2)^(1/2)-1/56*b*e^2*x*(-c^2*x^2-1)^(7/2)/c^7/(-c^2*x^2)^(1/2)-1/24*b*(6*
c^4*d^2-8*c^2*d*e+3*e^2)*x*(-c^2*x^2-1)^(1/2)/c^7/(-c^2*x^2)^(1/2)
```

**Rubi [A]** time = 0.23, antiderivative size = 250, normalized size of antiderivative = 1.00, number of steps used = 5, number of rules used = 6, integrand size = 21, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.286, Rules used = {266, 43, 6302, 12, 1251, 771}

$$\frac{1}{4}d^2x^4\left(a+b\text{csch}^{-1}(cx)\right)+\frac{1}{3}dex^6\left(a+b\text{csch}^{-1}(cx)\right)+\frac{1}{8}e^2x^8\left(a+b\text{csch}^{-1}(cx)\right)-\frac{bx\left(-c^2x^2-1\right)^{3/2}\left(6c^4d^2-16c^2de\right.}{72c^7\sqrt{-c^2x^2}}$$

Antiderivative was successfully verified.

```
[In] Int[x^3*(d + e*x^2)^2*(a + b*ArcCsch[c*x]),x]
```

```
[Out] -(b*(6*c^4*d^2 - 8*c^2*d*e + 3*e^2)*x*Sqrt[-1 - c^2*x^2])/(24*c^7*Sqrt[-(c^
2*x^2)]) - (b*(6*c^4*d^2 - 16*c^2*d*e + 9*e^2)*x*(-1 - c^2*x^2)^(3/2))/(72*
c^7*Sqrt[-(c^2*x^2)]) + (b*(8*c^2*d - 9*e)*e*x*(-1 - c^2*x^2)^(5/2))/(120*c
^7*Sqrt[-(c^2*x^2)]) - (b*e^2*x*(-1 - c^2*x^2)^(7/2))/(56*c^7*Sqrt[-(c^2*x^
2)]) + (d^2*x^4*(a + b*ArcCsch[c*x]))/4 + (d*e*x^6*(a + b*ArcCsch[c*x]))/3
+ (e^2*x^8*(a + b*ArcCsch[c*x]))/8
```

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 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 771

```
Int[((d_.) + (e_.)*(x_))^(m_.)*((f_.) + (g_.)*(x_))*((a_.) + (b_.)*(x_) + (
c_.)*(x_)^2)^(p_.), x_Symbol] :> Int[ExpandIntegrand[(d + e*x)^m*(f + g*x)*
(a + b*x + c*x^2)^p, x], x] /; FreeQ[{a, b, c, d, e, f, g, m}, x] && NeQ[b^
2 - 4*a*c, 0] && IntegerQ[p] && (GtQ[p, 0] || (EqQ[a, 0] && IntegerQ[m]))
```

Rule 1251

```
Int[(x_)^(m_.)*((d_) + (e_.)*(x_)^2)^(q_.)*((a_) + (b_.)*(x_)^2 + (c_.)*(x_
)^4)^(p_.), x_Symbol] :> Dist[1/2, Subst[Int[x^((m - 1)/2)*(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] && Inte
gerQ[(m - 1)/2]
```

Rule 6302

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))*((f_.)*(x_))^(m_.)*((d_.) + (e_.)*(
x_)^2)^(p_.), x_Symbol] :> With[{u = IntHide[(f*x)^m*(d + e*x^2)^p, x]}, Di
st[a + b*ArcCsch[c*x], u, x] - Dist[(b*c*x)/Sqrt[-(c^2*x^2)], Int[SimplifyI
ntegrand[u/(x*Sqrt[-1 - c^2*x^2]), x], x], x]] /; FreeQ[{a, b, c, d, e, f,
m, p}, x] && ((IGtQ[p, 0] &&  !(ILtQ[(m - 1)/2, 0] && GtQ[m + 2*p + 3, 0]))
 || (IGtQ[(m + 1)/2, 0] &&  !(ILtQ[p, 0] && GtQ[m + 2*p + 3, 0])) || (ILtQ[
(m + 2*p + 1)/2, 0] &&  !ILtQ[(m - 1)/2, 0]))
```

Rubi steps

$$\int x^3\left(d+ex^2\right)^2\left(a+b\text{csch}^{-1}(cx)\right)\,dx=\frac{1}{4}d^2x^4\left(a+b\text{csch}^{-1}(cx)\right)+\frac{1}{3}dex^6\left(a+b\text{csch}^{-1}(cx)\right)+\frac{1}{8}e^2x^8\left(a+b\text{csc}\right.$$

$$=\frac{1}{4}d^2x^4\left(a+b\text{csch}^{-1}(cx)\right)+\frac{1}{3}dex^6\left(a+b\text{csch}^{-1}(cx)\right)+\frac{1}{8}e^2x^8\left(a+b\text{csc}\right.$$

$$=\frac{1}{4}d^2x^4\left(a+b\text{csch}^{-1}(cx)\right)+\frac{1}{3}dex^6\left(a+b\text{csch}^{-1}(cx)\right)+\frac{1}{8}e^2x^8\left(a+b\text{csc}\right.$$

$$=\frac{1}{4}d^2x^4\left(a+b\text{csch}^{-1}(cx)\right)+\frac{1}{3}dex^6\left(a+b\text{csch}^{-1}(cx)\right)+\frac{1}{8}e^2x^8\left(a+b\text{csc}\right.$$

$$=-\frac{b\left(6c^4d^2-8c^2de+3e^2\right)x\sqrt{-1-c^2x^2}}{24c^7\sqrt{-c^2x^2}}-\frac{b\left(6c^4d^2-16c^2de+9e^2\right)x\left(-\right.}{72c^7\sqrt{-c^2x^2}}$$

**Mathematica** [A] time = 0.39, size = 159, normalized size = 0.64

$$\frac{x\left(105ax^3\left(6d^2+8dex^2+3e^2x^4\right)+\frac{b\sqrt{\frac{1}{c^2x^2}+1}\left(3c^6\left(70d^2x^2+56dex^4+15e^2x^6\right)-2c^4\left(210d^2+112dex^2+27e^2x^4\right)+8c^2e\left(56d+9ex^2\right)-144e^2\right)}{c^7}+\right.}{2520}$$

Antiderivative was successfully verified.

```
[In] Integrate[x^3*(d + e*x^2)^2*(a + b*ArcCsch[c*x]),x]
```

```
[Out] (x*(105*a*x^3*(6*d^2 + 8*d*e*x^2 + 3*e^2*x^4) + (b*Sqrt[1 + 1/(c^2*x^2)]*(-
144*e^2 + 8*c^2*e*(56*d + 9*e*x^2) - 2*c^4*(210*d^2 + 112*d*e*x^2 + 27*e^2*
x^4) + 3*c^6*(70*d^2*x^2 + 56*d*e*x^4 + 15*e^2*x^6)))/c^7 + 105*b*x^3*(6*d^
2 + 8*d*e*x^2 + 3*e^2*x^4)*ArcCsch[c*x]))/2520
```

**fricas** [A] time = 1.25, size = 224, normalized size = 0.90

$$\frac{315\,ac^7e^2x^8+840\,ac^7dex^6+630\,ac^7d^2x^4+105\left(3\,bc^7e^2x^8+8\,bc^7dex^6+6\,bc^7d^2x^4\right)\log\left(\frac{cx\sqrt{\frac{c^2x^2+1}{c^2x^2}}+1}{cx}\right)+\left(45\,bc^6\right.}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^3*(e*x^2+d)^2*(a+b*arccsch(c*x)),x, algorithm="fricas")
```

```
[Out] 1/2520*(315*a*c^7*e^2*x^8 + 840*a*c^7*d*e*x^6 + 630*a*c^7*d^2*x^4 + 105*(3*
b*c^7*e^2*x^8 + 8*b*c^7*d*e*x^6 + 6*b*c^7*d^2*x^4)*log((c*x*sqrt((c^2*x^2 +
 1)/(c^2*x^2)) + 1)/(c*x)) + (45*b*c^6*e^2*x^7 + 6*(28*b*c^6*d*e - 9*b*c^4*
e^2)*x^5 + 2*(105*b*c^6*d^2 - 112*b*c^4*d*e + 36*b*c^2*e^2)*x^3 - 4*(105*b*
c^4*d^2 - 112*b*c^2*d*e + 36*b*e^2)*x)*sqrt((c^2*x^2 + 1)/(c^2*x^2)))/c^7
```

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

$$\int \left(ex^2+d\right)^2 (b\,\mathrm{arcsch}\,(cx)+a)x^3\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^3*(e*x^2+d)^2*(a+b*arccsch(c*x)),x, algorithm="giac")
```

```
[Out] integrate((e*x^2 + d)^2*(b*arccsch(c*x) + a)*x^3, x)
```

**maple [A]** time = 0.05, size = 214, normalized size = 0.86

$$\frac{\frac{a\left(\frac{1}{8}e^2c^8x^8+\frac{1}{3}c^8de\,x^6+\frac{1}{4}c^8d^2x^4\right)}{c^4}+\frac{b\left(\frac{\mathrm{arccsch}(cx)e^2c^8x^8}{8}+\frac{\mathrm{arccsch}(cx)c^8de\,x^6}{3}+\frac{\mathrm{arccsch}(cx)c^8x^4d^2}{4}+\frac{\left(c^2x^2+1\right)\left(45c^6e^2x^6+168c^6de\,x^4+210c^6d^2x^2-54c^4e^2x^4-224c^4de\,x^2-\right.}{2520\sqrt{\frac{c^2x^2+1}{c^2x^2}}\,cx}\right.}{c^4}}{c^4}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^3*(e*x^2+d)^2*(a+b*arccsch(c*x)),x)
```

```
[Out] 1/c^4*(a/c^4*(1/8*e^2*c^8*x^8+1/3*c^8*d*e*x^6+1/4*c^8*d^2*x^4)+b/c^4*(1/8*a
rccsch(c*x)*e^2*c^8*x^8+1/3*arccsch(c*x)*c^8*d*e*x^6+1/4*arccsch(c*x)*c^8*x
^4*d^2+1/2520*(c^2*x^2+1)*(45*c^6*e^2*x^6+168*c^6*d*e*x^4+210*c^6*d^2*x^2-5
4*c^4*e^2*x^4-224*c^4*d*e*x^2-420*c^4*d^2+72*c^2*e^2*x^2+448*c^2*d*e-144*e^
2)/((c^2*x^2+1)/c^2/x^2)^(1/2)/c/x))
```

**maxima [A]** time = 0.37, size = 244, normalized size = 0.98

$$\frac{1}{8}ae^2x^8+\frac{1}{3}adex^6+\frac{1}{4}ad^2x^4+\frac{1}{12}\left(3\,x^4\,\mathrm{arcsch}\,(cx)+\frac{c^2x^3\left(\frac{1}{c^2x^2}+1\right)^{\frac{3}{2}}-3\,x\sqrt{\frac{1}{c^2x^2}+1}}{c^3}\right)bd^2+\frac{1}{45}\left(15\,x^6\,\mathrm{arcsch}\,(cx)+\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^3*(e*x^2+d)^2*(a+b*arccsch(c*x)),x, algorithm="maxima")
```

```
[Out] 1/8*a*e^2*x^8 + 1/3*a*d*e*x^6 + 1/4*a*d^2*x^4 + 1/12*(3*x^4*arccsch(c*x) +
(c^2*x^3*(1/(c^2*x^2) + 1)^(3/2) - 3*x*sqrt(1/(c^2*x^2) + 1))/c^3)*b*d^2 +
1/45*(15*x^6*arccsch(c*x) + (3*c^4*x^5*(1/(c^2*x^2) + 1)^(5/2) - 10*c^2*x^3
*(1/(c^2*x^2) + 1)^(3/2) + 15*x*sqrt(1/(c^2*x^2) + 1))/c^5)*b*d*e + 1/280*(
35*x^8*arccsch(c*x) + (5*c^6*x^7*(1/(c^2*x^2) + 1)^(7/2) - 21*c^4*x^5*(1/(c
^2*x^2) + 1)^(5/2) + 35*c^2*x^3*(1/(c^2*x^2) + 1)^(3/2) - 35*x*sqrt(1/(c^2*
x^2) + 1))/c^7)*b*e^2
```

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

$$\int x^3\left(e\,x^2+d\right)^2\left(a+b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^3*(d + e*x^2)^2*(a + b*asinh(1/(c*x))),x)
```

```
[Out] int(x^3*(d + e*x^2)^2*(a + b*asinh(1/(c*x))), x)
```

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

$$\int x^{3}\left(a+b\,\mathrm{acsch}\,(cx)\right)\left(d+ex^{2}\right)^{2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**3*(e*x**2+d)**2*(a+b*acsch(c*x)),x)
```

```
[Out] Integral(x**3*(a + b*acsch(c*x))*(d + e*x**2)**2, x)
```

## 3.95 $\int x \left(d+ex^2\right)^2 \left(a+b\,\mathbf{csch}^{-1}(cx)\right)\,dx$

**Optimal**. Leaf size=203

$$\frac{\left(d+ex^2\right)^3\left(a+b\,\text{csch}^{-1}(cx)\right)}{6e}-\frac{bcd^3x\tan^{-1}\left(\sqrt{-c^2x^2-1}\right)}{6e\sqrt{-c^2x^2}}-\frac{bex\left(-c^2x^2-1\right)^{3/2}\left(3c^2d-2e\right)}{18c^5\sqrt{-c^2x^2}}+\frac{be^2x\left(-c^2x^2-1\right)^{5/2}}{30c^5\sqrt{-c^2x^2}}+$$

```
[Out] 1/6*(e*x^2+d)^3*(a+b*arccsch(c*x))/e-1/18*b*(3*c^2*d-2*e)*e*x*(-c^2*x^2-1)^
(3/2)/c^5/(-c^2*x^2)^(1/2)+1/30*b*e^2*x*(-c^2*x^2-1)^(5/2)/c^5/(-c^2*x^2)^(
1/2)-1/6*b*c*d^3*x*arctan((-c^2*x^2-1)^(1/2))/e/(-c^2*x^2)^(1/2)+1/6*b*(3*c
^4*d^2-3*c^2*d*e+e^2)*x*(-c^2*x^2-1)^(1/2)/c^5/(-c^2*x^2)^(1/2)
```

**Rubi [A]** time = 0.16, antiderivative size = 203, normalized size of antiderivative = 1.00, number of steps used = 6, number of rules used = 5, integrand size = 19, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.263, Rules used = {6300, 446, 88, 63, 205}

$$\frac{\left(d+ex^2\right)^3\left(a+b\,\text{csch}^{-1}(cx)\right)}{6e}+\frac{bx\sqrt{-c^2x^2-1}\left(3c^4d^2-3c^2de+e^2\right)}{6c^5\sqrt{-c^2x^2}}-\frac{bcd^3x\tan^{-1}\left(\sqrt{-c^2x^2-1}\right)}{6e\sqrt{-c^2x^2}}-\frac{bex\left(-c^2x^2-1\right)^{3/2}}{18c^5\sqrt{-c^2x^2}}$$

Antiderivative was successfully verified.

```
[In] Int[x*(d + e*x^2)^2*(a + b*ArcCsch[c*x]),x]
```

```
[Out] (b*(3*c^4*d^2 - 3*c^2*d*e + e^2)*x*Sqrt[-1 - c^2*x^2])/(6*c^5*Sqrt[-(c^2*x^
2)]) - (b*(3*c^2*d - 2*e)*e*x*(-1 - c^2*x^2)^(3/2))/(18*c^5*Sqrt[-(c^2*x^2)
]) + (b*e^2*x*(-1 - c^2*x^2)^(5/2))/(30*c^5*Sqrt[-(c^2*x^2)]) + ((d + e*x^2
)^3*(a + b*ArcCsch[c*x]))/(6*e) - (b*c*d^3*x*ArcTan[Sqrt[-1 - c^2*x^2]])/(6
*e*Sqrt[-(c^2*x^2)])
```

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 88

```
Int[((a_.) + (b_.)*(x_))^(m_.)*((c_.) + (d_.)*(x_))^(n_.)*((e_.) + (f_.)*(x
_))^(p_.), x_Symbol] :> Int[ExpandIntegrand[(a + b*x)^m*(c + d*x)^n*(e + f*
x)^p, x], x] /; FreeQ[{a, b, c, d, e, f, p}, x] && IntegersQ[m, n] && (Inte
gerQ[p] || (GtQ[m, 0] && GeQ[n, -1]))
```

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 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 6300

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))*(x_)*((d_.) + (e_.)*(x_)^2)^(p_.),
x_Symbol] :> Simp[((d + e*x^2)^(p + 1)*(a + b*ArcCsch[c*x]))/(2*e*(p + 1)),
 x] - Dist[(b*c*x)/(2*e*(p + 1)*Sqrt[-(c^2*x^2)]), Int[(d + e*x^2)^(p + 1)/
(x*Sqrt[-1 - c^2*x^2]), x], x] /; FreeQ[{a, b, c, d, e, p}, x] && NeQ[p, -1
]
```

Rubi steps

$$\int x\left(d+ex^2\right)^2\left(a+b\text{csch}^{-1}(cx)\right)dx=\frac{\left(d+ex^2\right)^3\left(a+b\text{csch}^{-1}(cx)\right)}{6e}-\frac{(bcx)\int\frac{\left(d+ex^2\right)^3}{x\sqrt{-1-c^2x^2}}\,dx}{6e\sqrt{-c^2x^2}}$$

$$=\frac{\left(d+ex^2\right)^3\left(a+b\text{csch}^{-1}(cx)\right)}{6e}-\frac{(bcx)\,\text{Subst}\left(\int\frac{(d+ex)^3}{x\sqrt{-1-c^2x}}\,dx,x,x^2\right)}{12e\sqrt{-c^2x^2}}$$

$$=\frac{\left(d+ex^2\right)^3\left(a+b\text{csch}^{-1}(cx)\right)}{6e}-\frac{(bcx)\,\text{Subst}\left(\int\left(\frac{e\left(3c^4d^2-3c^2de+e^2\right)}{c^4\sqrt{-1-c^2x}}+\frac{d^3}{x\sqrt{-1-c}}\right.\right.}{12}$$

$$=\frac{b\left(3c^4d^2-3c^2de+e^2\right)x\sqrt{-1-c^2x^2}}{6c^5\sqrt{-c^2x^2}}-\frac{b\left(3c^2d-2e\right)ex\left(-1-c^2x^2\right)^{3/2}}{18c^5\sqrt{-c^2x^2}}+$$

$$=\frac{b\left(3c^4d^2-3c^2de+e^2\right)x\sqrt{-1-c^2x^2}}{6c^5\sqrt{-c^2x^2}}-\frac{b\left(3c^2d-2e\right)ex\left(-1-c^2x^2\right)^{3/2}}{18c^5\sqrt{-c^2x^2}}+$$

$$=\frac{b\left(3c^4d^2-3c^2de+e^2\right)x\sqrt{-1-c^2x^2}}{6c^5\sqrt{-c^2x^2}}-\frac{b\left(3c^2d-2e\right)ex\left(-1-c^2x^2\right)^{3/2}}{18c^5\sqrt{-c^2x^2}}+$$

**Mathematica** [A] time = 0.31, size = 123, normalized size = 0.61

$$\frac{1}{90}x\left(15ax\left(3d^2+3dex^2+e^2x^4\right)+\frac{b\sqrt{\frac{1}{c^2x^2}+1}\left(3c^4\left(15d^2+5dex^2+e^2x^4\right)-2c^2e\left(15d+2ex^2\right)+8e^2\right)}{c^5}+15bx\text{csch}\right.$$

Antiderivative was successfully verified.

```
[In] Integrate[x*(d + e*x^2)^2*(a + b*ArcCsch[c*x]),x]
```

```
[Out] (x*(15*a*x*(3*d^2 + 3*d*e*x^2 + e^2*x^4) + (b*Sqrt[1 + 1/(c^2*x^2)]*(8*e^2
- 2*c^2*e*(15*d + 2*e*x^2) + 3*c^4*(15*d^2 + 5*d*e*x^2 + e^2*x^4)))/c^5 + 1
5*b*x*(3*d^2 + 3*d*e*x^2 + e^2*x^4)*ArcCsch[c*x]))/90
```

**fricas** [A] time = 1.16, size = 189, normalized size = 0.93

$$\frac{15\,ac^5e^2x^6+45\,ac^5dex^4+45\,ac^5d^2x^2+15\left(bc^5e^2x^6+3\,bc^5dex^4+3\,bc^5d^2x^2\right)\log\left(\frac{cx\sqrt{\frac{c^2x^2+1}{c^2x^2}}+1}{cx}\right)+\left(3\,bc^4e^2x^5+(15\right.}{90\,c^5}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*(e*x^2+d)^2*(a+b*arccsch(c*x)),x, algorithm="fricas")
```

```
[Out] 1/90*(15*a*c^5*e^2*x^6 + 45*a*c^5*d*e*x^4 + 45*a*c^5*d^2*x^2 + 15*(b*c^5*e^
2*x^6 + 3*b*c^5*d*e*x^4 + 3*b*c^5*d^2*x^2)*log((c*x*sqrt((c^2*x^2 + 1)/(c^2
*x^2)) + 1)/(c*x)) + (3*b*c^4*e^2*x^5 + (15*b*c^4*d*e - 4*b*c^2*e^2)*x^3 +
(45*b*c^4*d^2 - 30*b*c^2*d*e + 8*b*e^2)*x)*sqrt((c^2*x^2 + 1)/(c^2*x^2)))/c
^5
```

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

$$\int\left(ex^2+d\right)^2\left(b\,\text{arcsch}\left(cx\right)+a\right)x\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*(e*x^2+d)^2*(a+b*arccsch(c*x)),x, algorithm="giac")
```

```
[Out] integrate((e*x^2 + d)^2*(b*arccsch(c*x) + a)*x, x)
```

**maple** [A] time = 0.05, size = 182, normalized size = 0.90

$$\frac{\frac{a\left(\frac{1}{6}c^6e^2x^6+\frac{1}{2}c^6de\,x^4+\frac{1}{2}c^6d^2x^2\right)}{c^4}+\frac{b\left(\frac{\text{arccsch}(cx)e^2c^6x^6}{6}+\frac{\text{arccsch}(cx)c^6de\,x^4}{2}+\frac{\text{arccsch}(cx)c^6x^2d^2}{2}+\frac{\left(c^2x^2+1\right)\left(3c^4e^2x^4+15c^4de\,x^2+45d^2c^4-4c^2e^2x^2-30c^2de+8e^2\right)}{90\sqrt{\frac{c^2x^2+1}{c^2x^2}}\,cx}\right)}{c^4}}{c^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x*(e*x^2+d)^2*(a+b*arccsch(c*x)),x)
```

```
[Out] 1/c^2*(a/c^4*(1/6*c^6*e^2*x^6+1/2*c^6*d*e*x^4+1/2*c^6*d^2*x^2)+b/c^4*(1/6*a
rccsch(c*x)*e^2*c^6*x^6+1/2*arccsch(c*x)*c^6*d*e*x^4+1/2*arccsch(c*x)*c^6*x
^2*d^2+1/90*(c^2*x^2+1)*(3*c^4*e^2*x^4+15*c^4*d*e*x^2+45*c^4*d^2-4*c^2*e^2*
x^2-30*c^2*d*e+8*e^2)/((c^2*x^2+1)/c^2/x^2)^(1/2)/c/x))
```

**maxima [A]** time = 0.37, size = 183, normalized size = 0.90

$$\frac{1}{6}ae^2x^6+\frac{1}{2}adex^4+\frac{1}{2}ad^2x^2+\frac{1}{2}\left(x^2\operatorname{arcsch}(cx)+\frac{x\sqrt{\frac{1}{c^2x^2}+1}}{c}\right)bd^2+\frac{1}{6}\left(3x^4\operatorname{arcsch}(cx)+\frac{c^2x^3\left(\frac{1}{c^2x^2}+1\right)^{\frac{3}{2}}-3x\sqrt{}}{c^3}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*(e*x^2+d)^2*(a+b*arccsch(c*x)),x, algorithm="maxima")
```

```
[Out] 1/6*a*e^2*x^6 + 1/2*a*d*e*x^4 + 1/2*a*d^2*x^2 + 1/2*(x^2*arccsch(c*x) + x*s
qrt(1/(c^2*x^2) + 1)/c)*b*d^2 + 1/6*(3*x^4*arccsch(c*x) + (c^2*x^3*(1/(c^2*
x^2) + 1)^(3/2) - 3*x*sqrt(1/(c^2*x^2) + 1))/c^3)*b*d*e + 1/90*(15*x^6*arcc
sch(c*x) + (3*c^4*x^5*(1/(c^2*x^2) + 1)^(5/2) - 10*c^2*x^3*(1/(c^2*x^2) + 1
)^(3/2) + 15*x*sqrt(1/(c^2*x^2) + 1))/c^5)*b*e^2
```

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

$$\int x\left(e\,x^2+d\right)^2\left(a+b\,\operatorname{asinh}\left(\frac{1}{c\,x}\right)\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x*(d + e*x^2)^2*(a + b*asinh(1/(c*x))),x)
```

```
[Out] int(x*(d + e*x^2)^2*(a + b*asinh(1/(c*x))), x)
```

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

$$\int x\left(a+b\operatorname{acsch}(cx)\right)\left(d+ex^2\right)^2\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*(e*x**2+d)**2*(a+b*acsch(c*x)),x)
```

```
[Out] Integral(x*(a + b*acsch(c*x))*(d + e*x**2)**2, x)
```

## 3.96 $\int \frac{\left(d+ex^2\right)^2\left(a+b\,\mathrm{csch}^{-1}(cx)\right)}{x}\,dx$

**Optimal**. Leaf size=178

$$-d^2\log\left(\frac{1}{x}\right)\left(a+b\,\mathrm{csch}^{-1}(cx)\right)+dex^2\left(a+b\,\mathrm{csch}^{-1}(cx)\right)+\frac{1}{4}e^2x^4\left(a+b\,\mathrm{csch}^{-1}(cx)\right)+\frac{be^2x^3\sqrt{\frac{1}{c^2x^2}+1}}{12c}+\frac{bex\sqrt{\frac{1}{c^2x^2}+1}}{6c}$$

```
[Out] 1/2*b*d^2*arccsch(c*x)^2+d*e*x^2*(a+b*arccsch(c*x))+1/4*e^2*x^4*(a+b*arccsc
h(c*x))-b*d^2*arccsch(c*x)*ln(1-(1/c/x+(1+1/c^2/x^2)^(1/2))^2)+b*d^2*arccsc
h(c*x)*ln(1/x)-d^2*(a+b*arccsch(c*x))*ln(1/x)-1/2*b*d^2*polylog(2,(1/c/x+(1
+1/c^2/x^2)^(1/2))^2)+1/6*b*(6*c^2*d-e)*e*x*(1+1/c^2/x^2)^(1/2)/c^3+1/12*b*
e^2*x^3*(1+1/c^2/x^2)^(1/2)/c
```

**Rubi** [A] time = 0.42, antiderivative size = 178, normalized size of antiderivative = 1.00, number of steps used = 12, number of rules used = 13, integrand size = 21, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.619, Rules used = {6304, 266, 43, 5789, 6742, 453, 264, 2325, 5659, 3716, 2190, 2279, 2391}

$$-\frac{1}{2}bd^2\text{PolyLog}\left(2,e^{2\mathrm{csch}^{-1}(cx)}\right)-d^2\log\left(\frac{1}{x}\right)\left(a+b\,\mathrm{csch}^{-1}(cx)\right)+dex^2\left(a+b\,\mathrm{csch}^{-1}(cx)\right)+\frac{1}{4}e^2x^4\left(a+b\,\mathrm{csch}^{-1}(cx)\right)+$$

Antiderivative was successfully verified.

```
[In] Int[((d + e*x^2)^2*(a + b*ArcCsch[c*x]))/x,x]
```

```
[Out] (b*(6*c^2*d - e)*e*Sqrt[1 + 1/(c^2*x^2)]*x)/(6*c^3) + (b*e^2*Sqrt[1 + 1/(c^
2*x^2)]*x^3)/(12*c) + (b*d^2*ArcCsch[c*x]^2)/2 + d*e*x^2*(a + b*ArcCsch[c*x
]) + (e^2*x^4*(a + b*ArcCsch[c*x]))/4 - b*d^2*ArcCsch[c*x]*Log[1 - E^(2*Arc
Csch[c*x])] + b*d^2*ArcCsch[c*x]*Log[x^(-1)] - d^2*(a + b*ArcCsch[c*x])*Log
[x^(-1)] - (b*d^2*PolyLog[2, E^(2*ArcCsch[c*x])])/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 264

```
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] /; FreeQ[{a, b, c, m, n,
 p}, x] && EqQ[(m + 1)/n + p + 1, 0] && NeQ[m, -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 453

```
Int[((e_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_.)*((c_) + (d_.)*(x_)^(n
_)), x_Symbol] :> Simp[(c*(e*x)^(m + 1)*(a + b*x^n)^(p + 1))/(a*e*(m + 1)),
 x] + Dist[(a*d*(m + 1) - b*c*(m + n*(p + 1) + 1))/(a*e^n*(m + 1)), Int[(e*
x)^(m + n)*(a + b*x^n)^p, x], x] /; FreeQ[{a, b, c, d, e, p}, x] && NeQ[b*c
 - a*d, 0] && (IntegerQ[n] || GtQ[e, 0]) && ((GtQ[n, 0] && LtQ[m, -1]) || (
LtQ[n, 0] && GtQ[m + n, -1])) &&  !ILtQ[p, -1]
```

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 2325

```
Int[((a_.) + Log[(c_.)*(x_)^(n_.)]*(b_.))/Sqrt[(d_) + (e_.)*(x_)^2], x_Symb
ol] :> Simp[(ArcSinh[(Rt[e, 2]*x)/Sqrt[d]]*(a + b*Log[c*x^n]))/Rt[e, 2], x]
 - Dist[(b*n)/Rt[e, 2], Int[ArcSinh[(Rt[e, 2]*x)/Sqrt[d]]/x, x], x] /; Free
Q[{a, b, c, d, e, n}, x] && GtQ[d, 0] && PosQ[e]
```

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 3716

```
Int[((c_.) + (d_.)*(x_))^(m_.)*tan[(e_.) + Pi*(k_.) + (Complex[0, fz_])*(f_
.)*(x_)], x_Symbol] :> -Simp[(I*(c + d*x)^(m + 1))/(d*(m + 1)), x] + Dist[2
```

```
*I, Int[((c + d*x)^m*E^(2*(-(I*e) + f*fz*x)))/(E^(2*I*k*Pi)*(1 + E^(2*(-(I*
e) + f*fz*x))/E^(2*I*k*Pi))), x], x] /; FreeQ[{c, d, e, f, fz}, x] && Integ
erQ[4*k] && IGtQ[m, 0]
```

Rule 5659

```
Int[((a_.) + ArcSinh[(c_.)*(x_)]*(b_.))^(n_.)/(x_), x_Symbol] :> Subst[Int[
(a + b*x)^n/Tanh[x], x], x, ArcSinh[c*x]] /; FreeQ[{a, b, c}, x] && IGtQ[n,
 0]
```

Rule 5789

```
Int[((a_.) + ArcSinh[(c_.)*(x_)]*(b_.))*((f_.)*(x_))^(m_.)*((d_) + (e_.)*(x
_)^2)^(p_.), x_Symbol] :> With[{u = IntHide[(f*x)^m*(d + e*x^2)^p, x]}, Dis
t[a + b*ArcSinh[c*x], u, x] - Dist[b*c, Int[SimplifyIntegrand[u/Sqrt[1 + c^
2*x^2], x], x], x]] /; FreeQ[{a, b, c, d, e, f, m}, x] && NeQ[e, c^2*d] &&
IntegerQ[p] && (GtQ[p, 0] || (IGtQ[(m - 1)/2, 0] && LeQ[m + p, 0]))
```

Rule 6304

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))^(n_.)*(x_)^(m_.)*((d_.) + (e_.)*(x_
)^2)^(p_.), x_Symbol] :> -Subst[Int[((e + d*x^2)^p*(a + b*ArcSinh[x/c])^n)/
x^(m + 2*(p + 1)), x], x, 1/x] /; FreeQ[{a, b, c, d, e, n}, x] && IGtQ[n, 0
] && IntegersQ[m, p]
```

Rule 6742

```
Int[u_, x_Symbol] :> With[{v = ExpandIntegrand[u, x]}, Int[v, x] /; SumQ[v]
]
```

Rubi steps

$$\int \frac{\left(d+ex^2\right)^2 \left(a+b\text{csch}^{-1}(cx)\right)}{x}\,dx = -\text{Subst}\left(\int \frac{\left(e+dx^2\right)^2 \left(a+b\sinh^{-1}\left(\frac{x}{c}\right)\right)}{x^5}\,dx, x, \frac{1}{x}\right)$$

$$= dex^2 \left(a+b\text{csch}^{-1}(cx)\right) + \frac{1}{4}e^2x^4 \left(a+b\text{csch}^{-1}(cx)\right) - d^2 \left(a+b\text{csch}^{-1}(cx)\right)$$

$$= dex^2 \left(a+b\text{csch}^{-1}(cx)\right) + \frac{1}{4}e^2x^4 \left(a+b\text{csch}^{-1}(cx)\right) - d^2 \left(a+b\text{csch}^{-1}(cx)\right)$$

$$= dex^2 \left(a+b\text{csch}^{-1}(cx)\right) + \frac{1}{4}e^2x^4 \left(a+b\text{csch}^{-1}(cx)\right) - d^2 \left(a+b\text{csch}^{-1}(cx)\right)$$

$$= \frac{be^2\sqrt{1+\frac{1}{c^2x^2}}\,x^3}{12c} + dex^2 \left(a+b\text{csch}^{-1}(cx)\right) + \frac{1}{4}e^2x^4 \left(a+b\text{csch}^{-1}(cx)\right) + bc$$

$$= \frac{b\left(6c^2d-e\right)e\sqrt{1+\frac{1}{c^2x^2}}\,x}{6c^3} + \frac{be^2\sqrt{1+\frac{1}{c^2x^2}}\,x^3}{12c} + dex^2 \left(a+b\text{csch}^{-1}(cx)\right) + \frac{1}{4}$$

$$= \frac{b\left(6c^2d-e\right)e\sqrt{1+\frac{1}{c^2x^2}}\,x}{6c^3} + \frac{be^2\sqrt{1+\frac{1}{c^2x^2}}\,x^3}{12c} + \frac{1}{2}bd^2\text{csch}^{-1}(cx)^2 + dex^2 \left(a\right.$$

$$= \frac{b\left(6c^2d-e\right)e\sqrt{1+\frac{1}{c^2x^2}}\,x}{6c^3} + \frac{be^2\sqrt{1+\frac{1}{c^2x^2}}\,x^3}{12c} + \frac{1}{2}bd^2\text{csch}^{-1}(cx)^2 + dex^2 \left(a\right.$$

$$= \frac{b\left(6c^2d-e\right)e\sqrt{1+\frac{1}{c^2x^2}}\,x}{6c^3} + \frac{be^2\sqrt{1+\frac{1}{c^2x^2}}\,x^3}{12c} + \frac{1}{2}bd^2\text{csch}^{-1}(cx)^2 + dex^2 \left(a\right.$$

$$= \frac{b\left(6c^2d-e\right)e\sqrt{1+\frac{1}{c^2x^2}}\,x}{6c^3} + \frac{be^2\sqrt{1+\frac{1}{c^2x^2}}\,x^3}{12c} + \frac{1}{2}bd^2\text{csch}^{-1}(cx)^2 + dex^2 \left(a\right.$$

**Mathematica [A]** time = 0.42, size = 148, normalized size = 0.83

$$ad^2\log(x)+adex^2+\frac{1}{4}ae^2x^4+\frac{bdex\left(\sqrt{\frac{1}{c^2x^2}+1}+cx\operatorname{csch}^{-1}(cx)\right)}{c}+\frac{be^2x\left(3c^3x^3\operatorname{csch}^{-1}(cx)+\sqrt{\frac{1}{c^2x^2}+1}\left(c^2x^2-2\right)\right)}{12c^3}+$$

Warning: Unable to verify antiderivative.

```
[In] Integrate[((d + e*x^2)^2*(a + b*ArcCsch[c*x]))/x,x]
```

```
[Out] a*d*e*x^2 + (a*e^2*x^4)/4 + (b*d*e*x*(Sqrt[1 + 1/(c^2*x^2)] + c*x*ArcCsch[c
*x]))/c + (b*e^2*x*(Sqrt[1 + 1/(c^2*x^2)]*(-2 + c^2*x^2) + 3*c^3*x^3*ArcCsc
h[c*x]))/(12*c^3) + a*d^2*Log[x] + (b*d^2*(-(ArcCsch[c*x]*(ArcCsch[c*x] + 2
*Log[1 - E^(-2*ArcCsch[c*x])])) + PolyLog[2, E^(-2*ArcCsch[c*x])]))/2
```

**fricas [F]** time = 0.95, size = 0, normalized size = 0.00

$$\mathrm{integral}\left(\frac{ae^2x^4+2\,adex^2+ad^2+\left(be^2x^4+2\,bdex^2+bd^2\right)\mathrm{arcsch}\,(cx)}{x},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((e*x^2+d)^2*(a+b*arccsch(c*x))/x,x, algorithm="fricas")
```

```
[Out] integral((a*e^2*x^4 + 2*a*d*e*x^2 + a*d^2 + (b*e^2*x^4 + 2*b*d*e*x^2 + b*d^
2)*arccsch(c*x))/x, x)
```

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

$$\int\frac{\left(ex^2+d\right)^2\left(b\,\mathrm{arcsch}\,(cx)+a\right)}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((e*x^2+d)^2*(a+b*arccsch(c*x))/x,x, algorithm="giac")
```

```
[Out] integrate((e*x^2 + d)^2*(b*arccsch(c*x) + a)/x, x)
```

**maple [F]** time = 0.43, size = 0, normalized size = 0.00

$$\int\frac{\left(e\,x^2+d\right)^2\left(a+b\,\mathrm{arccsch}\,(cx)\right)}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((e*x^2+d)^2*(a+b*arccsch(c*x))/x,x)
```

```
[Out] int((e*x^2+d)^2*(a+b*arccsch(c*x))/x,x)
```

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

$$\frac{1}{4}ae^2x^4+4bc^2d^2\int\frac{x\log(x)}{4\left(\sqrt{c^2x^2+1}\,c^2x^2+c^2x^2+\sqrt{c^2x^2+1}+1\right)}\,dx+adex^2-bd^2\log(c)\log(x)-\frac{1}{4}\left(2\log\left(c^2x^2+1\right.\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((e*x^2+d)^2*(a+b*arccsch(c*x))/x,x, algorithm="maxima")
```

```
[Out] 1/4*a*e^2*x^4 + 4*b*c^2*d^2*integrate(1/4*x*log(x)/(sqrt(c^2*x^2 + 1)*c^2*x
^2 + c^2*x^2 + sqrt(c^2*x^2 + 1) + 1), x) + a*d*e*x^2 - b*d^2*log(c)*log(x)
 - 1/4*(2*log(c^2*x^2 + 1)*log(x) + dilog(-c^2*x^2))*b*d^2 + a*d^2*log(x) +
 1/2*b*d*e*(2*sqrt(c^2*x^2 + 1) - log(c^2*x^2 + 1))/c^2 - 1/24*(3*c^2*x^2 -
 2*(c^2*x^2 + 1)^(3/2) + 6*sqrt(c^2*x^2 + 1) - 3*log(c^2*x^2 + 1) + 3)*b*e^
2/c^4 - 1/8*(2*b*c^2*e^2*x^4*log(c) + 4*b*c^2*d^2*log(x)^2 + (8*c^2*d*e*log
(c) - e^2)*b*x^2 + 2*(b*c^2*e^2*x^4 + 4*b*c^2*d*e*x^2)*log(x) - 2*(b*c^2*e^
2*x^4 + 4*b*c^2*d*e*x^2 + 4*b*c^2*d^2*log(x))*log(sqrt(c^2*x^2 + 1) + 1))/c
^2 + 1/8*(4*c^2*d*e - e^2)*b*log(c^2*x^2 + 1)/c^4
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.01

$$\int\frac{\left(e\,x^2+d\right)^2\,\left(a+b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)\right)}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(((d + e*x^2)^2*(a + b*asinh(1/(c*x))))/x,x)
```

```
[Out] int(((d + e*x^2)^2*(a + b*asinh(1/(c*x))))/x, x)
```

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

$$\int\frac{(a+b\,\mathrm{acsch}\,(cx))\left(d+ex^2\right)^2}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((e*x**2+d)**2*(a+b*acsch(c*x))/x,x)
```

```
[Out] Integral((a + b*acsch(c*x))*(d + e*x**2)**2/x, x)
```

# 3.97 $\int \frac{\left(d+ex^2\right)^2\left(a+b\text{csch}^{-1}(cx)\right)}{x^3}\,dx$

**Optimal**. Leaf size=178

$$-\frac{d^2\left(a+b\text{csch}^{-1}(cx)\right)}{2x^2}-2de\log\left(\frac{1}{x}\right)\left(a+b\text{csch}^{-1}(cx)\right)+\frac{1}{2}e^2x^2\left(a+b\text{csch}^{-1}(cx)\right)+\frac{bcd^2\sqrt{\frac{1}{c^2x^2}+1}}{4x}-\frac{1}{4}bc^2d^2\text{csch}^{-1}($$

```
[Out] -1/4*b*c^2*d^2*arccsch(c*x)+b*d*e*arccsch(c*x)^2-1/2*d^2*(a+b*arccsch(c*x))
/x^2+1/2*e^2*x^2*(a+b*arccsch(c*x))-2*b*d*e*arccsch(c*x)*ln(1-(1/c/x+(1+1/c
^2/x^2)^(1/2))^2)+2*b*d*e*arccsch(c*x)*ln(1/x)-2*d*e*(a+b*arccsch(c*x))*ln(
1/x)-b*d*e*polylog(2,(1/c/x+(1+1/c^2/x^2)^(1/2))^2)+1/4*b*c*d^2*(1+1/c^2/x^
2)^(1/2)/x+1/2*b*e^2*x*(1+1/c^2/x^2)^(1/2)/c
```

**Rubi [A]** time = 0.42, antiderivative size = 178, normalized size of antiderivative = 1.00, number of steps used = 14, number of rules used = 15, integrand size = 21, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.714, Rules used = {6304, 266, 43, 5789, 12, 6742, 264, 321, 215, 2325, 5659, 3716, 2190, 2279, 2391}

$$-bde\text{PolyLog}\left(2,e^{2\text{csch}^{-1}(cx)}\right)-\frac{d^2\left(a+b\text{csch}^{-1}(cx)\right)}{2x^2}-2de\log\left(\frac{1}{x}\right)\left(a+b\text{csch}^{-1}(cx)\right)+\frac{1}{2}e^2x^2\left(a+b\text{csch}^{-1}(cx)\right)+\frac{bc}{}$$

Antiderivative was successfully verified.

```
[In] Int[((d + e*x^2)^2*(a + b*ArcCsch[c*x]))/x^3,x]
```

```
[Out] (b*c*d^2*Sqrt[1 + 1/(c^2*x^2)])/(4*x) + (b*e^2*Sqrt[1 + 1/(c^2*x^2)]*x)/(2*
c) - (b*c^2*d^2*ArcCsch[c*x])/4 + b*d*e*ArcCsch[c*x]^2 - (d^2*(a + b*ArcCsc
h[c*x]))/(2*x^2) + (e^2*x^2*(a + b*ArcCsch[c*x]))/2 - 2*b*d*e*ArcCsch[c*x]*
Log[1 - E^(2*ArcCsch[c*x])] + 2*b*d*e*ArcCsch[c*x]*Log[x^(-1)] - 2*d*e*(a +
 b*ArcCsch[c*x])*Log[x^(-1)] - b*d*e*PolyLog[2, E^(2*ArcCsch[c*x])]
```

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 215

```
Int[1/Sqrt[(a_) + (b_.)*(x_)^2], x_Symbol] :> Simp[ArcSinh[(Rt[b, 2]*x)/Sqr
t[a]]/Rt[b, 2], x] /; FreeQ[{a, b}, x] && GtQ[a, 0] && PosQ[b]
```

Rule 264

```
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] /; FreeQ[{a, b, c, m, n,
 p}, x] && EqQ[(m + 1)/n + p + 1, 0] && NeQ[m, -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 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 2325

```
Int[((a_.) + Log[(c_.)*(x_)^(n_.)]*(b_.))/Sqrt[(d_) + (e_.)*(x_)^2], x_Symb
ol] :> Simp[(ArcSinh[(Rt[e, 2]*x)/Sqrt[d]]*(a + b*Log[c*x^n]))/Rt[e, 2], x]
 - Dist[(b*n)/Rt[e, 2], Int[ArcSinh[(Rt[e, 2]*x)/Sqrt[d]]/x, x], x] /; Free
```

```
Q[{a, b, c, d, e, n}, x] && GtQ[d, 0] && PosQ[e]
```

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 3716

```
Int[((c_.) + (d_.)*(x_))^(m_.)*tan[(e_.) + Pi*(k_.) + (Complex[0, fz_])*(f_
.)*(x_)], x_Symbol] :> -Simp[(I*(c + d*x)^(m + 1))/(d*(m + 1)), x] + Dist[2
*I, Int[((c + d*x)^m*E^(2*(-(I*e) + f*fz*x)))/(E^(2*I*k*Pi)*(1 + E^(2*(-(I*
e) + f*fz*x))/E^(2*I*k*Pi))), x], x] /; FreeQ[{c, d, e, f, fz}, x] && Integ
erQ[4*k] && IGtQ[m, 0]
```

Rule 5659

```
Int[((a_.) + ArcSinh[(c_.)*(x_)]*(b_.))^(n_.)/(x_), x_Symbol] :> Subst[Int[
(a + b*x)^n/Tanh[x], x], x, ArcSinh[c*x]] /; FreeQ[{a, b, c}, x] && IGtQ[n,
 0]
```

Rule 5789

```
Int[((a_.) + ArcSinh[(c_.)*(x_)]*(b_.))*((f_.)*(x_))^(m_.)*((d_) + (e_.)*(x
_)^2)^(p_.), x_Symbol] :> With[{u = IntHide[(f*x)^m*(d + e*x^2)^p, x]}, Dis
t[a + b*ArcSinh[c*x], u, x] - Dist[b*c, Int[SimplifyIntegrand[u/Sqrt[1 + c^
2*x^2], x], x], x]] /; FreeQ[{a, b, c, d, e, f, m}, x] && NeQ[e, c^2*d] &&
IntegerQ[p] && (GtQ[p, 0] || (IGtQ[(m - 1)/2, 0] && LeQ[m + p, 0]))
```

Rule 6304

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))^(n_.)*(x_)^(m_.)*((d_.) + (e_.)*(x_
)^2)^(p_.), x_Symbol] :> -Subst[Int[((e + d*x^2)^p*(a + b*ArcSinh[x/c])^n)/
x^(m + 2*(p + 1)), x], x, 1/x] /; FreeQ[{a, b, c, d, e, n}, x] && IGtQ[n, 0
] && IntegersQ[m, p]
```

Rule 6742

```
Int[u_, x_Symbol] :> With[{v = ExpandIntegrand[u, x]}, Int[v, x] /; SumQ[v]
]
```

Rubi steps

$$\int \frac{\left(d+ex^2\right)^2\left(a+b\text{csch}^{-1}(cx)\right)}{x^3}\,dx = -\text{Subst}\left(\int \frac{\left(e+dx^2\right)^2\left(a+b\sinh^{-1}\left(\frac{x}{c}\right)\right)}{x^3}\,dx, x, \frac{1}{x}\right)$$

$$= -\frac{d^2\left(a+b\text{csch}^{-1}(cx)\right)}{2x^2} + \frac{1}{2}e^2x^2\left(a+b\text{csch}^{-1}(cx)\right) - 2de\left(a+b\text{csch}^{-1}(cx)\right.$$

$$= -\frac{d^2\left(a+b\text{csch}^{-1}(cx)\right)}{2x^2} + \frac{1}{2}e^2x^2\left(a+b\text{csch}^{-1}(cx)\right) - 2de\left(a+b\text{csch}^{-1}(cx)\right.$$

$$= -\frac{d^2\left(a+b\text{csch}^{-1}(cx)\right)}{2x^2} + \frac{1}{2}e^2x^2\left(a+b\text{csch}^{-1}(cx)\right) - 2de\left(a+b\text{csch}^{-1}(cx)\right.$$

$$= -\frac{d^2\left(a+b\text{csch}^{-1}(cx)\right)}{2x^2} + \frac{1}{2}e^2x^2\left(a+b\text{csch}^{-1}(cx)\right) - 2de\left(a+b\text{csch}^{-1}(cx)\right.$$

$$= \frac{bcd^2\sqrt{1+\frac{1}{c^2x^2}}}{4x} + \frac{be^2\sqrt{1+\frac{1}{c^2x^2}}\,x}{2c} - \frac{d^2\left(a+b\text{csch}^{-1}(cx)\right)}{2x^2} + \frac{1}{2}e^2x^2\left(a+bc\right.$$

$$= \frac{bcd^2\sqrt{1+\frac{1}{c^2x^2}}}{4x} + \frac{be^2\sqrt{1+\frac{1}{c^2x^2}}\,x}{2c} - \frac{1}{4}bc^2d^2\text{csch}^{-1}(cx) - \frac{d^2\left(a+b\text{csch}^{-1}(\right.}{2x^2}$$

$$= \frac{bcd^2\sqrt{1+\frac{1}{c^2x^2}}}{4x} + \frac{be^2\sqrt{1+\frac{1}{c^2x^2}}\,x}{2c} - \frac{1}{4}bc^2d^2\text{csch}^{-1}(cx) + bde\,\text{csch}^{-1}(cx)^2 -$$

$$= \frac{bcd^2\sqrt{1+\frac{1}{c^2x^2}}}{4x} + \frac{be^2\sqrt{1+\frac{1}{c^2x^2}}\,x}{2c} - \frac{1}{4}bc^2d^2\text{csch}^{-1}(cx) + bde\,\text{csch}^{-1}(cx)^2 -$$

$$= \frac{bcd^2\sqrt{1+\frac{1}{c^2x^2}}}{4x} + \frac{be^2\sqrt{1+\frac{1}{c^2x^2}}\,x}{2c} - \frac{1}{4}bc^2d^2\text{csch}^{-1}(cx) + bde\,\text{csch}^{-1}(cx)^2 -$$

$$= \frac{bcd^2\sqrt{1+\frac{1}{c^2x^2}}}{4x} + \frac{be^2\sqrt{1+\frac{1}{c^2x^2}}\,x}{2c} - \frac{1}{4}bc^2d^2\text{csch}^{-1}(cx) + bde\,\text{csch}^{-1}(cx)^2 -$$

**Mathematica [A]** time = 0.91, size = 187, normalized size = 1.05

$$\frac{1}{4}\left(-\frac{2ad^2}{x^2}+8ade\log(x)+2ae^2x^2-\frac{bd^2\left(-c^2x^2+c^2x^2\sqrt{c^2x^2+1}\tanh^{-1}\left(\sqrt{c^2x^2+1}\right)-1\right)}{cx^3\sqrt{\frac{1}{c^2x^2}+1}}+\frac{2be^2x\left(\sqrt{\frac{1}{c^2x^2}+1}+\right.}{c}\right.$$

Warning: Unable to verify antiderivative.

```
[In] Integrate[((d + e*x^2)^2*(a + b*ArcCsch[c*x]))/x^3,x]
```

```
[Out] ((-2*a*d^2)/x^2 + 2*a*e^2*x^2 - (2*b*d^2*ArcCsch[c*x])/x^2 + (2*b*e^2*x*(Sq
rt[1 + 1/(c^2*x^2)] + c*x*ArcCsch[c*x]))/c - (b*d^2*(-1 - c^2*x^2 + c^2*x^2
*Sqrt[1 + c^2*x^2]*ArcTanh[Sqrt[1 + c^2*x^2]]))/(c*Sqrt[1 + 1/(c^2*x^2)]*x^
3) - 4*b*d*e*ArcCsch[c*x]*(ArcCsch[c*x] + 2*Log[1 - E^(-2*ArcCsch[c*x])]) +
 8*a*d*e*Log[x] + 4*b*d*e*PolyLog[2, E^(-2*ArcCsch[c*x])])/4
```

**fricas [F]** time = 0.66, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{ae^2x^4+2\,adex^2+ad^2+\left(be^2x^4+2\,bdex^2+bd^2\right)\text{arcsch}\,(cx)}{x^3},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((e*x^2+d)^2*(a+b*arccsch(c*x))/x^3,x, algorithm="fricas")
```

```
[Out] integral((a*e^2*x^4 + 2*a*d*e*x^2 + a*d^2 + (b*e^2*x^4 + 2*b*d*e*x^2 + b*d^
2)*arccsch(c*x))/x^3, x)
```

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

$$\int\frac{\left(ex^2+d\right)^2(b\,\text{arcsch}\,(cx)+a)}{x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((e*x^2+d)^2*(a+b*arccsch(c*x))/x^3,x, algorithm="giac")
```

```
[Out] integrate((e*x^2 + d)^2*(b*arccsch(c*x) + a)/x^3, x)
```

**maple [F]** time = 0.46, size = 0, normalized size = 0.00

$$\int\frac{\left(e\,x^2+d\right)^2(a+b\,\text{arccsch}\,(cx))}{x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

[In] int((e*x^2+d)^2*(a+b*arccsch(c*x))/x^3,x)

[Out] int((e*x^2+d)^2*(a+b*arccsch(c*x))/x^3,x)

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

$$4\,bc^2de\int\frac{x\log(x)}{2\left(\sqrt{c^2x^2+1}\,c^2x^2+c^2x^2+\sqrt{c^2x^2+1}\,+1\right)}\,dx-\frac{1}{2}\,be^2x^2\log(c)-\frac{1}{2}\,be^2x^2\log(x)+\frac{1}{2}\,ae^2x^2-2\,bde\log(c)\,l$$

Verification of antiderivative is not currently implemented for this CAS.

[In] integrate((e*x^2+d)^2*(a+b*arccsch(c*x))/x^3,x, algorithm="maxima")

[Out] 4*b*c^2*d*e*integrate(1/2*x*log(x)/(sqrt(c^2*x^2 + 1)*c^2*x^2 + c^2*x^2 + sqrt(c^2*x^2 + 1) + 1), x) - 1/2*b*e^2*x^2*log(c) - 1/2*b*e^2*x^2*log(x) + 1/2*a*e^2*x^2 - 2*b*d*e*log(c)*log(x) - b*d*e*log(x)^2 - 1/2*(2*log(c^2*x^2 + 1)*log(x) + dilog(-c^2*x^2))*b*d*e + 1/8*b*d^2*((2*c^4*x*sqrt(1/(c^2*x^2) + 1)/(c^2*x^2*(1/(c^2*x^2) + 1) - 1) - c^3*log(c*x*sqrt(1/(c^2*x^2) + 1) + 1) + c^3*log(c*x*sqrt(1/(c^2*x^2) + 1) - 1))/c - 4*arccsch(c*x)/x^2) + 2*a*d*e*log(x) + 1/4*b*e^2*(2*sqrt(c^2*x^2 + 1) - log(c^2*x^2 + 1))/c^2 + 1/4*b*e^2*log(c^2*x^2 + 1)/c^2 + 1/2*(b*e^2*x^2 + 4*b*d*e*log(x))*log(sqrt(c^2*x^2 + 1) + 1) - 1/2*a*d^2/x^2

**mupad [F]** time = 0.00, size = -1, normalized size = -0.01

$$\int\frac{{\left(e\,x^2+d\right)}^2\,\left(a+b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)\right)}{x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

[In] int(((d + e*x^2)^2*(a + b*asinh(1/(c*x))))/x^3,x)

[Out] int(((d + e*x^2)^2*(a + b*asinh(1/(c*x))))/x^3, x)

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

$$\int\frac{(a+b\,\mathrm{acsch}\,(cx))\left(d+ex^2\right)^2}{x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

[In] integrate((e*x**2+d)**2*(a+b*acsch(c*x))/x**3,x)

[Out] Integral((a + b*acsch(c*x))*(d + e*x**2)**2/x**3, x)

# 3.98 $\int \frac{x^2(a+b\operatorname{csch}^{-1}(cx))}{d+ex^2}\,dx$

**Optimal**. Leaf size=512

$$\frac{\sqrt{-d}\left(a+b\operatorname{csch}^{-1}(cx)\right)\log\left(1-\frac{c\sqrt{-d}\,e^{\operatorname{csch}^{-1}(cx)}}{\sqrt{e}-\sqrt{e-c^2d}}\right)}{2e^{3/2}}-\frac{\sqrt{-d}\left(a+b\operatorname{csch}^{-1}(cx)\right)\log\left(\frac{c\sqrt{-d}\,e^{\operatorname{csch}^{-1}(cx)}}{\sqrt{e}-\sqrt{e-c^2d}}+1\right)}{2e^{3/2}}+\frac{\sqrt{-d}\left(a+b\operatorname{csch}\right.}{}$$

```
[Out] x*(a+b*arccsch(c*x))/e+b*arctanh((1+1/c^2/x^2)^(1/2))/c/e+1/2*(a+b*arccsch(
c*x))*ln(1-c*(1/c/x+(1+1/c^2/x^2)^(1/2))*(-d)^(1/2)/(e^(1/2)-(-c^2*d+e)^(1/
2)))*(-d)^(1/2)/e^(3/2)-1/2*(a+b*arccsch(c*x))*ln(1+c*(1/c/x+(1+1/c^2/x^2)^
(1/2))*(-d)^(1/2)/(e^(1/2)-(-c^2*d+e)^(1/2)))*(-d)^(1/2)/e^(3/2)+1/2*(a+b*a
rccsch(c*x))*ln(1-c*(1/c/x+(1+1/c^2/x^2)^(1/2))*(-d)^(1/2)/(e^(1/2)+(-c^2*d
+e)^(1/2)))*(-d)^(1/2)/e^(3/2)-1/2*(a+b*arccsch(c*x))*ln(1+c*(1/c/x+(1+1/c^
2/x^2)^(1/2))*(-d)^(1/2)/(e^(1/2)+(-c^2*d+e)^(1/2)))*(-d)^(1/2)/e^(3/2)-1/2
*b*polylog(2,-c*(1/c/x+(1+1/c^2/x^2)^(1/2))*(-d)^(1/2)/(e^(1/2)-(-c^2*d+e)^
(1/2)))*(-d)^(1/2)/e^(3/2)+1/2*b*polylog(2,c*(1/c/x+(1+1/c^2/x^2)^(1/2))*(-
d)^(1/2)/(e^(1/2)-(-c^2*d+e)^(1/2)))*(-d)^(1/2)/e^(3/2)-1/2*b*polylog(2,-c*
(1/c/x+(1+1/c^2/x^2)^(1/2))*(-d)^(1/2)/(e^(1/2)+(-c^2*d+e)^(1/2)))*(-d)^(1/
2)/e^(3/2)+1/2*b*polylog(2,c*(1/c/x+(1+1/c^2/x^2)^(1/2))*(-d)^(1/2)/(e^(1/2
)+(-c^2*d+e)^(1/2)))*(-d)^(1/2)/e^(3/2)
```

**Rubi [A]** time = 1.20, antiderivative size = 512, normalized size of antiderivative = 1.00, number of steps used = 25, number of rules used = 12, integrand size = 21, $\frac{\text{number of rules}}{\text{integrand size}} = 0.571$, Rules used = {6304, 5791, 5661, 266, 63, 208, 5706, 5799, 5561, 2190, 2279, 2391}

$$-\frac{b\sqrt{-d}\operatorname{PolyLog}\left(2,-\frac{c\sqrt{-d}\,e^{\operatorname{csch}^{-1}(cx)}}{\sqrt{e}-\sqrt{e-c^2d}}\right)}{2e^{3/2}}+\frac{b\sqrt{-d}\operatorname{PolyLog}\left(2,\frac{c\sqrt{-d}\,e^{\operatorname{csch}^{-1}(cx)}}{\sqrt{e}-\sqrt{e-c^2d}}\right)}{2e^{3/2}}-\frac{b\sqrt{-d}\operatorname{PolyLog}\left(2,-\frac{c\sqrt{-d}\,e^{\operatorname{csch}^{-1}(cx)}}{\sqrt{e-c^2d}+\sqrt{e}}\right)}{2e^{3/2}}+\frac{b\sqrt{}}{}$$

Antiderivative was successfully verified.

```
[In] Int[(x^2*(a + b*ArcCsch[c*x]))/(d + e*x^2),x]
```

```
[Out] (x*(a + b*ArcCsch[c*x]))/e + (b*ArcTanh[Sqrt[1 + 1/(c^2*x^2)]])/(c*e) + (Sq
rt[-d]*(a + b*ArcCsch[c*x])*Log[1 - (c*Sqrt[-d]*E^ArcCsch[c*x])/(Sqrt[e] -
Sqrt[-(c^2*d) + e])])/(2*e^(3/2)) - (Sqrt[-d]*(a + b*ArcCsch[c*x])*Log[1 +
(c*Sqrt[-d]*E^ArcCsch[c*x])/(Sqrt[e] - Sqrt[-(c^2*d) + e])])/(2*e^(3/2)) +
(Sqrt[-d]*(a + b*ArcCsch[c*x])*Log[1 - (c*Sqrt[-d]*E^ArcCsch[c*x])/(Sqrt[e]
 + Sqrt[-(c^2*d) + e])])/(2*e^(3/2)) - (Sqrt[-d]*(a + b*ArcCsch[c*x])*Log[1
 + (c*Sqrt[-d]*E^ArcCsch[c*x])/(Sqrt[e] + Sqrt[-(c^2*d) + e])])/(2*e^(3/2))
 - (b*Sqrt[-d]*PolyLog[2, -((c*Sqrt[-d]*E^ArcCsch[c*x])/(Sqrt[e] - Sqrt[-(c
^2*d) + e]))])/(2*e^(3/2)) + (b*Sqrt[-d]*PolyLog[2, (c*Sqrt[-d]*E^ArcCsch[c
```

```
*x])/(Sqrt[e] - Sqrt[-(c^2*d) + e])])/(2*e^(3/2)) - (b*Sqrt[-d]*PolyLog[2,
-((c*Sqrt[-d]*E^ArcCsch[c*x])/(Sqrt[e] + Sqrt[-(c^2*d) + e]))])/(2*e^(3/2))
 + (b*Sqrt[-d]*PolyLog[2, (c*Sqrt[-d]*E^ArcCsch[c*x])/(Sqrt[e] + Sqrt[-(c^2
*d) + e])])/(2*e^(3/2))
```

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 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 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 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 5561

```
Int[(Cosh[(c_.) + (d_.)*(x_)]*((e_.) + (f_.)*(x_))^(m_.))/((a_) + (b_.)*Sin
h[(c_.) + (d_.)*(x_)]), x_Symbol] :> -Simp[(e + f*x)^(m + 1)/(b*f*(m + 1)),
 x] + (Int[((e + f*x)^m*E^(c + d*x))/(a - Rt[a^2 + b^2, 2] + b*E^(c + d*x))
, x] + Int[((e + f*x)^m*E^(c + d*x))/(a + Rt[a^2 + b^2, 2] + b*E^(c + d*x))
, x]) /; FreeQ[{a, b, c, d, e, f}, x] && IGtQ[m, 0] && NeQ[a^2 + b^2, 0]
```

Rule 5661

```
Int[((a_.) + ArcSinh[(c_.)*(x_)]*(b_.))^(n_.)*((d_.)*(x_))^(m_.), x_Symbol]
 :> Simp[((d*x)^(m + 1)*(a + b*ArcSinh[c*x])^n)/(d*(m + 1)), x] - Dist[(b*c
*n)/(d*(m + 1)), Int[((d*x)^(m + 1)*(a + b*ArcSinh[c*x])^(n - 1))/Sqrt[1 +
c^2*x^2], x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[n, 0] && NeQ[m, -1]
```

Rule 5706

```
Int[((a_.) + ArcSinh[(c_.)*(x_)]*(b_.))^(n_.)*((d_) + (e_.)*(x_)^2)^(p_.),
x_Symbol] :> Int[ExpandIntegrand[(a + b*ArcSinh[c*x])^n, (d + e*x^2)^p, x],
 x] /; FreeQ[{a, b, c, d, e, n}, x] && NeQ[e, c^2*d] && IntegerQ[p] && (p >
 0 || IGtQ[n, 0])
```

Rule 5791

```
Int[((a_.) + ArcSinh[(c_.)*(x_)]*(b_.))^(n_.)*((f_.)*(x_))^(m_.)*((d_) + (e
_.)*(x_)^2)^(p_.), x_Symbol] :> Int[ExpandIntegrand[(a + b*ArcSinh[c*x])^n,
 (f*x)^m*(d + e*x^2)^p, x], x] /; FreeQ[{a, b, c, d, e, f}, x] && NeQ[e, c^
2*d] && IGtQ[n, 0] && IntegerQ[p] && IntegerQ[m]
```

Rule 5799

```
Int[((a_.) + ArcSinh[(c_.)*(x_)]*(b_.))^(n_.)/((d_.) + (e_.)*(x_)), x_Symbo
l] :> Subst[Int[((a + b*x)^n*Cosh[x])/(c*d + e*Sinh[x]), x], x, ArcSinh[c*x
]] /; FreeQ[{a, b, c, d, e}, x] && IGtQ[n, 0]
```

Rule 6304

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))^(n_.)*(x_)^(m_.)*((d_.) + (e_.)*(x_
)^2)^(p_.), x_Symbol] :> -Subst[Int[((e + d*x^2)^p*(a + b*ArcSinh[x/c])^n)/
x^(m + 2*(p + 1)), x], x, 1/x] /; FreeQ[{a, b, c, d, e, n}, x] && IGtQ[n, 0
] && IntegersQ[m, p]
```

Rubi steps

$$\int \frac{x^2\left(a+b\text{csch}^{-1}(cx)\right)}{d+ex^2}\,dx = -\text{Subst}\left(\int \frac{a+b\sinh^{-1}\left(\frac{x}{c}\right)}{x^2\left(e+dx^2\right)}\,dx, x, \frac{1}{x}\right)$$

$$= -\text{Subst}\left(\int \left(\frac{a+b\sinh^{-1}\left(\frac{x}{c}\right)}{ex^2} - \frac{d\left(a+b\sinh^{-1}\left(\frac{x}{c}\right)\right)}{e\left(e+dx^2\right)}\right)dx, x, \frac{1}{x}\right)$$

$$= -\frac{\text{Subst}\left(\int \frac{a+b\sinh^{-1}\left(\frac{x}{c}\right)}{x^2}\,dx, x, \frac{1}{x}\right)}{e} + \frac{d\,\text{Subst}\left(\int \frac{a+b\sinh^{-1}\left(\frac{x}{c}\right)}{e+dx^2}\,dx, x, \frac{1}{x}\right)}{e}$$

$$= \frac{x\left(a+b\text{csch}^{-1}(cx)\right)}{e} - \frac{b\,\text{Subst}\left(\int \frac{1}{x\sqrt{1+\frac{x^2}{c^2}}}\,dx, x, \frac{1}{x}\right)}{ce} + \frac{d\,\text{Subst}\left(\int \left(\frac{a+b\sinh^{-1}\left(\frac{x}{c}\right)}{2\sqrt{e}\left(\sqrt{e}-\sqrt{-d}\,x\right)} -\right.\right.}{e}$$

$$= \frac{x\left(a+b\text{csch}^{-1}(cx)\right)}{e} + \frac{d\,\text{Subst}\left(\int \frac{a+b\sinh^{-1}\left(\frac{x}{c}\right)}{\sqrt{e}-\sqrt{-d}\,x}\,dx, x, \frac{1}{x}\right)}{2e^{3/2}} + \frac{d\,\text{Subst}\left(\int \frac{a+b\sinh^{-1}\left(\frac{x}{c}\right)}{\sqrt{e}+\sqrt{-d}\,x}\right.}{2e^{3/2}}$$

$$= \frac{x\left(a+b\text{csch}^{-1}(cx)\right)}{e} + \frac{d\,\text{Subst}\left(\int \frac{(a+bx)\cosh(x)}{\frac{\sqrt{e}}{c}-\sqrt{-d}\,\sinh(x)}\,dx, x, \text{csch}^{-1}(cx)\right)}{2e^{3/2}} + \frac{d\,\text{Subst}\left(\int\right.}{}$$

$$= \frac{x\left(a+b\text{csch}^{-1}(cx)\right)}{e} + \frac{b\tanh^{-1}\left(\sqrt{1+\frac{1}{c^2x^2}}\right)}{ce} + \frac{d\,\text{Subst}\left(\int \frac{e^x(a+bx)}{\frac{\sqrt{e}}{c}-\frac{\sqrt{-c^2d+e}}{c}-\sqrt{-d}\,e^x}\,dx, x\right.}{2e^{3/2}}$$

$$= \frac{x\left(a+b\text{csch}^{-1}(cx)\right)}{e} + \frac{b\tanh^{-1}\left(\sqrt{1+\frac{1}{c^2x^2}}\right)}{ce} + \frac{\sqrt{-d}\,\left(a+b\text{csch}^{-1}(cx)\right)\log\left(1-\right.}{2e^{3/2}}$$

$$= \frac{x\left(a+b\text{csch}^{-1}(cx)\right)}{e} + \frac{b\tanh^{-1}\left(\sqrt{1+\frac{1}{c^2x^2}}\right)}{ce} + \frac{\sqrt{-d}\,\left(a+b\text{csch}^{-1}(cx)\right)\log\left(1-\right.}{2e^{3/2}}$$

$$= \frac{x\left(a+b\text{csch}^{-1}(cx)\right)}{e} + \frac{b\tanh^{-1}\left(\sqrt{1+\frac{1}{c^2x^2}}\right)}{ce} + \frac{\sqrt{-d}\,\left(a+b\text{csch}^{-1}(cx)\right)\log\left(1-\right.}{2e^{3/2}}$$

**Mathematica [C]** time = 1.67, size = 1221, normalized size = 2.38

result too large to display

Warning: Unable to verify antiderivative.

```
[In] Integrate[(x^2*(a + b*ArcCsch[c*x]))/(d + e*x^2),x]
```

```
[Out] (4*a*c*Sqrt[e]*x + 4*b*c*Sqrt[e]*x*ArcCsch[c*x] - 4*a*c*Sqrt[d]*ArcTan[(Sqr
t[e]*x)/Sqrt[d]] - (8*I)*b*c*Sqrt[d]*ArcSin[Sqrt[1 + Sqrt[e]/(c*Sqrt[d])]/S
qrt[2]]*ArcTan[((c*Sqrt[d] - Sqrt[e])*Cot[(Pi + (2*I)*ArcCsch[c*x])/4])/Sqr
t[-(c^2*d) + e]] - (8*I)*b*c*Sqrt[d]*ArcSin[Sqrt[1 - Sqrt[e]/(c*Sqrt[d])]/S
qrt[2]]*ArcTan[((c*Sqrt[d] + Sqrt[e])*Cot[(Pi + (2*I)*ArcCsch[c*x])/4])/Sqr
t[-(c^2*d) + e]] + b*c*Sqrt[d]*Pi*Log[1 - (I*(-Sqrt[e] + Sqrt[-(c^2*d) + e]
)*E^ArcCsch[c*x])/(c*Sqrt[d])] - (2*I)*b*c*Sqrt[d]*ArcCsch[c*x]*Log[1 - (I*
(-Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])/(c*Sqrt[d])] + 4*b*c*Sqrt[d
]*ArcSin[Sqrt[1 + Sqrt[e]/(c*Sqrt[d])]/Sqrt[2]]*Log[1 - (I*(-Sqrt[e] + Sqrt
[-(c^2*d) + e])*E^ArcCsch[c*x])/(c*Sqrt[d])] - b*c*Sqrt[d]*Pi*Log[1 + (I*(-
Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])/(c*Sqrt[d])] + (2*I)*b*c*Sqrt
[d]*ArcCsch[c*x]*Log[1 + (I*(-Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])
/(c*Sqrt[d])] - 4*b*c*Sqrt[d]*ArcSin[Sqrt[1 - Sqrt[e]/(c*Sqrt[d])]/Sqrt[2]]
*Log[1 + (I*(-Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])/(c*Sqrt[d])] -
b*c*Sqrt[d]*Pi*Log[1 - (I*(Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])/(c
*Sqrt[d])] + (2*I)*b*c*Sqrt[d]*ArcCsch[c*x]*Log[1 - (I*(Sqrt[e] + Sqrt[-(c^
2*d) + e])*E^ArcCsch[c*x])/(c*Sqrt[d])] + 4*b*c*Sqrt[d]*ArcSin[Sqrt[1 - Sqr
t[e]/(c*Sqrt[d])]/Sqrt[2]]*Log[1 - (I*(Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcC
sch[c*x])/(c*Sqrt[d])] + b*c*Sqrt[d]*Pi*Log[1 + (I*(Sqrt[e] + Sqrt[-(c^2*d)
 + e])*E^ArcCsch[c*x])/(c*Sqrt[d])] - (2*I)*b*c*Sqrt[d]*ArcCsch[c*x]*Log[1
+ (I*(Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])/(c*Sqrt[d])] - 4*b*c*Sq
rt[d]*ArcSin[Sqrt[1 + Sqrt[e]/(c*Sqrt[d])]/Sqrt[2]]*Log[1 + (I*(Sqrt[e] + S
qrt[-(c^2*d) + e])*E^ArcCsch[c*x])/(c*Sqrt[d])] + b*c*Sqrt[d]*Pi*Log[Sqrt[e
] - (I*Sqrt[d])/x] - b*c*Sqrt[d]*Pi*Log[Sqrt[e] + (I*Sqrt[d])/x] - 4*b*Sqrt
[e]*Log[Tanh[ArcCsch[c*x]/2]] + (2*I)*b*c*Sqrt[d]*PolyLog[2, ((-I)*(-Sqrt[e
] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])/(c*Sqrt[d])] - (2*I)*b*c*Sqrt[d]*Po
lyLog[2, (I*(-Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])/(c*Sqrt[d])] -
(2*I)*b*c*Sqrt[d]*PolyLog[2, ((-I)*(Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch
[c*x])/(c*Sqrt[d])] + (2*I)*b*c*Sqrt[d]*PolyLog[2, (I*(Sqrt[e] + Sqrt[-(c^2
*d) + e])*E^ArcCsch[c*x])/(c*Sqrt[d])])/(4*c*e^(3/2))
```

**fricas [F]** time = 0.61, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{bx^2\,\text{arcsch}\,(cx)+ax^2}{ex^2+d},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*(a+b*arccsch(c*x))/(e*x^2+d),x, algorithm="fricas")
```

```
[Out] integral((b*x^2*arccsch(c*x) + a*x^2)/(e*x^2 + d), x)
```

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

$$\int \frac{(b\,\text{arcsch}(cx) + a)x^2}{ex^2 + d}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*(a+b*arccsch(c*x))/(e*x^2+d),x, algorithm="giac")
```

```
[Out] integrate((b*arccsch(c*x) + a)*x^2/(e*x^2 + d), x)
```

**maple [F]** time = 3.40, size = 0, normalized size = 0.00

$$\int \frac{x^2\,(a + b\,\text{arccsch}(cx))}{e\,x^2 + d}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^2*(a+b*arccsch(c*x))/(e*x^2+d),x)
```

```
[Out] int(x^2*(a+b*arccsch(c*x))/(e*x^2+d),x)
```

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

$$-a\left(\frac{d\arctan\left(\frac{ex}{\sqrt{de}}\right)}{\sqrt{de}\,e} - \frac{x}{e}\right) + b\int \frac{x^2\log\left(\sqrt{\frac{1}{c^2x^2} + 1} + \frac{1}{cx}\right)}{ex^2 + d}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*(a+b*arccsch(c*x))/(e*x^2+d),x, algorithm="maxima")
```

```
[Out] -a*(d*arctan(e*x/sqrt(d*e))/(sqrt(d*e)*e) - x/e) + b*integrate(x^2*log(sqrt
(1/(c^2*x^2) + 1) + 1/(c*x))/(e*x^2 + d), x)
```

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

$$\int \frac{x^2\,\left(a + b\,\text{asinh}\left(\frac{1}{c\,x}\right)\right)}{e\,x^2 + d}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((x^2*(a + b*asinh(1/(c*x))))/(d + e*x^2),x)
```

```
[Out] int((x^2*(a + b*asinh(1/(c*x))))/(d + e*x^2), x)
```

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

$$\int \frac{x^2 \left(a + b \operatorname{acsch}(cx)\right)}{d + ex^2} \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**2*(a+b*acsch(c*x))/(e*x**2+d),x)
```

```
[Out] Integral(x**2*(a + b*acsch(c*x))/(d + e*x**2), x)
```

# 3.99 $\int \frac{x\left(a+b\,\mathrm{csch}^{-1}(cx)\right)}{d+ex^2}\,dx$

**Optimal**. Leaf size=467

$$\frac{\left(a+b\,\mathrm{csch}^{-1}(cx)\right)\log\left(1-\frac{c\sqrt{-d}\,e^{\mathrm{csch}^{-1}(cx)}}{\sqrt{e}-\sqrt{e-c^2d}}\right)}{2e}+\frac{\left(a+b\,\mathrm{csch}^{-1}(cx)\right)\log\left(\frac{c\sqrt{-d}\,e^{\mathrm{csch}^{-1}(cx)}}{\sqrt{e}-\sqrt{e-c^2d}}+1\right)}{2e}+\frac{\left(a+b\,\mathrm{csch}^{-1}(cx)\right)\log\left(1\right.}{2e}$$

```
[Out] -(a+b*arccsch(c*x))^2/b/e-(a+b*arccsch(c*x))*ln(1-1/(1/c/x+(1+1/c^2/x^2)^(1
/2))^2)/e+1/2*(a+b*arccsch(c*x))*ln(1-c*(1/c/x+(1+1/c^2/x^2)^(1/2))*(-d)^(1
/2)/(e^(1/2)-(-c^2*d+e)^(1/2)))/e+1/2*(a+b*arccsch(c*x))*ln(1+c*(1/c/x+(1+1
/c^2/x^2)^(1/2))*(-d)^(1/2)/(e^(1/2)-(-c^2*d+e)^(1/2)))/e+1/2*(a+b*arccsch(
c*x))*ln(1-c*(1/c/x+(1+1/c^2/x^2)^(1/2))*(-d)^(1/2)/(e^(1/2)+(-c^2*d+e)^(1/
2)))/e+1/2*(a+b*arccsch(c*x))*ln(1+c*(1/c/x+(1+1/c^2/x^2)^(1/2))*(-d)^(1/2)
/(e^(1/2)+(-c^2*d+e)^(1/2)))/e+1/2*b*polylog(2,1/(1/c/x+(1+1/c^2/x^2)^(1/2)
)^2)/e+1/2*b*polylog(2,-c*(1/c/x+(1+1/c^2/x^2)^(1/2))*(-d)^(1/2)/(e^(1/2)-(
-c^2*d+e)^(1/2)))/e+1/2*b*polylog(2,c*(1/c/x+(1+1/c^2/x^2)^(1/2))*(-d)^(1/2
)/(e^(1/2)-(-c^2*d+e)^(1/2)))/e+1/2*b*polylog(2,-c*(1/c/x+(1+1/c^2/x^2)^(1/
2))*(-d)^(1/2)/(e^(1/2)+(-c^2*d+e)^(1/2)))/e+1/2*b*polylog(2,c*(1/c/x+(1+1/
c^2/x^2)^(1/2))*(-d)^(1/2)/(e^(1/2)+(-c^2*d+e)^(1/2)))/e
```

**Rubi [A]** time = 1.11, antiderivative size = 449, normalized size of antiderivative = 0.96, number of steps used = 26, number of rules used = 9, integrand size = 19, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.474, Rules used = {6304, 5791, 5659, 3716, 2190, 2279, 2391, 5799, 5561}

$$\frac{b\,\mathrm{PolyLog}\left(2,-\frac{c\sqrt{-d}\,e^{\mathrm{csch}^{-1}(cx)}}{\sqrt{e}-\sqrt{e-c^2d}}\right)}{2e}+\frac{b\,\mathrm{PolyLog}\left(2,\frac{c\sqrt{-d}\,e^{\mathrm{csch}^{-1}(cx)}}{\sqrt{e}-\sqrt{e-c^2d}}\right)}{2e}+\frac{b\,\mathrm{PolyLog}\left(2,-\frac{c\sqrt{-d}\,e^{\mathrm{csch}^{-1}(cx)}}{\sqrt{e-c^2d}+\sqrt{e}}\right)}{2e}+\frac{b\,\mathrm{PolyLog}\left(2,\frac{c\sqrt{-}}{\sqrt{e}}\right.}{2e}$$

Warning: Unable to verify antiderivative.

```
[In] Int[(x*(a + b*ArcCsch[c*x]))/(d + e*x^2),x]
```

```
[Out] ((a + b*ArcCsch[c*x])*Log[1 - (c*Sqrt[-d]*E^ArcCsch[c*x])/(Sqrt[e] - Sqrt[-
(c^2*d) + e])])/(2*e) + ((a + b*ArcCsch[c*x])*Log[1 + (c*Sqrt[-d]*E^ArcCsch
[c*x])/(Sqrt[e] - Sqrt[-(c^2*d) + e])])/(2*e) + ((a + b*ArcCsch[c*x])*Log[1
 - (c*Sqrt[-d]*E^ArcCsch[c*x])/(Sqrt[e] + Sqrt[-(c^2*d) + e])])/(2*e) + ((a
 + b*ArcCsch[c*x])*Log[1 + (c*Sqrt[-d]*E^ArcCsch[c*x])/(Sqrt[e] + Sqrt[-(c^
2*d) + e])])/(2*e) - ((a + b*ArcCsch[c*x])*Log[1 - E^(2*ArcCsch[c*x])])/e +
 (b*PolyLog[2, -((c*Sqrt[-d]*E^ArcCsch[c*x])/(Sqrt[e] - Sqrt[-(c^2*d) + e])
)])/(2*e) + (b*PolyLog[2, (c*Sqrt[-d]*E^ArcCsch[c*x])/(Sqrt[e] - Sqrt[-(c^2
*d) + e])])/(2*e) + (b*PolyLog[2, -((c*Sqrt[-d]*E^ArcCsch[c*x])/(Sqrt[e] +
Sqrt[-(c^2*d) + e]))])/(2*e) + (b*PolyLog[2, (c*Sqrt[-d]*E^ArcCsch[c*x])/(S
```

```
qrt[e] + Sqrt[-(c^2*d) + e])])/(2*e) - (b*PolyLog[2, E^(2*ArcCsch[c*x])])/(
2*e)
```

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 3716

```
Int[((c_.) + (d_.)*(x_))^(m_.)*tan[(e_.) + Pi*(k_.) + (Complex[0, fz_])*(f_
.)*(x_)], x_Symbol] :> -Simp[(I*(c + d*x)^(m + 1))/(d*(m + 1)), x] + Dist[2
*I, Int[((c + d*x)^m*E^(2*(-(I*e) + f*fz*x)))/(E^(2*I*k*Pi)*(1 + E^(2*(-(I*
e) + f*fz*x))/E^(2*I*k*Pi))), x], x] /; FreeQ[{c, d, e, f, fz}, x] && Integ
erQ[4*k] && IGtQ[m, 0]
```

Rule 5561

```
Int[(Cosh[(c_.) + (d_.)*(x_)]*((e_.) + (f_.)*(x_))^(m_.))/((a_) + (b_.)*Sin
h[(c_.) + (d_.)*(x_)]), x_Symbol] :> -Simp[(e + f*x)^(m + 1)/(b*f*(m + 1)),
 x] + (Int[((e + f*x)^m*E^(c + d*x))/(a - Rt[a^2 + b^2, 2] + b*E^(c + d*x))
, x] + Int[((e + f*x)^m*E^(c + d*x))/(a + Rt[a^2 + b^2, 2] + b*E^(c + d*x))
, x]) /; FreeQ[{a, b, c, d, e, f}, x] && IGtQ[m, 0] && NeQ[a^2 + b^2, 0]
```

Rule 5659

```
Int[((a_.) + ArcSinh[(c_.)*(x_)]*(b_.))^(n_.)/(x_), x_Symbol] :> Subst[Int[
(a + b*x)^n/Tanh[x], x], x, ArcSinh[c*x]] /; FreeQ[{a, b, c}, x] && IGtQ[n,
 0]
```

Rule 5791

```
Int[((a_.) + ArcSinh[(c_.)*(x_)]*(b_.))^(n_.)*((f_.)*(x_))^(m_.)*((d_) + (e
_.)*(x_)^2)^(p_.), x_Symbol] :> Int[ExpandIntegrand[(a + b*ArcSinh[c*x])^n,
 (f*x)^m*(d + e*x^2)^p, x], x] /; FreeQ[{a, b, c, d, e, f}, x] && NeQ[e, c^
2*d] && IGtQ[n, 0] && IntegerQ[p] && IntegerQ[m]
```

Rule 5799

```
Int[((a_.) + ArcSinh[(c_.)*(x_)]*(b_.))^(n_.)/((d_.) + (e_.)*(x_)), x_Symbo
l] :> Subst[Int[((a + b*x)^n*Cosh[x])/(c*d + e*Sinh[x]), x], x, ArcSinh[c*x
]] /; FreeQ[{a, b, c, d, e}, x] && IGtQ[n, 0]
```

Rule 6304

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))^(n_.)*(x_)^(m_.)*((d_.) + (e_.)*(x_
)^2)^(p_.), x_Symbol] :> -Subst[Int[((e + d*x^2)^p*(a + b*ArcSinh[x/c])^n)/
x^(m + 2*(p + 1)), x], x, 1/x] /; FreeQ[{a, b, c, d, e, n}, x] && IGtQ[n, 0
] && IntegersQ[m, p]
```

Rubi steps

$$\int \frac{x\left(a+b\text{csch}^{-1}(cx)\right)}{d+ex^2}\,dx = -\text{Subst}\left(\int \frac{a+b\sinh^{-1}\left(\frac{x}{c}\right)}{x\left(e+dx^2\right)}\,dx, x, \frac{1}{x}\right)$$

$$= -\text{Subst}\left(\int \left(\frac{a+b\sinh^{-1}\left(\frac{x}{c}\right)}{ex} - \frac{dx\left(a+b\sinh^{-1}\left(\frac{x}{c}\right)\right)}{e\left(e+dx^2\right)}\right) dx, x, \frac{1}{x}\right)$$

$$= -\frac{\text{Subst}\left(\int \frac{a+b\sinh^{-1}\left(\frac{x}{c}\right)}{x}\,dx, x, \frac{1}{x}\right)}{e} + \frac{d\,\text{Subst}\left(\int \frac{x\left(a+b\sinh^{-1}\left(\frac{x}{c}\right)\right)}{e+dx^2}\,dx, x, \frac{1}{x}\right)}{e}$$

$$= -\frac{\text{Subst}\left(\int (a+bx)\coth(x)\,dx, x, \text{csch}^{-1}(cx)\right)}{e} + \frac{d\,\text{Subst}\left(\int \left(-\frac{\sqrt{-d}\left(a+b\sinh^{-1}\left(\frac{x}{c}\right)\right)}{2d\left(\sqrt{e}-\sqrt{-d}\,x\right)} + \cdots\right.\right.}{e}$$

$$= \frac{\left(a+b\text{csch}^{-1}(cx)\right)^2}{2be} + \frac{2\,\text{Subst}\left(\int \frac{e^{2x}(a+bx)}{1-e^{2x}}\,dx, x, \text{csch}^{-1}(cx)\right)}{e} - \frac{\sqrt{-d}\ \text{Subst}\left(\int \frac{a+b\sin\cdots}{\sqrt{e}-\cdots}\right.}{2e}$$

$$= \frac{\left(a+b\text{csch}^{-1}(cx)\right)^2}{2be} - \frac{\left(a+b\text{csch}^{-1}(cx)\right)\log\left(1-e^{2\text{csch}^{-1}(cx)}\right)}{e} + \frac{b\,\text{Subst}\left(\int \log\left(1-\cdots\right.\right.}{\cdots}$$

$$= -\frac{\left(a+b\text{csch}^{-1}(cx)\right)\log\left(1-e^{2\text{csch}^{-1}(cx)}\right)}{e} + \frac{b\,\text{Subst}\left(\int \frac{\log(1-x)}{x}\,dx, x, e^{2\text{csch}^{-1}(cx)}\right)}{2e} - \cdots$$

$$= \frac{\left(a+b\text{csch}^{-1}(cx)\right)\log\left(1-\frac{c\sqrt{-d}\,e^{\text{csch}^{-1}(cx)}}{\sqrt{e}-\sqrt{-c^2d+e}}\right)}{2e} + \frac{\left(a+b\text{csch}^{-1}(cx)\right)\log\left(1+\frac{c\sqrt{-d}\,e^{\text{csch}^{-1}(cx)}}{\sqrt{e}-\sqrt{-c^2d+e}}\right)}{2e} \cdots$$

$$= \frac{\left(a+b\text{csch}^{-1}(cx)\right)\log\left(1-\frac{c\sqrt{-d}\,e^{\text{csch}^{-1}(cx)}}{\sqrt{e}-\sqrt{-c^2d+e}}\right)}{2e} + \frac{\left(a+b\text{csch}^{-1}(cx)\right)\log\left(1+\frac{c\sqrt{-d}\,e^{\text{csch}^{-1}(cx)}}{\sqrt{e}-\sqrt{-c^2d+e}}\right)}{2e} \cdots$$

$$= \frac{\left(a+b\text{csch}^{-1}(cx)\right)\log\left(1-\frac{c\sqrt{-d}\,e^{\text{csch}^{-1}(cx)}}{\sqrt{e}-\sqrt{-c^2d+e}}\right)}{2e} + \frac{\left(a+b\text{csch}^{-1}(cx)\right)\log\left(1+\frac{c\sqrt{-d}\,e^{\text{csch}^{-1}(cx)}}{\sqrt{e}-\sqrt{-c^2d+e}}\right)}{2e} \cdots$$

**Mathematica [C]** time = 0.35, size = 1103, normalized size = 2.36

result too large to display

Warning: Unable to verify antiderivative.

```
[In] Integrate[(x*(a + b*ArcCsch[c*x]))/(d + e*x^2),x]
```

```
[Out] (b*Pi^2 - (4*I)*b*Pi*ArcCsch[c*x] - 8*b*ArcCsch[c*x]^2 + 16*b*ArcSin[Sqrt[1
 + Sqrt[e]/(c*Sqrt[d])]/Sqrt[2]]*ArcTan[((c*Sqrt[d] - Sqrt[e])*Cot[(Pi + (2
*I)*ArcCsch[c*x])/4])/Sqrt[-(c^2*d) + e]] - 16*b*ArcSin[Sqrt[1 - Sqrt[e]/(c
*Sqrt[d])]/Sqrt[2]]*ArcTan[((c*Sqrt[d] + Sqrt[e])*Cot[(Pi + (2*I)*ArcCsch[c
*x])/4])/Sqrt[-(c^2*d) + e]] - 8*b*ArcCsch[c*x]*Log[1 - E^(-2*ArcCsch[c*x])
] + (2*I)*b*Pi*Log[1 - (I*(-Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])/(
c*Sqrt[d])] + 4*b*ArcCsch[c*x]*Log[1 - (I*(-Sqrt[e] + Sqrt[-(c^2*d) + e])*E
^ArcCsch[c*x])/(c*Sqrt[d])] + (8*I)*b*ArcSin[Sqrt[1 + Sqrt[e]/(c*Sqrt[d])]/
Sqrt[2]]*Log[1 - (I*(-Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])/(c*Sqrt
[d])] + (2*I)*b*Pi*Log[1 + (I*(-Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x
])/(c*Sqrt[d])] + 4*b*ArcCsch[c*x]*Log[1 + (I*(-Sqrt[e] + Sqrt[-(c^2*d) + e
])*E^ArcCsch[c*x])/(c*Sqrt[d])] + (8*I)*b*ArcSin[Sqrt[1 - Sqrt[e]/(c*Sqrt[d
])]/Sqrt[2]]*Log[1 + (I*(-Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])/(c*
Sqrt[d])] + (2*I)*b*Pi*Log[1 - (I*(Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[
c*x])/(c*Sqrt[d])] + 4*b*ArcCsch[c*x]*Log[1 - (I*(Sqrt[e] + Sqrt[-(c^2*d) +
 e])*E^ArcCsch[c*x])/(c*Sqrt[d])] - (8*I)*b*ArcSin[Sqrt[1 - Sqrt[e]/(c*Sqrt
[d])]/Sqrt[2]]*Log[1 - (I*(Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])/(c
*Sqrt[d])] + (2*I)*b*Pi*Log[1 + (I*(Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch
[c*x])/(c*Sqrt[d])] + 4*b*ArcCsch[c*x]*Log[1 + (I*(Sqrt[e] + Sqrt[-(c^2*d)
+ e])*E^ArcCsch[c*x])/(c*Sqrt[d])] - (8*I)*b*ArcSin[Sqrt[1 + Sqrt[e]/(c*Sqr
t[d])]/Sqrt[2]]*Log[1 + (I*(Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])/(
c*Sqrt[d])] - (2*I)*b*Pi*Log[Sqrt[e] - (I*Sqrt[d])/x] - (2*I)*b*Pi*Log[Sqrt
[e] + (I*Sqrt[d])/x] + 4*a*Log[d + e*x^2] + 4*b*PolyLog[2, E^(-2*ArcCsch[c*
x])] + 4*b*PolyLog[2, ((-I)*(-Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])
/(c*Sqrt[d])] + 4*b*PolyLog[2, (I*(-Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch
[c*x])/(c*Sqrt[d])] + 4*b*PolyLog[2, ((-I)*(Sqrt[e] + Sqrt[-(c^2*d) + e])*E
^ArcCsch[c*x])/(c*Sqrt[d])] + 4*b*PolyLog[2, (I*(Sqrt[e] + Sqrt[-(c^2*d) +
e])*E^ArcCsch[c*x])/(c*Sqrt[d])])/(8*e)
```

**fricas [F]** time = 0.95, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{bx\,\text{arcsch}\,(cx)+ax}{ex^2+d},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*(a+b*arccsch(c*x))/(e*x^2+d),x, algorithm="fricas")
```

```
[Out] integral((b*x*arccsch(c*x) + a*x)/(e*x^2 + d), x)
```

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

$$\int\frac{(b\,\text{arcsch}\,(cx)+a)x}{ex^2+d}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*(a+b*arccsch(c*x))/(e*x^2+d),x, algorithm="giac")
```

```
[Out] integrate((b*arccsch(c*x) + a)*x/(e*x^2 + d), x)
```

**maple [F]** time = 0.46, size = 0, normalized size = 0.00

$$\int \frac{x\left(a+b\,\mathrm{arccsch}\left(cx\right)\right)}{e\,x^{2}+d}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x*(a+b*arccsch(c*x))/(e*x^2+d),x)
```

```
[Out] int(x*(a+b*arccsch(c*x))/(e*x^2+d),x)
```

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

$$b\int \frac{x\log\left(\sqrt{\frac{1}{c^{2}x^{2}}+1}+\frac{1}{cx}\right)}{ex^{2}+d}\,dx+\frac{a\log\left(ex^{2}+d\right)}{2\,e}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*(a+b*arccsch(c*x))/(e*x^2+d),x, algorithm="maxima")
```

```
[Out] b*integrate(x*log(sqrt(1/(c^2*x^2) + 1) + 1/(c*x))/(e*x^2 + d), x) + 1/2*a*
log(e*x^2 + d)/e
```

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

$$\int \frac{x\,\left(a+b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)\right)}{e\,x^2+d}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((x*(a + b*asinh(1/(c*x))))/(d + e*x^2),x)
```

```
[Out] int((x*(a + b*asinh(1/(c*x))))/(d + e*x^2), x)
```

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

$$\int \frac{x\left(a+b\,\mathrm{acsch}\left(cx\right)\right)}{d+ex^{2}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*(a+b*acsch(c*x))/(e*x**2+d),x)
```

```
[Out] Integral(x*(a + b*acsch(c*x))/(d + e*x**2), x)
```

# 3.100 $\int \frac{a+b\textbf{csch}^{-1}(cx)}{d+ex^2}\,dx$

**Optimal**. Leaf size=477

$$\frac{\left(a+b\text{csch}^{-1}(cx)\right)\log\left(1-\frac{c\sqrt{-d}\,e^{\text{csch}^{-1}(cx)}}{\sqrt{e}-\sqrt{e-c^2d}}\right)}{2\sqrt{-d}\,\sqrt{e}}-\frac{\left(a+b\text{csch}^{-1}(cx)\right)\log\left(\frac{c\sqrt{-d}\,e^{\text{csch}^{-1}(cx)}}{\sqrt{e}-\sqrt{e-c^2d}}+1\right)}{2\sqrt{-d}\,\sqrt{e}}+\frac{\left(a+b\text{csch}^{-1}(cx)\right)\log\left(1\right.}{2\sqrt{-d}\,\sqrt{e}}$$

```
[Out] 1/2*(a+b*arccsch(c*x))*ln(1-c*(1/c/x+(1+1/c^2/x^2)^(1/2))*(-d)^(1/2)/(e^(1/
2)-(-c^2*d+e)^(1/2)))/(-d)^(1/2)/e^(1/2)-1/2*(a+b*arccsch(c*x))*ln(1+c*(1/c
/x+(1+1/c^2/x^2)^(1/2))*(-d)^(1/2)/(e^(1/2)-(-c^2*d+e)^(1/2)))/(-d)^(1/2)/e
^(1/2)+1/2*(a+b*arccsch(c*x))*ln(1-c*(1/c/x+(1+1/c^2/x^2)^(1/2))*(-d)^(1/2)
/(e^(1/2)+(-c^2*d+e)^(1/2)))/(-d)^(1/2)/e^(1/2)-1/2*(a+b*arccsch(c*x))*ln(1
+c*(1/c/x+(1+1/c^2/x^2)^(1/2))*(-d)^(1/2)/(e^(1/2)+(-c^2*d+e)^(1/2)))/(-d)^
(1/2)/e^(1/2)-1/2*b*polylog(2,-c*(1/c/x+(1+1/c^2/x^2)^(1/2))*(-d)^(1/2)/(e^
(1/2)-(-c^2*d+e)^(1/2)))/(-d)^(1/2)/e^(1/2)+1/2*b*polylog(2,c*(1/c/x+(1+1/c
^2/x^2)^(1/2))*(-d)^(1/2)/(e^(1/2)-(-c^2*d+e)^(1/2)))/(-d)^(1/2)/e^(1/2)-1/
2*b*polylog(2,-c*(1/c/x+(1+1/c^2/x^2)^(1/2))*(-d)^(1/2)/(e^(1/2)+(-c^2*d+e)
^(1/2)))/(-d)^(1/2)/e^(1/2)+1/2*b*polylog(2,c*(1/c/x+(1+1/c^2/x^2)^(1/2))*(
-d)^(1/2)/(e^(1/2)+(-c^2*d+e)^(1/2)))/(-d)^(1/2)/e^(1/2)
```

**Rubi [A]** time = 0.85, antiderivative size = 477, normalized size of antiderivative = 1.00, number of steps used = 19, number of rules used = 7, integrand size = 18, $\frac{\text{number of rules}}{\text{integrand size}} = 0.389$, Rules used = {6294, 5706, 5799, 5561, 2190, 2279, 2391}

$$-\frac{b\text{PolyLog}\left(2,-\frac{c\sqrt{-d}\,e^{\text{csch}^{-1}(cx)}}{\sqrt{e}-\sqrt{e-c^2d}}\right)}{2\sqrt{-d}\,\sqrt{e}}+\frac{b\text{PolyLog}\left(2,\frac{c\sqrt{-d}\,e^{\text{csch}^{-1}(cx)}}{\sqrt{e}-\sqrt{e-c^2d}}\right)}{2\sqrt{-d}\,\sqrt{e}}-\frac{b\text{PolyLog}\left(2,-\frac{c\sqrt{-d}\,e^{\text{csch}^{-1}(cx)}}{\sqrt{e-c^2d}+\sqrt{e}}\right)}{2\sqrt{-d}\,\sqrt{e}}+\frac{b\text{PolyLog}\left(2,\frac{c\sqrt{}}{\sqrt{}}\right.}{2\sqrt{-d}\,\sqrt{}}$$

Antiderivative was successfully verified.

```
[In] Int[(a + b*ArcCsch[c*x])/(d + e*x^2),x]
```

```
[Out] ((a + b*ArcCsch[c*x])*Log[1 - (c*Sqrt[-d]*E^ArcCsch[c*x])/(Sqrt[e] - Sqrt[-
(c^2*d) + e])])/(2*Sqrt[-d]*Sqrt[e]) - ((a + b*ArcCsch[c*x])*Log[1 + (c*Sqr
t[-d]*E^ArcCsch[c*x])/(Sqrt[e] - Sqrt[-(c^2*d) + e])])/(2*Sqrt[-d]*Sqrt[e])
 + ((a + b*ArcCsch[c*x])*Log[1 - (c*Sqrt[-d]*E^ArcCsch[c*x])/(Sqrt[e] + Sqr
t[-(c^2*d) + e])])/(2*Sqrt[-d]*Sqrt[e]) - ((a + b*ArcCsch[c*x])*Log[1 + (c*
Sqrt[-d]*E^ArcCsch[c*x])/(Sqrt[e] + Sqrt[-(c^2*d) + e])])/(2*Sqrt[-d]*Sqrt[
e]) - (b*PolyLog[2, -((c*Sqrt[-d]*E^ArcCsch[c*x])/(Sqrt[e] - Sqrt[-(c^2*d)
+ e]))])/(2*Sqrt[-d]*Sqrt[e]) + (b*PolyLog[2, (c*Sqrt[-d]*E^ArcCsch[c*x])/(
Sqrt[e] - Sqrt[-(c^2*d) + e])])/(2*Sqrt[-d]*Sqrt[e]) - (b*PolyLog[2, -((c*S
qrt[-d]*E^ArcCsch[c*x])/(Sqrt[e] + Sqrt[-(c^2*d) + e]))])/(2*Sqrt[-d]*Sqrt[
```

```
e]) + (b*PolyLog[2, (c*Sqrt[-d]*E^ArcCsch[c*x])/(Sqrt[e] + Sqrt[-(c^2*d) +
e])])/(2*Sqrt[-d]*Sqrt[e])
```

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 5561

```
Int[(Cosh[(c_.) + (d_.)*(x_)]*((e_.) + (f_.)*(x_))^(m_.))/((a_) + (b_.)*Sin
h[(c_.) + (d_.)*(x_)]), x_Symbol] :> -Simp[(e + f*x)^(m + 1)/(b*f*(m + 1)),
 x] + (Int[((e + f*x)^m*E^(c + d*x))/(a - Rt[a^2 + b^2, 2] + b*E^(c + d*x))
, x] + Int[((e + f*x)^m*E^(c + d*x))/(a + Rt[a^2 + b^2, 2] + b*E^(c + d*x))
, x]) /; FreeQ[{a, b, c, d, e, f}, x] && IGtQ[m, 0] && NeQ[a^2 + b^2, 0]
```

Rule 5706

```
Int[((a_.) + ArcSinh[(c_.)*(x_)]*(b_.))^(n_.)*((d_) + (e_.)*(x_)^2)^(p_.),
x_Symbol] :> Int[ExpandIntegrand[(a + b*ArcSinh[c*x])^n, (d + e*x^2)^p, x],
 x] /; FreeQ[{a, b, c, d, e, n}, x] && NeQ[e, c^2*d] && IntegerQ[p] && (p >
 0 || IGtQ[n, 0])
```

Rule 5799

```
Int[((a_.) + ArcSinh[(c_.)*(x_)]*(b_.))^(n_.)/((d_.) + (e_.)*(x_)), x_Symbo
l] :> Subst[Int[((a + b*x)^n*Cosh[x])/(c*d + e*Sinh[x]), x], x, ArcSinh[c*x
]] /; FreeQ[{a, b, c, d, e}, x] && IGtQ[n, 0]
```

Rule 6294

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))^(n_.)*((d_.) + (e_.)*(x_)^2)^(p_.),
 x_Symbol] :> -Subst[Int[((e + d*x^2)^p*(a + b*ArcSinh[x/c])^n)/x^(2*(p + 1
)), x], x, 1/x] /; FreeQ[{a, b, c, d, e, n}, x] && IGtQ[n, 0] && IntegerQ[p
]
```

Rubi steps

$$\int \frac{a+b\operatorname{csch}^{-1}(cx)}{d+ex^2}\,dx = -\operatorname{Subst}\left(\int \frac{a+b\sinh^{-1}\left(\frac{x}{c}\right)}{e+dx^2}\,dx, x, \frac{1}{x}\right)$$

$$= -\operatorname{Subst}\left(\int \left(\frac{a+b\sinh^{-1}\left(\frac{x}{c}\right)}{2\sqrt{e}\left(\sqrt{e}-\sqrt{-d}\,x\right)} + \frac{a+b\sinh^{-1}\left(\frac{x}{c}\right)}{2\sqrt{e}\left(\sqrt{e}+\sqrt{-d}\,x\right)}\right) dx, x, \frac{1}{x}\right)$$

$$= -\frac{\operatorname{Subst}\left(\int \frac{a+b\sinh^{-1}\left(\frac{x}{c}\right)}{\sqrt{e}-\sqrt{-d}\,x}\,dx, x, \frac{1}{x}\right)}{2\sqrt{e}} - \frac{\operatorname{Subst}\left(\int \frac{a+b\sinh^{-1}\left(\frac{x}{c}\right)}{\sqrt{e}+\sqrt{-d}\,x}\,dx, x, \frac{1}{x}\right)}{2\sqrt{e}}$$

$$= -\frac{\operatorname{Subst}\left(\int \frac{(a+bx)\cosh(x)}{\frac{\sqrt{e}}{c}-\sqrt{-d}\,\sinh(x)}\,dx, x, \operatorname{csch}^{-1}(cx)\right)}{2\sqrt{e}} - \frac{\operatorname{Subst}\left(\int \frac{(a+bx)\cosh(x)}{\frac{\sqrt{e}}{c}+\sqrt{-d}\,\sinh(x)}\,dx, x, \operatorname{csch}^{-1}(cx\right.}{2\sqrt{e}}$$

$$= -\frac{\operatorname{Subst}\left(\int \frac{e^x(a+bx)}{\frac{\sqrt{e}}{c}-\frac{\sqrt{-c^2d+e}}{c}-\sqrt{-d}\,e^x}\,dx, x, \operatorname{csch}^{-1}(cx)\right)}{2\sqrt{e}} - \frac{\operatorname{Subst}\left(\int \frac{e^x(a+bx)}{\frac{\sqrt{e}}{c}+\frac{\sqrt{-c^2d+e}}{c}-\sqrt{-d}\,e^x}\,dx, x, \operatorname{cs}\right.}{2\sqrt{e}}$$

$$= \frac{\left(a+b\operatorname{csch}^{-1}(cx)\right)\log\left(1-\frac{c\sqrt{-d}\,e^{\operatorname{csch}^{-1}(cx)}}{\sqrt{e}-\sqrt{-c^2d+e}}\right)}{2\sqrt{-d}\,\sqrt{e}} - \frac{\left(a+b\operatorname{csch}^{-1}(cx)\right)\log\left(1+\frac{c\sqrt{-d}\,e^{\operatorname{csch}^{-1}(cx)}}{\sqrt{e}-\sqrt{-c^2d+e}}\right)}{2\sqrt{-d}\,\sqrt{e}}$$

$$= \frac{\left(a+b\operatorname{csch}^{-1}(cx)\right)\log\left(1-\frac{c\sqrt{-d}\,e^{\operatorname{csch}^{-1}(cx)}}{\sqrt{e}-\sqrt{-c^2d+e}}\right)}{2\sqrt{-d}\,\sqrt{e}} - \frac{\left(a+b\operatorname{csch}^{-1}(cx)\right)\log\left(1+\frac{c\sqrt{-d}\,e^{\operatorname{csch}^{-1}(cx)}}{\sqrt{e}-\sqrt{-c^2d+e}}\right)}{2\sqrt{-d}\,\sqrt{e}}$$

$$= \frac{\left(a+b\operatorname{csch}^{-1}(cx)\right)\log\left(1-\frac{c\sqrt{-d}\,e^{\operatorname{csch}^{-1}(cx)}}{\sqrt{e}-\sqrt{-c^2d+e}}\right)}{2\sqrt{-d}\,\sqrt{e}} - \frac{\left(a+b\operatorname{csch}^{-1}(cx)\right)\log\left(1+\frac{c\sqrt{-d}\,e^{\operatorname{csch}^{-1}(cx)}}{\sqrt{e}-\sqrt{-c^2d+e}}\right)}{2\sqrt{-d}\,\sqrt{e}}$$

**Mathematica [C]** time = 0.51, size = 1055, normalized size = 2.21

$$4a\tan^{-1}\left(\frac{\sqrt{e}x}{\sqrt{d}}\right)+8ib\sin^{-1}\left(\frac{\sqrt{\frac{\sqrt{e}}{c\sqrt{d}}+1}}{\sqrt{2}}\right)\tan^{-1}\left(\frac{\left(c\sqrt{d}-\sqrt{e}\right)\cot\left(\frac{1}{4}\left(2i\text{csch}^{-1}(cx)+\pi\right)\right)}{\sqrt{e-c^2d}}\right)+8ib\sin^{-1}\left(\frac{\sqrt{1-\frac{\sqrt{e}}{c\sqrt{d}}}}{\sqrt{2}}\right)\tan^{-1}\left(\frac{\left(\sqrt{d}c+\sqrt{e}\right)$$

Warning: Unable to verify antiderivative.

```
[In] Integrate[(a + b*ArcCsch[c*x])/(d + e*x^2),x]
```

```
[Out] (4*a*ArcTan[(Sqrt[e]*x)/Sqrt[d]] + (8*I)*b*ArcSin[Sqrt[1 + Sqrt[e]/(c*Sqrt[
d])]/Sqrt[2]]*ArcTan[((c*Sqrt[d] - Sqrt[e])*Cot[(Pi + (2*I)*ArcCsch[c*x])/4
])/Sqrt[-(c^2*d) + e]] + (8*I)*b*ArcSin[Sqrt[1 - Sqrt[e]/(c*Sqrt[d])]/Sqrt[
2]]*ArcTan[((c*Sqrt[d] + Sqrt[e])*Cot[(Pi + (2*I)*ArcCsch[c*x])/4])/Sqrt[-(
c^2*d) + e]] - b*Pi*Log[1 - (I*(-Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*
x])/(c*Sqrt[d])] + (2*I)*b*ArcCsch[c*x]*Log[1 - (I*(-Sqrt[e] + Sqrt[-(c^2*d
) + e])*E^ArcCsch[c*x])/(c*Sqrt[d])] - 4*b*ArcSin[Sqrt[1 + Sqrt[e]/(c*Sqrt[
d])]/Sqrt[2]]*Log[1 - (I*(-Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])/(c
*Sqrt[d])] + b*Pi*Log[1 + (I*(-Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x]
)/(c*Sqrt[d])] - (2*I)*b*ArcCsch[c*x]*Log[1 + (I*(-Sqrt[e] + Sqrt[-(c^2*d)
+ e])*E^ArcCsch[c*x])/(c*Sqrt[d])] + 4*b*ArcSin[Sqrt[1 - Sqrt[e]/(c*Sqrt[d]
)]/Sqrt[2]]*Log[1 + (I*(-Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])/(c*S
qrt[d])] + b*Pi*Log[1 - (I*(Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])/(
c*Sqrt[d])] - (2*I)*b*ArcCsch[c*x]*Log[1 - (I*(Sqrt[e] + Sqrt[-(c^2*d) + e]
)*E^ArcCsch[c*x])/(c*Sqrt[d])] - 4*b*ArcSin[Sqrt[1 - Sqrt[e]/(c*Sqrt[d])]/S
qrt[2]]*Log[1 - (I*(Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])/(c*Sqrt[d
])] - b*Pi*Log[1 + (I*(Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])/(c*Sqr
t[d])] + (2*I)*b*ArcCsch[c*x]*Log[1 + (I*(Sqrt[e] + Sqrt[-(c^2*d) + e])*E^A
rcCsch[c*x])/(c*Sqrt[d])] + 4*b*ArcSin[Sqrt[1 + Sqrt[e]/(c*Sqrt[d])]/Sqrt[2
]]*Log[1 + (I*(Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])/(c*Sqrt[d])] -
 b*Pi*Log[Sqrt[e] - (I*Sqrt[d])/x] + b*Pi*Log[Sqrt[e] + (I*Sqrt[d])/x] - (2
*I)*b*PolyLog[2, ((-I)*(-Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])/(c*S
qrt[d])] + (2*I)*b*PolyLog[2, (I*(-Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[
c*x])/(c*Sqrt[d])] + (2*I)*b*PolyLog[2, ((-I)*(Sqrt[e] + Sqrt[-(c^2*d) + e]
)*E^ArcCsch[c*x])/(c*Sqrt[d])] - (2*I)*b*PolyLog[2, (I*(Sqrt[e] + Sqrt[-(c^
2*d) + e])*E^ArcCsch[c*x])/(c*Sqrt[d])])/(4*Sqrt[d]*Sqrt[e])
```

**fricas [F]** time = 0.80, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{b\,\text{arcsch}\,(cx)+a}{ex^2+d},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))/(e*x^2+d),x, algorithm="fricas")
```

```
[Out] integral((b*arccsch(c*x) + a)/(e*x^2 + d), x)
```

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

$$\int \frac{b \operatorname{arcsch}(cx) + a}{ex^2 + d}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))/(e*x^2+d),x, algorithm="giac")
[Out] integrate((b*arccsch(c*x) + a)/(e*x^2 + d), x)
```

**maple [F]** time = 1.45, size = 0, normalized size = 0.00

$$\int \frac{a + b \operatorname{arccsch}(cx)}{e\,x^2 + d}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a+b*arccsch(c*x))/(e*x^2+d),x)
[Out] int((a+b*arccsch(c*x))/(e*x^2+d),x)
```

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

$$b \int \frac{\log\left(\sqrt{\frac{1}{c^2x^2} + 1} + \frac{1}{cx}\right)}{ex^2 + d}\, dx + \frac{a \arctan\left(\frac{ex}{\sqrt{de}}\right)}{\sqrt{de}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))/(e*x^2+d),x, algorithm="maxima")
[Out] b*integrate(log(sqrt(1/(c^2*x^2) + 1) + 1/(c*x))/(e*x^2 + d), x) + a*arctan
(e*x/sqrt(d*e))/sqrt(d*e)
```

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

$$\int \frac{a + b \operatorname{asinh}\left(\frac{1}{c\,x}\right)}{e\,x^2 + d}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a + b*asinh(1/(c*x)))/(d + e*x^2),x)
[Out] int((a + b*asinh(1/(c*x)))/(d + e*x^2), x)
```

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

$$\int \frac{a + b\,\text{acsch}\,(cx)}{d + ex^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*acsch(c*x))/(e*x**2+d),x)
```

```
[Out] Integral((a + b*acsch(c*x))/(d + e*x**2), x)
```

# 3.101 $\int \frac{a+b\,\mathrm{csch}^{-1}(cx)}{x(d+ex^2)}\,dx$

**Optimal**. Leaf size=425

$$-\frac{\left(a+b\,\mathrm{csch}^{-1}(cx)\right)\log\left(1-\frac{c\sqrt{-d}\,e^{\mathrm{csch}^{-1}(cx)}}{\sqrt{e}-\sqrt{e-c^2d}}\right)}{2d}-\frac{\left(a+b\,\mathrm{csch}^{-1}(cx)\right)\log\left(\frac{c\sqrt{-d}\,e^{\mathrm{csch}^{-1}(cx)}}{\sqrt{e}-\sqrt{e-c^2d}}+1\right)}{2d}-\frac{\left(a+b\,\mathrm{csch}^{-1}(cx)\right)\log\left(\right.}{2d}$$

```
[Out] 1/2*(a+b*arccsch(c*x))^2/b/d-1/2*(a+b*arccsch(c*x))*ln(1-c*(1/c/x+(1+1/c^2/
x^2)^(1/2))*(-d)^(1/2)/(e^(1/2)-(-c^2*d+e)^(1/2)))/d-1/2*(a+b*arccsch(c*x))
*ln(1+c*(1/c/x+(1+1/c^2/x^2)^(1/2))*(-d)^(1/2)/(e^(1/2)-(-c^2*d+e)^(1/2)))/
d-1/2*(a+b*arccsch(c*x))*ln(1-c*(1/c/x+(1+1/c^2/x^2)^(1/2))*(-d)^(1/2)/(e^(
1/2)+(-c^2*d+e)^(1/2)))/d-1/2*(a+b*arccsch(c*x))*ln(1+c*(1/c/x+(1+1/c^2/x^2
)^(1/2))*(-d)^(1/2)/(e^(1/2)+(-c^2*d+e)^(1/2)))/d-1/2*b*polylog(2,-c*(1/c/x
+(1+1/c^2/x^2)^(1/2))*(-d)^(1/2)/(e^(1/2)-(-c^2*d+e)^(1/2)))/d-1/2*b*polylo
g(2,c*(1/c/x+(1+1/c^2/x^2)^(1/2))*(-d)^(1/2)/(e^(1/2)-(-c^2*d+e)^(1/2)))/d-
1/2*b*polylog(2,-c*(1/c/x+(1+1/c^2/x^2)^(1/2))*(-d)^(1/2)/(e^(1/2)+(-c^2*d+
e)^(1/2)))/d-1/2*b*polylog(2,c*(1/c/x+(1+1/c^2/x^2)^(1/2))*(-d)^(1/2)/(e^(1
/2)+(-c^2*d+e)^(1/2)))/d
```

**Rubi [A]** time = 0.86, antiderivative size = 425, normalized size of antiderivative = 1.00, number of steps used = 19, number of rules used = 7, integrand size = 21, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.333, Rules used = {6304, 5791, 5799, 5561, 2190, 2279, 2391}

$$-\frac{b\mathrm{PolyLog}\left(2,-\frac{c\sqrt{-d}\,e^{\mathrm{csch}^{-1}(cx)}}{\sqrt{e}-\sqrt{e-c^2d}}\right)}{2d}-\frac{b\mathrm{PolyLog}\left(2,\frac{c\sqrt{-d}\,e^{\mathrm{csch}^{-1}(cx)}}{\sqrt{e}-\sqrt{e-c^2d}}\right)}{2d}-\frac{b\mathrm{PolyLog}\left(2,-\frac{c\sqrt{-d}\,e^{\mathrm{csch}^{-1}(cx)}}{\sqrt{e-c^2d}+\sqrt{e}}\right)}{2d}-\frac{b\mathrm{PolyLog}\left(2,\frac{c\sqrt{-d}}{\sqrt{}}\right.}{2d}$$

Antiderivative was successfully verified.

```
[In] Int[(a + b*ArcCsch[c*x])/(x*(d + e*x^2)),x]
```

```
[Out] (a + b*ArcCsch[c*x])^2/(2*b*d) - ((a + b*ArcCsch[c*x])*Log[1 - (c*Sqrt[-d]*
E^ArcCsch[c*x])/(Sqrt[e] - Sqrt[-(c^2*d) + e])])/(2*d) - ((a + b*ArcCsch[c*
x])*Log[1 + (c*Sqrt[-d]*E^ArcCsch[c*x])/(Sqrt[e] - Sqrt[-(c^2*d) + e])])/(2
*d) - ((a + b*ArcCsch[c*x])*Log[1 - (c*Sqrt[-d]*E^ArcCsch[c*x])/(Sqrt[e] +
Sqrt[-(c^2*d) + e])])/(2*d) - ((a + b*ArcCsch[c*x])*Log[1 + (c*Sqrt[-d]*E^A
rcCsch[c*x])/(Sqrt[e] + Sqrt[-(c^2*d) + e])])/(2*d) - (b*PolyLog[2, -((c*Sq
rt[-d]*E^ArcCsch[c*x])/(Sqrt[e] - Sqrt[-(c^2*d) + e]))])/(2*d) - (b*PolyLog
[2, (c*Sqrt[-d]*E^ArcCsch[c*x])/(Sqrt[e] - Sqrt[-(c^2*d) + e])])/(2*d) - (b
*PolyLog[2, -((c*Sqrt[-d]*E^ArcCsch[c*x])/(Sqrt[e] + Sqrt[-(c^2*d) + e]))])
/(2*d) - (b*PolyLog[2, (c*Sqrt[-d]*E^ArcCsch[c*x])/(Sqrt[e] + Sqrt[-(c^2*d)
 + e])])/(2*d)
```

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 5561

```
Int[(Cosh[(c_.) + (d_.)*(x_)]*((e_.) + (f_.)*(x_))^(m_.))/((a_) + (b_.)*Sin
h[(c_.) + (d_.)*(x_)]), x_Symbol] :> -Simp[(e + f*x)^(m + 1)/(b*f*(m + 1)),
 x] + (Int[((e + f*x)^m*E^(c + d*x))/(a - Rt[a^2 + b^2, 2] + b*E^(c + d*x))
, x] + Int[((e + f*x)^m*E^(c + d*x))/(a + Rt[a^2 + b^2, 2] + b*E^(c + d*x))
, x]) /; FreeQ[{a, b, c, d, e, f}, x] && IGtQ[m, 0] && NeQ[a^2 + b^2, 0]
```

Rule 5791

```
Int[((a_.) + ArcSinh[(c_.)*(x_)]*(b_.))^(n_.)*((f_.)*(x_))^(m_.)*((d_) + (e
_.)*(x_)^2)^(p_.), x_Symbol] :> Int[ExpandIntegrand[(a + b*ArcSinh[c*x])^n,
 (f*x)^m*(d + e*x^2)^p, x], x] /; FreeQ[{a, b, c, d, e, f}, x] && NeQ[e, c^
2*d] && IGtQ[n, 0] && IntegerQ[p] && IntegerQ[m]
```

Rule 5799

```
Int[((a_.) + ArcSinh[(c_.)*(x_)]*(b_.))^(n_.)/((d_.) + (e_.)*(x_)), x_Symbo
l] :> Subst[Int[((a + b*x)^n*Cosh[x])/(c*d + e*Sinh[x]), x], x, ArcSinh[c*x
]] /; FreeQ[{a, b, c, d, e}, x] && IGtQ[n, 0]
```

Rule 6304

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))^(n_.)*(x_)^(m_.)*((d_.) + (e_.)*(x_
)^2)^(p_.), x_Symbol] :> -Subst[Int[((e + d*x^2)^p*(a + b*ArcSinh[x/c])^n)/
x^(m + 2*(p + 1)), x], x, 1/x] /; FreeQ[{a, b, c, d, e, n}, x] && IGtQ[n, 0
```

```
] && IntegersQ[m, p]
```

Rubi steps

$$\int \frac{a+b\text{csch}^{-1}(cx)}{x\left(d+ex^2\right)}\,dx = -\text{Subst}\left(\int \frac{x\left(a+b\sinh^{-1}\left(\frac{x}{c}\right)\right)}{e+dx^2}\,dx, x, \frac{1}{x}\right)$$

$$= -\text{Subst}\left(\int \left(-\frac{\sqrt{-d}\left(a+b\sinh^{-1}\left(\frac{x}{c}\right)\right)}{2d\left(\sqrt{e}-\sqrt{-d}\,x\right)} + \frac{\sqrt{-d}\left(a+b\sinh^{-1}\left(\frac{x}{c}\right)\right)}{2d\left(\sqrt{e}+\sqrt{-d}\,x\right)}\right) dx, x, \frac{1}{x}\right)$$

$$= -\frac{\text{Subst}\left(\int \frac{a+b\sinh^{-1}\left(\frac{x}{c}\right)}{\sqrt{e}-\sqrt{-d}\,x}\,dx, x, \frac{1}{x}\right)}{2\sqrt{-d}} + \frac{\text{Subst}\left(\int \frac{a+b\sinh^{-1}\left(\frac{x}{c}\right)}{\sqrt{e}+\sqrt{-d}\,x}\,dx, x, \frac{1}{x}\right)}{2\sqrt{-d}}$$

$$= -\frac{\text{Subst}\left(\int \frac{(a+bx)\cosh(x)}{\frac{\sqrt{e}}{c}-\sqrt{-d}\,\sinh(x)}\,dx, x, \text{csch}^{-1}(cx)\right)}{2\sqrt{-d}} + \frac{\text{Subst}\left(\int \frac{(a+bx)\cosh(x)}{\frac{\sqrt{e}}{c}+\sqrt{-d}\,\sinh(x)}\,dx, x, \text{csch}^{-1}(cx\right.}{2\sqrt{-d}}$$

$$= \frac{\left(a+b\text{csch}^{-1}(cx)\right)^2}{2bd} - \frac{\text{Subst}\left(\int \frac{e^x(a+bx)}{\frac{\sqrt{e}}{c}-\frac{\sqrt{-c^2d+e}}{c}-\sqrt{-d}\,e^x}\,dx, x, \text{csch}^{-1}(cx)\right)}{2\sqrt{-d}} - \frac{\text{Subst}\left(\int \frac{e}{\frac{\sqrt{e}}{c}+\frac{\sqrt{}}{}}\right.}{}$$

$$= \frac{\left(a+b\text{csch}^{-1}(cx)\right)^2}{2bd} - \frac{\left(a+b\text{csch}^{-1}(cx)\right)\log\left(1-\frac{c\sqrt{-d}\,e^{\text{csch}^{-1}(cx)}}{\sqrt{e}-\sqrt{-c^2d+e}}\right)}{2d} - \frac{\left(a+b\text{csch}^{-1}(cx)\right)\text{lo}}{2}$$

$$= \frac{\left(a+b\text{csch}^{-1}(cx)\right)^2}{2bd} - \frac{\left(a+b\text{csch}^{-1}(cx)\right)\log\left(1-\frac{c\sqrt{-d}\,e^{\text{csch}^{-1}(cx)}}{\sqrt{e}-\sqrt{-c^2d+e}}\right)}{2d} - \frac{\left(a+b\text{csch}^{-1}(cx)\right)\text{lo}}{2}$$

$$= \frac{\left(a+b\text{csch}^{-1}(cx)\right)^2}{2bd} - \frac{\left(a+b\text{csch}^{-1}(cx)\right)\log\left(1-\frac{c\sqrt{-d}\,e^{\text{csch}^{-1}(cx)}}{\sqrt{e}-\sqrt{-c^2d+e}}\right)}{2d} - \frac{\left(a+b\text{csch}^{-1}(cx)\right)\text{lo}}{2}$$

**Mathematica [C]** time = 0.98, size = 387, normalized size = 0.91

$$-2a\log\left(d+ex^2\right)+4a\log(x)+b\left(\text{Li}_2\left(\frac{\left(dc^2-2e+2\sqrt{e\left(e-c^2d\right)}\right)e^{-2\text{csch}^{-1}(cx)}}{c^2d}\right)+\text{Li}_2\left(\frac{\left(c^2d-2\left(e+\sqrt{e\left(e-c^2d\right)}\right)\right)e^{-2\text{csch}^{-1}(cx)}}{c^2d}\right)-2\left(i\,\text{s}\right.\right.$$

Warning: Unable to verify antiderivative.

```
[In] Integrate[(a + b*ArcCsch[c*x])/(x*(d + e*x^2)),x]
```

```
[Out] (4*a*Log[x] - 2*a*Log[d + e*x^2] + b*(-2*(ArcCsch[c*x]^2 + I*ArcSin[Sqrt[e/
(c^2*d)]]*(2*ArcTanh[Sqrt[e*(-(c^2*d) + e)]/(c*e*Sqrt[1 + 1/(c^2*x^2)]*x)]
- Log[(2*e - 2*Sqrt[e*(-(c^2*d) + e)] + c^2*d*(-1 + E^(2*ArcCsch[c*x])))/(c
^2*d*E^(2*ArcCsch[c*x]))] + Log[(2*(e + Sqrt[e*(-(c^2*d) + e)]) + c^2*d*(-1
 + E^(2*ArcCsch[c*x])))/(c^2*d*E^(2*ArcCsch[c*x]))]) + ArcCsch[c*x]*(Log[(2
*e - 2*Sqrt[e*(-(c^2*d) + e)] + c^2*d*(-1 + E^(2*ArcCsch[c*x])))/(c^2*d*E^(
2*ArcCsch[c*x]))] + Log[(2*(e + Sqrt[e*(-(c^2*d) + e)]) + c^2*d*(-1 + E^(2*
ArcCsch[c*x])))/(c^2*d*E^(2*ArcCsch[c*x]))])) + PolyLog[2, (c^2*d - 2*e + 2
*Sqrt[e*(-(c^2*d) + e)])/(c^2*d*E^(2*ArcCsch[c*x]))] + PolyLog[2, (c^2*d -
2*(e + Sqrt[e*(-(c^2*d) + e)]))/(c^2*d*E^(2*ArcCsch[c*x]))]))/(4*d)
```

**fricas [F]** time = 0.71, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{b\,\text{arcsch}\,(cx) + a}{ex^3 + dx}, x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))/x/(e*x^2+d),x, algorithm="fricas")
```

```
[Out] integral((b*arccsch(c*x) + a)/(e*x^3 + d*x), x)
```

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

$$\int \frac{b\,\text{arcsch}\,(cx) + a}{(ex^2 + d)x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))/x/(e*x^2+d),x, algorithm="giac")
```

```
[Out] integrate((b*arccsch(c*x) + a)/((e*x^2 + d)*x), x)
```

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

$$\int \frac{a + b\,\text{arccsch}\,(cx)}{x\left(e\,x^2 + d\right)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a+b*arccsch(c*x))/x/(e*x^2+d),x)
```

```
[Out] int((a+b*arccsch(c*x))/x/(e*x^2+d),x)
```

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

$$-\frac{1}{2}\,a\left(\frac{\log\left(ex^2+d\right)}{d}-\frac{2\,\log(x)}{d}\right)+b\int\frac{\log\left(\sqrt{\frac{1}{c^2x^2}+1}+\frac{1}{cx}\right)}{ex^3+dx}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))/x/(e*x^2+d),x, algorithm="maxima")
```

```
[Out] -1/2*a*(log(e*x^2 + d)/d - 2*log(x)/d) + b*integrate(log(sqrt(1/(c^2*x^2) +
 1) + 1/(c*x))/(e*x^3 + d*x), x)
```

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

$$\int\frac{a+b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)}{x\,\left(e\,x^2+d\right)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a + b*asinh(1/(c*x)))/(x*(d + e*x^2)),x)
```

```
[Out] int((a + b*asinh(1/(c*x)))/(x*(d + e*x^2)), x)
```

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

$$\int\frac{a+b\,\mathrm{acsch}\,(cx)}{x\left(d+ex^2\right)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*acsch(c*x))/x/(e*x**2+d),x)
```

```
[Out] Integral((a + b*acsch(c*x))/(x*(d + e*x**2)), x)
```

# 3.102 $\int \frac{a+b\text{csch}^{-1}(cx)}{x^2(d+ex^2)}\,dx$

**Optimal**. Leaf size=518

$$\frac{\sqrt{e}\left(a+b\text{csch}^{-1}(cx)\right)\log\left(1-\frac{c\sqrt{-d}\,e^{\text{csch}^{-1}(cx)}}{\sqrt{e}-\sqrt{e-c^2d}}\right)}{2(-d)^{3/2}}-\frac{\sqrt{e}\left(a+b\text{csch}^{-1}(cx)\right)\log\left(\frac{c\sqrt{-d}\,e^{\text{csch}^{-1}(cx)}}{\sqrt{e}-\sqrt{e-c^2d}}+1\right)}{2(-d)^{3/2}}+\frac{\sqrt{e}\left(a+b\text{csch}^{-1}(cx\right.}{2}$$

```
[Out] -a/d/x-b*arccsch(c*x)/d/x+1/2*(a+b*arccsch(c*x))*ln(1-c*(1/c/x+(1+1/c^2/x^2
)^(1/2))*(-d)^(1/2)/(e^(1/2)-(-c^2*d+e)^(1/2)))*e^(1/2)/(-d)^(3/2)-1/2*(a+b
*arccsch(c*x))*ln(1+c*(1/c/x+(1+1/c^2/x^2)^(1/2))*(-d)^(1/2)/(e^(1/2)-(-c^2
*d+e)^(1/2)))*e^(1/2)/(-d)^(3/2)+1/2*(a+b*arccsch(c*x))*ln(1-c*(1/c/x+(1+1/
c^2/x^2)^(1/2))*(-d)^(1/2)/(e^(1/2)+(-c^2*d+e)^(1/2)))*e^(1/2)/(-d)^(3/2)-1
/2*(a+b*arccsch(c*x))*ln(1+c*(1/c/x+(1+1/c^2/x^2)^(1/2))*(-d)^(1/2)/(e^(1/2
)+(-c^2*d+e)^(1/2)))*e^(1/2)/(-d)^(3/2)-1/2*b*polylog(2,-c*(1/c/x+(1+1/c^2/
x^2)^(1/2))*(-d)^(1/2)/(e^(1/2)-(-c^2*d+e)^(1/2)))*e^(1/2)/(-d)^(3/2)+1/2*b
*polylog(2,c*(1/c/x+(1+1/c^2/x^2)^(1/2))*(-d)^(1/2)/(e^(1/2)-(-c^2*d+e)^(1/
2)))*e^(1/2)/(-d)^(3/2)-1/2*b*polylog(2,-c*(1/c/x+(1+1/c^2/x^2)^(1/2))*(-d)
^(1/2)/(e^(1/2)+(-c^2*d+e)^(1/2)))*e^(1/2)/(-d)^(3/2)+1/2*b*polylog(2,c*(1/
c/x+(1+1/c^2/x^2)^(1/2))*(-d)^(1/2)/(e^(1/2)+(-c^2*d+e)^(1/2)))*e^(1/2)/(-d
)^(3/2)+b*c*(1+1/c^2/x^2)^(1/2)/d
```

**Rubi [A]** time = 1.06, antiderivative size = 518, normalized size of antiderivative = 1.00, number of steps used = 24, number of rules used = 10, integrand size = 21, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.476, Rules used = {6304, 5791, 5653, 261, 5706, 5799, 5561, 2190, 2279, 2391}

$$-\frac{b\sqrt{e}\,\text{PolyLog}\left(2,-\frac{c\sqrt{-d}\,e^{\text{csch}^{-1}(cx)}}{\sqrt{e}-\sqrt{e-c^2d}}\right)}{2(-d)^{3/2}}+\frac{b\sqrt{e}\,\text{PolyLog}\left(2,\frac{c\sqrt{-d}\,e^{\text{csch}^{-1}(cx)}}{\sqrt{e}-\sqrt{e-c^2d}}\right)}{2(-d)^{3/2}}-\frac{b\sqrt{e}\,\text{PolyLog}\left(2,-\frac{c\sqrt{-d}\,e^{\text{csch}^{-1}(cx)}}{\sqrt{e-c^2d}+\sqrt{e}}\right)}{2(-d)^{3/2}}+\frac{b\sqrt{e}\,\text{Pol}}{}$$

Antiderivative was successfully verified.

```
[In] Int[(a + b*ArcCsch[c*x])/(x^2*(d + e*x^2)),x]
```

```
[Out] (b*c*Sqrt[1 + 1/(c^2*x^2)])/d - a/(d*x) - (b*ArcCsch[c*x])/(d*x) + (Sqrt[e]
*(a + b*ArcCsch[c*x])*Log[1 - (c*Sqrt[-d]*E^ArcCsch[c*x])/(Sqrt[e] - Sqrt[-
(c^2*d) + e])])/(2*(-d)^(3/2)) - (Sqrt[e]*(a + b*ArcCsch[c*x])*Log[1 + (c*S
qrt[-d]*E^ArcCsch[c*x])/(Sqrt[e] - Sqrt[-(c^2*d) + e])])/(2*(-d)^(3/2)) + (
Sqrt[e]*(a + b*ArcCsch[c*x])*Log[1 - (c*Sqrt[-d]*E^ArcCsch[c*x])/(Sqrt[e] +
 Sqrt[-(c^2*d) + e])])/(2*(-d)^(3/2)) - (Sqrt[e]*(a + b*ArcCsch[c*x])*Log[1
 + (c*Sqrt[-d]*E^ArcCsch[c*x])/(Sqrt[e] + Sqrt[-(c^2*d) + e])])/(2*(-d)^(3/
2)) - (b*Sqrt[e]*PolyLog[2, -((c*Sqrt[-d]*E^ArcCsch[c*x])/(Sqrt[e] - Sqrt[-
```

```
(c^2*d) + e]))])/(2*(-d)^(3/2)) + (b*Sqrt[e]*PolyLog[2, (c*Sqrt[-d]*E^ArcCs
ch[c*x])/(Sqrt[e] - Sqrt[-(c^2*d) + e])])/(2*(-d)^(3/2)) - (b*Sqrt[e]*PolyL
og[2, -((c*Sqrt[-d]*E^ArcCsch[c*x])/(Sqrt[e] + Sqrt[-(c^2*d) + e]))])/(2*(-
d)^(3/2)) + (b*Sqrt[e]*PolyLog[2, (c*Sqrt[-d]*E^ArcCsch[c*x])/(Sqrt[e] + Sq
rt[-(c^2*d) + e])])/(2*(-d)^(3/2))
```

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 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 5561

```
Int[(Cosh[(c_.) + (d_.)*(x_)]*((e_.) + (f_.)*(x_))^(m_.))/((a_) + (b_.)*Sin
h[(c_.) + (d_.)*(x_)]), x_Symbol] :> -Simp[(e + f*x)^(m + 1)/(b*f*(m + 1)),
 x] + (Int[((e + f*x)^m*E^(c + d*x))/(a - Rt[a^2 + b^2, 2] + b*E^(c + d*x))
, x] + Int[((e + f*x)^m*E^(c + d*x))/(a + Rt[a^2 + b^2, 2] + b*E^(c + d*x))
, x]) /; FreeQ[{a, b, c, d, e, f}, x] && IGtQ[m, 0] && NeQ[a^2 + b^2, 0]
```

Rule 5653

```
Int[((a_.) + ArcSinh[(c_.)*(x_)]*(b_.))^(n_.), x_Symbol] :> Simp[x*(a + b*A
rcSinh[c*x])^n, x] - Dist[b*c*n, Int[(x*(a + b*ArcSinh[c*x])^(n - 1))/Sqrt[
1 + c^2*x^2], x], x] /; FreeQ[{a, b, c}, x] && GtQ[n, 0]
```

Rule 5706

```
Int[((a_.) + ArcSinh[(c_.)*(x_)]*(b_.))^(n_.)*((d_) + (e_.)*(x_)^2)^(p_.),
x_Symbol] :> Int[ExpandIntegrand[(a + b*ArcSinh[c*x])^n, (d + e*x^2)^p, x],
 x] /; FreeQ[{a, b, c, d, e, n}, x] && NeQ[e, c^2*d] && IntegerQ[p] && (p >
 0 || IGtQ[n, 0])
```

Rule 5791

```
Int[((a_.) + ArcSinh[(c_.)*(x_)]*(b_.))^(n_.)*((f_.)*(x_))^(m_.)*((d_) + (e
_.)*(x_)^2)^(p_.), x_Symbol] :> Int[ExpandIntegrand[(a + b*ArcSinh[c*x])^n,
 (f*x)^m*(d + e*x^2)^p, x], x] /; FreeQ[{a, b, c, d, e, f}, x] && NeQ[e, c^
2*d] && IGtQ[n, 0] && IntegerQ[p] && IntegerQ[m]
```

Rule 5799

```
Int[((a_.) + ArcSinh[(c_.)*(x_)]*(b_.))^(n_.)/((d_.) + (e_.)*(x_)), x_Symbo
l] :> Subst[Int[((a + b*x)^n*Cosh[x])/(c*d + e*Sinh[x]), x], x, ArcSinh[c*x
]] /; FreeQ[{a, b, c, d, e}, x] && IGtQ[n, 0]
```

Rule 6304

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))^(n_.)*(x_)^(m_.)*((d_.) + (e_.)*(x_
)^2)^(p_.), x_Symbol] :> -Subst[Int[((e + d*x^2)^p*(a + b*ArcSinh[x/c])^n)/
x^(m + 2*(p + 1)), x], x, 1/x] /; FreeQ[{a, b, c, d, e, n}, x] && IGtQ[n, 0
] && IntegersQ[m, p]
```

Rubi steps

$$\int \frac{a+b\operatorname{csch}^{-1}(cx)}{x^2(d+ex^2)}\,dx = -\operatorname{Subst}\left(\int \frac{x^2\left(a+b\sinh^{-1}\left(\frac{x}{c}\right)\right)}{e+dx^2}\,dx, x, \frac{1}{x}\right)$$

$$= -\operatorname{Subst}\left(\int \left(\frac{a+b\sinh^{-1}\left(\frac{x}{c}\right)}{d} - \frac{e\left(a+b\sinh^{-1}\left(\frac{x}{c}\right)\right)}{d\left(e+dx^2\right)}\right)dx, x, \frac{1}{x}\right)$$

$$= -\frac{\operatorname{Subst}\left(\int \left(a+b\sinh^{-1}\left(\frac{x}{c}\right)\right)dx, x, \frac{1}{x}\right)}{d} + \frac{e\operatorname{Subst}\left(\int \frac{a+b\sinh^{-1}\left(\frac{x}{c}\right)}{e+dx^2}\,dx, x, \frac{1}{x}\right)}{d}$$

$$= -\frac{a}{dx} - \frac{b\operatorname{Subst}\left(\int \sinh^{-1}\left(\frac{x}{c}\right)dx, x, \frac{1}{x}\right)}{d} + \frac{e\operatorname{Subst}\left(\int \left(\frac{a+b\sinh^{-1}\left(\frac{x}{c}\right)}{2\sqrt{e}\left(\sqrt{e}-\sqrt{-d}\,x\right)} + \frac{a+b\sinh^{-1}\left(\frac{x}{c}\right)}{2\sqrt{e}\left(\sqrt{e}+\sqrt{-d}\,x\right)}\right)\right.}{d}$$

$$= -\frac{a}{dx} - \frac{b\operatorname{csch}^{-1}(cx)}{dx} + \frac{b\operatorname{Subst}\left(\int \frac{x}{\sqrt{1+\frac{x^2}{c^2}}}\,dx, x, \frac{1}{x}\right)}{cd} + \frac{\sqrt{e}\operatorname{Subst}\left(\int \frac{a+b\sinh^{-1}\left(\frac{x}{c}\right)}{\sqrt{e}-\sqrt{-d}\,x}\,dx, x, \frac{1}{x}\right.}{2d}$$

$$= \frac{bc\sqrt{1+\frac{1}{c^2x^2}}}{d} - \frac{a}{dx} - \frac{b\operatorname{csch}^{-1}(cx)}{dx} + \frac{\sqrt{e}\operatorname{Subst}\left(\int \frac{(a+bx)\cosh(x)}{\frac{\sqrt{e}}{c}-\sqrt{-d}\sinh(x)}\,dx, x, \operatorname{csch}^{-1}(cx)\right)}{2d} + \cdots$$

$$= \frac{bc\sqrt{1+\frac{1}{c^2x^2}}}{d} - \frac{a}{dx} - \frac{b\operatorname{csch}^{-1}(cx)}{dx} + \frac{\sqrt{e}\operatorname{Subst}\left(\int \frac{e^x(a+bx)}{\frac{\sqrt{e}}{c}-\frac{\sqrt{-c^2d+e}}{c}-\sqrt{-d}\,e^x}\,dx, x, \operatorname{csch}^{-1}(cx)\right)}{2d}$$

$$= \frac{bc\sqrt{1+\frac{1}{c^2x^2}}}{d} - \frac{a}{dx} - \frac{b\operatorname{csch}^{-1}(cx)}{dx} + \frac{\sqrt{e}\left(a+b\operatorname{csch}^{-1}(cx)\right)\log\left(1-\frac{c\sqrt{-d}\,e^{\operatorname{csch}^{-1}(cx)}}{\sqrt{e}-\sqrt{-c^2d+e}}\right)}{2(-d)^{3/2}} - \cdots$$

$$= \frac{bc\sqrt{1+\frac{1}{c^2x^2}}}{d} - \frac{a}{dx} - \frac{b\operatorname{csch}^{-1}(cx)}{dx} + \frac{\sqrt{e}\left(a+b\operatorname{csch}^{-1}(cx)\right)\log\left(1-\frac{c\sqrt{-d}\,e^{\operatorname{csch}^{-1}(cx)}}{\sqrt{e}-\sqrt{-c^2d+e}}\right)}{2(-d)^{3/2}} - \cdots$$

$$= \frac{bc\sqrt{1+\frac{1}{c^2x^2}}}{d} - \frac{a}{dx} - \frac{b\operatorname{csch}^{-1}(cx)}{dx} + \frac{\sqrt{e}\left(a+b\operatorname{csch}^{-1}(cx)\right)\log\left(1-\frac{c\sqrt{-d}\,e^{\operatorname{csch}^{-1}(cx)}}{\sqrt{e}-\sqrt{-c^2d+e}}\right)}{2(-d)^{3/2}} - \cdots$$

**Mathematica [C]** time = 1.69, size = 1211, normalized size = 2.34

result too large to display

Warning: Unable to verify antiderivative.

```
[In] Integrate[(a + b*ArcCsch[c*x])/(x^2*(d + e*x^2)),x]
```

```
[Out] -(a/(d*x)) - (a*Sqrt[e]*ArcTan[(Sqrt[e]*x)/Sqrt[d]])/d^(3/2) + b*((c*Sqrt[1
 + 1/(c^2*x^2)] - ArcCsch[c*x]/x)/d - ((I/16)*Sqrt[e]*(Pi^2 - (4*I)*Pi*ArcC
sch[c*x] - 8*ArcCsch[c*x]^2 + 32*ArcSin[Sqrt[1 + Sqrt[e]/(c*Sqrt[d])]/Sqrt[
2]]*ArcTan[((c*Sqrt[d] - Sqrt[e])*Cot[(Pi + (2*I)*ArcCsch[c*x])/4])/Sqrt[-(
c^2*d) + e]] - 8*ArcCsch[c*x]*Log[1 - E^(-2*ArcCsch[c*x])] + (4*I)*Pi*Log[1
 - (I*(-Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])/(c*Sqrt[d])] + 8*ArcC
sch[c*x]*Log[1 - (I*(-Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])/(c*Sqrt
[d])] + (16*I)*ArcSin[Sqrt[1 + Sqrt[e]/(c*Sqrt[d])]/Sqrt[2]]*Log[1 - (I*(-S
qrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])/(c*Sqrt[d])] + (4*I)*Pi*Log[1
+ (I*(Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])/(c*Sqrt[d])] + 8*ArcCsc
h[c*x]*Log[1 + (I*(Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])/(c*Sqrt[d]
)] - (16*I)*ArcSin[Sqrt[1 + Sqrt[e]/(c*Sqrt[d])]/Sqrt[2]]*Log[1 + (I*(Sqrt[
e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])/(c*Sqrt[d])] - (4*I)*Pi*Log[Sqrt[e
] + (I*Sqrt[d])/x] + 4*PolyLog[2, E^(-2*ArcCsch[c*x])] + 8*PolyLog[2, (I*(-
Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])/(c*Sqrt[d])] + 8*PolyLog[2, (
(-I)*(Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])/(c*Sqrt[d])]))/d^(3/2)
+ ((I/16)*Sqrt[e]*(Pi^2 - (4*I)*Pi*ArcCsch[c*x] - 8*ArcCsch[c*x]^2 - 32*Arc
Sin[Sqrt[1 - Sqrt[e]/(c*Sqrt[d])]/Sqrt[2]]*ArcTan[((c*Sqrt[d] + Sqrt[e])*Co
t[(Pi + (2*I)*ArcCsch[c*x])/4])/Sqrt[-(c^2*d) + e]] - 8*ArcCsch[c*x]*Log[1
- E^(-2*ArcCsch[c*x])] + (4*I)*Pi*Log[1 + (I*(-Sqrt[e] + Sqrt[-(c^2*d) + e]
)*E^ArcCsch[c*x])/(c*Sqrt[d])] + 8*ArcCsch[c*x]*Log[1 + (I*(-Sqrt[e] + Sqrt
[-(c^2*d) + e])*E^ArcCsch[c*x])/(c*Sqrt[d])] + (16*I)*ArcSin[Sqrt[1 - Sqrt[
e]/(c*Sqrt[d])]/Sqrt[2]]*Log[1 + (I*(-Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCs
ch[c*x])/(c*Sqrt[d])] + (4*I)*Pi*Log[1 - (I*(Sqrt[e] + Sqrt[-(c^2*d) + e])*
E^ArcCsch[c*x])/(c*Sqrt[d])] + 8*ArcCsch[c*x]*Log[1 - (I*(Sqrt[e] + Sqrt[-(
c^2*d) + e])*E^ArcCsch[c*x])/(c*Sqrt[d])] - (16*I)*ArcSin[Sqrt[1 - Sqrt[e]/
(c*Sqrt[d])]/Sqrt[2]]*Log[1 - (I*(Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c
*x])/(c*Sqrt[d])] - (4*I)*Pi*Log[Sqrt[e] - (I*Sqrt[d])/x] + 4*PolyLog[2, E^
(-2*ArcCsch[c*x])] + 8*PolyLog[2, ((-I)*(-Sqrt[e] + Sqrt[-(c^2*d) + e])*E^A
rcCsch[c*x])/(c*Sqrt[d])] + 8*PolyLog[2, (I*(Sqrt[e] + Sqrt[-(c^2*d) + e])*
E^ArcCsch[c*x])/(c*Sqrt[d])]))/d^(3/2))
```

**fricas [F]** time = 1.04, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{b\,\text{arcsch}\,(cx)+a}{ex^4+dx^2},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))/x^2/(e*x^2+d),x, algorithm="fricas")
```

```
[Out] integral((b*arccsch(c*x) + a)/(e*x^4 + d*x^2), x)
```

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

$$\int \frac{b \operatorname{arcsch}(cx) + a}{(ex^2 + d)x^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))/x^2/(e*x^2+d),x, algorithm="giac")
```

```
[Out] integrate((b*arccsch(c*x) + a)/((e*x^2 + d)*x^2), x)
```

**maple [F]** time = 2.76, size = 0, normalized size = 0.00

$$\int \frac{a + b \operatorname{arccsch}(cx)}{x^2 (e x^2 + d)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a+b*arccsch(c*x))/x^2/(e*x^2+d),x)
```

```
[Out] int((a+b*arccsch(c*x))/x^2/(e*x^2+d),x)
```

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

$$-a\left(\frac{e \arctan\left(\frac{ex}{\sqrt{de}}\right)}{\sqrt{de}\,d} + \frac{1}{dx}\right) + b\int \frac{\log\left(\sqrt{\frac{1}{c^2x^2} + 1} + \frac{1}{cx}\right)}{ex^4 + dx^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))/x^2/(e*x^2+d),x, algorithm="maxima")
```

```
[Out] -a*(e*arctan(e*x/sqrt(d*e))/(sqrt(d*e)*d) + 1/(d*x)) + b*integrate(log(sqrt
(1/(c^2*x^2) + 1) + 1/(c*x))/(e*x^4 + d*x^2), x)
```

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

$$\int \frac{a + b \operatorname{asinh}\left(\frac{1}{c\,x}\right)}{x^2\,(e\,x^2 + d)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a + b*asinh(1/(c*x)))/(x^2*(d + e*x^2)),x)
```

```
[Out] int((a + b*asinh(1/(c*x)))/(x^2*(d + e*x^2)), x)
```

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

$$\int \frac{a + b\operatorname{acsch}(cx)}{x^2 \left(d + ex^2\right)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*acsch(c*x))/x**2/(e*x**2+d),x)
```

```
[Out] Integral((a + b*acsch(c*x))/(x**2*(d + e*x**2)), x)
```

# 3.103 $\int \frac{x^5(a+b\text{csch}^{-1}(cx))}{(d+ex^2)^2}\,dx$

**Optimal**. Leaf size=591

$$-\frac{d\left(a+b\text{csch}^{-1}(cx)\right)\log\left(1-\frac{c\sqrt{-d}\,e^{\text{csch}^{-1}(cx)}}{\sqrt{e}-\sqrt{e-c^2d}}\right)}{e^3}-\frac{d\left(a+b\text{csch}^{-1}(cx)\right)\log\left(\frac{c\sqrt{-d}\,e^{\text{csch}^{-1}(cx)}}{\sqrt{e}-\sqrt{e-c^2d}}+1\right)}{e^3}-\frac{d\left(a+b\text{csch}^{-1}(cx)\right)\text{l}}{}$$

```
[Out] 1/2*d*(a+b*arccsch(c*x))/e^2/(e+d/x^2)+1/2*x^2*(a+b*arccsch(c*x))/e^2+2*d*(
a+b*arccsch(c*x))^2/b/e^3+2*d*(a+b*arccsch(c*x))*ln(1-1/(1/c/x+(1+1/c^2/x^2
)^(1/2))^2)/e^3-d*(a+b*arccsch(c*x))*ln(1-c*(1/c/x+(1+1/c^2/x^2)^(1/2))*(-d
)^(1/2)/(e^(1/2)-(-c^2*d+e)^(1/2)))/e^3-d*(a+b*arccsch(c*x))*ln(1+c*(1/c/x+
(1+1/c^2/x^2)^(1/2))*(-d)^(1/2)/(e^(1/2)-(-c^2*d+e)^(1/2)))/e^3-d*(a+b*arcc
sch(c*x))*ln(1-c*(1/c/x+(1+1/c^2/x^2)^(1/2))*(-d)^(1/2)/(e^(1/2)+(-c^2*d+e)
^(1/2)))/e^3-d*(a+b*arccsch(c*x))*ln(1+c*(1/c/x+(1+1/c^2/x^2)^(1/2))*(-d)^(
1/2)/(e^(1/2)+(-c^2*d+e)^(1/2)))/e^3-b*d*polylog(2,1/(1/c/x+(1+1/c^2/x^2)^(
1/2))^2)/e^3-b*d*polylog(2,-c*(1/c/x+(1+1/c^2/x^2)^(1/2))*(-d)^(1/2)/(e^(1/
2)-(-c^2*d+e)^(1/2)))/e^3-b*d*polylog(2,c*(1/c/x+(1+1/c^2/x^2)^(1/2))*(-d)^
(1/2)/(e^(1/2)-(-c^2*d+e)^(1/2)))/e^3-b*d*polylog(2,-c*(1/c/x+(1+1/c^2/x^2)
^(1/2))*(-d)^(1/2)/(e^(1/2)+(-c^2*d+e)^(1/2)))/e^3-b*d*polylog(2,c*(1/c/x+(
1+1/c^2/x^2)^(1/2))*(-d)^(1/2)/(e^(1/2)+(-c^2*d+e)^(1/2)))/e^3-1/2*b*d*arct
an((c^2*d-e)^(1/2)/c/x/e^(1/2)/(1+1/c^2/x^2)^(1/2))/e^(5/2)/(c^2*d-e)^(1/2)
+1/2*b*x*(1+1/c^2/x^2)^(1/2)/c/e^2
```

**Rubi [A]** time = 1.28, antiderivative size = 571, normalized size of antiderivative = 0.97, number of steps used = 31, number of rules used = 14, integrand size = 21, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.667, Rules used = {6304, 5791, 5661, 264, 5659, 3716, 2190, 2279, 2391, 5787, 377, 205, 5799, 5561}

$$-\frac{bd\text{PolyLog}\left(2,-\frac{c\sqrt{-d}\,e^{\text{csch}^{-1}(cx)}}{\sqrt{e}-\sqrt{e-c^2d}}\right)}{e^3}-\frac{bd\text{PolyLog}\left(2,\frac{c\sqrt{-d}\,e^{\text{csch}^{-1}(cx)}}{\sqrt{e}-\sqrt{e-c^2d}}\right)}{e^3}-\frac{bd\text{PolyLog}\left(2,-\frac{c\sqrt{-d}\,e^{\text{csch}^{-1}(cx)}}{\sqrt{e-c^2d}+\sqrt{e}}\right)}{e^3}-\frac{bd\text{PolyLog}\left(\right.}{}$$

Warning: Unable to verify antiderivative.

```
[In] Int[(x^5*(a + b*ArcCsch[c*x]))/(d + e*x^2)^2,x]
```

```
[Out] (b*Sqrt[1 + 1/(c^2*x^2)]*x)/(2*c*e^2) + (d*(a + b*ArcCsch[c*x]))/(2*e^2*(e
+ d/x^2)) + (x^2*(a + b*ArcCsch[c*x]))/(2*e^2) - (b*d*ArcTan[Sqrt[c^2*d - e
```

```
]/(c*Sqrt[e]*Sqrt[1 + 1/(c^2*x^2)]*x)])/(2*Sqrt[c^2*d - e]*e^(5/2)) - (d*(a
 + b*ArcCsch[c*x])*Log[1 - (c*Sqrt[-d]*E^ArcCsch[c*x])/(Sqrt[e] - Sqrt[-(c^
2*d) + e])])/e^3 - (d*(a + b*ArcCsch[c*x])*Log[1 + (c*Sqrt[-d]*E^ArcCsch[c*
x])/(Sqrt[e] - Sqrt[-(c^2*d) + e])])/e^3 - (d*(a + b*ArcCsch[c*x])*Log[1 -
(c*Sqrt[-d]*E^ArcCsch[c*x])/(Sqrt[e] + Sqrt[-(c^2*d) + e])])/e^3 - (d*(a +
b*ArcCsch[c*x])*Log[1 + (c*Sqrt[-d]*E^ArcCsch[c*x])/(Sqrt[e] + Sqrt[-(c^2*d
) + e])])/e^3 + (2*d*(a + b*ArcCsch[c*x])*Log[1 - E^(2*ArcCsch[c*x])])/e^3
- (b*d*PolyLog[2, -((c*Sqrt[-d]*E^ArcCsch[c*x])/(Sqrt[e] - Sqrt[-(c^2*d) +
e]))])/e^3 - (b*d*PolyLog[2, (c*Sqrt[-d]*E^ArcCsch[c*x])/(Sqrt[e] - Sqrt[-(
c^2*d) + e])])/e^3 - (b*d*PolyLog[2, -((c*Sqrt[-d]*E^ArcCsch[c*x])/(Sqrt[e]
 + Sqrt[-(c^2*d) + e]))])/e^3 - (b*d*PolyLog[2, (c*Sqrt[-d]*E^ArcCsch[c*x])
/(Sqrt[e] + Sqrt[-(c^2*d) + e])])/e^3 + (b*d*PolyLog[2, E^(2*ArcCsch[c*x])]
)/e^3
```

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 264

```
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] /; FreeQ[{a, b, c, m, n,
 p}, x] && EqQ[(m + 1)/n + p + 1, 0] && NeQ[m, -1]
```

Rule 377

```
Int[((a_) + (b_.)*(x_)^(n_))^(p_)/((c_) + (d_.)*(x_)^(n_)), x_Symbol] :> Su
bst[Int[1/(c - (b*c - a*d)*x^n), x], x, x/(a + b*x^n)^(1/n)] /; FreeQ[{a, b
, c, d}, x] && NeQ[b*c - a*d, 0] && EqQ[n*p + 1, 0] && IntegerQ[n]
```

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 3716

```
Int[((c_.) + (d_.)*(x_))^(m_.)*tan[(e_.) + Pi*(k_.) + (Complex[0, fz_])*(f_
.)*(x_)], x_Symbol] :> -Simp[(I*(c + d*x)^(m + 1))/(d*(m + 1)), x] + Dist[2
*I, Int[((c + d*x)^m*E^(2*(-(I*e) + f*fz*x)))/(E^(2*I*k*Pi)*(1 + E^(2*(-(I*
e) + f*fz*x))/E^(2*I*k*Pi))), x], x] /; FreeQ[{c, d, e, f, fz}, x] && Integ
erQ[4*k] && IGtQ[m, 0]
```

Rule 5561

```
Int[(Cosh[(c_.) + (d_.)*(x_)]*((e_.) + (f_.)*(x_))^(m_.))/((a_) + (b_.)*Sin
h[(c_.) + (d_.)*(x_)]), x_Symbol] :> -Simp[(e + f*x)^(m + 1)/(b*f*(m + 1)),
 x] + (Int[((e + f*x)^m*E^(c + d*x))/(a - Rt[a^2 + b^2, 2] + b*E^(c + d*x))
, x] + Int[((e + f*x)^m*E^(c + d*x))/(a + Rt[a^2 + b^2, 2] + b*E^(c + d*x))
, x]) /; FreeQ[{a, b, c, d, e, f}, x] && IGtQ[m, 0] && NeQ[a^2 + b^2, 0]
```

Rule 5659

```
Int[((a_.) + ArcSinh[(c_.)*(x_)]*(b_.))^(n_.)/(x_), x_Symbol] :> Subst[Int[
(a + b*x)^n/Tanh[x], x], x, ArcSinh[c*x]] /; FreeQ[{a, b, c}, x] && IGtQ[n,
 0]
```

Rule 5661

```
Int[((a_.) + ArcSinh[(c_.)*(x_)]*(b_.))^(n_.)*((d_.)*(x_))^(m_.), x_Symbol]
 :> Simp[((d*x)^(m + 1)*(a + b*ArcSinh[c*x])^n)/(d*(m + 1)), x] - Dist[(b*c
*n)/(d*(m + 1)), Int[((d*x)^(m + 1)*(a + b*ArcSinh[c*x])^(n - 1))/Sqrt[1 +
c^2*x^2], x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[n, 0] && NeQ[m, -1]
```

Rule 5787

```
Int[((a_.) + ArcSinh[(c_.)*(x_)]*(b_.))*(x_)*((d_) + (e_.)*(x_)^2)^(p_.), x
_Symbol] :> Simp[((d + e*x^2)^(p + 1)*(a + b*ArcSinh[c*x]))/(2*e*(p + 1)),
x] - Dist[(b*c)/(2*e*(p + 1)), Int[(d + e*x^2)^(p + 1)/Sqrt[1 + c^2*x^2], x
], x] /; FreeQ[{a, b, c, d, e, p}, x] && NeQ[e, c^2*d] && NeQ[p, -1]
```

Rule 5791

```
Int[((a_.) + ArcSinh[(c_.)*(x_)]*(b_.))^(n_.)*((f_.)*(x_))^(m_.)*((d_) + (e
_.)*(x_)^2)^(p_.), x_Symbol] :> Int[ExpandIntegrand[(a + b*ArcSinh[c*x])^n,
```

```
(f*x)^m*(d + e*x^2)^p, x], x] /; FreeQ[{a, b, c, d, e, f}, x] && NeQ[e, c^
2*d] && IGtQ[n, 0] && IntegerQ[p] && IntegerQ[m]
```

Rule 5799

```
Int[((a_.) + ArcSinh[(c_.)*(x_)]*(b_.))^(n_.)/((d_.) + (e_.)*(x_)), x_Symbo
l] :> Subst[Int[((a + b*x)^n*Cosh[x])/(c*d + e*Sinh[x]), x], x, ArcSinh[c*x
]] /; FreeQ[{a, b, c, d, e}, x] && IGtQ[n, 0]
```

Rule 6304

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))^(n_.)*(x_)^(m_.)*((d_.) + (e_.)*(x_
)^2)^(p_.), x_Symbol] :> -Subst[Int[((e + d*x^2)^p*(a + b*ArcSinh[x/c])^n)/
x^(m + 2*(p + 1)), x], x, 1/x] /; FreeQ[{a, b, c, d, e, n}, x] && IGtQ[n, 0
] && IntegersQ[m, p]
```

Rubi steps

$$\int \frac{x^5\left(a+b\text{csch}^{-1}(cx)\right)}{\left(d+ex^2\right)^2}\,dx = -\text{Subst}\left(\int \frac{a+b\sinh^{-1}\left(\frac{x}{c}\right)}{x^3\left(e+dx^2\right)^2}\,dx, x, \frac{1}{x}\right)$$

$$= -\text{Subst}\left(\int\left(\frac{a+b\sinh^{-1}\left(\frac{x}{c}\right)}{e^2x^3} - \frac{2d\left(a+b\sinh^{-1}\left(\frac{x}{c}\right)\right)}{e^3x} + \frac{d^2x\left(a+b\sinh^{-1}\left(\frac{x}{c}\right)\right)}{e^2\left(e+dx^2\right)^2} + \right.\right.$$

$$= \frac{(2d)\,\text{Subst}\left(\int \frac{a+b\sinh^{-1}\left(\frac{x}{c}\right)}{x}\,dx, x, \frac{1}{x}\right)}{e^3} - \frac{\left(2d^2\right)\text{Subst}\left(\int \frac{x\left(a+b\sinh^{-1}\left(\frac{x}{c}\right)\right)}{e+dx^2}\,dx, x, \frac{1}{x}\right)}{e^3} - \frac{\text{Su}}{}$$

$$= \frac{d\left(a+b\text{csch}^{-1}(cx)\right)}{2e^2\left(e+\frac{d}{x^2}\right)} + \frac{x^2\left(a+b\text{csch}^{-1}(cx)\right)}{2e^2} + \frac{(2d)\,\text{Subst}\left(\int(a+bx)\coth(x)\,dx, x\right.}{e^3}$$

$$= \frac{b\sqrt{1+\frac{1}{c^2x^2}}\,x}{2ce^2} + \frac{d\left(a+b\text{csch}^{-1}(cx)\right)}{2e^2\left(e+\frac{d}{x^2}\right)} + \frac{x^2\left(a+b\text{csch}^{-1}(cx)\right)}{2e^2} - \frac{d\left(a+b\text{csch}^{-1}(cx)\right)}{be^3}$$

$$= \frac{b\sqrt{1+\frac{1}{c^2x^2}}\,x}{2ce^2} + \frac{d\left(a+b\text{csch}^{-1}(cx)\right)}{2e^2\left(e+\frac{d}{x^2}\right)} + \frac{x^2\left(a+b\text{csch}^{-1}(cx)\right)}{2e^2} - \frac{d\left(a+b\text{csch}^{-1}(cx)\right)}{be^3}$$

$$= \frac{b\sqrt{1+\frac{1}{c^2x^2}}\,x}{2ce^2} + \frac{d\left(a+b\text{csch}^{-1}(cx)\right)}{2e^2\left(e+\frac{d}{x^2}\right)} + \frac{x^2\left(a+b\text{csch}^{-1}(cx)\right)}{2e^2} - \frac{bd\tan^{-1}\left(\frac{\sqrt{c^2d-e}}{c\sqrt{e}\sqrt{1+}}\right.}{2\sqrt{c^2d-e}\,e^{5/2}}$$

$$= \frac{b\sqrt{1+\frac{1}{c^2x^2}}\,x}{2ce^2} + \frac{d\left(a+b\text{csch}^{-1}(cx)\right)}{2e^2\left(e+\frac{d}{x^2}\right)} + \frac{x^2\left(a+b\text{csch}^{-1}(cx)\right)}{2e^2} - \frac{bd\tan^{-1}\left(\frac{\sqrt{c^2d-e}}{c\sqrt{e}\sqrt{1+}}\right.}{2\sqrt{c^2d-e}\,e^{5/2}}$$

$$= \frac{b\sqrt{1+\frac{1}{c^2x^2}}\,x}{2ce^2} + \frac{d\left(a+b\text{csch}^{-1}(cx)\right)}{2e^2\left(e+\frac{d}{x^2}\right)} + \frac{x^2\left(a+b\text{csch}^{-1}(cx)\right)}{2e^2} - \frac{bd\tan^{-1}\left(\frac{\sqrt{c^2d-e}}{c\sqrt{e}\sqrt{1+}}\right.}{2\sqrt{c^2d-e}\,e^{5/2}}$$

$$= \frac{b\sqrt{1+\frac{1}{c^2x^2}}\,x}{} + \frac{d\left(a+b\text{csch}^{-1}(cx)\right)}{} + \frac{x^2\left(a+b\text{csch}^{-1}(cx)\right)}{} - \frac{bd\tan^{-1}\left(\frac{\sqrt{c^2d-e}}{c\sqrt{e}\sqrt{1+}}\right.}{}$$

**Mathematica [C]** time = 6.36, size = 1447, normalized size = 2.45

result too large to display

Warning: Unable to verify antiderivative.

```
[In] Integrate[(x^5*(a + b*ArcCsch[c*x]))/(d + e*x^2)^2,x]
```

```
[Out] -1/4*(-2*a*e*x^2 + (2*a*d^2)/(d + e*x^2) + 4*a*d*Log[d + e*x^2] + b*(d*Pi^2
 - (2*e*Sqrt[1 + 1/(c^2*x^2)]*x)/c - (4*I)*d*Pi*ArcCsch[c*x] - 2*e*x^2*ArcC
sch[c*x] + (d^(3/2)*ArcCsch[c*x])/(Sqrt[d] - I*Sqrt[e]*x) + (d^(3/2)*ArcCsc
h[c*x])/(Sqrt[d] + I*Sqrt[e]*x) - 8*d*ArcCsch[c*x]^2 - 2*d*ArcSinh[1/(c*x)]
 + 16*d*ArcSin[Sqrt[1 + Sqrt[e]/(c*Sqrt[d])]/Sqrt[2]]*ArcTan[((c*Sqrt[d] -
Sqrt[e])*Cot[(Pi + (2*I)*ArcCsch[c*x])/4])/Sqrt[-(c^2*d) + e]] - 16*d*ArcSi
n[Sqrt[1 - Sqrt[e]/(c*Sqrt[d])]/Sqrt[2]]*ArcTan[((c*Sqrt[d] + Sqrt[e])*Cot[
(Pi + (2*I)*ArcCsch[c*x])/4])/Sqrt[-(c^2*d) + e]] - 8*d*ArcCsch[c*x]*Log[1
- E^(-2*ArcCsch[c*x])] + (2*I)*d*Pi*Log[1 - (I*(-Sqrt[e] + Sqrt[-(c^2*d) +
e])*E^ArcCsch[c*x])/(c*Sqrt[d])] + 4*d*ArcCsch[c*x]*Log[1 - (I*(-Sqrt[e] +
Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])/(c*Sqrt[d])] + (8*I)*d*ArcSin[Sqrt[1 +
Sqrt[e]/(c*Sqrt[d])]/Sqrt[2]]*Log[1 - (I*(-Sqrt[e] + Sqrt[-(c^2*d) + e])*E^
ArcCsch[c*x])/(c*Sqrt[d])] + (2*I)*d*Pi*Log[1 + (I*(-Sqrt[e] + Sqrt[-(c^2*d
) + e])*E^ArcCsch[c*x])/(c*Sqrt[d])] + 4*d*ArcCsch[c*x]*Log[1 + (I*(-Sqrt[e
] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])/(c*Sqrt[d])] + (8*I)*d*ArcSin[Sqrt[
1 - Sqrt[e]/(c*Sqrt[d])]/Sqrt[2]]*Log[1 + (I*(-Sqrt[e] + Sqrt[-(c^2*d) + e]
)*E^ArcCsch[c*x])/(c*Sqrt[d])] + (2*I)*d*Pi*Log[1 - (I*(Sqrt[e] + Sqrt[-(c^
2*d) + e])*E^ArcCsch[c*x])/(c*Sqrt[d])] + 4*d*ArcCsch[c*x]*Log[1 - (I*(Sqrt
[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])/(c*Sqrt[d])] - (8*I)*d*ArcSin[Sqr
t[1 - Sqrt[e]/(c*Sqrt[d])]/Sqrt[2]]*Log[1 - (I*(Sqrt[e] + Sqrt[-(c^2*d) + e
])*E^ArcCsch[c*x])/(c*Sqrt[d])] + (2*I)*d*Pi*Log[1 + (I*(Sqrt[e] + Sqrt[-(c
^2*d) + e])*E^ArcCsch[c*x])/(c*Sqrt[d])] + 4*d*ArcCsch[c*x]*Log[1 + (I*(Sqr
t[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])/(c*Sqrt[d])] - (8*I)*d*ArcSin[Sq
rt[1 + Sqrt[e]/(c*Sqrt[d])]/Sqrt[2]]*Log[1 + (I*(Sqrt[e] + Sqrt[-(c^2*d) +
e])*E^ArcCsch[c*x])/(c*Sqrt[d])] - (2*I)*d*Pi*Log[Sqrt[e] - (I*Sqrt[d])/x]
- (2*I)*d*Pi*Log[Sqrt[e] + (I*Sqrt[d])/x] + (d*Sqrt[e]*Log[(2*Sqrt[d]*Sqrt[
e]*(I*Sqrt[e] + c*(c*Sqrt[d] + I*Sqrt[-(c^2*d) + e]*Sqrt[1 + 1/(c^2*x^2)])*
x))/(Sqrt[-(c^2*d) + e]*(I*Sqrt[d] + Sqrt[e]*x))])/Sqrt[-(c^2*d) + e] + (d*
Sqrt[e]*Log[(-2*Sqrt[d]*Sqrt[e]*(Sqrt[e] + c*(I*c*Sqrt[d] + Sqrt[-(c^2*d) +
 e]*Sqrt[1 + 1/(c^2*x^2)])*x))/(Sqrt[-(c^2*d) + e]*(Sqrt[d] + I*Sqrt[e]*x))
])/Sqrt[-(c^2*d) + e] + 4*d*PolyLog[2, E^(-2*ArcCsch[c*x])] + 4*d*PolyLog[2
, ((-I)*(-Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])/(c*Sqrt[d])] + 4*d*
PolyLog[2, (I*(-Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])/(c*Sqrt[d])]
+ 4*d*PolyLog[2, ((-I)*(Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])/(c*Sq
rt[d])] + 4*d*PolyLog[2, (I*(Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])/
(c*Sqrt[d])]))/e^3
```

**fricas [F]** time = 0.56, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{bx^5 \operatorname{arcsch}(cx) + ax^5}{e^2x^4 + 2\,dex^2 + d^2}, x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^5*(a+b*arccsch(c*x))/(e*x^2+d)^2,x, algorithm="fricas")
```

```
[Out] integral((b*x^5*arccsch(c*x) + a*x^5)/(e^2*x^4 + 2*d*e*x^2 + d^2), x)
```

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

$$\int \frac{(b \operatorname{arcsch}(cx) + a)x^5}{\left(ex^2 + d\right)^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^5*(a+b*arccsch(c*x))/(e*x^2+d)^2,x, algorithm="giac")
```

```
[Out] integrate((b*arccsch(c*x) + a)*x^5/(e*x^2 + d)^2, x)
```

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

$$\int \frac{x^5 (a + b \operatorname{arccsch}(cx))}{\left(e\,x^2 + d\right)^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^5*(a+b*arccsch(c*x))/(e*x^2+d)^2,x)
```

```
[Out] int(x^5*(a+b*arccsch(c*x))/(e*x^2+d)^2,x)
```

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

$$-\frac{1}{2}a\left(\frac{d^2}{e^4x^2 + de^3} - \frac{x^2}{e^2} + \frac{2\,d\log\left(ex^2 + d\right)}{e^3}\right) + b\int \frac{x^5 \log\left(\sqrt{\frac{1}{c^2x^2} + 1} + \frac{1}{cx}\right)}{e^2x^4 + 2\,dex^2 + d^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^5*(a+b*arccsch(c*x))/(e*x^2+d)^2,x, algorithm="maxima")
```

```
[Out] -1/2*a*(d^2/(e^4*x^2 + d*e^3) - x^2/e^2 + 2*d*log(e*x^2 + d)/e^3) + b*integ
rate(x^5*log(sqrt(1/(c^2*x^2) + 1) + 1/(c*x))/(e^2*x^4 + 2*d*e*x^2 + d^2),
x)
```

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

$$\int \frac{x^5 \left(a + b \operatorname{asinh}\left(\frac{1}{c\,x}\right)\right)}{\left(e\,x^2 + d\right)^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((x^5*(a + b*asinh(1/(c*x))))/(d + e*x^2)^2,x)
[Out] int((x^5*(a + b*asinh(1/(c*x))))/(d + e*x^2)^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**5*(a+b*acsch(c*x))/(e*x**2+d)**2,x)
[Out] Timed out
```

# 3.104 $\int \frac{x^3\left(a+b\operatorname{csch}^{-1}(cx)\right)}{\left(d+ex^2\right)^2}\,dx$

**Optimal**. Leaf size=553

$$\frac{\left(a+b\operatorname{csch}^{-1}(cx)\right)\log\left(1-\frac{c\sqrt{-d}\,e^{\operatorname{csch}^{-1}(cx)}}{\sqrt{e}-\sqrt{e-c^2d}}\right)}{2e^2}+\frac{\left(a+b\operatorname{csch}^{-1}(cx)\right)\log\left(\frac{c\sqrt{-d}\,e^{\operatorname{csch}^{-1}(cx)}}{\sqrt{e}-\sqrt{e-c^2d}}+1\right)}{2e^2}+\frac{\left(a+b\operatorname{csch}^{-1}(cx)\right)\log\left(1\right.}{2e^2}$$

```
[Out] 1/2*(-a-b*arccsch(c*x))/e/(e+d/x^2)-(a+b*arccsch(c*x))^2/b/e^2-(a+b*arccsch
(c*x))*ln(1-1/(1/c/x+(1+1/c^2/x^2)^(1/2))^2)/e^2+1/2*(a+b*arccsch(c*x))*ln(
1-c*(1/c/x+(1+1/c^2/x^2)^(1/2))*(-d)^(1/2)/(e^(1/2)-(-c^2*d+e)^(1/2)))/e^2+
1/2*(a+b*arccsch(c*x))*ln(1+c*(1/c/x+(1+1/c^2/x^2)^(1/2))*(-d)^(1/2)/(e^(1/
2)-(-c^2*d+e)^(1/2)))/e^2+1/2*(a+b*arccsch(c*x))*ln(1-c*(1/c/x+(1+1/c^2/x^2
)^(1/2))*(-d)^(1/2)/(e^(1/2)+(-c^2*d+e)^(1/2)))/e^2+1/2*(a+b*arccsch(c*x))*
ln(1+c*(1/c/x+(1+1/c^2/x^2)^(1/2))*(-d)^(1/2)/(e^(1/2)+(-c^2*d+e)^(1/2)))/e
^2+1/2*b*polylog(2,1/(1/c/x+(1+1/c^2/x^2)^(1/2))^2)/e^2+1/2*b*polylog(2,-c*
(1/c/x+(1+1/c^2/x^2)^(1/2))*(-d)^(1/2)/(e^(1/2)-(-c^2*d+e)^(1/2)))/e^2+1/2*
b*polylog(2,c*(1/c/x+(1+1/c^2/x^2)^(1/2))*(-d)^(1/2)/(e^(1/2)-(-c^2*d+e)^(1
/2)))/e^2+1/2*b*polylog(2,-c*(1/c/x+(1+1/c^2/x^2)^(1/2))*(-d)^(1/2)/(e^(1/2
)+(-c^2*d+e)^(1/2)))/e^2+1/2*b*polylog(2,c*(1/c/x+(1+1/c^2/x^2)^(1/2))*(-d)
^(1/2)/(e^(1/2)+(-c^2*d+e)^(1/2)))/e^2+1/2*b*arctan((c^2*d-e)^(1/2)/c/x/e^(
1/2)/(1+1/c^2/x^2)^(1/2))/e^(3/2)/(c^2*d-e)^(1/2)
```

**Rubi [A]** time = 1.25, antiderivative size = 535, normalized size of antiderivative = 0.97, number of steps used = 29, number of rules used = 12, integrand size = 21, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.571, Rules used = {6304, 5791, 5659, 3716, 2190, 2279, 2391, 5787, 377, 205, 5799, 5561}

$$\frac{b\text{PolyLog}\left(2,-\frac{c\sqrt{-d}\,e^{\operatorname{csch}^{-1}(cx)}}{\sqrt{e}-\sqrt{e-c^2d}}\right)}{2e^2}+\frac{b\text{PolyLog}\left(2,\frac{c\sqrt{-d}\,e^{\operatorname{csch}^{-1}(cx)}}{\sqrt{e}-\sqrt{e-c^2d}}\right)}{2e^2}+\frac{b\text{PolyLog}\left(2,-\frac{c\sqrt{-d}\,e^{\operatorname{csch}^{-1}(cx)}}{\sqrt{e-c^2d}+\sqrt{e}}\right)}{2e^2}+\frac{b\text{PolyLog}\left(2,\frac{c\sqrt{-d}}{\sqrt{e}}\right.}{2e^2}$$

Warning: Unable to verify antiderivative.

```
[In] Int[(x^3*(a + b*ArcCsch[c*x]))/(d + e*x^2)^2,x]
```

```
[Out] -(a + b*ArcCsch[c*x])/(2*e*(e + d/x^2)) + (b*ArcTan[Sqrt[c^2*d - e]/(c*Sqrt
[e]*Sqrt[1 + 1/(c^2*x^2)]*x)])/(2*Sqrt[c^2*d - e]*e^(3/2)) + ((a + b*ArcCsc
h[c*x])*Log[1 - (c*Sqrt[-d]*E^ArcCsch[c*x])/(Sqrt[e] - Sqrt[-(c^2*d) + e])]
```

```
)/(2*e^2) + ((a + b*ArcCsch[c*x])*Log[1 + (c*Sqrt[-d]*E^ArcCsch[c*x])/(Sqrt
[e] - Sqrt[-(c^2*d) + e])])/(2*e^2) + ((a + b*ArcCsch[c*x])*Log[1 - (c*Sqrt
[-d]*E^ArcCsch[c*x])/(Sqrt[e] + Sqrt[-(c^2*d) + e])])/(2*e^2) + ((a + b*Arc
Csch[c*x])*Log[1 + (c*Sqrt[-d]*E^ArcCsch[c*x])/(Sqrt[e] + Sqrt[-(c^2*d) + e
])])/(2*e^2) - ((a + b*ArcCsch[c*x])*Log[1 - E^(2*ArcCsch[c*x])])/e^2 + (b*
PolyLog[2, -((c*Sqrt[-d]*E^ArcCsch[c*x])/(Sqrt[e] - Sqrt[-(c^2*d) + e]))])/
(2*e^2) + (b*PolyLog[2, (c*Sqrt[-d]*E^ArcCsch[c*x])/(Sqrt[e] - Sqrt[-(c^2*d
) + e])])/(2*e^2) + (b*PolyLog[2, -((c*Sqrt[-d]*E^ArcCsch[c*x])/(Sqrt[e] +
Sqrt[-(c^2*d) + e]))])/(2*e^2) + (b*PolyLog[2, (c*Sqrt[-d]*E^ArcCsch[c*x])/
(Sqrt[e] + Sqrt[-(c^2*d) + e])])/(2*e^2) - (b*PolyLog[2, E^(2*ArcCsch[c*x])
])/(2*e^2)
```

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 377

```
Int[((a_) + (b_.)*(x_)^(n_))^(p_)/((c_) + (d_.)*(x_)^(n_)), x_Symbol] :> Su
bst[Int[1/(c - (b*c - a*d)*x^n), x], x, x/(a + b*x^n)^(1/n)] /; FreeQ[{a, b
, c, d}, x] && NeQ[b*c - a*d, 0] && EqQ[n*p + 1, 0] && IntegerQ[n]
```

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 3716

```
Int[((c_.) + (d_.)*(x_))^(m_.)*tan[(e_.) + Pi*(k_.) + (Complex[0, fz_])*(f_
.)*(x_)], x_Symbol] :> -Simp[(I*(c + d*x)^(m + 1))/(d*(m + 1)), x] + Dist[2
```

```
*I, Int[((c + d*x)^m*E^(2*(-(I*e) + f*fz*x)))/(E^(2*I*k*Pi)*(1 + E^(2*(-(I*
e) + f*fz*x))/E^(2*I*k*Pi))), x], x] /; FreeQ[{c, d, e, f, fz}, x] && Integ
erQ[4*k] && IGtQ[m, 0]
```

Rule 5561

```
Int[(Cosh[(c_.) + (d_.)*(x_)]*((e_.) + (f_.)*(x_))^(m_.))/((a_) + (b_.)*Sin
h[(c_.) + (d_.)*(x_)]), x_Symbol] :> -Simp[(e + f*x)^(m + 1)/(b*f*(m + 1)),
 x] + (Int[((e + f*x)^m*E^(c + d*x))/(a - Rt[a^2 + b^2, 2] + b*E^(c + d*x))
, x] + Int[((e + f*x)^m*E^(c + d*x))/(a + Rt[a^2 + b^2, 2] + b*E^(c + d*x))
, x]) /; FreeQ[{a, b, c, d, e, f}, x] && IGtQ[m, 0] && NeQ[a^2 + b^2, 0]
```

Rule 5659

```
Int[((a_.) + ArcSinh[(c_.)*(x_)]*(b_.))^(n_.)/(x_), x_Symbol] :> Subst[Int[
(a + b*x)^n/Tanh[x], x], x, ArcSinh[c*x]] /; FreeQ[{a, b, c}, x] && IGtQ[n,
 0]
```

Rule 5787

```
Int[((a_.) + ArcSinh[(c_.)*(x_)]*(b_.))*(x_)*((d_) + (e_.)*(x_)^2)^(p_.), x
_Symbol] :> Simp[((d + e*x^2)^(p + 1)*(a + b*ArcSinh[c*x]))/(2*e*(p + 1)),
x] - Dist[(b*c)/(2*e*(p + 1)), Int[(d + e*x^2)^(p + 1)/Sqrt[1 + c^2*x^2], x
], x] /; FreeQ[{a, b, c, d, e, p}, x] && NeQ[e, c^2*d] && NeQ[p, -1]
```

Rule 5791

```
Int[((a_.) + ArcSinh[(c_.)*(x_)]*(b_.))^(n_.)*((f_.)*(x_))^(m_.)*((d_) + (e
_.)*(x_)^2)^(p_.), x_Symbol] :> Int[ExpandIntegrand[(a + b*ArcSinh[c*x])^n,
 (f*x)^m*(d + e*x^2)^p, x], x] /; FreeQ[{a, b, c, d, e, f}, x] && NeQ[e, c^
2*d] && IGtQ[n, 0] && IntegerQ[p] && IntegerQ[m]
```

Rule 5799

```
Int[((a_.) + ArcSinh[(c_.)*(x_)]*(b_.))^(n_.)/((d_.) + (e_.)*(x_)), x_Symbo
l] :> Subst[Int[((a + b*x)^n*Cosh[x])/(c*d + e*Sinh[x]), x], x, ArcSinh[c*x
]] /; FreeQ[{a, b, c, d, e}, x] && IGtQ[n, 0]
```

Rule 6304

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))^(n_.)*(x_)^(m_.)*((d_.) + (e_.)*(x_
)^2)^(p_.), x_Symbol] :> -Subst[Int[((e + d*x^2)^p*(a + b*ArcSinh[x/c])^n)/
x^(m + 2*(p + 1)), x], x, 1/x] /; FreeQ[{a, b, c, d, e, n}, x] && IGtQ[n, 0
] && IntegersQ[m, p]
```

Rubi steps

$$\int \frac{x^3\left(a+b\text{csch}^{-1}(cx)\right)}{\left(d+ex^2\right)^2}\,dx = -\text{Subst}\left(\int \frac{a+b\sinh^{-1}\left(\frac{x}{c}\right)}{x\left(e+dx^2\right)^2}\,dx, x, \frac{1}{x}\right)$$

$$= -\text{Subst}\left(\int \left(\frac{a+b\sinh^{-1}\left(\frac{x}{c}\right)}{e^2x} - \frac{dx\left(a+b\sinh^{-1}\left(\frac{x}{c}\right)\right)}{e\left(e+dx^2\right)^2} - \frac{dx\left(a+b\sinh^{-1}\left(\frac{x}{c}\right)\right)}{e^2\left(e+dx^2\right)}\right) d$$

$$= -\frac{\text{Subst}\left(\int \frac{a+b\sinh^{-1}\left(\frac{x}{c}\right)}{x}\,dx, x, \frac{1}{x}\right)}{e^2} + \frac{d\,\text{Subst}\left(\int \frac{x\left(a+b\sinh^{-1}\left(\frac{x}{c}\right)\right)}{e+dx^2}\,dx, x, \frac{1}{x}\right)}{e^2} + \frac{d\,\text{Subst}\left(\right.}{}$$

$$= -\frac{a+b\text{csch}^{-1}(cx)}{2e\left(e+\frac{d}{x^2}\right)} - \frac{\text{Subst}\left(\int (a+bx)\coth(x)\,dx, x, \text{csch}^{-1}(cx)\right)}{e^2} + \frac{d\,\text{Subst}\left(\int \left(-\right.\right.}{}$$

$$= -\frac{a+b\text{csch}^{-1}(cx)}{2e\left(e+\frac{d}{x^2}\right)} + \frac{\left(a+b\text{csch}^{-1}(cx)\right)^2}{2be^2} + \frac{2\,\text{Subst}\left(\int \frac{e^{2x}(a+bx)}{1-e^{2x}}\,dx, x, \text{csch}^{-1}(cx)\right)}{e^2}$$

$$= -\frac{a+b\text{csch}^{-1}(cx)}{2e\left(e+\frac{d}{x^2}\right)} + \frac{\left(a+b\text{csch}^{-1}(cx)\right)^2}{2be^2} + \frac{b\tan^{-1}\left(\frac{\sqrt{c^2d-e}}{c\sqrt{e}\sqrt{1+\frac{1}{c^2x^2}}\,x}\right)}{2\sqrt{c^2d-e}\,e^{3/2}} - \frac{\left(a+b\text{csch}^{-1}\right.}{}$$

$$= -\frac{a+b\text{csch}^{-1}(cx)}{2e\left(e+\frac{d}{x^2}\right)} + \frac{b\tan^{-1}\left(\frac{\sqrt{c^2d-e}}{c\sqrt{e}\sqrt{1+\frac{1}{c^2x^2}}\,x}\right)}{2\sqrt{c^2d-e}\,e^{3/2}} - \frac{\left(a+b\text{csch}^{-1}(cx)\right)\log\left(1-e^{2\text{csch}^{-1}(\right.}{e^2}$$

$$= -\frac{a+b\text{csch}^{-1}(cx)}{2e\left(e+\frac{d}{x^2}\right)} + \frac{b\tan^{-1}\left(\frac{\sqrt{c^2d-e}}{c\sqrt{e}\sqrt{1+\frac{1}{c^2x^2}}\,x}\right)}{2\sqrt{c^2d-e}\,e^{3/2}} + \frac{\left(a+b\text{csch}^{-1}(cx)\right)\log\left(1-\frac{c\sqrt{-d}\,e^{\text{csch}}}{\sqrt{e}-\sqrt{-c}}\right.}{2e^2}$$

$$= -\frac{a+b\text{csch}^{-1}(cx)}{2e\left(e+\frac{d}{x^2}\right)} + \frac{b\tan^{-1}\left(\frac{\sqrt{c^2d-e}}{c\sqrt{e}\sqrt{1+\frac{1}{c^2x^2}}\,x}\right)}{2\sqrt{c^2d-e}\,e^{3/2}} + \frac{\left(a+b\text{csch}^{-1}(cx)\right)\log\left(1-\frac{c\sqrt{-d}\,e^{\text{csch}}}{\sqrt{e}-\sqrt{-c}}\right.}{2e^2}$$

$$= -\frac{a+b\text{csch}^{-1}(cx)}{} + \frac{b\tan^{-1}\left(\frac{\sqrt{c^2d-e}}{c\sqrt{e}\sqrt{1+\frac{1}{c^2x^2}}\,x}\right)}{} + \frac{\left(a+b\text{csch}^{-1}(cx)\right)\log\left(1-\frac{c\sqrt{-d}\,e^{\text{csch}}}{\sqrt{e}-\sqrt{-c}}\right.}{}$$

**<u>Mathematica</u> [C]** time = 2.41, size = 1410, normalized size = 2.55

result too large to display

Warning: Unable to verify antiderivative.

```
[In] Integrate[(x^3*(a + b*ArcCsch[c*x]))/(d + e*x^2)^2,x]
```

```
[Out] (b*Pi^2 + (4*a*d)/(d + e*x^2) - (4*I)*b*Pi*ArcCsch[c*x] + (2*b*Sqrt[d]*ArcC
sch[c*x])/(Sqrt[d] - I*Sqrt[e]*x) + (2*b*Sqrt[d]*ArcCsch[c*x])/(Sqrt[d] + I
*Sqrt[e]*x) - 8*b*ArcCsch[c*x]^2 - 4*b*ArcSinh[1/(c*x)] + 16*b*ArcSin[Sqrt[
1 + Sqrt[e]/(c*Sqrt[d])]/Sqrt[2]]*ArcTan[((c*Sqrt[d] - Sqrt[e])*Cot[(Pi + (
2*I)*ArcCsch[c*x])/4])/Sqrt[-(c^2*d) + e]] - 16*b*ArcSin[Sqrt[1 - Sqrt[e]/(
c*Sqrt[d])]/Sqrt[2]]*ArcTan[((c*Sqrt[d] + Sqrt[e])*Cot[(Pi + (2*I)*ArcCsch[
c*x])/4])/Sqrt[-(c^2*d) + e]] - 8*b*ArcCsch[c*x]*Log[1 - E^(-2*ArcCsch[c*x]
)] + (2*I)*b*Pi*Log[1 - (I*(-Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])/
(c*Sqrt[d])] + 4*b*ArcCsch[c*x]*Log[1 - (I*(-Sqrt[e] + Sqrt[-(c^2*d) + e])*
E^ArcCsch[c*x])/(c*Sqrt[d])] + (8*I)*b*ArcSin[Sqrt[1 + Sqrt[e]/(c*Sqrt[d])]
/Sqrt[2]]*Log[1 - (I*(-Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])/(c*Sqr
t[d])] + (2*I)*b*Pi*Log[1 + (I*(-Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*
x])/(c*Sqrt[d])] + 4*b*ArcCsch[c*x]*Log[1 + (I*(-Sqrt[e] + Sqrt[-(c^2*d) +
e])*E^ArcCsch[c*x])/(c*Sqrt[d])] + (8*I)*b*ArcSin[Sqrt[1 - Sqrt[e]/(c*Sqrt[
d])]/Sqrt[2]]*Log[1 + (I*(-Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])/(c
*Sqrt[d])] + (2*I)*b*Pi*Log[1 - (I*(Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch
[c*x])/(c*Sqrt[d])] + 4*b*ArcCsch[c*x]*Log[1 - (I*(Sqrt[e] + Sqrt[-(c^2*d)
+ e])*E^ArcCsch[c*x])/(c*Sqrt[d])] - (8*I)*b*ArcSin[Sqrt[1 - Sqrt[e]/(c*Sqr
t[d])]/Sqrt[2]]*Log[1 - (I*(Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])/(
c*Sqrt[d])] + (2*I)*b*Pi*Log[1 + (I*(Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsc
h[c*x])/(c*Sqrt[d])] + 4*b*ArcCsch[c*x]*Log[1 + (I*(Sqrt[e] + Sqrt[-(c^2*d)
 + e])*E^ArcCsch[c*x])/(c*Sqrt[d])] - (8*I)*b*ArcSin[Sqrt[1 + Sqrt[e]/(c*Sq
rt[d])]/Sqrt[2]]*Log[1 + (I*(Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])/
(c*Sqrt[d])] - (2*I)*b*Pi*Log[Sqrt[e] - (I*Sqrt[d])/x] - (2*I)*b*Pi*Log[Sqr
t[e] + (I*Sqrt[d])/x] + (2*b*Sqrt[e]*Log[(2*Sqrt[d]*Sqrt[e]*(I*Sqrt[e] + c*
(c*Sqrt[d] + I*Sqrt[-(c^2*d) + e]*Sqrt[1 + 1/(c^2*x^2)])*x))/(Sqrt[-(c^2*d)
 + e]*(I*Sqrt[d] + Sqrt[e]*x))])/Sqrt[-(c^2*d) + e] + (2*b*Sqrt[e]*Log[(-2*
Sqrt[d]*Sqrt[e]*(Sqrt[e] + c*(I*c*Sqrt[d] + Sqrt[-(c^2*d) + e]*Sqrt[1 + 1/(
c^2*x^2)])*x))/(Sqrt[-(c^2*d) + e]*(Sqrt[d] + I*Sqrt[e]*x))])/Sqrt[-(c^2*d)
 + e] + 4*a*Log[d + e*x^2] + 4*b*PolyLog[2, E^(-2*ArcCsch[c*x])] + 4*b*Poly
Log[2, ((-I)*(-Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])/(c*Sqrt[d])] +
 4*b*PolyLog[2, (I*(-Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])/(c*Sqrt[
d])] + 4*b*PolyLog[2, ((-I)*(Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])/
(c*Sqrt[d])] + 4*b*PolyLog[2, (I*(Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c
*x])/(c*Sqrt[d])])/(8*e^2)
```

**fricas [F]** time = 1.95, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{bx^3 \operatorname{arcsch}(cx) + ax^3}{e^2x^4 + 2\,dex^2 + d^2}, x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^3*(a+b*arccsch(c*x))/(e*x^2+d)^2,x, algorithm="fricas")
```

```
[Out] integral((b*x^3*arccsch(c*x) + a*x^3)/(e^2*x^4 + 2*d*e*x^2 + d^2), x)
```

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

$$\int \frac{(b \operatorname{arcsch}(cx) + a)x^3}{\left(ex^2 + d\right)^2}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^3*(a+b*arccsch(c*x))/(e*x^2+d)^2,x, algorithm="giac")
```

```
[Out] integrate((b*arccsch(c*x) + a)*x^3/(e*x^2 + d)^2, x)
```

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

$$\int \frac{x^3 (a + b \operatorname{arccsch}(cx))}{\left(e\,x^2 + d\right)^2}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^3*(a+b*arccsch(c*x))/(e*x^2+d)^2,x)
```

```
[Out] int(x^3*(a+b*arccsch(c*x))/(e*x^2+d)^2,x)
```

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

$$\frac{1}{2}\,a\left(\frac{d}{e^3x^2 + de^2} + \frac{\log\left(ex^2 + d\right)}{e^2}\right) + b\int \frac{x^3 \log\left(\sqrt{\frac{1}{c^2x^2} + 1} + \frac{1}{cx}\right)}{e^2x^4 + 2\,dex^2 + d^2}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^3*(a+b*arccsch(c*x))/(e*x^2+d)^2,x, algorithm="maxima")
```

```
[Out] 1/2*a*(d/(e^3*x^2 + d*e^2) + log(e*x^2 + d)/e^2) + b*integrate(x^3*log(sqrt
(1/(c^2*x^2) + 1) + 1/(c*x))/(e^2*x^4 + 2*d*e*x^2 + d^2), x)
```

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

$$\int \frac{x^3 \left(a + b \operatorname{asinh}\left(\frac{1}{c\,x}\right)\right)}{\left(e\,x^2 + d\right)^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((x^3*(a + b*asinh(1/(c*x))))/(d + e*x^2)^2,x)
[Out] int((x^3*(a + b*asinh(1/(c*x))))/(d + e*x^2)^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**3*(a+b*acsch(c*x))/(e*x**2+d)**2,x)
[Out] Timed out
```

# 3.105 $\int \frac{x\left(a+b\,\mathrm{csch}^{-1}(cx)\right)}{\left(d+ex^2\right)^2}\,dx$

**Optimal**. Leaf size=139

$$-\frac{a+b\,\mathrm{csch}^{-1}(cx)}{2e\left(d+ex^2\right)}+\frac{bcx\tan^{-1}\left(\sqrt{-c^2x^2-1}\right)}{2de\sqrt{-c^2x^2}}+\frac{bcx\tanh^{-1}\left(\frac{\sqrt{e}\sqrt{-c^2x^2-1}}{\sqrt{c^2d-e}}\right)}{2d\sqrt{e}\sqrt{-c^2x^2}\sqrt{c^2d-e}}$$

```
[Out] 1/2*(-a-b*arccsch(c*x))/e/(e*x^2+d)+1/2*b*c*x*arctan((-c^2*x^2-1)^(1/2))/d/
e/(-c^2*x^2)^(1/2)+1/2*b*c*x*arctanh(e^(1/2)*(-c^2*x^2-1)^(1/2)/(c^2*d-e)^(
1/2))/d/(c^2*d-e)^(1/2)/e^(1/2)/(-c^2*x^2)^(1/2)
```

**Rubi** [A] time = 0.15, antiderivative size = 139, normalized size of antiderivative = 1.00, number of steps used = 7, number of rules used = 6, integrand size = 19, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.316, Rules used = {6300, 446, 86, 63, 205, 208}

$$-\frac{a+b\,\mathrm{csch}^{-1}(cx)}{2e\left(d+ex^2\right)}+\frac{bcx\tan^{-1}\left(\sqrt{-c^2x^2-1}\right)}{2de\sqrt{-c^2x^2}}+\frac{bcx\tanh^{-1}\left(\frac{\sqrt{e}\sqrt{-c^2x^2-1}}{\sqrt{c^2d-e}}\right)}{2d\sqrt{e}\sqrt{-c^2x^2}\sqrt{c^2d-e}}$$

Antiderivative was successfully verified.

```
[In] Int[(x*(a + b*ArcCsch[c*x]))/(d + e*x^2)^2,x]
```

```
[Out] -(a + b*ArcCsch[c*x])/(2*e*(d + e*x^2)) + (b*c*x*ArcTan[Sqrt[-1 - c^2*x^2]]
)/(2*d*e*Sqrt[-(c^2*x^2)]) + (b*c*x*ArcTanh[(Sqrt[e]*Sqrt[-1 - c^2*x^2])/Sq
rt[c^2*d - e]])/(2*d*Sqrt[c^2*d - e]*Sqrt[e]*Sqrt[-(c^2*x^2)])
```

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 86

```
Int[((e_.) + (f_.)*(x_))^(p_)/(((a_.) + (b_.)*(x_))*((c_.) + (d_.)*(x_))),
x_Symbol] :> Dist[b/(b*c - a*d), Int[(e + f*x)^p/(a + b*x), x], x] - Dist[d
/(b*c - a*d), Int[(e + f*x)^p/(c + d*x), x], x] /; FreeQ[{a, b, c, d, e, f,
 p}, x] && !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 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 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 6300

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))*(x_)*((d_.) + (e_.)*(x_)^2)^(p_.),
x_Symbol] :> Simp[((d + e*x^2)^(p + 1)*(a + b*ArcCsch[c*x]))/(2*e*(p + 1)),
 x] - Dist[(b*c*x)/(2*e*(p + 1)*Sqrt[-(c^2*x^2)]), Int[(d + e*x^2)^(p + 1)/
(x*Sqrt[-1 - c^2*x^2]), x], x] /; FreeQ[{a, b, c, d, e, p}, x] && NeQ[p, -1
]
```

Rubi steps

$$\int \frac{x\left(a+b\operatorname{csch}^{-1}(cx)\right)}{\left(d+ex^2\right)^2}\,dx = -\frac{a+b\operatorname{csch}^{-1}(cx)}{2e\left(d+ex^2\right)} + \frac{(bcx)\int \frac{1}{x\sqrt{-1-c^2x^2}\left(d+ex^2\right)}\,dx}{2e\sqrt{-c^2x^2}}$$

$$= -\frac{a+b\operatorname{csch}^{-1}(cx)}{2e\left(d+ex^2\right)} + \frac{(bcx)\operatorname{Subst}\left(\int \frac{1}{x\sqrt{-1-c^2x}\,(d+ex)}\,dx, x, x^2\right)}{4e\sqrt{-c^2x^2}}$$

$$= -\frac{a+b\operatorname{csch}^{-1}(cx)}{2e\left(d+ex^2\right)} - \frac{(bcx)\operatorname{Subst}\left(\int \frac{1}{\sqrt{-1-c^2x}\,(d+ex)}\,dx, x, x^2\right)}{4d\sqrt{-c^2x^2}} + \frac{(bcx)\operatorname{Subst}\left(\int \frac{1}{x\sqrt{-1-}}\right.}{4de\sqrt{-c^2x}}$$

$$= -\frac{a+b\operatorname{csch}^{-1}(cx)}{2e\left(d+ex^2\right)} + \frac{(bx)\operatorname{Subst}\left(\int \frac{1}{d-\frac{e}{c^2}-\frac{ex^2}{c^2}}\,dx, x, \sqrt{-1-c^2x^2}\right)}{2cd\sqrt{-c^2x^2}} - \frac{(bx)\operatorname{Subst}\left(\int \frac{}{-\frac{1}{c^2}}\right.}{2cd}$$

$$= -\frac{a+b\operatorname{csch}^{-1}(cx)}{2e\left(d+ex^2\right)} + \frac{bcx\tan^{-1}\left(\sqrt{-1-c^2x^2}\right)}{2de\sqrt{-c^2x^2}} + \frac{bcx\tanh^{-1}\left(\frac{\sqrt{e}\sqrt{-1-c^2x^2}}{\sqrt{c^2d-e}}\right)}{2d\sqrt{c^2d-e}\sqrt{e}\sqrt{-c^2x^2}}$$

**Mathematica [C]** time = 0.79, size = 271, normalized size = 1.95

$$-\frac{\frac{2a}{d+ex^2} + \frac{b\sqrt{e}\log\left(-\frac{4\left(cd\sqrt{e}x\left(c\sqrt{d}+i\sqrt{\frac{1}{c^2x^2}+1}\sqrt{e-c^2d}\right)+ide\right)}{b\sqrt{e-c^2d}\left(\sqrt{d}-i\sqrt{e}x\right)}\right)}{d\sqrt{e-c^2d}} + \frac{b\sqrt{e}\log\left(\frac{4i\left(de+cd\sqrt{e}x\left(\sqrt{\frac{1}{c^2x^2}+1}\sqrt{e-c^2d}+ic\sqrt{d}\right)\right)}{b\sqrt{e-c^2d}\left(\sqrt{d}+i\sqrt{e}x\right)}\right)}{d\sqrt{e-c^2d}} + \frac{2b\operatorname{csch}^{-1}(cx)}{d+ex^2} - \frac{2b\sinh^{-1}\left(\frac{1}{cx}\right)}{d}}{4e}$$

Antiderivative was successfully verified.

```
[In] Integrate[(x*(a + b*ArcCsch[c*x]))/(d + e*x^2)^2,x]
```

```
[Out] -1/4*((2*a)/(d + e*x^2) + (2*b*ArcCsch[c*x])/(d + e*x^2) - (2*b*ArcSinh[1/(
c*x)])/d + (b*Sqrt[e]*Log[(-4*(I*d*e + c*d*Sqrt[e]*(c*Sqrt[d] + I*Sqrt[-(c^
2*d) + e]*Sqrt[1 + 1/(c^2*x^2)])*x))/(b*Sqrt[-(c^2*d) + e]*(Sqrt[d] - I*Sqr
t[e]*x))])/(d*Sqrt[-(c^2*d) + e]) + (b*Sqrt[e]*Log[((4*I)*(d*e + c*d*Sqrt[e
]*(I*c*Sqrt[d] + Sqrt[-(c^2*d) + e]*Sqrt[1 + 1/(c^2*x^2)])*x))/(b*Sqrt[-(c^
2*d) + e]*(Sqrt[d] + I*Sqrt[e]*x))])/(d*Sqrt[-(c^2*d) + e]))/e
```

**fricas [B]** time = 0.94, size = 615, normalized size = 4.42

$$\left[-\frac{2\,ac^2d^2-2\,ade+\sqrt{-c^2de+e^2}\left(bex^2+bd\right)\log\left(\frac{c^2ex^2-c^2d-2\,\sqrt{-c^2de+e^2}\,cx\sqrt{\frac{c^2x^2+1}{c^2x^2}}+2\,e}{ex^2+d}\right)-2\left(bc^2d^2-bde+\left(bc^2de-be\right.\right.}{4\left(c^2d^3e\right.}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*(a+b*arccsch(c*x))/(e*x^2+d)^2,x, algorithm="fricas")
```

```
[Out] [-1/4*(2*a*c^2*d^2 - 2*a*d*e + sqrt(-c^2*d*e + e^2)*(b*e*x^2 + b*d)*log((c^
2*e*x^2 - c^2*d - 2*sqrt(-c^2*d*e + e^2)*c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2))
+ 2*e)/(e*x^2 + d)) - 2*(b*c^2*d^2 - b*d*e + (b*c^2*d*e - b*e^2)*x^2)*log(c
*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) - c*x + 1) + 2*(b*c^2*d^2 - b*d*e + (b*c^2
*d*e - b*e^2)*x^2)*log(c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) - c*x - 1) + 2*(b*
c^2*d^2 - b*d*e)*log((c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) + 1)/(c*x)))/(c^2*d
^3*e - d^2*e^2 + (c^2*d^2*e^2 - d*e^3)*x^2), -1/2*(a*c^2*d^2 - a*d*e + sqrt
(c^2*d*e - e^2)*(b*e*x^2 + b*d)*arctan(-sqrt(c^2*d*e - e^2)*c*x*sqrt((c^2*x
^2 + 1)/(c^2*x^2))/(c^2*d - e)) - (b*c^2*d^2 - b*d*e + (b*c^2*d*e - b*e^2)*
x^2)*log(c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) - c*x + 1) + (b*c^2*d^2 - b*d*e
+ (b*c^2*d*e - b*e^2)*x^2)*log(c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) - c*x - 1)
 + (b*c^2*d^2 - b*d*e)*log((c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) + 1)/(c*x)))/
(c^2*d^3*e - d^2*e^2 + (c^2*d^2*e^2 - d*e^3)*x^2)]
```

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

$$\int \frac{(b\,\mathrm{arcsch}\,(cx)+a)x}{\left(ex^2+d\right)^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*(a+b*arccsch(c*x))/(e*x^2+d)^2,x, algorithm="giac")
```

```
[Out] integrate((b*arccsch(c*x) + a)*x/(e*x^2 + d)^2, x)
```

**maple [B]** time = 0.07, size = 360, normalized size = 2.59

$$-\frac{c^2a}{2e\left(c^2x^2e+c^2d\right)}-\frac{c^2b\,\mathrm{arccsch}\,(cx)}{2e\left(c^2x^2e+c^2d\right)}+\frac{b\sqrt{c^2x^2+1}\ \mathrm{arctanh}\left(\frac{1}{\sqrt{c^2x^2+1}}\right)}{2ce\sqrt{\frac{c^2x^2+1}{c^2x^2}}\ xd}-\frac{b\sqrt{c^2x^2+1}\ \ln\left(-\frac{2\left(\sqrt{c^2x^2+1}\ \sqrt{-\frac{c^2d-e}{e}}\ e+\sqrt{-c^2d\right.}{-cxe+\sqrt{-c^2de}}\right.}{4ce\sqrt{\frac{c^2x^2+1}{c^2x^2}}\ xd\sqrt{-\frac{c^2d-e}{e}}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x*(a+b*arccsch(c*x))/(e*x^2+d)^2,x)
```

```
[Out] -1/2*c^2*a/e/(c^2*e*x^2+c^2*d)-1/2*c^2*b/e/(c^2*e*x^2+c^2*d)*arccsch(c*x)+1
/2/c*b/e*(c^2*x^2+1)^(1/2)/((c^2*x^2+1)/c^2/x^2)^(1/2)/x/d*arctanh(1/(c^2*x
^2+1)^(1/2))-1/4/c*b/e*(c^2*x^2+1)^(1/2)/((c^2*x^2+1)/c^2/x^2)^(1/2)/x/d/(-
(c^2*d-e)/e)^(1/2)*ln(-2*((c^2*x^2+1)^(1/2)*(-(c^2*d-e)/e)^(1/2)*e+(-c^2*d*
e)^(1/2)*c*x+e)/(-c*x*e+(-c^2*d*e)^(1/2)))-1/4/c*b/e*(c^2*x^2+1)^(1/2)/((c^
2*x^2+1)/c^2/x^2)^(1/2)/x/d/(-(c^2*d-e)/e)^(1/2)*ln(-2*(-(c^2*x^2+1)^(1/2)*
(-(c^2*d-e)/e)^(1/2)*e+(-c^2*d*e)^(1/2)*c*x-e)/(c*x*e+(-c^2*d*e)^(1/2)))
```

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

$$-\frac{1}{4}\left(4\,c^{2}\int\frac{x}{2\left(c^{2}e^{2}x^{4}+\left(c^{2}de+e^{2}\right)x^{2}+de+\left(c^{2}e^{2}x^{4}+\left(c^{2}de+e^{2}\right)x^{2}+de\right)\sqrt{c^{2}x^{2}+1}\right)}\,dx-\frac{2\,c^{2}d^{2}\log(c)-2\left(c^{2}\right.}{}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*(a+b*arccsch(c*x))/(e*x^2+d)^2,x, algorithm="maxima")
```

```
[Out] -1/4*(4*c^2*integrate(1/2*x/(c^2*e^2*x^4 + (c^2*d*e + e^2)*x^2 + d*e + (c^2
*e^2*x^4 + (c^2*d*e + e^2)*x^2 + d*e)*sqrt(c^2*x^2 + 1)), x) - (2*c^2*d^2*l
og(c) - 2*(c^2*d*e - e^2)*x^2*log(x) - 2*d*e*log(c) + (c^2*d*e*x^2 + c^2*d^
2)*log(c^2*x^2 + 1) - 2*(c^2*d^2 - d*e)*log(sqrt(c^2*x^2 + 1) + 1))/(c^2*d^
3*e - d^2*e^2 + (c^2*d^2*e^2 - d*e^3)*x^2) + log(e*x^2 + d)/(c^2*d^2 - d*e)
)*b - 1/2*a/(e^2*x^2 + d*e)
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.01

$$\int\frac{x\left(a+b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)\right)}{{\left(e\,x^2+d\right)}^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((x*(a + b*asinh(1/(c*x))))/(d + e*x^2)^2,x)
```

```
[Out] int((x*(a + b*asinh(1/(c*x))))/(d + e*x^2)^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*acsch(c*x))/(e*x**2+d)**2,x)
```

```
[Out] Timed out
```

# 3.106 $\int \frac{a+b\text{csch}^{-1}(cx)}{x(d+ex^2)^2}\,dx$

**Optimal**. Leaf size=515

$$-\frac{(a+b\text{csch}^{-1}(cx))\log\left(1-\frac{c\sqrt{-d}e^{\text{csch}^{-1}(cx)}}{\sqrt{e}-\sqrt{e-c^2d}}\right)}{2d^2}-\frac{(a+b\text{csch}^{-1}(cx))\log\left(\frac{c\sqrt{-d}e^{\text{csch}^{-1}(cx)}}{\sqrt{e}-\sqrt{e-c^2d}}+1\right)}{2d^2}-\frac{(a+b\text{csch}^{-1}(cx))\log(}{2d^2}$$

```
[Out] -1/2*e*(a+b*arccsch(c*x))/d^2/(e+d/x^2)+1/2*(a+b*arccsch(c*x))^2/b/d^2-1/2*
(a+b*arccsch(c*x))*ln(1-c*(1/c/x+(1+1/c^2/x^2)^(1/2))*(-d)^(1/2)/(e^(1/2)-(
-c^2*d+e)^(1/2)))/d^2-1/2*(a+b*arccsch(c*x))*ln(1+c*(1/c/x+(1+1/c^2/x^2)^(1
/2))*(-d)^(1/2)/(e^(1/2)-(-c^2*d+e)^(1/2)))/d^2-1/2*(a+b*arccsch(c*x))*ln(1
-c*(1/c/x+(1+1/c^2/x^2)^(1/2))*(-d)^(1/2)/(e^(1/2)+(-c^2*d+e)^(1/2)))/d^2-1
/2*(a+b*arccsch(c*x))*ln(1+c*(1/c/x+(1+1/c^2/x^2)^(1/2))*(-d)^(1/2)/(e^(1/2
)+(-c^2*d+e)^(1/2)))/d^2-1/2*b*polylog(2,-c*(1/c/x+(1+1/c^2/x^2)^(1/2))*(-d
)^(1/2)/(e^(1/2)-(-c^2*d+e)^(1/2)))/d^2-1/2*b*polylog(2,c*(1/c/x+(1+1/c^2/x
^2)^(1/2))*(-d)^(1/2)/(e^(1/2)-(-c^2*d+e)^(1/2)))/d^2-1/2*b*polylog(2,-c*(1
/c/x+(1+1/c^2/x^2)^(1/2))*(-d)^(1/2)/(e^(1/2)+(-c^2*d+e)^(1/2)))/d^2-1/2*b*
polylog(2,c*(1/c/x+(1+1/c^2/x^2)^(1/2))*(-d)^(1/2)/(e^(1/2)+(-c^2*d+e)^(1/2
)))/d^2+1/2*b*arctan((c^2*d-e)^(1/2)/c/x/e^(1/2)/(1+1/c^2/x^2)^(1/2))*e^(1/
2)/d^2/(c^2*d-e)^(1/2)
```

**Rubi [A]** time = 1.15, antiderivative size = 515, normalized size of antiderivative = 1.00, number of steps used = 24, number of rules used = 10, integrand size = 21, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.476, Rules used = {6304, 5791, 5787, 377, 205, 5799, 5561, 2190, 2279, 2391}

$$-\frac{b\text{PolyLog}\left(2,-\frac{c\sqrt{-d}e^{\text{csch}^{-1}(cx)}}{\sqrt{e}-\sqrt{e-c^2d}}\right)}{2d^2}-\frac{b\text{PolyLog}\left(2,\frac{c\sqrt{-d}e^{\text{csch}^{-1}(cx)}}{\sqrt{e}-\sqrt{e-c^2d}}\right)}{2d^2}-\frac{b\text{PolyLog}\left(2,-\frac{c\sqrt{-d}e^{\text{csch}^{-1}(cx)}}{\sqrt{e-c^2d}+\sqrt{e}}\right)}{2d^2}-\frac{b\text{PolyLog}\left(2,\frac{c\sqrt{-}}{\sqrt{}}\right)}{2d^2}$$

Antiderivative was successfully verified.

```
[In] Int[(a + b*ArcCsch[c*x])/(x*(d + e*x^2)^2),x]
```

```
[Out] -(e*(a + b*ArcCsch[c*x]))/(2*d^2*(e + d/x^2)) + (a + b*ArcCsch[c*x])^2/(2*b
*d^2) + (b*Sqrt[e]*ArcTan[Sqrt[c^2*d - e]/(c*Sqrt[e]*Sqrt[1 + 1/(c^2*x^2)]*
x)])/(2*d^2*Sqrt[c^2*d - e]) - ((a + b*ArcCsch[c*x])*Log[1 - (c*Sqrt[-d]*E^
ArcCsch[c*x])/(Sqrt[e] - Sqrt[-(c^2*d) + e])])/(2*d^2) - ((a + b*ArcCsch[c*
```

```
x])*Log[1 + (c*Sqrt[-d]*E^ArcCsch[c*x])/(Sqrt[e] - Sqrt[-(c^2*d) + e])])/(2
*d^2) - ((a + b*ArcCsch[c*x])*Log[1 - (c*Sqrt[-d]*E^ArcCsch[c*x])/(Sqrt[e]
+ Sqrt[-(c^2*d) + e])])/(2*d^2) - ((a + b*ArcCsch[c*x])*Log[1 + (c*Sqrt[-d]
*E^ArcCsch[c*x])/(Sqrt[e] + Sqrt[-(c^2*d) + e])])/(2*d^2) - (b*PolyLog[2, -
((c*Sqrt[-d]*E^ArcCsch[c*x])/(Sqrt[e] - Sqrt[-(c^2*d) + e]))])/(2*d^2) - (b
*PolyLog[2, (c*Sqrt[-d]*E^ArcCsch[c*x])/(Sqrt[e] - Sqrt[-(c^2*d) + e])])/(2
*d^2) - (b*PolyLog[2, -((c*Sqrt[-d]*E^ArcCsch[c*x])/(Sqrt[e] + Sqrt[-(c^2*d
) + e]))])/(2*d^2) - (b*PolyLog[2, (c*Sqrt[-d]*E^ArcCsch[c*x])/(Sqrt[e] + S
qrt[-(c^2*d) + e])])/(2*d^2)
```

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 377

```
Int[((a_) + (b_.)*(x_)^(n_))^(p_)/((c_) + (d_.)*(x_)^(n_)), x_Symbol] :> Su
bst[Int[1/(c - (b*c - a*d)*x^n), x], x, x/(a + b*x^n)^(1/n)] /; FreeQ[{a, b
, c, d}, x] && NeQ[b*c - a*d, 0] && EqQ[n*p + 1, 0] && IntegerQ[n]
```

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 5561

```
Int[(Cosh[(c_.) + (d_.)*(x_)]*((e_.) + (f_.)*(x_))^(m_.))/((a_) + (b_.)*Sin
h[(c_.) + (d_.)*(x_)]), x_Symbol] :> -Simp[(e + f*x)^(m + 1)/(b*f*(m + 1)),
 x] + (Int[((e + f*x)^m*E^(c + d*x))/(a - Rt[a^2 + b^2, 2] + b*E^(c + d*x))
, x] + Int[((e + f*x)^m*E^(c + d*x))/(a + Rt[a^2 + b^2, 2] + b*E^(c + d*x))
```

```
, x]) /; FreeQ[{a, b, c, d, e, f}, x] && IGtQ[m, 0] && NeQ[a^2 + b^2, 0]
```

Rule 5787

```
Int[((a_.) + ArcSinh[(c_.)*(x_)]*(b_.))*(x_)*((d_) + (e_.)*(x_)^2)^(p_.), x
_Symbol] :> Simp[((d + e*x^2)^(p + 1)*(a + b*ArcSinh[c*x]))/(2*e*(p + 1)),
x] - Dist[(b*c)/(2*e*(p + 1)), Int[(d + e*x^2)^(p + 1)/Sqrt[1 + c^2*x^2], x
], x] /; FreeQ[{a, b, c, d, e, p}, x] && NeQ[e, c^2*d] && NeQ[p, -1]
```

Rule 5791

```
Int[((a_.) + ArcSinh[(c_.)*(x_)]*(b_.))^(n_.)*((f_.)*(x_))^(m_.)*((d_) + (e
_.)*(x_)^2)^(p_.), x_Symbol] :> Int[ExpandIntegrand[(a + b*ArcSinh[c*x])^n,
 (f*x)^m*(d + e*x^2)^p, x], x] /; FreeQ[{a, b, c, d, e, f}, x] && NeQ[e, c^
2*d] && IGtQ[n, 0] && IntegerQ[p] && IntegerQ[m]
```

Rule 5799

```
Int[((a_.) + ArcSinh[(c_.)*(x_)]*(b_.))^(n_.)/((d_.) + (e_.)*(x_)), x_Symbo
l] :> Subst[Int[((a + b*x)^n*Cosh[x])/(c*d + e*Sinh[x]), x], x, ArcSinh[c*x
]] /; FreeQ[{a, b, c, d, e}, x] && IGtQ[n, 0]
```

Rule 6304

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))^(n_.)*(x_)^(m_.)*((d_.) + (e_.)*(x_
)^2)^(p_.), x_Symbol] :> -Subst[Int[((e + d*x^2)^p*(a + b*ArcSinh[x/c])^n)/
x^(m + 2*(p + 1)), x], x, 1/x] /; FreeQ[{a, b, c, d, e, n}, x] && IGtQ[n, 0
] && IntegersQ[m, p]
```

Rubi steps

$$\int \frac{a+b\text{csch}^{-1}(cx)}{x\left(d+ex^2\right)^2}\,dx = -\text{Subst}\left(\int \frac{x^3\left(a+b\sinh^{-1}\left(\frac{x}{c}\right)\right)}{\left(e+dx^2\right)^2}\,dx, x, \frac{1}{x}\right)$$

$$= -\text{Subst}\left(\int \left(-\frac{ex\left(a+b\sinh^{-1}\left(\frac{x}{c}\right)\right)}{d\left(e+dx^2\right)^2} + \frac{x\left(a+b\sinh^{-1}\left(\frac{x}{c}\right)\right)}{d\left(e+dx^2\right)}\right) dx, x, \frac{1}{x}\right)$$

$$= -\frac{\text{Subst}\left(\int \frac{x\left(a+b\sinh^{-1}\left(\frac{x}{c}\right)\right)}{e+dx^2}\,dx, x, \frac{1}{x}\right)}{d} + \frac{e\,\text{Subst}\left(\int \frac{x\left(a+b\sinh^{-1}\left(\frac{x}{c}\right)\right)}{\left(e+dx^2\right)^2}\,dx, x, \frac{1}{x}\right)}{d}$$

$$= -\frac{e\left(a+b\text{csch}^{-1}(cx)\right)}{2d^2\left(e+\frac{d}{x^2}\right)} - \frac{\text{Subst}\left(\int \left(-\frac{\sqrt{-d}\left(a+b\sinh^{-1}\left(\frac{x}{c}\right)\right)}{2d\left(\sqrt{e}-\sqrt{-d}\,x\right)} + \frac{\sqrt{-d}\left(a+b\sinh^{-1}\left(\frac{x}{c}\right)\right)}{2d\left(\sqrt{e}+\sqrt{-d}\,x\right)}\right) dx, x, \frac{1}{x}\right)}{d} + \cdots$$

$$= -\frac{e\left(a+b\text{csch}^{-1}(cx)\right)}{2d^2\left(e+\frac{d}{x^2}\right)} + \frac{\text{Subst}\left(\int \frac{a+b\sinh^{-1}\left(\frac{x}{c}\right)}{\sqrt{e}-\sqrt{-d}\,x}\,dx, x, \frac{1}{x}\right)}{2(-d)^{3/2}} - \frac{\text{Subst}\left(\int \frac{a+b\sinh^{-1}\left(\frac{x}{c}\right)}{\sqrt{e}+\sqrt{-d}\,x}\,dx, x, \frac{1}{x}\right)}{2(-d)^{3/2}} \cdots$$

$$= -\frac{e\left(a+b\text{csch}^{-1}(cx)\right)}{2d^2\left(e+\frac{d}{x^2}\right)} + \frac{b\sqrt{e}\,\tan^{-1}\left(\frac{\sqrt{c^2d-e}}{c\sqrt{e}\sqrt{1+\frac{1}{c^2x^2}}\,x}\right)}{2d^2\sqrt{c^2d-e}} + \frac{\text{Subst}\left(\int \frac{(a+bx)\cosh(x)}{\frac{\sqrt{e}}{c}-\sqrt{-d}\,\sinh(x)}\,dx, x, \text{csch}\cdots\right)}{2(-d)^{3/2}} \cdots$$

$$= -\frac{e\left(a+b\text{csch}^{-1}(cx)\right)}{2d^2\left(e+\frac{d}{x^2}\right)} + \frac{\left(a+b\text{csch}^{-1}(cx)\right)^2}{2bd^2} + \frac{b\sqrt{e}\,\tan^{-1}\left(\frac{\sqrt{c^2d-e}}{c\sqrt{e}\sqrt{1+\frac{1}{c^2x^2}}\,x}\right)}{2d^2\sqrt{c^2d-e}} + \frac{\text{Subst}\left(\int \cdots\right)}{\cdots} \cdots$$

$$= -\frac{e\left(a+b\text{csch}^{-1}(cx)\right)}{2d^2\left(e+\frac{d}{x^2}\right)} + \frac{\left(a+b\text{csch}^{-1}(cx)\right)^2}{2bd^2} + \frac{b\sqrt{e}\,\tan^{-1}\left(\frac{\sqrt{c^2d-e}}{c\sqrt{e}\sqrt{1+\frac{1}{c^2x^2}}\,x}\right)}{2d^2\sqrt{c^2d-e}} - \frac{\left(a+b\text{csch}^{-1}\cdots\right.}{\cdots} \cdots$$

$$= -\frac{e\left(a+b\text{csch}^{-1}(cx)\right)}{2d^2\left(e+\frac{d}{x^2}\right)} + \frac{\left(a+b\text{csch}^{-1}(cx)\right)^2}{2bd^2} + \frac{b\sqrt{e}\,\tan^{-1}\left(\frac{\sqrt{c^2d-e}}{c\sqrt{e}\sqrt{1+\frac{1}{c^2x^2}}\,x}\right)}{2d^2\sqrt{c^2d-e}} - \frac{\left(a+b\text{csch}^{-1}\cdots\right.}{\cdots} \cdots$$

$$= -\frac{e\left(a+b\text{csch}^{-1}(cx)\right)}{\cdots} + \frac{\left(a+b\text{csch}^{-1}(cx)\right)^2}{\cdots} + \frac{b\sqrt{e}\,\tan^{-1}\left(\frac{\sqrt{c^2d-e}}{c\sqrt{e}\sqrt{1+\frac{1}{c^2x^2}}\,x}\right)}{\cdots} - \frac{\left(a+b\text{csch}^{-1}\cdots\right.}{\cdots} \cdots$$

**Mathematica [F]** time = 44.15, size = 0, normalized size = 0.00

$$\int \frac{a+b\text{csch}^{-1}(cx)}{x\left(d+ex^2\right)^2}\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[(a + b*ArcCsch[c*x])/(x*(d + e*x^2)^2),x]
[Out] Integrate[(a + b*ArcCsch[c*x])/(x*(d + e*x^2)^2), x]
```

**fricas [F]** time = 1.67, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{b\,\text{arcsch}\,(cx)+a}{e^2x^5+2\,dex^3+d^2x},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))/x/(e*x^2+d)^2,x, algorithm="fricas")
[Out] integral((b*arccsch(c*x) + a)/(e^2*x^5 + 2*d*e*x^3 + d^2*x), x)
```

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

$$\int \frac{b\,\text{arcsch}\,(cx)+a}{\left(ex^2+d\right)^2x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))/x/(e*x^2+d)^2,x, algorithm="giac")
[Out] integrate((b*arccsch(c*x) + a)/((e*x^2 + d)^2*x), x)
```

**maple [F]** time = 0.48, size = 0, normalized size = 0.00

$$\int \frac{a+b\,\text{arccsch}\,(cx)}{x\left(e\,x^2+d\right)^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a+b*arccsch(c*x))/x/(e*x^2+d)^2,x)
[Out] int((a+b*arccsch(c*x))/x/(e*x^2+d)^2,x)
```

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

$$\frac{1}{2}\,a\left(\frac{1}{dex^2+d^2}-\frac{\log\left(ex^2+d\right)}{d^2}+\frac{2\,\log(x)}{d^2}\right)+b\int\frac{\log\left(\sqrt{\frac{1}{c^2x^2}+1}+\frac{1}{cx}\right)}{e^2x^5+2\,dex^3+d^2x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))/x/(e*x^2+d)^2,x, algorithm="maxima")
```

```
[Out] 1/2*a*(1/(d*e*x^2 + d^2) - log(e*x^2 + d)/d^2 + 2*log(x)/d^2) + b*integrate
(log(sqrt(1/(c^2*x^2) + 1) + 1/(c*x))/(e^2*x^5 + 2*d*e*x^3 + d^2*x), x)
```

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

$$\int\frac{a+b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)}{x\,\left(e\,x^2+d\right)^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a + b*asinh(1/(c*x)))/(x*(d + e*x^2)^2),x)
```

```
[Out] int((a + b*asinh(1/(c*x)))/(x*(d + e*x^2)^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*acsch(c*x))/x/(e*x**2+d)**2,x)
```

```
[Out] Timed out
```

# 3.107 $\int \frac{x^4\left(a+b\,\mathrm{csch}^{-1}(cx)\right)}{\left(d+ex^2\right)^2}\,dx$

**Optimal**. Leaf size=756

$$\frac{3\sqrt{-d}\left(a+b\,\mathrm{csch}^{-1}(cx)\right)\log\left(1-\frac{c\sqrt{-d}\,e^{\mathrm{csch}^{-1}(cx)}}{\sqrt{e}-\sqrt{e-c^2d}}\right)}{4e^{5/2}}-\frac{3\sqrt{-d}\left(a+b\,\mathrm{csch}^{-1}(cx)\right)\log\left(\frac{c\sqrt{-d}\,e^{\mathrm{csch}^{-1}(cx)}}{\sqrt{e}-\sqrt{e-c^2d}}+1\right)}{4e^{5/2}}+\frac{3\sqrt{-d}\left(a+\right.}{}$$

```
[Out] x*(a+b*arccsch(c*x))/e^2+b*arctanh((1+1/c^2/x^2)^(1/2))/c/e^2+3/4*(a+b*arcc
sch(c*x))*ln(1-c*(1/c/x+(1+1/c^2/x^2)^(1/2))*(-d)^(1/2)/(e^(1/2)-(-c^2*d+e)
^(1/2)))*(-d)^(1/2)/e^(5/2)-3/4*(a+b*arccsch(c*x))*ln(1+c*(1/c/x+(1+1/c^2/x
^2)^(1/2))*(-d)^(1/2)/(e^(1/2)-(-c^2*d+e)^(1/2)))*(-d)^(1/2)/e^(5/2)+3/4*(a
+b*arccsch(c*x))*ln(1-c*(1/c/x+(1+1/c^2/x^2)^(1/2))*(-d)^(1/2)/(e^(1/2)+(-c
^2*d+e)^(1/2)))*(-d)^(1/2)/e^(5/2)-3/4*(a+b*arccsch(c*x))*ln(1+c*(1/c/x+(1+
1/c^2/x^2)^(1/2))*(-d)^(1/2)/(e^(1/2)+(-c^2*d+e)^(1/2)))*(-d)^(1/2)/e^(5/2)
-3/4*b*polylog(2,-c*(1/c/x+(1+1/c^2/x^2)^(1/2))*(-d)^(1/2)/(e^(1/2)-(-c^2*d
+e)^(1/2)))*(-d)^(1/2)/e^(5/2)+3/4*b*polylog(2,c*(1/c/x+(1+1/c^2/x^2)^(1/2)
)*(-d)^(1/2)/(e^(1/2)-(-c^2*d+e)^(1/2)))*(-d)^(1/2)/e^(5/2)-3/4*b*polylog(2
,-c*(1/c/x+(1+1/c^2/x^2)^(1/2))*(-d)^(1/2)/(e^(1/2)+(-c^2*d+e)^(1/2)))*(-d)
^(1/2)/e^(5/2)+3/4*b*polylog(2,c*(1/c/x+(1+1/c^2/x^2)^(1/2))*(-d)^(1/2)/(e^
(1/2)+(-c^2*d+e)^(1/2)))*(-d)^(1/2)/e^(5/2)+1/4*b*arctanh((c^2*d-(-d)^(1/2)
*e^(1/2)/x)/c/d^(1/2)/(c^2*d-e)^(1/2)/(1+1/c^2/x^2)^(1/2))*d^(1/2)/e^2/(c^2
*d-e)^(1/2)+1/4*b*arctanh((c^2*d+(-d)^(1/2)*e^(1/2)/x)/c/d^(1/2)/(c^2*d-e)^
(1/2)/(1+1/c^2/x^2)^(1/2))*d^(1/2)/e^2/(c^2*d-e)^(1/2)-1/4*d*(a+b*arccsch(c
*x))/e^2/(-d/x+(-d)^(1/2)*e^(1/2))+1/4*d*(a+b*arccsch(c*x))/e^2/(d/x+(-d)^(
1/2)*e^(1/2))
```

**Rubi [A]** time = 2.47, antiderivative size = 756, normalized size of antiderivative = 1.00, number of steps used = 51, number of rules used = 15, integrand size = 21, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.714, Rules used = {6304, 5791, 5661, 266, 63, 208, 5706, 5801, 725, 206, 5799, 5561, 2190, 2279, 2391}

$$-\frac{3b\sqrt{-d}\,\mathrm{PolyLog}\left(2,-\frac{c\sqrt{-d}\,e^{\mathrm{csch}^{-1}(cx)}}{\sqrt{e}-\sqrt{e-c^2d}}\right)}{4e^{5/2}}+\frac{3b\sqrt{-d}\,\mathrm{PolyLog}\left(2,\frac{c\sqrt{-d}\,e^{\mathrm{csch}^{-1}(cx)}}{\sqrt{e}-\sqrt{e-c^2d}}\right)}{4e^{5/2}}-\frac{3b\sqrt{-d}\,\mathrm{PolyLog}\left(2,-\frac{c\sqrt{-d}\,e^{\mathrm{csch}^{-1}(cx)}}{\sqrt{e-c^2d}+\sqrt{e}}\right)}{4e^{5/2}}$$

Antiderivative was successfully verified.

```
[In] Int[(x^4*(a + b*ArcCsch[c*x]))/(d + e*x^2)^2,x]
```

```
[Out] -(d*(a + b*ArcCsch[c*x]))/(4*e^2*(Sqrt[-d]*Sqrt[e] - d/x)) + (d*(a + b*ArcC
sch[c*x]))/(4*e^2*(Sqrt[-d]*Sqrt[e] + d/x)) + (x*(a + b*ArcCsch[c*x]))/e^2
+ (b*ArcTanh[Sqrt[1 + 1/(c^2*x^2)]])/(c*e^2) + (b*Sqrt[d]*ArcTanh[(c^2*d -
(Sqrt[-d]*Sqrt[e])/x)/(c*Sqrt[d]*Sqrt[c^2*d - e]*Sqrt[1 + 1/(c^2*x^2)])])/(
4*Sqrt[c^2*d - e]*e^2) + (b*Sqrt[d]*ArcTanh[(c^2*d + (Sqrt[-d]*Sqrt[e])/x)/
(c*Sqrt[d]*Sqrt[c^2*d - e]*Sqrt[1 + 1/(c^2*x^2)])])/(4*Sqrt[c^2*d - e]*e^2)
 + (3*Sqrt[-d]*(a + b*ArcCsch[c*x])*Log[1 - (c*Sqrt[-d]*E^ArcCsch[c*x])/(Sq
rt[e] - Sqrt[-(c^2*d) + e])])/(4*e^(5/2)) - (3*Sqrt[-d]*(a + b*ArcCsch[c*x]
)*Log[1 + (c*Sqrt[-d]*E^ArcCsch[c*x])/(Sqrt[e] - Sqrt[-(c^2*d) + e])])/(4*e
^(5/2)) + (3*Sqrt[-d]*(a + b*ArcCsch[c*x])*Log[1 - (c*Sqrt[-d]*E^ArcCsch[c*
x])/(Sqrt[e] + Sqrt[-(c^2*d) + e])])/(4*e^(5/2)) - (3*Sqrt[-d]*(a + b*ArcCs
ch[c*x])*Log[1 + (c*Sqrt[-d]*E^ArcCsch[c*x])/(Sqrt[e] + Sqrt[-(c^2*d) + e])
])/(4*e^(5/2)) - (3*b*Sqrt[-d]*PolyLog[2, -((c*Sqrt[-d]*E^ArcCsch[c*x])/(Sq
rt[e] - Sqrt[-(c^2*d) + e]))])/(4*e^(5/2)) + (3*b*Sqrt[-d]*PolyLog[2, (c*Sq
rt[-d]*E^ArcCsch[c*x])/(Sqrt[e] - Sqrt[-(c^2*d) + e])])/(4*e^(5/2)) - (3*b*
Sqrt[-d]*PolyLog[2, -((c*Sqrt[-d]*E^ArcCsch[c*x])/(Sqrt[e] + Sqrt[-(c^2*d)
+ e]))])/(4*e^(5/2)) + (3*b*Sqrt[-d]*PolyLog[2, (c*Sqrt[-d]*E^ArcCsch[c*x])
/(Sqrt[e] + Sqrt[-(c^2*d) + e])])/(4*e^(5/2))
```

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 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 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 725

```
Int[1/(((d_) + (e_.)*(x_))*Sqrt[(a_) + (c_.)*(x_)^2]), x_Symbol] :> -Subst[
Int[1/(c*d^2 + a*e^2 - x^2), x], x, (a*e - c*d*x)/Sqrt[a + c*x^2]] /; FreeQ
[{a, c, d, e}, 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 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 5561

```
Int[(Cosh[(c_.) + (d_.)*(x_)]*((e_.) + (f_.)*(x_))^(m_.))/((a_) + (b_.)*Sin
h[(c_.) + (d_.)*(x_)]), x_Symbol] :> -Simp[(e + f*x)^(m + 1)/(b*f*(m + 1)),
 x] + (Int[((e + f*x)^m*E^(c + d*x))/(a - Rt[a^2 + b^2, 2] + b*E^(c + d*x))
, x] + Int[((e + f*x)^m*E^(c + d*x))/(a + Rt[a^2 + b^2, 2] + b*E^(c + d*x))
, x]) /; FreeQ[{a, b, c, d, e, f}, x] && IGtQ[m, 0] && NeQ[a^2 + b^2, 0]
```

Rule 5661

```
Int[((a_.) + ArcSinh[(c_.)*(x_)]*(b_.))^(n_.)*((d_.)*(x_))^(m_.), x_Symbol]
 :> Simp[((d*x)^(m + 1)*(a + b*ArcSinh[c*x])^n)/(d*(m + 1)), x] - Dist[(b*c
*n)/(d*(m + 1)), Int[((d*x)^(m + 1)*(a + b*ArcSinh[c*x])^(n - 1))/Sqrt[1 +
c^2*x^2], x], x] /; FreeQ[{a, b, c, d, m}, x] && IGtQ[n, 0] && NeQ[m, -1]
```

Rule 5706

```
Int[((a_.) + ArcSinh[(c_.)*(x_)]*(b_.))^(n_.)*((d_) + (e_.)*(x_)^2)^(p_.),
x_Symbol] :> Int[ExpandIntegrand[(a + b*ArcSinh[c*x])^n, (d + e*x^2)^p, x],
 x] /; FreeQ[{a, b, c, d, e, n}, x] && NeQ[e, c^2*d] && IntegerQ[p] && (p >
 0 || IGtQ[n, 0])
```

Rule 5791

```
Int[((a_.) + ArcSinh[(c_.)*(x_)]*(b_.))^(n_.)*((f_.)*(x_))^(m_.)*((d_) + (e
_.)*(x_)^2)^(p_.), x_Symbol] :> Int[ExpandIntegrand[(a + b*ArcSinh[c*x])^n,
 (f*x)^m*(d + e*x^2)^p, x], x] /; FreeQ[{a, b, c, d, e, f}, x] && NeQ[e, c^
2*d] && IGtQ[n, 0] && IntegerQ[p] && IntegerQ[m]
```

Rule 5799

```
Int[((a_.) + ArcSinh[(c_.)*(x_)]*(b_.))^(n_.)/((d_.) + (e_.)*(x_)), x_Symbo
l] :> Subst[Int[((a + b*x)^n*Cosh[x])/(c*d + e*Sinh[x]), x], x, ArcSinh[c*x
]] /; FreeQ[{a, b, c, d, e}, x] && IGtQ[n, 0]
```

Rule 5801

```
Int[((a_.) + ArcSinh[(c_.)*(x_)]*(b_.))^(n_.)*((d_.) + (e_.)*(x_))^(m_.), x
_Symbol] :> Simp[((d + e*x)^(m + 1)*(a + b*ArcSinh[c*x])^n)/(e*(m + 1)), x]
 - Dist[(b*c*n)/(e*(m + 1)), Int[((d + e*x)^(m + 1)*(a + b*ArcSinh[c*x])^(n
 - 1))/Sqrt[1 + c^2*x^2], x], x] /; FreeQ[{a, b, c, d, e, m}, x] && IGtQ[n,
 0] && NeQ[m, -1]
```

Rule 6304

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))^(n_.)*(x_)^(m_.)*((d_.) + (e_.)*(x_
)^2)^(p_.), x_Symbol] :> -Subst[Int[((e + d*x^2)^p*(a + b*ArcSinh[x/c])^n)/
x^(m + 2*(p + 1)), x], x, 1/x] /; FreeQ[{a, b, c, d, e, n}, x] && IGtQ[n, 0
] && IntegersQ[m, p]
```

Rubi steps

$$\int \frac{x^4\left(a+b\text{csch}^{-1}(cx)\right)}{\left(d+ex^2\right)^2}\,dx = -\text{Subst}\left(\int \frac{a+b\sinh^{-1}\left(\frac{x}{c}\right)}{x^2\left(e+dx^2\right)^2}\,dx, x, \frac{1}{x}\right)$$

$$= -\text{Subst}\left(\int\left(\frac{a+b\sinh^{-1}\left(\frac{x}{c}\right)}{e^2x^2} - \frac{d\left(a+b\sinh^{-1}\left(\frac{x}{c}\right)\right)}{e\left(e+dx^2\right)^2} - \frac{d\left(a+b\sinh^{-1}\left(\frac{x}{c}\right)\right)}{e^2\left(e+dx^2\right)}\right)dx,$$

$$= -\frac{\text{Subst}\left(\int \frac{a+b\sinh^{-1}\left(\frac{x}{c}\right)}{x^2}\,dx, x, \frac{1}{x}\right)}{e^2} + \frac{d\,\text{Subst}\left(\int \frac{a+b\sinh^{-1}\left(\frac{x}{c}\right)}{e+dx^2}\,dx, x, \frac{1}{x}\right)}{e^2} + \frac{d\,\text{Subst}\left(\int\right.}{}$$

$$= \frac{x\left(a+b\text{csch}^{-1}(cx)\right)}{e^2} - \frac{b\,\text{Subst}\left(\int \frac{1}{x\sqrt{1+\frac{x^2}{c^2}}}\,dx, x, \frac{1}{x}\right)}{ce^2} + \frac{d\,\text{Subst}\left(\int\left(\frac{a+b\sinh^{-1}\left(\frac{x}{c}\right)}{2\sqrt{e}\left(\sqrt{e}-\sqrt{-d}\,x\right)}\right.\right.}{e^2}$$

$$= \frac{x\left(a+b\text{csch}^{-1}(cx)\right)}{e^2} + \frac{d\,\text{Subst}\left(\int \frac{a+b\sinh^{-1}\left(\frac{x}{c}\right)}{\sqrt{e}-\sqrt{-d}\,x}\,dx, x, \frac{1}{x}\right)}{2e^{5/2}} + \frac{d\,\text{Subst}\left(\int \frac{a+b\sinh^{-1}\left(\frac{x}{c}\right)}{\sqrt{e}+\sqrt{-d}\,x}\right.}{2e^{5/2}}$$

$$= -\frac{d\left(a+b\text{csch}^{-1}(cx)\right)}{4e^2\left(\sqrt{-d}\sqrt{e}-\frac{d}{x}\right)} + \frac{d\left(a+b\text{csch}^{-1}(cx)\right)}{4e^2\left(\sqrt{-d}\sqrt{e}+\frac{d}{x}\right)} + \frac{x\left(a+b\text{csch}^{-1}(cx)\right)}{e^2} + \frac{d\,\text{Subst}\left(\int\right.}{}$$

$$= -\frac{d\left(a+b\text{csch}^{-1}(cx)\right)}{4e^2\left(\sqrt{-d}\sqrt{e}-\frac{d}{x}\right)} + \frac{d\left(a+b\text{csch}^{-1}(cx)\right)}{4e^2\left(\sqrt{-d}\sqrt{e}+\frac{d}{x}\right)} + \frac{x\left(a+b\text{csch}^{-1}(cx)\right)}{e^2} + \frac{b\tanh^{-1}\left(\sqrt{\right.}}{ce}$$

$$= -\frac{d\left(a+b\text{csch}^{-1}(cx)\right)}{4e^2\left(\sqrt{-d}\sqrt{e}-\frac{d}{x}\right)} + \frac{d\left(a+b\text{csch}^{-1}(cx)\right)}{4e^2\left(\sqrt{-d}\sqrt{e}+\frac{d}{x}\right)} + \frac{x\left(a+b\text{csch}^{-1}(cx)\right)}{e^2} + \frac{b\tanh^{-1}\left(\sqrt{\right.}}{ce}$$

$$= -\frac{d\left(a+b\text{csch}^{-1}(cx)\right)}{4e^2\left(\sqrt{-d}\sqrt{e}-\frac{d}{x}\right)} + \frac{d\left(a+b\text{csch}^{-1}(cx)\right)}{4e^2\left(\sqrt{-d}\sqrt{e}+\frac{d}{x}\right)} + \frac{x\left(a+b\text{csch}^{-1}(cx)\right)}{e^2} + \frac{b\tanh^{-1}\left(\sqrt{\right.}}{ce}$$

$$= -\frac{d\left(a+b\text{csch}^{-1}(cx)\right)}{4e^2\left(\sqrt{-d}\sqrt{e}-\frac{d}{x}\right)} + \frac{d\left(a+b\text{csch}^{-1}(cx)\right)}{4e^2\left(\sqrt{-d}\sqrt{e}+\frac{d}{x}\right)} + \frac{x\left(a+b\text{csch}^{-1}(cx)\right)}{e^2} + \frac{b\tanh^{-1}\left(\sqrt{\right.}}{ce}$$

**Mathematica [C]** time = 6.17, size = 1583, normalized size = 2.09

result too large to display

Warning: Unable to verify antiderivative.

```
[In] Integrate[(x^4*(a + b*ArcCsch[c*x]))/(d + e*x^2)^2,x]
```

```
[Out] (a*x)/e^2 + (a*d*x)/(2*e^2*(d + e*x^2)) - (3*a*Sqrt[d]*ArcTan[(Sqrt[e]*x)/S
qrt[d]])/(2*e^(5/2)) + b*(-1/4*(d*(-(ArcCsch[c*x]/(I*Sqrt[d]*Sqrt[e] + e*x)
) - (I*(ArcSinh[1/(c*x)]/Sqrt[e] - Log[(2*Sqrt[d]*Sqrt[e]*(I*Sqrt[e] + c*(c
*Sqrt[d] + I*Sqrt[-(c^2*d) + e]*Sqrt[1 + 1/(c^2*x^2)])*x))/(Sqrt[-(c^2*d) +
 e]*(I*Sqrt[d] + Sqrt[e]*x))]/Sqrt[-(c^2*d) + e]))/Sqrt[d]))/e^2 - (d*(-(Ar
cCsch[c*x]/((-I)*Sqrt[d]*Sqrt[e] + e*x)) + (I*(ArcSinh[1/(c*x)]/Sqrt[e] - L
og[(-2*Sqrt[d]*Sqrt[e]*(Sqrt[e] + c*(I*c*Sqrt[d] + Sqrt[-(c^2*d) + e]*Sqrt[
1 + 1/(c^2*x^2)])*x))/(Sqrt[-(c^2*d) + e]*(Sqrt[d] + I*Sqrt[e]*x))]/Sqrt[-(
c^2*d) + e]))/Sqrt[d]))/(4*e^2) - (((3*I)/32)*Sqrt[d]*(Pi^2 - (4*I)*Pi*ArcC
sch[c*x] - 8*ArcCsch[c*x]^2 + 32*ArcSin[Sqrt[1 + Sqrt[e]/(c*Sqrt[d])]/Sqrt[
2]]*ArcTan[((c*Sqrt[d] - Sqrt[e])*Cot[(Pi + (2*I)*ArcCsch[c*x])/4])/Sqrt[-(
c^2*d) + e]] - 8*ArcCsch[c*x]*Log[1 - E^(-2*ArcCsch[c*x])] + (4*I)*Pi*Log[1
 - (I*(-Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])/(c*Sqrt[d])] + 8*ArcC
sch[c*x]*Log[1 - (I*(-Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])/(c*Sqrt
[d])] + (16*I)*ArcSin[Sqrt[1 + Sqrt[e]/(c*Sqrt[d])]/Sqrt[2]]*Log[1 - (I*(-S
qrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])/(c*Sqrt[d])] + (4*I)*Pi*Log[1
+ (I*(Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])/(c*Sqrt[d])] + 8*ArcCsc
h[c*x]*Log[1 + (I*(Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])/(c*Sqrt[d]
)] - (16*I)*ArcSin[Sqrt[1 + Sqrt[e]/(c*Sqrt[d])]/Sqrt[2]]*Log[1 + (I*(Sqrt[
e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])/(c*Sqrt[d])] - (4*I)*Pi*Log[Sqrt[e
] + (I*Sqrt[d])/x] + 4*PolyLog[2, E^(-2*ArcCsch[c*x])] + 8*PolyLog[2, (I*(-
Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])/(c*Sqrt[d])] + 8*PolyLog[2, (
(-I)*(Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])/(c*Sqrt[d])]))/e^(5/2)
+ (((3*I)/32)*Sqrt[d]*(Pi^2 - (4*I)*Pi*ArcCsch[c*x] - 8*ArcCsch[c*x]^2 - 32
*ArcSin[Sqrt[1 - Sqrt[e]/(c*Sqrt[d])]/Sqrt[2]]*ArcTan[((c*Sqrt[d] + Sqrt[e]
)*Cot[(Pi + (2*I)*ArcCsch[c*x])/4])/Sqrt[-(c^2*d) + e]] - 8*ArcCsch[c*x]*Lo
g[1 - E^(-2*ArcCsch[c*x])] + (4*I)*Pi*Log[1 + (I*(-Sqrt[e] + Sqrt[-(c^2*d)
+ e])*E^ArcCsch[c*x])/(c*Sqrt[d])] + 8*ArcCsch[c*x]*Log[1 + (I*(-Sqrt[e] +
Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])/(c*Sqrt[d])] + (16*I)*ArcSin[Sqrt[1 - S
qrt[e]/(c*Sqrt[d])]/Sqrt[2]]*Log[1 + (I*(-Sqrt[e] + Sqrt[-(c^2*d) + e])*E^A
rcCsch[c*x])/(c*Sqrt[d])] + (4*I)*Pi*Log[1 - (I*(Sqrt[e] + Sqrt[-(c^2*d) +
e])*E^ArcCsch[c*x])/(c*Sqrt[d])] + 8*ArcCsch[c*x]*Log[1 - (I*(Sqrt[e] + Sqr
t[-(c^2*d) + e])*E^ArcCsch[c*x])/(c*Sqrt[d])] - (16*I)*ArcSin[Sqrt[1 - Sqrt
[e]/(c*Sqrt[d])]/Sqrt[2]]*Log[1 - (I*(Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCs
ch[c*x])/(c*Sqrt[d])] - (4*I)*Pi*Log[Sqrt[e] - (I*Sqrt[d])/x] + 4*PolyLog[2
, E^(-2*ArcCsch[c*x])] + 8*PolyLog[2, ((-I)*(-Sqrt[e] + Sqrt[-(c^2*d) + e])
*E^ArcCsch[c*x])/(c*Sqrt[d])] + 8*PolyLog[2, (I*(Sqrt[e] + Sqrt[-(c^2*d) +
```

```
e])*E^ArcCsch[c*x])/(c*Sqrt[d])]))/e^(5/2) + ((ArcCsch[c*x]*Coth[ArcCsch[c*
x]/2])/2 - Log[Tanh[ArcCsch[c*x]/2]] - (ArcCsch[c*x]*Tanh[ArcCsch[c*x]/2])/
2)/(c*e^2))
```

**fricas [F]** time = 0.85, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{bx^4 \operatorname{arcsch}(cx) + ax^4}{e^2x^4 + 2\,dex^2 + d^2}, x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^4*(a+b*arccsch(c*x))/(e*x^2+d)^2,x, algorithm="fricas")
[Out] integral((b*x^4*arccsch(c*x) + a*x^4)/(e^2*x^4 + 2*d*e*x^2 + d^2), x)
```

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

$$\int \frac{(b \operatorname{arcsch}(cx) + a)x^4}{\left(ex^2 + d\right)^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^4*(a+b*arccsch(c*x))/(e*x^2+d)^2,x, algorithm="giac")
[Out] integrate((b*arccsch(c*x) + a)*x^4/(e*x^2 + d)^2, x)
```

**maple [F]** time = 15.13, size = 0, normalized size = 0.00

$$\int \frac{x^4\,(a + b \operatorname{arccsch}(cx))}{\left(e\,x^2 + d\right)^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^4*(a+b*arccsch(c*x))/(e*x^2+d)^2,x)
[Out] int(x^4*(a+b*arccsch(c*x))/(e*x^2+d)^2,x)
```

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

$$\frac{1}{2}\,a\left(\frac{dx}{e^3x^2 + de^2} - \frac{3\,d\arctan\left(\frac{ex}{\sqrt{de}}\right)}{\sqrt{de}\,e^2} + \frac{2\,x}{e^2}\right) + b\int \frac{x^4 \log\left(\sqrt{\frac{1}{c^2x^2} + 1} + \frac{1}{cx}\right)}{e^2x^4 + 2\,dex^2 + d^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^4*(a+b*arccsch(c*x))/(e*x^2+d)^2,x, algorithm="maxima")
```

```
[Out] 1/2*a*(d*x/(e^3*x^2 + d*e^2) - 3*d*arctan(e*x/sqrt(d*e))/(sqrt(d*e)*e^2) +
2*x/e^2) + b*integrate(x^4*log(sqrt(1/(c^2*x^2) + 1) + 1/(c*x))/(e^2*x^4 +
2*d*e*x^2 + d^2), x)
```

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

$$\int \frac{x^4 \left(a + b \operatorname{asinh}\left(\frac{1}{c\,x}\right)\right)}{\left(e\,x^2 + d\right)^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((x^4*(a + b*asinh(1/(c*x))))/(d + e*x^2)^2,x)
```

```
[Out] int((x^4*(a + b*asinh(1/(c*x))))/(d + e*x^2)^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**4*(a+b*acsch(c*x))/(e*x**2+d)**2,x)
```

```
[Out] Timed out
```

# 3.108 $\int \frac{x^2\left(a+b\text{csch}^{-1}(cx)\right)}{\left(d+ex^2\right)^2}\,dx$

**Optimal**. Leaf size=719

$$\frac{\left(a+b\text{csch}^{-1}(cx)\right)\log\left(1-\frac{c\sqrt{-d}\,e^{\text{csch}^{-1}(cx)}}{\sqrt{e}-\sqrt{e-c^2d}}\right)}{4\sqrt{-d}\,e^{3/2}}-\frac{\left(a+b\text{csch}^{-1}(cx)\right)\log\left(\frac{c\sqrt{-d}\,e^{\text{csch}^{-1}(cx)}}{\sqrt{e}-\sqrt{e-c^2d}}+1\right)}{4\sqrt{-d}\,e^{3/2}}+\frac{\left(a+b\text{csch}^{-1}(cx)\right)\log\left(1\right.}{4\sqrt{-d}\,e^{3/2}}$$

```
[Out] 1/4*(a+b*arccsch(c*x))*ln(1-c*(1/c/x+(1+1/c^2/x^2)^(1/2))*(-d)^(1/2)/(e^(1/
2)-(-c^2*d+e)^(1/2)))/e^(3/2)/(-d)^(1/2)-1/4*(a+b*arccsch(c*x))*ln(1+c*(1/c
/x+(1+1/c^2/x^2)^(1/2))*(-d)^(1/2)/(e^(1/2)-(-c^2*d+e)^(1/2)))/e^(3/2)/(-d)
^(1/2)+1/4*(a+b*arccsch(c*x))*ln(1-c*(1/c/x+(1+1/c^2/x^2)^(1/2))*(-d)^(1/2)
/(e^(1/2)+(-c^2*d+e)^(1/2)))/e^(3/2)/(-d)^(1/2)-1/4*(a+b*arccsch(c*x))*ln(1
+c*(1/c/x+(1+1/c^2/x^2)^(1/2))*(-d)^(1/2)/(e^(1/2)+(-c^2*d+e)^(1/2)))/e^(3/
2)/(-d)^(1/2)-1/4*b*polylog(2,-c*(1/c/x+(1+1/c^2/x^2)^(1/2))*(-d)^(1/2)/(e^
(1/2)-(-c^2*d+e)^(1/2)))/e^(3/2)/(-d)^(1/2)+1/4*b*polylog(2,c*(1/c/x+(1+1/c
^2/x^2)^(1/2))*(-d)^(1/2)/(e^(1/2)-(-c^2*d+e)^(1/2)))/e^(3/2)/(-d)^(1/2)-1/
4*b*polylog(2,-c*(1/c/x+(1+1/c^2/x^2)^(1/2))*(-d)^(1/2)/(e^(1/2)+(-c^2*d+e)
^(1/2)))/e^(3/2)/(-d)^(1/2)+1/4*b*polylog(2,c*(1/c/x+(1+1/c^2/x^2)^(1/2))*(
-d)^(1/2)/(e^(1/2)+(-c^2*d+e)^(1/2)))/e^(3/2)/(-d)^(1/2)-1/4*b*arctanh((c^2
*d-(-d)^(1/2)*e^(1/2)/x)/c/d^(1/2)/(c^2*d-e)^(1/2)/(1+1/c^2/x^2)^(1/2))/e/d
^(1/2)/(c^2*d-e)^(1/2)-1/4*b*arctanh((c^2*d+(-d)^(1/2)*e^(1/2)/x)/c/d^(1/2)
/(c^2*d-e)^(1/2)/(1+1/c^2/x^2)^(1/2))/e/d^(1/2)/(c^2*d-e)^(1/2)+1/4*(a+b*ar
ccsch(c*x))/e/(-d/x+(-d)^(1/2)*e^(1/2))+1/4*(-a-b*arccsch(c*x))/e/(d/x+(-d)
^(1/2)*e^(1/2))
```

**Rubi** [A] time = 1.24, antiderivative size = 719, normalized size of antiderivative = 1.00, number of steps used = 27, number of rules used = 10, integrand size = 21, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.476, Rules used = {6304, 5706, 5801, 725, 206, 5799, 5561, 2190, 2279, 2391}

$$-\frac{b\text{PolyLog}\left(2,-\frac{c\sqrt{-d}\,e^{\text{csch}^{-1}(cx)}}{\sqrt{e}-\sqrt{e-c^2d}}\right)}{4\sqrt{-d}\,e^{3/2}}+\frac{b\text{PolyLog}\left(2,\frac{c\sqrt{-d}\,e^{\text{csch}^{-1}(cx)}}{\sqrt{e}-\sqrt{e-c^2d}}\right)}{4\sqrt{-d}\,e^{3/2}}-\frac{b\text{PolyLog}\left(2,-\frac{c\sqrt{-d}\,e^{\text{csch}^{-1}(cx)}}{\sqrt{e-c^2d}+\sqrt{e}}\right)}{4\sqrt{-d}\,e^{3/2}}+\frac{b\text{PolyLog}\left(2,\frac{c\sqrt{}}{\sqrt{}}\right.}{4\sqrt{-d}\,e}$$

Antiderivative was successfully verified.

```
[In] Int[(x^2*(a + b*ArcCsch[c*x]))/(d + e*x^2)^2,x]
```

```
[Out] (a + b*ArcCsch[c*x])/(4*e*(Sqrt[-d]*Sqrt[e] - d/x)) - (a + b*ArcCsch[c*x])/
(4*e*(Sqrt[-d]*Sqrt[e] + d/x)) - (b*ArcTanh[(c^2*d - (Sqrt[-d]*Sqrt[e])/x)/
(c*Sqrt[d]*Sqrt[c^2*d - e]*Sqrt[1 + 1/(c^2*x^2)])])/(4*Sqrt[d]*Sqrt[c^2*d -
 e]*e) - (b*ArcTanh[(c^2*d + (Sqrt[-d]*Sqrt[e])/x)/(c*Sqrt[d]*Sqrt[c^2*d -
e]*Sqrt[1 + 1/(c^2*x^2)])])/(4*Sqrt[d]*Sqrt[c^2*d - e]*e) + ((a + b*ArcCsch
[c*x])*Log[1 - (c*Sqrt[-d]*E^ArcCsch[c*x])/(Sqrt[e] - Sqrt[-(c^2*d) + e])])
/(4*Sqrt[-d]*e^(3/2)) - ((a + b*ArcCsch[c*x])*Log[1 + (c*Sqrt[-d]*E^ArcCsch
[c*x])/(Sqrt[e] - Sqrt[-(c^2*d) + e])])/(4*Sqrt[-d]*e^(3/2)) + ((a + b*ArcC
sch[c*x])*Log[1 - (c*Sqrt[-d]*E^ArcCsch[c*x])/(Sqrt[e] + Sqrt[-(c^2*d) + e]
)])/(4*Sqrt[-d]*e^(3/2)) - ((a + b*ArcCsch[c*x])*Log[1 + (c*Sqrt[-d]*E^ArcC
sch[c*x])/(Sqrt[e] + Sqrt[-(c^2*d) + e])])/(4*Sqrt[-d]*e^(3/2)) - (b*PolyLo
g[2, -((c*Sqrt[-d]*E^ArcCsch[c*x])/(Sqrt[e] - Sqrt[-(c^2*d) + e]))])/(4*Sqr
t[-d]*e^(3/2)) + (b*PolyLog[2, (c*Sqrt[-d]*E^ArcCsch[c*x])/(Sqrt[e] - Sqrt[
-(c^2*d) + e])])/(4*Sqrt[-d]*e^(3/2)) - (b*PolyLog[2, -((c*Sqrt[-d]*E^ArcCs
ch[c*x])/(Sqrt[e] + Sqrt[-(c^2*d) + e]))])/(4*Sqrt[-d]*e^(3/2)) + (b*PolyLo
g[2, (c*Sqrt[-d]*E^ArcCsch[c*x])/(Sqrt[e] + Sqrt[-(c^2*d) + e])])/(4*Sqrt[-
d]*e^(3/2))
```

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 725

```
Int[1/(((d_) + (e_.)*(x_))*Sqrt[(a_) + (c_.)*(x_)^2]), x_Symbol] :> -Subst[
Int[1/(c*d^2 + a*e^2 - x^2), x], x, (a*e - c*d*x)/Sqrt[a + c*x^2]] /; FreeQ
[{a, c, d, e}, 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 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 5561

```
Int[(Cosh[(c_.) + (d_.)*(x_)]*((e_.) + (f_.)*(x_))^(m_.))/((a_) + (b_.)*Sin
h[(c_.) + (d_.)*(x_)]), x_Symbol] :> -Simp[(e + f*x)^(m + 1)/(b*f*(m + 1)),
 x] + (Int[((e + f*x)^m*E^(c + d*x))/(a - Rt[a^2 + b^2, 2] + b*E^(c + d*x))
, x] + Int[((e + f*x)^m*E^(c + d*x))/(a + Rt[a^2 + b^2, 2] + b*E^(c + d*x))
, x]) /; FreeQ[{a, b, c, d, e, f}, x] && IGtQ[m, 0] && NeQ[a^2 + b^2, 0]
```

Rule 5706

```
Int[((a_.) + ArcSinh[(c_.)*(x_)]*(b_.))^(n_.)*((d_) + (e_.)*(x_)^2)^(p_.),
x_Symbol] :> Int[ExpandIntegrand[(a + b*ArcSinh[c*x])^n, (d + e*x^2)^p, x],
 x] /; FreeQ[{a, b, c, d, e, n}, x] && NeQ[e, c^2*d] && IntegerQ[p] && (p >
 0 || IGtQ[n, 0])
```

Rule 5799

```
Int[((a_.) + ArcSinh[(c_.)*(x_)]*(b_.))^(n_.)/((d_.) + (e_.)*(x_)), x_Symbo
l] :> Subst[Int[((a + b*x)^n*Cosh[x])/(c*d + e*Sinh[x]), x], x, ArcSinh[c*x
]] /; FreeQ[{a, b, c, d, e}, x] && IGtQ[n, 0]
```

Rule 5801

```
Int[((a_.) + ArcSinh[(c_.)*(x_)]*(b_.))^(n_.)*((d_.) + (e_.)*(x_))^(m_.), x
_Symbol] :> Simp[((d + e*x)^(m + 1)*(a + b*ArcSinh[c*x])^n)/(e*(m + 1)), x]
 - Dist[(b*c*n)/(e*(m + 1)), Int[((d + e*x)^(m + 1)*(a + b*ArcSinh[c*x])^(n
 - 1))/Sqrt[1 + c^2*x^2], x], x] /; FreeQ[{a, b, c, d, e, m}, x] && IGtQ[n,
 0] && NeQ[m, -1]
```

Rule 6304

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))^(n_.)*(x_)^(m_.)*((d_.) + (e_.)*(x_
)^2)^(p_.), x_Symbol] :> -Subst[Int[((e + d*x^2)^p*(a + b*ArcSinh[x/c])^n)/
x^(m + 2*(p + 1)), x], x, 1/x] /; FreeQ[{a, b, c, d, e, n}, x] && IGtQ[n, 0
] && IntegersQ[m, p]
```

Rubi steps

$$\int \frac{x^2\left(a+b\text{csch}^{-1}(cx)\right)}{\left(d+ex^2\right)^2}\,dx=-\text{Subst}\left(\int \frac{a+b\sinh^{-1}\left(\frac{x}{c}\right)}{\left(e+dx^2\right)^2}\,dx,x,\frac{1}{x}\right)$$

$$=-\text{Subst}\left(\int\left(-\frac{d\left(a+b\sinh^{-1}\left(\frac{x}{c}\right)\right)}{4e\left(\sqrt{-d}\,\sqrt{e}-dx\right)^2}-\frac{d\left(a+b\sinh^{-1}\left(\frac{x}{c}\right)\right)}{4e\left(\sqrt{-d}\,\sqrt{e}+dx\right)^2}-\frac{d\left(a+b\sinh^{-1}\left(\frac{x}{c}\right)\right)}{2e\left(-de-d^2x^2\right)}\right)\right.$$

$$=\frac{d\,\text{Subst}\left(\int \frac{a+b\sinh^{-1}\left(\frac{x}{c}\right)}{\left(\sqrt{-d}\,\sqrt{e}-dx\right)^2}\,dx,x,\frac{1}{x}\right)}{4e}+\frac{d\,\text{Subst}\left(\int \frac{a+b\sinh^{-1}\left(\frac{x}{c}\right)}{\left(\sqrt{-d}\,\sqrt{e}+dx\right)^2}\,dx,x,\frac{1}{x}\right)}{4e}+\frac{d\,\text{Subst}\left(\int\right.}{}$$

$$=\frac{a+b\text{csch}^{-1}(cx)}{4e\left(\sqrt{-d}\,\sqrt{e}-\frac{d}{x}\right)}-\frac{a+b\text{csch}^{-1}(cx)}{4e\left(\sqrt{-d}\,\sqrt{e}+\frac{d}{x}\right)}-\frac{b\,\text{Subst}\left(\int \frac{1}{\left(\sqrt{-d}\,\sqrt{e}-dx\right)\sqrt{1+\frac{x^2}{c^2}}}\,dx,x,\frac{1}{x}\right)}{4ce}+\frac{b}{}$$

$$=\frac{a+b\text{csch}^{-1}(cx)}{4e\left(\sqrt{-d}\,\sqrt{e}-\frac{d}{x}\right)}-\frac{a+b\text{csch}^{-1}(cx)}{4e\left(\sqrt{-d}\,\sqrt{e}+\frac{d}{x}\right)}-\frac{\text{Subst}\left(\int \frac{a+b\sinh^{-1}\left(\frac{x}{c}\right)}{\sqrt{e}-\sqrt{-d}\,x}\,dx,x,\frac{1}{x}\right)}{4e^{3/2}}-\frac{\text{Subst}\left(\int\right.}{}$$

$$=\frac{a+b\text{csch}^{-1}(cx)}{4e\left(\sqrt{-d}\,\sqrt{e}-\frac{d}{x}\right)}-\frac{a+b\text{csch}^{-1}(cx)}{4e\left(\sqrt{-d}\,\sqrt{e}+\frac{d}{x}\right)}-\frac{b\tanh^{-1}\left(\frac{c^2d-\frac{\sqrt{-d}\,\sqrt{e}}{x}}{c\sqrt{d}\,\sqrt{c^2d-e}\,\sqrt{1+\frac{1}{c^2x^2}}}\right)}{4\sqrt{d}\,\sqrt{c^2d-e}\,e}-\frac{b\tanh^{-1}\left(\right.}{4\sqrt{}}$$

$$=\frac{a+b\text{csch}^{-1}(cx)}{4e\left(\sqrt{-d}\,\sqrt{e}-\frac{d}{x}\right)}-\frac{a+b\text{csch}^{-1}(cx)}{4e\left(\sqrt{-d}\,\sqrt{e}+\frac{d}{x}\right)}-\frac{b\tanh^{-1}\left(\frac{c^2d-\frac{\sqrt{-d}\,\sqrt{e}}{x}}{c\sqrt{d}\,\sqrt{c^2d-e}\,\sqrt{1+\frac{1}{c^2x^2}}}\right)}{4\sqrt{d}\,\sqrt{c^2d-e}\,e}-\frac{b\tanh^{-1}\left(\right.}{4\sqrt{}}$$

$$=\frac{a+b\text{csch}^{-1}(cx)}{4e\left(\sqrt{-d}\,\sqrt{e}-\frac{d}{x}\right)}-\frac{a+b\text{csch}^{-1}(cx)}{4e\left(\sqrt{-d}\,\sqrt{e}+\frac{d}{x}\right)}-\frac{b\tanh^{-1}\left(\frac{c^2d-\frac{\sqrt{-d}\,\sqrt{e}}{x}}{c\sqrt{d}\,\sqrt{c^2d-e}\,\sqrt{1+\frac{1}{c^2x^2}}}\right)}{4\sqrt{d}\,\sqrt{c^2d-e}\,e}-\frac{b\tanh^{-1}\left(\right.}{4\sqrt{}}$$

$$=\frac{a+b\text{csch}^{-1}(cx)}{4e\left(\sqrt{-d}\,\sqrt{e}-\frac{d}{x}\right)}-\frac{a+b\text{csch}^{-1}(cx)}{4e\left(\sqrt{-d}\,\sqrt{e}+\frac{d}{x}\right)}-\frac{b\tanh^{-1}\left(\frac{c^2d-\frac{\sqrt{-d}\,\sqrt{e}}{x}}{c\sqrt{d}\,\sqrt{c^2d-e}\,\sqrt{1+\frac{1}{c^2x^2}}}\right)}{4\sqrt{d}\,\sqrt{c^2d-e}\,e}-\frac{b\tanh^{-1}\left(\right.}{4\sqrt{}}$$

$$\frac{a+b\text{csch}^{-1}(cx)}{}\quad\frac{a+b\text{csch}^{-1}(cx)}{}\quad\frac{b\tanh^{-1}\left(\frac{c^2d-\frac{\sqrt{-d}\,\sqrt{e}}{x}}{c\sqrt{d}\,\sqrt{c^2d-e}\,\sqrt{1+\frac{1}{c^2x^2}}}\right)}{}\quad b\tanh^{-1}$$

**Mathematica [C]** time = 2.74, size = 1442, normalized size = 2.01

result too large to display

Warning: Unable to verify antiderivative.

```
[In] Integrate[(x^2*(a + b*ArcCsch[c*x]))/(d + e*x^2)^2,x]
```

```
[Out] ((-4*a*Sqrt[e]*x)/(d + e*x^2) + (4*a*ArcTan[(Sqrt[e]*x)/Sqrt[d]])/Sqrt[d] +
 b*((2*ArcCsch[c*x])/(I*Sqrt[d] - Sqrt[e]*x) - (2*ArcCsch[c*x])/(I*Sqrt[d]
+ Sqrt[e]*x) + ((8*I)*ArcSin[Sqrt[1 + Sqrt[e]/(c*Sqrt[d])]/Sqrt[2]]*ArcTan[
((c*Sqrt[d] - Sqrt[e])*Cot[(Pi + (2*I)*ArcCsch[c*x])/4])/Sqrt[-(c^2*d) + e]
])/Sqrt[d] + ((8*I)*ArcSin[Sqrt[1 - Sqrt[e]/(c*Sqrt[d])]/Sqrt[2]]*ArcTan[((
c*Sqrt[d] + Sqrt[e])*Cot[(Pi + (2*I)*ArcCsch[c*x])/4])/Sqrt[-(c^2*d) + e]])
/Sqrt[d] - (Pi*Log[1 - (I*(-Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])/(
c*Sqrt[d])]])/Sqrt[d] + ((2*I)*ArcCsch[c*x]*Log[1 - (I*(-Sqrt[e] + Sqrt[-(c^
2*d) + e])*E^ArcCsch[c*x])/(c*Sqrt[d])]])/Sqrt[d] - (4*ArcSin[Sqrt[1 + Sqrt[
e]/(c*Sqrt[d])]/Sqrt[2]]*Log[1 - (I*(-Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCs
ch[c*x])/(c*Sqrt[d])]])/Sqrt[d] + (Pi*Log[1 + (I*(-Sqrt[e] + Sqrt[-(c^2*d) +
 e])*E^ArcCsch[c*x])/(c*Sqrt[d])]])/Sqrt[d] - ((2*I)*ArcCsch[c*x]*Log[1 + (I
*(-Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])/(c*Sqrt[d])]])/Sqrt[d] + (4
*ArcSin[Sqrt[1 - Sqrt[e]/(c*Sqrt[d])]/Sqrt[2]]*Log[1 + (I*(-Sqrt[e] + Sqrt[
-(c^2*d) + e])*E^ArcCsch[c*x])/(c*Sqrt[d])]])/Sqrt[d] + (Pi*Log[1 - (I*(Sqrt
[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])/(c*Sqrt[d])]])/Sqrt[d] - ((2*I)*Ar
cCsch[c*x]*Log[1 - (I*(Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])/(c*Sqr
t[d])]])/Sqrt[d] - (4*ArcSin[Sqrt[1 - Sqrt[e]/(c*Sqrt[d])]/Sqrt[2]]*Log[1 -
(I*(Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])/(c*Sqrt[d])]])/Sqrt[d] - (
Pi*Log[1 + (I*(Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])/(c*Sqrt[d])]])/
Sqrt[d] + ((2*I)*ArcCsch[c*x]*Log[1 + (I*(Sqrt[e] + Sqrt[-(c^2*d) + e])*E^A
rcCsch[c*x])/(c*Sqrt[d])]])/Sqrt[d] + (4*ArcSin[Sqrt[1 + Sqrt[e]/(c*Sqrt[d])
]/Sqrt[2]]*Log[1 + (I*(Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])/(c*Sqr
t[d])]])/Sqrt[d] - (Pi*Log[Sqrt[e] - (I*Sqrt[d])/x]])/Sqrt[d] + (Pi*Log[Sqrt[
e] + (I*Sqrt[d])/x]])/Sqrt[d] + ((2*I)*Sqrt[e]*Log[(2*Sqrt[d]*Sqrt[e]*(I*Sqr
t[e] + c*(c*Sqrt[d] + I*Sqrt[-(c^2*d) + e]*Sqrt[1 + 1/(c^2*x^2)])*x))/(Sqrt
[-(c^2*d) + e]*(I*Sqrt[d] + Sqrt[e]*x))]])/(Sqrt[d]*Sqrt[-(c^2*d) + e]) - ((
2*I)*Sqrt[e]*Log[(-2*Sqrt[d]*Sqrt[e]*(Sqrt[e] + c*(I*c*Sqrt[d] + Sqrt[-(c^2
*d) + e]*Sqrt[1 + 1/(c^2*x^2)])*x))/(Sqrt[-(c^2*d) + e]*(Sqrt[d] + I*Sqrt[e
]*x))]])/(Sqrt[d]*Sqrt[-(c^2*d) + e]) - ((2*I)*PolyLog[2, ((-I)*(-Sqrt[e] +
Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])/(c*Sqrt[d])]])/Sqrt[d] + ((2*I)*PolyLog[
2, (I*(-Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])/(c*Sqrt[d])]])/Sqrt[d]
 + ((2*I)*PolyLog[2, ((-I)*(Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])/(
c*Sqrt[d])]])/Sqrt[d] - ((2*I)*PolyLog[2, (I*(Sqrt[e] + Sqrt[-(c^2*d) + e])*
E^ArcCsch[c*x])/(c*Sqrt[d])]])/Sqrt[d]))/(8*e^(3/2))
```

**fricas [F]** time = 0.57, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{bx^2\operatorname{arcsch}(cx)+ax^2}{e^2x^4+2\,dex^2+d^2},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*(a+b*arccsch(c*x))/(e*x^2+d)^2,x, algorithm="fricas")
```

```
[Out] integral((b*x^2*arccsch(c*x) + a*x^2)/(e^2*x^4 + 2*d*e*x^2 + d^2), x)
```

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

$$\int \frac{(b\operatorname{arcsch}(cx)+a)x^2}{\left(ex^2+d\right)^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*(a+b*arccsch(c*x))/(e*x^2+d)^2,x, algorithm="giac")
```

```
[Out] integrate((b*arccsch(c*x) + a)*x^2/(e*x^2 + d)^2, x)
```

**maple [F]** time = 3.51, size = 0, normalized size = 0.00

$$\int \frac{x^2\left(a+b\operatorname{arccsch}(cx)\right)}{\left(e\,x^2+d\right)^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^2*(a+b*arccsch(c*x))/(e*x^2+d)^2,x)
```

```
[Out] int(x^2*(a+b*arccsch(c*x))/(e*x^2+d)^2,x)
```

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

$$-\frac{1}{2}a\left(\frac{x}{e^2x^2+de}-\frac{\arctan\left(\frac{ex}{\sqrt{de}}\right)}{\sqrt{de}\,e}\right)+b\int \frac{x^2\log\left(\sqrt{\frac{1}{c^2x^2}+1}+\frac{1}{cx}\right)}{e^2x^4+2\,dex^2+d^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*(a+b*arccsch(c*x))/(e*x^2+d)^2,x, algorithm="maxima")
```

```
[Out] -1/2*a*(x/(e^2*x^2 + d*e) - arctan(e*x/sqrt(d*e))/(sqrt(d*e)*e)) + b*integr
ate(x^2*log(sqrt(1/(c^2*x^2) + 1) + 1/(c*x))/(e^2*x^4 + 2*d*e*x^2 + d^2), x
)
```

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

$$\int \frac{x^2 \left(a+b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)\right)}{\left(e\,x^2+d\right)^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((x^2*(a + b*asinh(1/(c*x))))/(d + e*x^2)^2,x)
[Out] int((x^2*(a + b*asinh(1/(c*x))))/(d + e*x^2)^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**2*(a+b*acsch(c*x))/(e*x**2+d)**2,x)
[Out] Timed out
```

# 3.109 $\int \frac{a+b\,\mathbf{csch}^{-1}(cx)}{\left(d+ex^2\right)^2}\,dx$

**Optimal**. Leaf size=713

$$-\frac{\left(a+b\operatorname{csch}^{-1}(cx)\right)\log\left(1-\frac{c\sqrt{-d}\,e^{\operatorname{csch}^{-1}(cx)}}{\sqrt{e}-\sqrt{e-c^2d}}\right)}{4(-d)^{3/2}\sqrt{e}}+\frac{\left(a+b\operatorname{csch}^{-1}(cx)\right)\log\left(\frac{c\sqrt{-d}\,e^{\operatorname{csch}^{-1}(cx)}}{\sqrt{e}-\sqrt{e-c^2d}}+1\right)}{4(-d)^{3/2}\sqrt{e}}-\frac{\left(a+b\operatorname{csch}^{-1}(cx)\right)\log\left(1\right.}{4(-d)^{3/2}\sqrt{\ }}$$

```
[Out] 1/4*b*arctanh((c^2*d-(-d)^(1/2)*e^(1/2)/x)/c/d^(1/2)/(c^2*d-e)^(1/2)/(1+1/c
^2/x^2)^(1/2))/d^(3/2)/(c^2*d-e)^(1/2)+1/4*b*arctanh((c^2*d+(-d)^(1/2)*e^(1
/2)/x)/c/d^(1/2)/(c^2*d-e)^(1/2)/(1+1/c^2/x^2)^(1/2))/d^(3/2)/(c^2*d-e)^(1/
2)-1/4*(a+b*arccsch(c*x))*ln(1-c*(1/c/x+(1+1/c^2/x^2)^(1/2))*(-d)^(1/2)/(e^
(1/2)-(-c^2*d+e)^(1/2)))/(-d)^(3/2)/e^(1/2)+1/4*(a+b*arccsch(c*x))*ln(1+c*(
1/c/x+(1+1/c^2/x^2)^(1/2))*(-d)^(1/2)/(e^(1/2)-(-c^2*d+e)^(1/2)))/(-d)^(3/2
)/e^(1/2)-1/4*(a+b*arccsch(c*x))*ln(1-c*(1/c/x+(1+1/c^2/x^2)^(1/2))*(-d)^(1
/2)/(e^(1/2)+(-c^2*d+e)^(1/2)))/(-d)^(3/2)/e^(1/2)+1/4*(a+b*arccsch(c*x))*l
n(1+c*(1/c/x+(1+1/c^2/x^2)^(1/2))*(-d)^(1/2)/(e^(1/2)+(-c^2*d+e)^(1/2)))/(-
d)^(3/2)/e^(1/2)+1/4*b*polylog(2,-c*(1/c/x+(1+1/c^2/x^2)^(1/2))*(-d)^(1/2)/
(e^(1/2)-(-c^2*d+e)^(1/2)))/(-d)^(3/2)/e^(1/2)-1/4*b*polylog(2,c*(1/c/x+(1+
1/c^2/x^2)^(1/2))*(-d)^(1/2)/(e^(1/2)-(-c^2*d+e)^(1/2)))/(-d)^(3/2)/e^(1/2)
+1/4*b*polylog(2,-c*(1/c/x+(1+1/c^2/x^2)^(1/2))*(-d)^(1/2)/(e^(1/2)+(-c^2*d
+e)^(1/2)))/(-d)^(3/2)/e^(1/2)-1/4*b*polylog(2,c*(1/c/x+(1+1/c^2/x^2)^(1/2)
)*(-d)^(1/2)/(e^(1/2)+(-c^2*d+e)^(1/2)))/(-d)^(3/2)/e^(1/2)+1/4*(-a-b*arccs
ch(c*x))/d/(-d/x+(-d)^(1/2)*e^(1/2))+1/4*(a+b*arccsch(c*x))/d/(d/x+(-d)^(1/
2)*e^(1/2))
```

**Rubi [A]** time = 2.19, antiderivative size = 713, normalized size of antiderivative = 1.00, number of steps used = 47, number of rules used = 11, integrand size = 18, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.611, Rules used = {6294, 5791, 5706, 5801, 725, 206, 5799, 5561, 2190, 2279, 2391}

$$\frac{b\text{PolyLog}\left(2,-\frac{c\sqrt{-d}\,e^{\operatorname{csch}^{-1}(cx)}}{\sqrt{e}-\sqrt{e-c^2d}}\right)}{4(-d)^{3/2}\sqrt{e}}-\frac{b\text{PolyLog}\left(2,\frac{c\sqrt{-d}\,e^{\operatorname{csch}^{-1}(cx)}}{\sqrt{e}-\sqrt{e-c^2d}}\right)}{4(-d)^{3/2}\sqrt{e}}+\frac{b\text{PolyLog}\left(2,-\frac{c\sqrt{-d}\,e^{\operatorname{csch}^{-1}(cx)}}{\sqrt{e-c^2d}+\sqrt{e}}\right)}{4(-d)^{3/2}\sqrt{e}}-\frac{b\text{PolyLog}\left(2,\frac{c\sqrt{-d}\,e}{\sqrt{e-c}}\right.}{4(-d)^{3/2}\sqrt{e}}$$

Antiderivative was successfully verified.

```
[In] Int[(a + b*ArcCsch[c*x])/(d + e*x^2)^2,x]
```

```
[Out] -(a + b*ArcCsch[c*x])/(4*d*(Sqrt[-d]*Sqrt[e] - d/x)) + (a + b*ArcCsch[c*x])
/(4*d*(Sqrt[-d]*Sqrt[e] + d/x)) + (b*ArcTanh[(c^2*d - (Sqrt[-d]*Sqrt[e])/x)
/(c*Sqrt[d]*Sqrt[c^2*d - e]*Sqrt[1 + 1/(c^2*x^2)])])/(4*d^(3/2)*Sqrt[c^2*d
- e]) + (b*ArcTanh[(c^2*d + (Sqrt[-d]*Sqrt[e])/x)/(c*Sqrt[d]*Sqrt[c^2*d - e
]*Sqrt[1 + 1/(c^2*x^2)])])/(4*d^(3/2)*Sqrt[c^2*d - e]) - ((a + b*ArcCsch[c*
x])*Log[1 - (c*Sqrt[-d]*E^ArcCsch[c*x])/(Sqrt[e] - Sqrt[-(c^2*d) + e])])/(4
*(-d)^(3/2)*Sqrt[e]) + ((a + b*ArcCsch[c*x])*Log[1 + (c*Sqrt[-d]*E^ArcCsch[
c*x])/(Sqrt[e] - Sqrt[-(c^2*d) + e])])/(4*(-d)^(3/2)*Sqrt[e]) - ((a + b*Arc
Csch[c*x])*Log[1 - (c*Sqrt[-d]*E^ArcCsch[c*x])/(Sqrt[e] + Sqrt[-(c^2*d) + e
])])/(4*(-d)^(3/2)*Sqrt[e]) + ((a + b*ArcCsch[c*x])*Log[1 + (c*Sqrt[-d]*E^A
rcCsch[c*x])/(Sqrt[e] + Sqrt[-(c^2*d) + e])])/(4*(-d)^(3/2)*Sqrt[e]) + (b*P
olyLog[2, -((c*Sqrt[-d]*E^ArcCsch[c*x])/(Sqrt[e] - Sqrt[-(c^2*d) + e]))])/(
4*(-d)^(3/2)*Sqrt[e]) - (b*PolyLog[2, (c*Sqrt[-d]*E^ArcCsch[c*x])/(Sqrt[e]
- Sqrt[-(c^2*d) + e])])/(4*(-d)^(3/2)*Sqrt[e]) + (b*PolyLog[2, -((c*Sqrt[-d
]*E^ArcCsch[c*x])/(Sqrt[e] + Sqrt[-(c^2*d) + e]))])/(4*(-d)^(3/2)*Sqrt[e])
- (b*PolyLog[2, (c*Sqrt[-d]*E^ArcCsch[c*x])/(Sqrt[e] + Sqrt[-(c^2*d) + e])]
)/(4*(-d)^(3/2)*Sqrt[e])
```

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 725

```
Int[1/(((d_) + (e_.)*(x_))*Sqrt[(a_) + (c_.)*(x_)^2]), x_Symbol] :> -Subst[
Int[1/(c*d^2 + a*e^2 - x^2), x], x, (a*e - c*d*x)/Sqrt[a + c*x^2]] /; FreeQ
[{a, c, d, e}, 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 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 5561

```
Int[(Cosh[(c_.) + (d_.)*(x_)]*((e_.) + (f_.)*(x_))^(m_.))/((a_) + (b_.)*Sin
h[(c_.) + (d_.)*(x_)]), x_Symbol] :> -Simp[(e + f*x)^(m + 1)/(b*f*(m + 1)),
 x] + (Int[((e + f*x)^m*E^(c + d*x))/(a - Rt[a^2 + b^2, 2] + b*E^(c + d*x))
, x] + Int[((e + f*x)^m*E^(c + d*x))/(a + Rt[a^2 + b^2, 2] + b*E^(c + d*x))
, x]) /; FreeQ[{a, b, c, d, e, f}, x] && IGtQ[m, 0] && NeQ[a^2 + b^2, 0]
```

Rule 5706

```
Int[((a_.) + ArcSinh[(c_.)*(x_)]*(b_.))^(n_.)*((d_) + (e_.)*(x_)^2)^(p_.),
x_Symbol] :> Int[ExpandIntegrand[(a + b*ArcSinh[c*x])^n, (d + e*x^2)^p, x],
 x] /; FreeQ[{a, b, c, d, e, n}, x] && NeQ[e, c^2*d] && IntegerQ[p] && (p >
 0 || IGtQ[n, 0])
```

Rule 5791

```
Int[((a_.) + ArcSinh[(c_.)*(x_)]*(b_.))^(n_.)*((f_.)*(x_))^(m_.)*((d_) + (e
_.)*(x_)^2)^(p_.), x_Symbol] :> Int[ExpandIntegrand[(a + b*ArcSinh[c*x])^n,
 (f*x)^m*(d + e*x^2)^p, x], x] /; FreeQ[{a, b, c, d, e, f}, x] && NeQ[e, c^
2*d] && IGtQ[n, 0] && IntegerQ[p] && IntegerQ[m]
```

Rule 5799

```
Int[((a_.) + ArcSinh[(c_.)*(x_)]*(b_.))^(n_.)/((d_.) + (e_.)*(x_)), x_Symbo
l] :> Subst[Int[((a + b*x)^n*Cosh[x])/(c*d + e*Sinh[x]), x], x, ArcSinh[c*x
]] /; FreeQ[{a, b, c, d, e}, x] && IGtQ[n, 0]
```

Rule 5801

```
Int[((a_.) + ArcSinh[(c_.)*(x_)]*(b_.))^(n_.)*((d_.) + (e_.)*(x_))^(m_.), x
_Symbol] :> Simp[((d + e*x)^(m + 1)*(a + b*ArcSinh[c*x])^n)/(e*(m + 1)), x]
 - Dist[(b*c*n)/(e*(m + 1)), Int[((d + e*x)^(m + 1)*(a + b*ArcSinh[c*x])^(n
 - 1))/Sqrt[1 + c^2*x^2], x], x] /; FreeQ[{a, b, c, d, e, m}, x] && IGtQ[n,
 0] && NeQ[m, -1]
```

Rule 6294

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))^(n_.)*((d_.) + (e_.)*(x_)^2)^(p_.),
 x_Symbol] :> -Subst[Int[((e + d*x^2)^p*(a + b*ArcSinh[x/c])^n)/x^(2*(p + 1
)), x], x, 1/x] /; FreeQ[{a, b, c, d, e, n}, x] && IGtQ[n, 0] && IntegerQ[p
```

```
]
```

Rubi steps

$$\int \frac{a+b\text{csch}^{-1}(cx)}{\left(d+ex^2\right)^2}\,dx = -\text{Subst}\left(\int \frac{x^2\left(a+b\sinh^{-1}\left(\frac{x}{c}\right)\right)}{\left(e+dx^2\right)^2}\,dx, x, \frac{1}{x}\right)$$

$$= -\text{Subst}\left(\int\left(-\frac{e\left(a+b\sinh^{-1}\left(\frac{x}{c}\right)\right)}{d\left(e+dx^2\right)^2}+\frac{a+b\sinh^{-1}\left(\frac{x}{c}\right)}{d\left(e+dx^2\right)}\right)dx, x, \frac{1}{x}\right)$$

$$= -\frac{\text{Subst}\left(\int \frac{a+b\sinh^{-1}\left(\frac{x}{c}\right)}{e+dx^2}\,dx, x, \frac{1}{x}\right)}{d}+\frac{e\,\text{Subst}\left(\int \frac{a+b\sinh^{-1}\left(\frac{x}{c}\right)}{\left(e+dx^2\right)^2}\,dx, x, \frac{1}{x}\right)}{d}$$

$$= -\frac{\text{Subst}\left(\int\left(\frac{a+b\sinh^{-1}\left(\frac{x}{c}\right)}{2\sqrt{e}\left(\sqrt{e}-\sqrt{-d}\,x\right)}+\frac{a+b\sinh^{-1}\left(\frac{x}{c}\right)}{2\sqrt{e}\left(\sqrt{e}+\sqrt{-d}\,x\right)}\right)dx, x, \frac{1}{x}\right)}{d}+\frac{e\,\text{Subst}\left(\int\left(-\frac{d\left(a+b\sinh^{-1}\left(\frac{x}{c}\right)\right)}{4e\left(\sqrt{-d}\,\sqrt{e}-dx\right)^2}-\cdots\right.\right.}{\cdots}$$

$$= -\left(\frac{1}{4}\text{Subst}\left(\int \frac{a+b\sinh^{-1}\left(\frac{x}{c}\right)}{\left(\sqrt{-d}\,\sqrt{e}-dx\right)^2}\,dx, x, \frac{1}{x}\right)\right)-\frac{1}{4}\text{Subst}\left(\int \frac{a+b\sinh^{-1}\left(\frac{x}{c}\right)}{\left(\sqrt{-d}\,\sqrt{e}+dx\right)^2}\,dx, x, \frac{1}{x}\right)-\cdots$$

$$= -\frac{a+b\text{csch}^{-1}(cx)}{4d\left(\sqrt{-d}\,\sqrt{e}-\frac{d}{x}\right)}+\frac{a+b\text{csch}^{-1}(cx)}{4d\left(\sqrt{-d}\,\sqrt{e}+\frac{d}{x}\right)}-\frac{1}{2}\text{Subst}\left(\int\left(-\frac{a+b\sinh^{-1}\left(\frac{x}{c}\right)}{2d\sqrt{e}\left(\sqrt{e}-\sqrt{-d}\,x\right)}-\frac{a+\cdots}{2d\sqrt{e}\cdots}\right.\right.$$

$$= -\frac{a+b\text{csch}^{-1}(cx)}{4d\left(\sqrt{-d}\,\sqrt{e}-\frac{d}{x}\right)}+\frac{a+b\text{csch}^{-1}(cx)}{4d\left(\sqrt{-d}\,\sqrt{e}+\frac{d}{x}\right)}-\frac{b\,\text{Subst}\left(\int \frac{1}{d^2-\frac{de}{c^2}-x^2}\,dx, x, \frac{-d-\frac{\sqrt{-d}\,\sqrt{e}}{c^2x}}{\sqrt{1+\frac{1}{c^2x^2}}}\right)}{4cd}+\frac{b\,\text{Sub}\cdots}{\cdots}$$

$$= -\frac{a+b\text{csch}^{-1}(cx)}{4d\left(\sqrt{-d}\,\sqrt{e}-\frac{d}{x}\right)}+\frac{a+b\text{csch}^{-1}(cx)}{4d\left(\sqrt{-d}\,\sqrt{e}+\frac{d}{x}\right)}+\frac{b\tanh^{-1}\left(\frac{c^2d-\frac{\sqrt{-d}\,\sqrt{e}}{x}}{c\sqrt{d}\,\sqrt{c^2d-e}\,\sqrt{1+\frac{1}{c^2x^2}}}\right)}{4d^{3/2}\sqrt{c^2d-e}}+\frac{b\tanh^{-1}\left(\cdots\right)}{4d^{3/2}\cdots}$$

$$= -\frac{a+b\text{csch}^{-1}(cx)}{4d\left(\sqrt{-d}\,\sqrt{e}-\frac{d}{x}\right)}+\frac{a+b\text{csch}^{-1}(cx)}{4d\left(\sqrt{-d}\,\sqrt{e}+\frac{d}{x}\right)}+\frac{b\tanh^{-1}\left(\frac{c^2d-\frac{\sqrt{-d}\,\sqrt{e}}{x}}{c\sqrt{d}\,\sqrt{c^2d-e}\,\sqrt{1+\frac{1}{c^2x^2}}}\right)}{4d^{3/2}\sqrt{c^2d-e}}+\frac{b\tanh^{-1}\left(\cdots\right)}{4d^{3/2}\cdots}$$

$$= -\frac{a+b\text{csch}^{-1}(cx)}{4d\left(\sqrt{-d}\,\sqrt{e}-\frac{d}{x}\right)}+\frac{a+b\text{csch}^{-1}(cx)}{4d\left(\sqrt{-d}\,\sqrt{e}+\frac{d}{x}\right)}+\frac{b\tanh^{-1}\left(\frac{c^2d-\frac{\sqrt{-d}\,\sqrt{e}}{x}}{c\sqrt{d}\,\sqrt{c^2d-e}\,\sqrt{1+\frac{1}{c^2x^2}}}\right)}{4d^{3/2}\sqrt{c^2d-e}}+\frac{b\tanh^{-1}\left(\cdots\right)}{4d^{3/2}\cdots}$$

**Mathematica [C]** time = 3.65, size = 1437, normalized size = 2.02

result too large to display

Warning: Unable to verify antiderivative.

```
[In] Integrate[(a + b*ArcCsch[c*x])/(d + e*x^2)^2,x]
```

```
[Out] ((a*x)/(d^2 + d*e*x^2) + (a*ArcTan[(Sqrt[e]*x)/Sqrt[d]])/(d^(3/2)*Sqrt[e])
+ (b*((2*Sqrt[d]*ArcCsch[c*x])/((-I)*Sqrt[d]*Sqrt[e] + e*x) + (2*Sqrt[d]*Ar
cCsch[c*x])/(I*Sqrt[d]*Sqrt[e] + e*x) + ((8*I)*ArcSin[Sqrt[1 + Sqrt[e]/(c*S
qrt[d])]/Sqrt[2]]*ArcTan[((c*Sqrt[d] - Sqrt[e])*Cot[(Pi + (2*I)*ArcCsch[c*x
])/4])/Sqrt[-(c^2*d) + e]])/Sqrt[e] + ((8*I)*ArcSin[Sqrt[1 - Sqrt[e]/(c*Sqr
t[d])]/Sqrt[2]]*ArcTan[((c*Sqrt[d] + Sqrt[e])*Cot[(Pi + (2*I)*ArcCsch[c*x])
/4])/Sqrt[-(c^2*d) + e]])/Sqrt[e] - (Pi*Log[1 - (I*(-Sqrt[e] + Sqrt[-(c^2*d
) + e])*E^ArcCsch[c*x])/(c*Sqrt[d])]])/Sqrt[e] + ((2*I)*ArcCsch[c*x]*Log[1 -
 (I*(-Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])/(c*Sqrt[d])])/Sqrt[e] -
 (4*ArcSin[Sqrt[1 + Sqrt[e]/(c*Sqrt[d])]/Sqrt[2]]*Log[1 - (I*(-Sqrt[e] + Sq
rt[-(c^2*d) + e])*E^ArcCsch[c*x])/(c*Sqrt[d])]])/Sqrt[e] + (Pi*Log[1 + (I*(-
Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])/(c*Sqrt[d])]])/Sqrt[e] - ((2*I
)*ArcCsch[c*x]*Log[1 + (I*(-Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])/(
c*Sqrt[d])]])/Sqrt[e] + (4*ArcSin[Sqrt[1 - Sqrt[e]/(c*Sqrt[d])]/Sqrt[2]]*Log
[1 + (I*(-Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])/(c*Sqrt[d])]])/Sqrt[
e] + (Pi*Log[1 - (I*(Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])/(c*Sqrt[
d])]])/Sqrt[e] - ((2*I)*ArcCsch[c*x]*Log[1 - (I*(Sqrt[e] + Sqrt[-(c^2*d) + e
])*E^ArcCsch[c*x])/(c*Sqrt[d])]])/Sqrt[e] - (4*ArcSin[Sqrt[1 - Sqrt[e]/(c*Sq
rt[d])]/Sqrt[2]]*Log[1 - (I*(Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])/
(c*Sqrt[d])]])/Sqrt[e] - (Pi*Log[1 + (I*(Sqrt[e] + Sqrt[-(c^2*d) + e])*E^Arc
Csch[c*x])/(c*Sqrt[d])]])/Sqrt[e] + ((2*I)*ArcCsch[c*x]*Log[1 + (I*(Sqrt[e]
+ Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])/(c*Sqrt[d])]])/Sqrt[e] + (4*ArcSin[Sqr
t[1 + Sqrt[e]/(c*Sqrt[d])]/Sqrt[2]]*Log[1 + (I*(Sqrt[e] + Sqrt[-(c^2*d) + e
])*E^ArcCsch[c*x])/(c*Sqrt[d])]])/Sqrt[e] - (Pi*Log[Sqrt[e] - (I*Sqrt[d])/x]
)/Sqrt[e] + (Pi*Log[Sqrt[e] + (I*Sqrt[d])/x])/Sqrt[e] - ((2*I)*Log[(2*Sqrt[
d]*Sqrt[e]*(I*Sqrt[e] + c*(c*Sqrt[d] + I*Sqrt[-(c^2*d) + e]*Sqrt[1 + 1/(c^2
*x^2)])*x))/(Sqrt[-(c^2*d) + e]*(I*Sqrt[d] + Sqrt[e]*x))]])/Sqrt[-(c^2*d) +
e] + ((2*I)*Log[(-2*Sqrt[d]*Sqrt[e]*(Sqrt[e] + c*(I*c*Sqrt[d] + Sqrt[-(c^2*
d) + e]*Sqrt[1 + 1/(c^2*x^2)])*x))/(Sqrt[-(c^2*d) + e]*(Sqrt[d] + I*Sqrt[e]
*x))]])/Sqrt[-(c^2*d) + e] - ((2*I)*PolyLog[2, ((-I)*(-Sqrt[e] + Sqrt[-(c^2*
d) + e])*E^ArcCsch[c*x])/(c*Sqrt[d])]])/Sqrt[e] + ((2*I)*PolyLog[2, (I*(-Sqr
t[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])/(c*Sqrt[d])]])/Sqrt[e] + ((2*I)*P
olyLog[2, ((-I)*(Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])/(c*Sqrt[d])]
)/Sqrt[e] - ((2*I)*PolyLog[2, (I*(Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c
*x])/(c*Sqrt[d])]])/Sqrt[e]))/(4*d^(3/2)))/2
```

**fricas [F]** time = 0.81, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{b\,\text{arcsch}\,(cx) + a}{e^2x^4 + 2\,dex^2 + d^2}, x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))/(e*x^2+d)^2,x, algorithm="fricas")
```

```
[Out] integral((b*arccsch(c*x) + a)/(e^2*x^4 + 2*d*e*x^2 + d^2), x)
```

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

$$\int \frac{b\,\text{arcsch}\,(cx) + a}{\left(ex^2 + d\right)^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))/(e*x^2+d)^2,x, algorithm="giac")
```

```
[Out] integrate((b*arccsch(c*x) + a)/(e*x^2 + d)^2, x)
```

**maple [F]** time = 4.65, size = 0, normalized size = 0.00

$$\int \frac{a + b\,\text{arccsch}\,(cx)}{\left(e\,x^2 + d\right)^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a+b*arccsch(c*x))/(e*x^2+d)^2,x)
```

```
[Out] int((a+b*arccsch(c*x))/(e*x^2+d)^2,x)
```

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

$$\frac{1}{2}\,a\left(\frac{x}{dex^2 + d^2} + \frac{\arctan\left(\frac{ex}{\sqrt{de}}\right)}{\sqrt{de}\,d}\right) + b\int \frac{\log\left(\sqrt{\frac{1}{c^2x^2} + 1} + \frac{1}{cx}\right)}{e^2x^4 + 2\,dex^2 + d^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))/(e*x^2+d)^2,x, algorithm="maxima")
```

```
[Out] 1/2*a*(x/(d*e*x^2 + d^2) + arctan(e*x/sqrt(d*e))/(sqrt(d*e)*d)) + b*integra
te(log(sqrt(1/(c^2*x^2) + 1) + 1/(c*x))/(e^2*x^4 + 2*d*e*x^2 + d^2), x)
```

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

$$\int \frac{a+b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)}{\left(e\,x^2+d\right)^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a + b*asinh(1/(c*x)))/(d + e*x^2)^2,x)
[Out] int((a + b*asinh(1/(c*x)))/(d + e*x^2)^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*acsch(c*x))/(e*x**2+d)**2,x)
[Out] Timed out
```

# 3.110 $\int \frac{a+b\text{csch}^{-1}(cx)}{x^2(d+ex^2)^2}\,dx$

**Optimal**. Leaf size=758

$$-\frac{3\sqrt{e}\left(a+b\text{csch}^{-1}(cx)\right)\log\left(1-\frac{c\sqrt{-d}\,e^{\text{csch}^{-1}(cx)}}{\sqrt{e}-\sqrt{e-c^2d}}\right)}{4(-d)^{5/2}}+\frac{3\sqrt{e}\left(a+b\text{csch}^{-1}(cx)\right)\log\left(\frac{c\sqrt{-d}\,e^{\text{csch}^{-1}(cx)}}{\sqrt{e}-\sqrt{e-c^2d}}+1\right)}{4(-d)^{5/2}}-\frac{3\sqrt{e}\left(a+b\text{csch}\right.}{}$$

```
[Out] -a/d^2/x-b*arccsch(c*x)/d^2/x-1/4*b*e*arctanh((c^2*d-(-d)^(1/2)*e^(1/2)/x)/
c/d^(1/2)/(c^2*d-e)^(1/2)/(1+1/c^2/x^2)^(1/2))/d^(5/2)/(c^2*d-e)^(1/2)-1/4*
b*e*arctanh((c^2*d+(-d)^(1/2)*e^(1/2)/x)/c/d^(1/2)/(c^2*d-e)^(1/2)/(1+1/c^2
/x^2)^(1/2))/d^(5/2)/(c^2*d-e)^(1/2)-3/4*(a+b*arccsch(c*x))*ln(1-c*(1/c/x+(
1+1/c^2/x^2)^(1/2))*(-d)^(1/2)/(e^(1/2)-(-c^2*d+e)^(1/2)))*e^(1/2)/(-d)^(5/
2)+3/4*(a+b*arccsch(c*x))*ln(1+c*(1/c/x+(1+1/c^2/x^2)^(1/2))*(-d)^(1/2)/(e^
(1/2)-(-c^2*d+e)^(1/2)))*e^(1/2)/(-d)^(5/2)-3/4*(a+b*arccsch(c*x))*ln(1-c*(
1/c/x+(1+1/c^2/x^2)^(1/2))*(-d)^(1/2)/(e^(1/2)+(-c^2*d+e)^(1/2)))*e^(1/2)/(
-d)^(5/2)+3/4*(a+b*arccsch(c*x))*ln(1+c*(1/c/x+(1+1/c^2/x^2)^(1/2))*(-d)^(1
/2)/(e^(1/2)+(-c^2*d+e)^(1/2)))*e^(1/2)/(-d)^(5/2)+3/4*b*polylog(2,-c*(1/c/
x+(1+1/c^2/x^2)^(1/2))*(-d)^(1/2)/(e^(1/2)-(-c^2*d+e)^(1/2)))*e^(1/2)/(-d)^
(5/2)-3/4*b*polylog(2,c*(1/c/x+(1+1/c^2/x^2)^(1/2))*(-d)^(1/2)/(e^(1/2)-(-c
^2*d+e)^(1/2)))*e^(1/2)/(-d)^(5/2)+3/4*b*polylog(2,-c*(1/c/x+(1+1/c^2/x^2)^
(1/2))*(-d)^(1/2)/(e^(1/2)+(-c^2*d+e)^(1/2)))*e^(1/2)/(-d)^(5/2)-3/4*b*poly
log(2,c*(1/c/x+(1+1/c^2/x^2)^(1/2))*(-d)^(1/2)/(e^(1/2)+(-c^2*d+e)^(1/2)))*
e^(1/2)/(-d)^(5/2)+1/4*e*(a+b*arccsch(c*x))/d^2/(-d/x+(-d)^(1/2)*e^(1/2))-1
/4*e*(a+b*arccsch(c*x))/d^2/(d/x+(-d)^(1/2)*e^(1/2))+b*c*(1+1/c^2/x^2)^(1/2
)/d^2
```

**Rubi [A]** time = 2.25, antiderivative size = 758, normalized size of antiderivative = 1.00, number of steps used = 50, number of rules used = 13, integrand size = 21, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.619, Rules used = {6304, 5791, 5653, 261, 5706, 5801, 725, 206, 5799, 5561, 2190, 2279, 2391}

$$\frac{3b\sqrt{e}\,\text{PolyLog}\left(2,-\frac{c\sqrt{-d}\,e^{\text{csch}^{-1}(cx)}}{\sqrt{e}-\sqrt{e-c^2d}}\right)}{4(-d)^{5/2}}-\frac{3b\sqrt{e}\,\text{PolyLog}\left(2,\frac{c\sqrt{-d}\,e^{\text{csch}^{-1}(cx)}}{\sqrt{e}-\sqrt{e-c^2d}}\right)}{4(-d)^{5/2}}+\frac{3b\sqrt{e}\,\text{PolyLog}\left(2,-\frac{c\sqrt{-d}\,e^{\text{csch}^{-1}(cx)}}{\sqrt{e-c^2d}+\sqrt{e}}\right)}{4(-d)^{5/2}}-\frac{3b\sqrt{e}\,\text{I}}{}$$

Antiderivative was successfully verified.

```
[In] Int[(a + b*ArcCsch[c*x])/(x^2*(d + e*x^2)^2),x]
```

```
[Out] (b*c*Sqrt[1 + 1/(c^2*x^2)])/d^2 - a/(d^2*x) - (b*ArcCsch[c*x])/(d^2*x) + (e
*(a + b*ArcCsch[c*x]))/(4*d^2*(Sqrt[-d]*Sqrt[e] - d/x)) - (e*(a + b*ArcCsch
[c*x]))/(4*d^2*(Sqrt[-d]*Sqrt[e] + d/x)) - (b*e*ArcTanh[(c^2*d - (Sqrt[-d]*
Sqrt[e])/x)/(c*Sqrt[d]*Sqrt[c^2*d - e]*Sqrt[1 + 1/(c^2*x^2)])])/(4*d^(5/2)*
Sqrt[c^2*d - e]) - (b*e*ArcTanh[(c^2*d + (Sqrt[-d]*Sqrt[e])/x)/(c*Sqrt[d]*S
qrt[c^2*d - e]*Sqrt[1 + 1/(c^2*x^2)])])/(4*d^(5/2)*Sqrt[c^2*d - e]) - (3*Sq
rt[e]*(a + b*ArcCsch[c*x])*Log[1 - (c*Sqrt[-d]*E^ArcCsch[c*x])/(Sqrt[e] - S
qrt[-(c^2*d) + e])])/(4*(-d)^(5/2)) + (3*Sqrt[e]*(a + b*ArcCsch[c*x])*Log[1
 + (c*Sqrt[-d]*E^ArcCsch[c*x])/(Sqrt[e] - Sqrt[-(c^2*d) + e])])/(4*(-d)^(5/
2)) - (3*Sqrt[e]*(a + b*ArcCsch[c*x])*Log[1 - (c*Sqrt[-d]*E^ArcCsch[c*x])/(
Sqrt[e] + Sqrt[-(c^2*d) + e])])/(4*(-d)^(5/2)) + (3*Sqrt[e]*(a + b*ArcCsch[
c*x])*Log[1 + (c*Sqrt[-d]*E^ArcCsch[c*x])/(Sqrt[e] + Sqrt[-(c^2*d) + e])])/
(4*(-d)^(5/2)) + (3*b*Sqrt[e]*PolyLog[2, -((c*Sqrt[-d]*E^ArcCsch[c*x])/(Sqr
t[e] - Sqrt[-(c^2*d) + e]))])/(4*(-d)^(5/2)) - (3*b*Sqrt[e]*PolyLog[2, (c*S
qrt[-d]*E^ArcCsch[c*x])/(Sqrt[e] - Sqrt[-(c^2*d) + e])])/(4*(-d)^(5/2)) + (
3*b*Sqrt[e]*PolyLog[2, -((c*Sqrt[-d]*E^ArcCsch[c*x])/(Sqrt[e] + Sqrt[-(c^2*
d) + e]))])/(4*(-d)^(5/2)) - (3*b*Sqrt[e]*PolyLog[2, (c*Sqrt[-d]*E^ArcCsch[
c*x])/(Sqrt[e] + Sqrt[-(c^2*d) + e])])/(4*(-d)^(5/2))
```

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 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 725

```
Int[1/(((d_) + (e_.)*(x_))*Sqrt[(a_) + (c_.)*(x_)^2]), x_Symbol] :> -Subst[
Int[1/(c*d^2 + a*e^2 - x^2), x], x, (a*e - c*d*x)/Sqrt[a + c*x^2]] /; FreeQ
[{a, c, d, e}, 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 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 5561

```
Int[(Cosh[(c_.) + (d_.)*(x_)]*((e_.) + (f_.)*(x_))^(m_.))/((a_) + (b_.)*Sin
h[(c_.) + (d_.)*(x_)]), x_Symbol] :> -Simp[(e + f*x)^(m + 1)/(b*f*(m + 1)),
 x] + (Int[((e + f*x)^m*E^(c + d*x))/(a - Rt[a^2 + b^2, 2] + b*E^(c + d*x))
, x] + Int[((e + f*x)^m*E^(c + d*x))/(a + Rt[a^2 + b^2, 2] + b*E^(c + d*x))
, x]) /; FreeQ[{a, b, c, d, e, f}, x] && IGtQ[m, 0] && NeQ[a^2 + b^2, 0]
```

Rule 5653

```
Int[((a_.) + ArcSinh[(c_.)*(x_)]*(b_.))^(n_.), x_Symbol] :> Simp[x*(a + b*A
rcSinh[c*x])^n, x] - Dist[b*c*n, Int[(x*(a + b*ArcSinh[c*x])^(n - 1))/Sqrt[
1 + c^2*x^2], x], x] /; FreeQ[{a, b, c}, x] && GtQ[n, 0]
```

Rule 5706

```
Int[((a_.) + ArcSinh[(c_.)*(x_)]*(b_.))^(n_.)*((d_) + (e_.)*(x_)^2)^(p_.),
x_Symbol] :> Int[ExpandIntegrand[(a + b*ArcSinh[c*x])^n, (d + e*x^2)^p, x],
 x] /; FreeQ[{a, b, c, d, e, n}, x] && NeQ[e, c^2*d] && IntegerQ[p] && (p >
 0 || IGtQ[n, 0])
```

Rule 5791

```
Int[((a_.) + ArcSinh[(c_.)*(x_)]*(b_.))^(n_.)*((f_.)*(x_))^(m_.)*((d_) + (e
_.)*(x_)^2)^(p_.), x_Symbol] :> Int[ExpandIntegrand[(a + b*ArcSinh[c*x])^n,
 (f*x)^m*(d + e*x^2)^p, x], x] /; FreeQ[{a, b, c, d, e, f}, x] && NeQ[e, c^
2*d] && IGtQ[n, 0] && IntegerQ[p] && IntegerQ[m]
```

Rule 5799

```
Int[((a_.) + ArcSinh[(c_.)*(x_)]*(b_.))^(n_.)/((d_.) + (e_.)*(x_)), x_Symbo
l] :> Subst[Int[((a + b*x)^n*Cosh[x])/(c*d + e*Sinh[x]), x], x, ArcSinh[c*x
]] /; FreeQ[{a, b, c, d, e}, x] && IGtQ[n, 0]
```

Rule 5801

```
Int[((a_.) + ArcSinh[(c_.)*(x_)]*(b_.))^(n_.)*((d_.) + (e_.)*(x_))^(m_.), x
_Symbol] :> Simp[((d + e*x)^(m + 1)*(a + b*ArcSinh[c*x])^n)/(e*(m + 1)), x]
 - Dist[(b*c*n)/(e*(m + 1)), Int[((d + e*x)^(m + 1)*(a + b*ArcSinh[c*x])^(n
 - 1))/Sqrt[1 + c^2*x^2], x], x] /; FreeQ[{a, b, c, d, e, m}, x] && IGtQ[n,
 0] && NeQ[m, -1]
```

Rule 6304

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))^(n_.)*(x_)^(m_.)*((d_.) + (e_.)*(x_
)^2)^(p_.), x_Symbol] :> -Subst[Int[((e + d*x^2)^p*(a + b*ArcSinh[x/c])^n)/
x^(m + 2*(p + 1)), x], x, 1/x] /; FreeQ[{a, b, c, d, e, n}, x] && IGtQ[n, 0
] && IntegersQ[m, p]
```

Rubi steps

$$\int \frac{a+b\text{csch}^{-1}(cx)}{x^2\left(d+ex^2\right)^2}\,dx = -\text{Subst}\left(\int \frac{x^4\left(a+b\sinh^{-1}\left(\frac{x}{c}\right)\right)}{\left(e+dx^2\right)^2}\,dx, x, \frac{1}{x}\right)$$

$$= -\text{Subst}\left(\int \left(\frac{a+b\sinh^{-1}\left(\frac{x}{c}\right)}{d^2} + \frac{e^2\left(a+b\sinh^{-1}\left(\frac{x}{c}\right)\right)}{d^2\left(e+dx^2\right)^2} - \frac{2e\left(a+b\sinh^{-1}\left(\frac{x}{c}\right)\right)}{d^2\left(e+dx^2\right)}\right) dx, x, \frac{1}{x}$$

$$= -\frac{\text{Subst}\left(\int \left(a+b\sinh^{-1}\left(\frac{x}{c}\right)\right) dx, x, \frac{1}{x}\right)}{d^2} + \frac{(2e)\,\text{Subst}\left(\int \frac{a+b\sinh^{-1}\left(\frac{x}{c}\right)}{e+dx^2}\,dx, x, \frac{1}{x}\right)}{d^2} - \frac{e^2\,\text{Subst}}{}$$

$$= -\frac{a}{d^2x} - \frac{b\,\text{Subst}\left(\int \sinh^{-1}\left(\frac{x}{c}\right) dx, x, \frac{1}{x}\right)}{d^2} + \frac{(2e)\,\text{Subst}\left(\int \left(\frac{a+b\sinh^{-1}\left(\frac{x}{c}\right)}{2\sqrt{e}\left(\sqrt{e}-\sqrt{-d}\,x\right)} + \frac{a+b\sinh^{-1}\left(\frac{x}{c}\right)}{2\sqrt{e}\left(\sqrt{e}+\sqrt{-d}\,x\right)}\right.\right.}{d^2}$$

$$= -\frac{a}{d^2x} - \frac{b\text{csch}^{-1}(cx)}{d^2x} + \frac{b\,\text{Subst}\left(\int \frac{x}{\sqrt{1+\frac{x^2}{c^2}}}\,dx, x, \frac{1}{x}\right)}{cd^2} + \frac{\sqrt{e}\,\text{Subst}\left(\int \frac{a+b\sinh^{-1}\left(\frac{x}{c}\right)}{\sqrt{e}-\sqrt{-d}\,x}\,dx, x, \frac{1}{x}\right)}{d^2}$$

$$= \frac{bc\sqrt{1+\frac{1}{c^2x^2}}}{d^2} - \frac{a}{d^2x} - \frac{b\text{csch}^{-1}(cx)}{d^2x} + \frac{e\left(a+b\text{csch}^{-1}(cx)\right)}{4d^2\left(\sqrt{-d}\sqrt{e}-\frac{d}{x}\right)} - \frac{e\left(a+b\text{csch}^{-1}(cx)\right)}{4d^2\left(\sqrt{-d}\sqrt{e}+\frac{d}{x}\right)} + \frac{\sqrt{e}\,\text{S}}{}$$

$$= \frac{bc\sqrt{1+\frac{1}{c^2x^2}}}{d^2} - \frac{a}{d^2x} - \frac{b\text{csch}^{-1}(cx)}{d^2x} + \frac{e\left(a+b\text{csch}^{-1}(cx)\right)}{4d^2\left(\sqrt{-d}\sqrt{e}-\frac{d}{x}\right)} - \frac{e\left(a+b\text{csch}^{-1}(cx)\right)}{4d^2\left(\sqrt{-d}\sqrt{e}+\frac{d}{x}\right)} - \frac{\sqrt{e}\,\text{S}}{}$$

$$= \frac{bc\sqrt{1+\frac{1}{c^2x^2}}}{d^2} - \frac{a}{d^2x} - \frac{b\text{csch}^{-1}(cx)}{d^2x} + \frac{e\left(a+b\text{csch}^{-1}(cx)\right)}{4d^2\left(\sqrt{-d}\sqrt{e}-\frac{d}{x}\right)} - \frac{e\left(a+b\text{csch}^{-1}(cx)\right)}{4d^2\left(\sqrt{-d}\sqrt{e}+\frac{d}{x}\right)} - \frac{be\,\text{tan}}{}$$

$$= \frac{bc\sqrt{1+\frac{1}{c^2x^2}}}{d^2} - \frac{a}{d^2x} - \frac{b\text{csch}^{-1}(cx)}{d^2x} + \frac{e\left(a+b\text{csch}^{-1}(cx)\right)}{4d^2\left(\sqrt{-d}\sqrt{e}-\frac{d}{x}\right)} - \frac{e\left(a+b\text{csch}^{-1}(cx)\right)}{4d^2\left(\sqrt{-d}\sqrt{e}+\frac{d}{x}\right)} - \frac{be\,\text{tan}}{}$$

$$= \frac{bc\sqrt{1+\frac{1}{c^2x^2}}}{d^2} - \frac{a}{d^2x} - \frac{b\text{csch}^{-1}(cx)}{d^2x} + \frac{e\left(a+b\text{csch}^{-1}(cx)\right)}{4d^2\left(\sqrt{-d}\sqrt{e}-\frac{d}{x}\right)} - \frac{e\left(a+b\text{csch}^{-1}(cx)\right)}{4d^2\left(\sqrt{-d}\sqrt{e}+\frac{d}{x}\right)} - \frac{be\,\text{tan}}{}$$

**Mathematica [C]** time = 3.12, size = 1487, normalized size = 1.96

result too large to display

Warning: Unable to verify antiderivative.

```
[In] Integrate[(a + b*ArcCsch[c*x])/(x^2*(d + e*x^2)^2),x]
```

```
[Out] ((-8*a*Sqrt[d])/x - (4*a*Sqrt[d]*e*x)/(d + e*x^2) - 12*a*Sqrt[e]*ArcTan[(Sq
rt[e]*x)/Sqrt[d]] + b*(8*c*Sqrt[d]*Sqrt[1 + 1/(c^2*x^2)] - (8*Sqrt[d]*ArcCs
ch[c*x])/x - (2*Sqrt[d]*e*ArcCsch[c*x])/((-I)*Sqrt[d]*Sqrt[e] + e*x) - (2*S
qrt[d]*e*ArcCsch[c*x])/(I*Sqrt[d]*Sqrt[e] + e*x) - (24*I)*Sqrt[e]*ArcSin[Sq
rt[1 + Sqrt[e]/(c*Sqrt[d])]/Sqrt[2]]*ArcTan[((c*Sqrt[d] - Sqrt[e])*Cot[(Pi
+ (2*I)*ArcCsch[c*x])/4])/Sqrt[-(c^2*d) + e]] - (24*I)*Sqrt[e]*ArcSin[Sqrt[
1 - Sqrt[e]/(c*Sqrt[d])]/Sqrt[2]]*ArcTan[((c*Sqrt[d] + Sqrt[e])*Cot[(Pi + (
2*I)*ArcCsch[c*x])/4])/Sqrt[-(c^2*d) + e]] + 3*Sqrt[e]*Pi*Log[1 - (I*(-Sqrt
[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])/(c*Sqrt[d])] - (6*I)*Sqrt[e]*ArcC
sch[c*x]*Log[1 - (I*(-Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])/(c*Sqrt
[d])] + 12*Sqrt[e]*ArcSin[Sqrt[1 + Sqrt[e]/(c*Sqrt[d])]/Sqrt[2]]*Log[1 - (I
*(-Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])/(c*Sqrt[d])] - 3*Sqrt[e]*P
i*Log[1 + (I*(-Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])/(c*Sqrt[d])] +
 (6*I)*Sqrt[e]*ArcCsch[c*x]*Log[1 + (I*(-Sqrt[e] + Sqrt[-(c^2*d) + e])*E^Ar
cCsch[c*x])/(c*Sqrt[d])] - 12*Sqrt[e]*ArcSin[Sqrt[1 - Sqrt[e]/(c*Sqrt[d])]/
Sqrt[2]]*Log[1 + (I*(-Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])/(c*Sqrt
[d])] - 3*Sqrt[e]*Pi*Log[1 - (I*(Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*
x])/(c*Sqrt[d])] + (6*I)*Sqrt[e]*ArcCsch[c*x]*Log[1 - (I*(Sqrt[e] + Sqrt[-(
c^2*d) + e])*E^ArcCsch[c*x])/(c*Sqrt[d])] + 12*Sqrt[e]*ArcSin[Sqrt[1 - Sqrt
[e]/(c*Sqrt[d])]/Sqrt[2]]*Log[1 - (I*(Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCs
ch[c*x])/(c*Sqrt[d])] + 3*Sqrt[e]*Pi*Log[1 + (I*(Sqrt[e] + Sqrt[-(c^2*d) +
e])*E^ArcCsch[c*x])/(c*Sqrt[d])] - (6*I)*Sqrt[e]*ArcCsch[c*x]*Log[1 + (I*(S
qrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])/(c*Sqrt[d])] - 12*Sqrt[e]*ArcS
in[Sqrt[1 + Sqrt[e]/(c*Sqrt[d])]/Sqrt[2]]*Log[1 + (I*(Sqrt[e] + Sqrt[-(c^2*
d) + e])*E^ArcCsch[c*x])/(c*Sqrt[d])] + 3*Sqrt[e]*Pi*Log[Sqrt[e] - (I*Sqrt[
d])/x] - 3*Sqrt[e]*Pi*Log[Sqrt[e] + (I*Sqrt[d])/x] + ((2*I)*e*Log[(2*Sqrt[d
]*Sqrt[e]*(I*Sqrt[e] + c*(c*Sqrt[d] + I*Sqrt[-(c^2*d) + e]*Sqrt[1 + 1/(c^2*
x^2)])*x))/(Sqrt[-(c^2*d) + e]*(I*Sqrt[d] + Sqrt[e]*x))])/Sqrt[-(c^2*d) + e
] - ((2*I)*e*Log[(-2*Sqrt[d]*Sqrt[e]*(Sqrt[e] + c*(I*c*Sqrt[d] + Sqrt[-(c^2
*d) + e]*Sqrt[1 + 1/(c^2*x^2)])*x))/(Sqrt[-(c^2*d) + e]*(Sqrt[d] + I*Sqrt[e
]*x))])/Sqrt[-(c^2*d) + e] + (6*I)*Sqrt[e]*PolyLog[2, ((-I)*(-Sqrt[e] + Sqr
t[-(c^2*d) + e])*E^ArcCsch[c*x])/(c*Sqrt[d])] - (6*I)*Sqrt[e]*PolyLog[2, (I
*(-Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])/(c*Sqrt[d])] - (6*I)*Sqrt[
e]*PolyLog[2, ((-I)*(Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])/(c*Sqrt[
d])] + (6*I)*Sqrt[e]*PolyLog[2, (I*(Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch
[c*x])/(c*Sqrt[d])]))/(8*d^(5/2))
```

**fricas** [F] time = 2.02, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{b\,\text{arcsch}\,(cx)+a}{e^2x^6+2\,dex^4+d^2x^2},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))/x^2/(e*x^2+d)^2,x, algorithm="fricas")
```

```
[Out] integral((b*arccsch(c*x) + a)/(e^2*x^6 + 2*d*e*x^4 + d^2*x^2), x)
```

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

$$\int \frac{b\,\text{arcsch}\,(cx)+a}{\left(ex^2+d\right)^2x^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))/x^2/(e*x^2+d)^2,x, algorithm="giac")
```

```
[Out] integrate((b*arccsch(c*x) + a)/((e*x^2 + d)^2*x^2), x)
```

**maple** [F] time = 14.66, size = 0, normalized size = 0.00

$$\int \frac{a+b\,\text{arccsch}\,(cx)}{x^2\left(e\,x^2+d\right)^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a+b*arccsch(c*x))/x^2/(e*x^2+d)^2,x)
```

```
[Out] int((a+b*arccsch(c*x))/x^2/(e*x^2+d)^2,x)
```

**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((a+b*arccsch(c*x))/x^2/(e*x^2+d)^2,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(e-c^2*d>0)', see `assume?` for more
 details)Is e-c^2*d positive or negative?
```

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

$$\int \frac{a+b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)}{x^2\,{\left(e\,x^2+d\right)}^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a + b*asinh(1/(c*x)))/(x^2*(d + e*x^2)^2),x)
[Out] int((a + b*asinh(1/(c*x)))/(x^2*(d + e*x^2)^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*acsch(c*x))/x**2/(e*x**2+d)**2,x)
[Out] Timed out
```

# 3.111 $\int \frac{x^5\left(a+b\operatorname{csch}^{-1}(cx)\right)}{\left(d+ex^2\right)^3}\,dx$

**Optimal**. Leaf size=694

$$\frac{\left(a+b\operatorname{csch}^{-1}(cx)\right)\log\left(1-\frac{c\sqrt{-d}\,e^{\operatorname{csch}^{-1}(cx)}}{\sqrt{e}-\sqrt{e-c^2d}}\right)}{2e^3}+\frac{\left(a+b\operatorname{csch}^{-1}(cx)\right)\log\left(\frac{c\sqrt{-d}\,e^{\operatorname{csch}^{-1}(cx)}}{\sqrt{e}-\sqrt{e-c^2d}}+1\right)}{2e^3}+\frac{\left(a+b\operatorname{csch}^{-1}(cx)\right)\log\left(1-\right.}{2e^3}$$

```
[Out] 1/4*(-a-b*arccsch(c*x))/e/(e+d/x^2)^2+1/2*(-a-b*arccsch(c*x))/e^2/(e+d/x^2)
-(a+b*arccsch(c*x))^2/b/e^3+1/8*b*(c^2*d-2*e)*arctan((c^2*d-e)^(1/2)/c/x/e^
(1/2)/(1+1/c^2/x^2)^(1/2))/(c^2*d-e)^(3/2)/e^(5/2)-(a+b*arccsch(c*x))*ln(1-
1/(1/c/x+(1+1/c^2/x^2)^(1/2))^2)/e^3+1/2*(a+b*arccsch(c*x))*ln(1-c*(1/c/x+(
1+1/c^2/x^2)^(1/2))*(-d)^(1/2)/(e^(1/2)-(-c^2*d+e)^(1/2)))/e^3+1/2*(a+b*arc
csch(c*x))*ln(1+c*(1/c/x+(1+1/c^2/x^2)^(1/2))*(-d)^(1/2)/(e^(1/2)-(-c^2*d+e
)^(1/2)))/e^3+1/2*(a+b*arccsch(c*x))*ln(1-c*(1/c/x+(1+1/c^2/x^2)^(1/2))*(-d
)^(1/2)/(e^(1/2)+(-c^2*d+e)^(1/2)))/e^3+1/2*(a+b*arccsch(c*x))*ln(1+c*(1/c/
x+(1+1/c^2/x^2)^(1/2))*(-d)^(1/2)/(e^(1/2)+(-c^2*d+e)^(1/2)))/e^3+1/2*b*pol
ylog(2,1/(1/c/x+(1+1/c^2/x^2)^(1/2))^2)/e^3+1/2*b*polylog(2,-c*(1/c/x+(1+1/
c^2/x^2)^(1/2))*(-d)^(1/2)/(e^(1/2)-(-c^2*d+e)^(1/2)))/e^3+1/2*b*polylog(2,
c*(1/c/x+(1+1/c^2/x^2)^(1/2))*(-d)^(1/2)/(e^(1/2)-(-c^2*d+e)^(1/2)))/e^3+1/
2*b*polylog(2,-c*(1/c/x+(1+1/c^2/x^2)^(1/2))*(-d)^(1/2)/(e^(1/2)+(-c^2*d+e)
^(1/2)))/e^3+1/2*b*polylog(2,c*(1/c/x+(1+1/c^2/x^2)^(1/2))*(-d)^(1/2)/(e^(1
/2)+(-c^2*d+e)^(1/2)))/e^3+1/2*b*arctan((c^2*d-e)^(1/2)/c/x/e^(1/2)/(1+1/c^
2/x^2)^(1/2))/e^(5/2)/(c^2*d-e)^(1/2)+1/8*b*c*d*(1+1/c^2/x^2)^(1/2)/(c^2*d-
e)/e^2/(e+d/x^2)/x
```

**Rubi [A]** time = 1.41, antiderivative size = 676, normalized size of antiderivative = 0.97, number of steps used = 33, number of rules used = 13, integrand size = 21, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.619, Rules used = {6304, 5791, 5659, 3716, 2190, 2279, 2391, 5787, 382, 377, 205, 5799, 5561}

$$\frac{b\text{PolyLog}\left(2,-\frac{c\sqrt{-d}\,e^{\operatorname{csch}^{-1}(cx)}}{\sqrt{e}-\sqrt{e-c^2d}}\right)}{2e^3}+\frac{b\text{PolyLog}\left(2,\frac{c\sqrt{-d}\,e^{\operatorname{csch}^{-1}(cx)}}{\sqrt{e}-\sqrt{e-c^2d}}\right)}{2e^3}+\frac{b\text{PolyLog}\left(2,-\frac{c\sqrt{-d}\,e^{\operatorname{csch}^{-1}(cx)}}{\sqrt{e-c^2d}+\sqrt{e}}\right)}{2e^3}+\frac{b\text{PolyLog}\left(2,\frac{c\sqrt{-d}\,e}{\sqrt{e-c}}\right.}{2e^3}$$

Warning: Unable to verify antiderivative.

```
[In] Int[(x^5*(a + b*ArcCsch[c*x]))/(d + e*x^2)^3,x]
```

```
[Out] (b*c*d*Sqrt[1 + 1/(c^2*x^2)])/(8*(c^2*d - e)*e^2*(e + d/x^2)*x) - (a + b*Ar
cCsch[c*x])/(4*e*(e + d/x^2)^2) - (a + b*ArcCsch[c*x])/(2*e^2*(e + d/x^2))
+ (b*(c^2*d - 2*e)*ArcTan[Sqrt[c^2*d - e]/(c*Sqrt[e]*Sqrt[1 + 1/(c^2*x^2)]*
x)])/(8*(c^2*d - e)^(3/2)*e^(5/2)) + (b*ArcTan[Sqrt[c^2*d - e]/(c*Sqrt[e]*S
qrt[1 + 1/(c^2*x^2)]*x)])/(2*Sqrt[c^2*d - e]*e^(5/2)) + ((a + b*ArcCsch[c*x
])*Log[1 - (c*Sqrt[-d]*E^ArcCsch[c*x])/(Sqrt[e] - Sqrt[-(c^2*d) + e])])/(2*
e^3) + ((a + b*ArcCsch[c*x])*Log[1 + (c*Sqrt[-d]*E^ArcCsch[c*x])/(Sqrt[e] -
 Sqrt[-(c^2*d) + e])])/(2*e^3) + ((a + b*ArcCsch[c*x])*Log[1 - (c*Sqrt[-d]*
E^ArcCsch[c*x])/(Sqrt[e] + Sqrt[-(c^2*d) + e])])/(2*e^3) + ((a + b*ArcCsch[
c*x])*Log[1 + (c*Sqrt[-d]*E^ArcCsch[c*x])/(Sqrt[e] + Sqrt[-(c^2*d) + e])])/
(2*e^3) - ((a + b*ArcCsch[c*x])*Log[1 - E^(2*ArcCsch[c*x])])/e^3 + (b*PolyL
og[2, -((c*Sqrt[-d]*E^ArcCsch[c*x])/(Sqrt[e] - Sqrt[-(c^2*d) + e]))])/(2*e^
3) + (b*PolyLog[2, (c*Sqrt[-d]*E^ArcCsch[c*x])/(Sqrt[e] - Sqrt[-(c^2*d) + e
])])/(2*e^3) + (b*PolyLog[2, -((c*Sqrt[-d]*E^ArcCsch[c*x])/(Sqrt[e] + Sqrt[
-(c^2*d) + e]))])/(2*e^3) + (b*PolyLog[2, (c*Sqrt[-d]*E^ArcCsch[c*x])/(Sqrt
[e] + Sqrt[-(c^2*d) + e])])/(2*e^3) - (b*PolyLog[2, E^(2*ArcCsch[c*x])])/(2
*e^3)
```

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 377

```
Int[((a_) + (b_.)*(x_)^(n_))^(p_)/((c_) + (d_.)*(x_)^(n_)), x_Symbol] :> Su
bst[Int[1/(c - (b*c - a*d)*x^n), x], x, x/(a + b*x^n)^(1/n)] /; FreeQ[{a, b
, c, d}, x] && NeQ[b*c - a*d, 0] && EqQ[n*p + 1, 0] && IntegerQ[n]
```

Rule 382

```
Int[((a_) + (b_.)*(x_)^(n_))^(p_)*((c_) + (d_.)*(x_)^(n_))^(q_), x_Symbol]
:> -Simp[(b*x*(a + b*x^n)^(p + 1)*(c + d*x^n)^(q + 1))/(a*n*(p + 1)*(b*c -
a*d)), x] + Dist[(b*c + n*(p + 1)*(b*c - a*d))/(a*n*(p + 1)*(b*c - a*d)), I
nt[(a + b*x^n)^(p + 1)*(c + d*x^n)^q, x], x] /; FreeQ[{a, b, c, d, n, q}, x
] && NeQ[b*c - a*d, 0] && EqQ[n*(p + q + 2) + 1, 0] && (LtQ[p, -1] ||  !LtQ
[q, -1]) && NeQ[p, -1]
```

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 3716

```
Int[((c_.) + (d_.)*(x_))^(m_.)*tan[(e_.) + Pi*(k_.) + (Complex[0, fz_])*(f_
.)*(x_)], x_Symbol] :> -Simp[(I*(c + d*x)^(m + 1))/(d*(m + 1)), x] + Dist[2
*I, Int[((c + d*x)^m*E^(2*(-(I*e) + f*fz*x)))/(E^(2*I*k*Pi)*(1 + E^(2*(-(I*
e) + f*fz*x))/E^(2*I*k*Pi))), x], x] /; FreeQ[{c, d, e, f, fz}, x] && Integ
erQ[4*k] && IGtQ[m, 0]
```

Rule 5561

```
Int[(Cosh[(c_.) + (d_.)*(x_)]*((e_.) + (f_.)*(x_))^(m_.))/((a_) + (b_.)*Sin
h[(c_.) + (d_.)*(x_)]), x_Symbol] :> -Simp[(e + f*x)^(m + 1)/(b*f*(m + 1)),
 x] + (Int[((e + f*x)^m*E^(c + d*x))/(a - Rt[a^2 + b^2, 2] + b*E^(c + d*x))
, x] + Int[((e + f*x)^m*E^(c + d*x))/(a + Rt[a^2 + b^2, 2] + b*E^(c + d*x))
, x]) /; FreeQ[{a, b, c, d, e, f}, x] && IGtQ[m, 0] && NeQ[a^2 + b^2, 0]
```

Rule 5659

```
Int[((a_.) + ArcSinh[(c_.)*(x_)]*(b_.))^(n_.)/(x_), x_Symbol] :> Subst[Int[
(a + b*x)^n/Tanh[x], x], x, ArcSinh[c*x]] /; FreeQ[{a, b, c}, x] && IGtQ[n,
 0]
```

Rule 5787

```
Int[((a_.) + ArcSinh[(c_.)*(x_)]*(b_.))*(x_)*((d_) + (e_.)*(x_)^2)^(p_.), x
_Symbol] :> Simp[((d + e*x^2)^(p + 1)*(a + b*ArcSinh[c*x]))/(2*e*(p + 1)),
x] - Dist[(b*c)/(2*e*(p + 1)), Int[(d + e*x^2)^(p + 1)/Sqrt[1 + c^2*x^2], x
], x] /; FreeQ[{a, b, c, d, e, p}, x] && NeQ[e, c^2*d] && NeQ[p, -1]
```

Rule 5791

```
Int[((a_.) + ArcSinh[(c_.)*(x_)]*(b_.))^(n_.)*((f_.)*(x_))^(m_.)*((d_) + (e
_.)*(x_)^2)^(p_.), x_Symbol] :> Int[ExpandIntegrand[(a + b*ArcSinh[c*x])^n,
 (f*x)^m*(d + e*x^2)^p, x], x] /; FreeQ[{a, b, c, d, e, f}, x] && NeQ[e, c^
```

```
2*d] && IGtQ[n, 0] && IntegerQ[p] && IntegerQ[m]
```

Rule 5799

```
Int[((a_.) + ArcSinh[(c_.)*(x_)]*(b_.))^(n_.)/((d_.) + (e_.)*(x_)), x_Symbo
l] :> Subst[Int[((a + b*x)^n*Cosh[x])/(c*d + e*Sinh[x]), x], x, ArcSinh[c*x
]] /; FreeQ[{a, b, c, d, e}, x] && IGtQ[n, 0]
```

Rule 6304

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))^(n_.)*(x_)^(m_.)*((d_.) + (e_.)*(x_
)^2)^(p_.), x_Symbol] :> -Subst[Int[((e + d*x^2)^p*(a + b*ArcSinh[x/c])^n)/
x^(m + 2*(p + 1)), x], x, 1/x] /; FreeQ[{a, b, c, d, e, n}, x] && IGtQ[n, 0
] && IntegersQ[m, p]
```

Rubi steps

$$\int \frac{x^5\left(a+b\text{csch}^{-1}(cx)\right)}{\left(d+ex^2\right)^3}\,dx = -\text{Subst}\left(\int \frac{a+b\sinh^{-1}\left(\frac{x}{c}\right)}{x\left(e+dx^2\right)^3}\,dx, x, \frac{1}{x}\right)$$

$$= -\text{Subst}\left(\int\left(\frac{a+b\sinh^{-1}\left(\frac{x}{c}\right)}{e^3x} - \frac{dx\left(a+b\sinh^{-1}\left(\frac{x}{c}\right)\right)}{e\left(e+dx^2\right)^3} - \frac{dx\left(a+b\sinh^{-1}\left(\frac{x}{c}\right)\right)}{e^2\left(e+dx^2\right)^2} - \frac{dx}{\cdots}\right.\right.$$

$$= -\frac{\text{Subst}\left(\int \frac{a+b\sinh^{-1}\left(\frac{x}{c}\right)}{x}\,dx, x, \frac{1}{x}\right)}{e^3} + \frac{d\,\text{Subst}\left(\int \frac{x\left(a+b\sinh^{-1}\left(\frac{x}{c}\right)\right)}{e+dx^2}\,dx, x, \frac{1}{x}\right)}{e^3} + \frac{d\,\text{Subst}\left(\int \cdots\right.}{\cdots}$$

$$= -\frac{a+b\text{csch}^{-1}(cx)}{4e\left(e+\frac{d}{x^2}\right)^2} - \frac{a+b\text{csch}^{-1}(cx)}{2e^2\left(e+\frac{d}{x^2}\right)} - \frac{\text{Subst}\left(\int(a+bx)\coth(x)\,dx, x, \text{csch}^{-1}(cx)\right)}{e^3}$$

$$= \frac{bcd\sqrt{1+\frac{1}{c^2x^2}}}{8\left(c^2d-e\right)e^2\left(e+\frac{d}{x^2}\right)x} - \frac{a+b\text{csch}^{-1}(cx)}{4e\left(e+\frac{d}{x^2}\right)^2} - \frac{a+b\text{csch}^{-1}(cx)}{2e^2\left(e+\frac{d}{x^2}\right)} + \frac{\left(a+b\text{csch}^{-1}(cx)\right)^2}{2be^3}$$

$$= \frac{bcd\sqrt{1+\frac{1}{c^2x^2}}}{8\left(c^2d-e\right)e^2\left(e+\frac{d}{x^2}\right)x} - \frac{a+b\text{csch}^{-1}(cx)}{4e\left(e+\frac{d}{x^2}\right)^2} - \frac{a+b\text{csch}^{-1}(cx)}{2e^2\left(e+\frac{d}{x^2}\right)} + \frac{\left(a+b\text{csch}^{-1}(cx)\right)^2}{2be^3}$$

$$= \frac{bcd\sqrt{1+\frac{1}{c^2x^2}}}{8\left(c^2d-e\right)e^2\left(e+\frac{d}{x^2}\right)x} - \frac{a+b\text{csch}^{-1}(cx)}{4e\left(e+\frac{d}{x^2}\right)^2} - \frac{a+b\text{csch}^{-1}(cx)}{2e^2\left(e+\frac{d}{x^2}\right)} + \frac{b\left(c^2d-2e\right)\tan^{-1}}{8\left(c^2d-e\right)}$$

$$= \frac{bcd\sqrt{1+\frac{1}{c^2x^2}}}{8\left(c^2d-e\right)e^2\left(e+\frac{d}{x^2}\right)x} - \frac{a+b\text{csch}^{-1}(cx)}{4e\left(e+\frac{d}{x^2}\right)^2} - \frac{a+b\text{csch}^{-1}(cx)}{2e^2\left(e+\frac{d}{x^2}\right)} + \frac{b\left(c^2d-2e\right)\tan^{-1}}{8\left(c^2d-e\right)}$$

$$= \frac{bcd\sqrt{1+\frac{1}{c^2x^2}}}{8\left(c^2d-e\right)e^2\left(e+\frac{d}{x^2}\right)x} - \frac{a+b\text{csch}^{-1}(cx)}{4e\left(e+\frac{d}{x^2}\right)^2} - \frac{a+b\text{csch}^{-1}(cx)}{2e^2\left(e+\frac{d}{x^2}\right)} + \frac{b\left(c^2d-2e\right)\tan^{-1}}{8\left(c^2d-e\right)}$$

$$b\left(c^2d-2e\right)\tan^{-1}$$

**Mathematica [C]** time = 7.85, size = 2023, normalized size = 2.91

Result too large to show

Warning: Unable to verify antiderivative.

```
[In] Integrate[(x^5*(a + b*ArcCsch[c*x]))/(d + e*x^2)^3,x]
```

```
[Out] -1/4*(a*d^2)/(e^3*(d + e*x^2)^2) + (a*d)/(e^3*(d + e*x^2)) + (a*Log[d + e*x
^2])/(2*e^3) + b*(-1/16*(d*((I*c*Sqrt[e]*Sqrt[1 + 1/(c^2*x^2)]*x)/(Sqrt[d]*
(c^2*d - e)*((-I)*Sqrt[d] + Sqrt[e]*x)) - ArcCsch[c*x]/(Sqrt[e]*((-I)*Sqrt[
d] + Sqrt[e]*x)^2) - ArcSinh[1/(c*x)]/(d*Sqrt[e]) + (I*(2*c^2*d - e)*Log[(4
*d*Sqrt[c^2*d - e]*Sqrt[e]*(Sqrt[e] + I*c*(c*Sqrt[d] - Sqrt[c^2*d - e]*Sqrt
[1 + 1/(c^2*x^2)])*x))/((2*c^2*d - e)*(Sqrt[d] + I*Sqrt[e]*x))])/(d*(c^2*d
- e)^(3/2))))/e^(5/2) - (d*(((-I)*c*Sqrt[e]*Sqrt[1 + 1/(c^2*x^2)]*x)/(Sqrt[
d]*(c^2*d - e)*(I*Sqrt[d] + Sqrt[e]*x)) - ArcCsch[c*x]/(Sqrt[e]*(I*Sqrt[d]
+ Sqrt[e]*x)^2) - ArcSinh[1/(c*x)]/(d*Sqrt[e]) + (I*(2*c^2*d - e)*Log[((4*I
)*d*Sqrt[c^2*d - e]*Sqrt[e]*(I*Sqrt[e] + c*(c*Sqrt[d] + Sqrt[c^2*d - e]*Sqr
t[1 + 1/(c^2*x^2)])*x))/((2*c^2*d - e)*(Sqrt[d] - I*Sqrt[e]*x))])/(d*(c^2*d
 - e)^(3/2))))/(16*e^(5/2)) - (((7*I)/16)*Sqrt[d]*(-(ArcCsch[c*x]/(I*Sqrt[d
]*Sqrt[e] + e*x)) - (I*(ArcSinh[1/(c*x)]/Sqrt[e] - Log[(2*Sqrt[d]*Sqrt[e]*(
I*Sqrt[e] + c*(c*Sqrt[d] + I*Sqrt[-(c^2*d) + e]*Sqrt[1 + 1/(c^2*x^2)])*x))/
(Sqrt[-(c^2*d) + e]*(I*Sqrt[d] + Sqrt[e]*x))]/Sqrt[-(c^2*d) + e]))/Sqrt[d])
)/e^(5/2) + (((7*I)/16)*Sqrt[d]*(-(ArcCsch[c*x]/((-I)*Sqrt[d]*Sqrt[e] + e*x
)) + (I*(ArcSinh[1/(c*x)]/Sqrt[e] - Log[(-2*Sqrt[d]*Sqrt[e]*(Sqrt[e] + c*(I
*c*Sqrt[d] + Sqrt[-(c^2*d) + e]*Sqrt[1 + 1/(c^2*x^2)])*x))/(Sqrt[-(c^2*d) +
 e]*(Sqrt[d] + I*Sqrt[e]*x))]/Sqrt[-(c^2*d) + e]))/Sqrt[d]))/e^(5/2) + (Pi^
2 - (4*I)*Pi*ArcCsch[c*x] - 8*ArcCsch[c*x]^2 + 32*ArcSin[Sqrt[1 + Sqrt[e]/(
c*Sqrt[d])]/Sqrt[2]]*ArcTan[((c*Sqrt[d] - Sqrt[e])*Cot[(Pi + (2*I)*ArcCsch[
c*x])/4])/Sqrt[-(c^2*d) + e]] - 8*ArcCsch[c*x]*Log[1 - E^(-2*ArcCsch[c*x])]
 + (4*I)*Pi*Log[1 - (I*(-Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])/(c*S
qrt[d])] + 8*ArcCsch[c*x]*Log[1 - (I*(-Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcC
sch[c*x])/(c*Sqrt[d])] + (16*I)*ArcSin[Sqrt[1 + Sqrt[e]/(c*Sqrt[d])]/Sqrt[2
]]*Log[1 - (I*(-Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])/(c*Sqrt[d])]
+ (4*I)*Pi*Log[1 + (I*(Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])/(c*Sqr
t[d])] + 8*ArcCsch[c*x]*Log[1 + (I*(Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch
[c*x])/(c*Sqrt[d])] - (16*I)*ArcSin[Sqrt[1 + Sqrt[e]/(c*Sqrt[d])]/Sqrt[2]]*
Log[1 + (I*(Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])/(c*Sqrt[d])] - (4
*I)*Pi*Log[Sqrt[e] + (I*Sqrt[d])/x] + 4*PolyLog[2, E^(-2*ArcCsch[c*x])] + 8
*PolyLog[2, (I*(-Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])/(c*Sqrt[d])]
 + 8*PolyLog[2, ((-I)*(Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])/(c*Sqr
t[d])])/(16*e^3) + (Pi^2 - (4*I)*Pi*ArcCsch[c*x] - 8*ArcCsch[c*x]^2 - 32*Ar
cSin[Sqrt[1 - Sqrt[e]/(c*Sqrt[d])]/Sqrt[2]]*ArcTan[((c*Sqrt[d] + Sqrt[e])*C
ot[(Pi + (2*I)*ArcCsch[c*x])/4])/Sqrt[-(c^2*d) + e]] - 8*ArcCsch[c*x]*Log[1
 - E^(-2*ArcCsch[c*x])] + (4*I)*Pi*Log[1 + (I*(-Sqrt[e] + Sqrt[-(c^2*d) + e
```

```
])*E^ArcCsch[c*x])/(c*Sqrt[d])] + 8*ArcCsch[c*x]*Log[1 + (I*(-Sqrt[e] + Sqr
t[-(c^2*d) + e])*E^ArcCsch[c*x])/(c*Sqrt[d])] + (16*I)*ArcSin[Sqrt[1 - Sqrt
[e]/(c*Sqrt[d])]/Sqrt[2]]*Log[1 + (I*(-Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcC
sch[c*x])/(c*Sqrt[d])] + (4*I)*Pi*Log[1 - (I*(Sqrt[e] + Sqrt[-(c^2*d) + e])
*E^ArcCsch[c*x])/(c*Sqrt[d])] + 8*ArcCsch[c*x]*Log[1 - (I*(Sqrt[e] + Sqrt[-
(c^2*d) + e])*E^ArcCsch[c*x])/(c*Sqrt[d])] - (16*I)*ArcSin[Sqrt[1 - Sqrt[e]
/(c*Sqrt[d])]/Sqrt[2]]*Log[1 - (I*(Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[
c*x])/(c*Sqrt[d])] - (4*I)*Pi*Log[Sqrt[e] - (I*Sqrt[d])/x] + 4*PolyLog[2, E
^(-2*ArcCsch[c*x])] + 8*PolyLog[2, ((-I)*(-Sqrt[e] + Sqrt[-(c^2*d) + e])*E^
ArcCsch[c*x])/(c*Sqrt[d])] + 8*PolyLog[2, (I*(Sqrt[e] + Sqrt[-(c^2*d) + e])
*E^ArcCsch[c*x])/(c*Sqrt[d])])/(16*e^3))
```

**fricas [F]** time = 2.92, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{bx^5 \operatorname{arcsch}(cx) + ax^5}{e^3x^6 + 3\,de^2x^4 + 3\,d^2ex^2 + d^3}, x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^5*(a+b*arccsch(c*x))/(e*x^2+d)^3,x, algorithm="fricas")
```

```
[Out] integral((b*x^5*arccsch(c*x) + a*x^5)/(e^3*x^6 + 3*d*e^2*x^4 + 3*d^2*e*x^2
+ d^3), x)
```

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

$$\int \frac{(b \operatorname{arcsch}(cx) + a)x^5}{\left(ex^2 + d\right)^3}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^5*(a+b*arccsch(c*x))/(e*x^2+d)^3,x, algorithm="giac")
```

```
[Out] integrate((b*arccsch(c*x) + a)*x^5/(e*x^2 + d)^3, x)
```

**maple [F]** time = 0.49, size = 0, normalized size = 0.00

$$\int \frac{x^5\left(a + b \operatorname{arccsch}(cx)\right)}{\left(e\,x^2 + d\right)^3}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^5*(a+b*arccsch(c*x))/(e*x^2+d)^3,x)
```

```
[Out] int(x^5*(a+b*arccsch(c*x))/(e*x^2+d)^3,x)
```

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

$$\frac{1}{4}\,a\left(\frac{4\,dex^2+3\,d^2}{e^5x^4+2\,de^4x^2+d^2e^3}+\frac{2\,\log\left(ex^2+d\right)}{e^3}\right)+b\int\frac{x^5\log\left(\sqrt{\frac{1}{c^2x^2}+1}+\frac{1}{cx}\right)}{e^3x^6+3\,de^2x^4+3\,d^2ex^2+d^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^5*(a+b*arccsch(c*x))/(e*x^2+d)^3,x, algorithm="maxima")
```

```
[Out] 1/4*a*((4*d*e*x^2 + 3*d^2)/(e^5*x^4 + 2*d*e^4*x^2 + d^2*e^3) + 2*log(e*x^2
+ d)/e^3) + b*integrate(x^5*log(sqrt(1/(c^2*x^2) + 1) + 1/(c*x))/(e^3*x^6 +
 3*d*e^2*x^4 + 3*d^2*e*x^2 + d^3), x)
```

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

$$\int\frac{x^5\,\left(a+b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)\right)}{{\left(e\,x^2+d\right)}^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((x^5*(a + b*asinh(1/(c*x))))/(d + e*x^2)^3,x)
```

```
[Out] int((x^5*(a + b*asinh(1/(c*x))))/(d + e*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(x**5*(a+b*acsch(c*x))/(e*x**2+d)**3,x)
```

```
[Out] Timed out
```

# 3.112 $\int \frac{x^3\left(a+b\,\mathbf{csch}^{-1}(cx)\right)}{\left(d+ex^2\right)^3}\,dx$

**Optimal**. Leaf size=167

$$\frac{x^4\left(a+b\,\text{csch}^{-1}(cx)\right)}{4d\left(d+ex^2\right)^2}+\frac{bcx\left(c^2d-2e\right)\tanh^{-1}\left(\frac{\sqrt{e}\sqrt{-c^2x^2-1}}{\sqrt{c^2d-e}}\right)}{8de^{3/2}\sqrt{-c^2x^2}\left(c^2d-e\right)^{3/2}}-\frac{bcx\sqrt{-c^2x^2-1}}{8e\sqrt{-c^2x^2}\left(c^2d-e\right)\left(d+ex^2\right)}$$

```
[Out] 1/4*x^4*(a+b*arccsch(c*x))/d/(e*x^2+d)^2+1/8*b*c*(c^2*d-2*e)*x*arctanh(e^(1
/2)*(-c^2*x^2-1)^(1/2)/(c^2*d-e)^(1/2))/d/(c^2*d-e)^(3/2)/e^(3/2)/(-c^2*x^2
)^(1/2)-1/8*b*c*x*(-c^2*x^2-1)^(1/2)/(c^2*d-e)/e/(e*x^2+d)/(-c^2*x^2)^(1/2)
```

**Rubi [A]** time = 0.22, antiderivative size = 167, normalized size of antiderivative = 1.00, number of steps used = 6, number of rules used = 7, integrand size = 21, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.333, Rules used = {264, 6302, 12, 446, 78, 63, 208}

$$\frac{x^4\left(a+b\,\text{csch}^{-1}(cx)\right)}{4d\left(d+ex^2\right)^2}+\frac{bcx\left(c^2d-2e\right)\tanh^{-1}\left(\frac{\sqrt{e}\sqrt{-c^2x^2-1}}{\sqrt{c^2d-e}}\right)}{8de^{3/2}\sqrt{-c^2x^2}\left(c^2d-e\right)^{3/2}}-\frac{bcx\sqrt{-c^2x^2-1}}{8e\sqrt{-c^2x^2}\left(c^2d-e\right)\left(d+ex^2\right)}$$

Antiderivative was successfully verified.

```
[In] Int[(x^3*(a + b*ArcCsch[c*x]))/(d + e*x^2)^3,x]
```

```
[Out] -(b*c*x*Sqrt[-1 - c^2*x^2])/(8*(c^2*d - e)*e*Sqrt[-(c^2*x^2)]*(d + e*x^2))
+ (x^4*(a + b*ArcCsch[c*x]))/(4*d*(d + e*x^2)^2) + (b*c*(c^2*d - 2*e)*x*Arc
Tanh[(Sqrt[e]*Sqrt[-1 - c^2*x^2])/Sqrt[c^2*d - e]])/(8*d*(c^2*d - e)^(3/2)*
e^(3/2)*Sqrt[-(c^2*x^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 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 264

```
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] /; FreeQ[{a, b, c, m, n,
 p}, x] && EqQ[(m + 1)/n + p + 1, 0] && NeQ[m, -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 6302

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))*((f_.)*(x_))^(m_.)*((d_.) + (e_.)*(
x_)^2)^(p_.), x_Symbol] :> With[{u = IntHide[(f*x)^m*(d + e*x^2)^p, x]}, Di
st[a + b*ArcCsch[c*x], u, x] - Dist[(b*c*x)/Sqrt[-(c^2*x^2)], Int[SimplifyI
ntegrand[u/(x*Sqrt[-1 - c^2*x^2]), x], x], x]] /; FreeQ[{a, b, c, d, e, f,
m, p}, x] && ((IGtQ[p, 0] &&  !(ILtQ[(m - 1)/2, 0] && GtQ[m + 2*p + 3, 0]))
 || (IGtQ[(m + 1)/2, 0] &&  !(ILtQ[p, 0] && GtQ[m + 2*p + 3, 0])) || (ILtQ[
(m + 2*p + 1)/2, 0] &&  !ILtQ[(m - 1)/2, 0]))
```

Rubi steps

$$\int \frac{x^3\left(a+b\operatorname{csch}^{-1}(cx)\right)}{\left(d+ex^2\right)^3}\,dx = \frac{x^4\left(a+b\operatorname{csch}^{-1}(cx)\right)}{4d\left(d+ex^2\right)^2} - \frac{(bcx)\int \frac{x^3}{4d\sqrt{-1-c^2x^2}\left(d+ex^2\right)^2}\,dx}{\sqrt{-c^2x^2}}$$

$$= \frac{x^4\left(a+b\operatorname{csch}^{-1}(cx)\right)}{4d\left(d+ex^2\right)^2} - \frac{(bcx)\int \frac{x^3}{\sqrt{-1-c^2x^2}\left(d+ex^2\right)^2}\,dx}{4d\sqrt{-c^2x^2}}$$

$$= \frac{x^4\left(a+b\operatorname{csch}^{-1}(cx)\right)}{4d\left(d+ex^2\right)^2} - \frac{(bcx)\operatorname{Subst}\left(\int \frac{x}{\sqrt{-1-c^2x}\,(d+ex)^2}\,dx, x, x^2\right)}{8d\sqrt{-c^2x^2}}$$

$$= -\frac{bcx\sqrt{-1-c^2x^2}}{8\left(c^2d-e\right)e\sqrt{-c^2x^2}\,\left(d+ex^2\right)} + \frac{x^4\left(a+b\operatorname{csch}^{-1}(cx)\right)}{4d\left(d+ex^2\right)^2} - \frac{\left(bc\left(c^2d-2e\right)x\right)\operatorname{Subst}\left(\right.}{16d\left(c^2d-\right.}$$

$$= -\frac{bcx\sqrt{-1-c^2x^2}}{8\left(c^2d-e\right)e\sqrt{-c^2x^2}\,\left(d+ex^2\right)} + \frac{x^4\left(a+b\operatorname{csch}^{-1}(cx)\right)}{4d\left(d+ex^2\right)^2} + \frac{\left(b\left(c^2d-2e\right)x\right)\operatorname{Subst}\left(\int\right.}{8cd\left(c^2d\right.}$$

$$= -\frac{bcx\sqrt{-1-c^2x^2}}{8\left(c^2d-e\right)e\sqrt{-c^2x^2}\,\left(d+ex^2\right)} + \frac{x^4\left(a+b\operatorname{csch}^{-1}(cx)\right)}{4d\left(d+ex^2\right)^2} + \frac{bc\left(c^2d-2e\right)x\tanh^{-1}\left(\right.}{8d\left(c^2d-e\right)^{3/2}e^{3/2}\sqrt{\phantom{x}}}$$

**Mathematica [C]** time = 1.48, size = 375, normalized size = 2.25

$$-\frac{\frac{8a}{d+ex^2} - \frac{4ad}{\left(d+ex^2\right)^2} + \frac{b\sqrt{e}\left(2e-c^2d\right)\log\left(\frac{16de^{3/2}\sqrt{e-c^2d}\left(\sqrt{e}+cx\left(\sqrt{\frac{1}{c^2x^2}+1}\sqrt{e-c^2d}-ic\sqrt{d}\right)\right)}{b\left(2e-c^2d\right)\left(\sqrt{e}x+i\sqrt{d}\right)}\right)}{d\left(e-c^2d\right)^{3/2}} + \frac{b\sqrt{e}\left(2e-c^2d\right)\log\left(-\frac{16ide^{3/2}\sqrt{e-c^2d}\left(\sqrt{e}+cx\left(\sqrt{\frac{1}{c^2x^2}+1}\sqrt{e-\right.\right.\right.}{b\left(c^2d-2e\right)\left(\sqrt{d}+i\sqrt{e}x\right)}\right.}{d\left(e-c^2d\right)^{3/2}}}{16e^2}$$

Antiderivative was successfully verified.

```
[In] Integrate[(x^3*(a + b*ArcCsch[c*x]))/(d + e*x^2)^3,x]
```

```
[Out] -1/16*((-4*a*d)/(d + e*x^2)^2 + (8*a)/(d + e*x^2) - (2*b*c*e*Sqrt[1 + 1/(c^
2*x^2)]*x)/((-(c^2*d) + e)*(d + e*x^2)) + (4*b*(d + 2*e*x^2)*ArcCsch[c*x])/
(d + e*x^2)^2 - (4*b*ArcSinh[1/(c*x)])/d + (b*Sqrt[e]*(-(c^2*d) + 2*e)*Log[
(16*d*e^(3/2)*Sqrt[-(c^2*d) + e]*(Sqrt[e] + c*((-I)*c*Sqrt[d] + Sqrt[-(c^2*
d) + e]*Sqrt[1 + 1/(c^2*x^2)])*x))/(b*(-(c^2*d) + 2*e)*(I*Sqrt[d] + Sqrt[e]
```

```
*x))])/(d*(-(c^2*d) + e)^(3/2)) + (b*Sqrt[e]*(-(c^2*d) + 2*e)*Log[((-16*I)*
d*e^(3/2)*Sqrt[-(c^2*d) + e]*(Sqrt[e] + c*(I*c*Sqrt[d] + Sqrt[-(c^2*d) + e]
*Sqrt[1 + 1/(c^2*x^2)])*x))/(b*(c^2*d - 2*e)*(Sqrt[d] + I*Sqrt[e]*x))])/(d*
(-(c^2*d) + e)^(3/2)))/e^2
```

**fricas [B]** time = 3.05, size = 1381, normalized size = 8.27

result too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^3*(a+b*arccsch(c*x))/(e*x^2+d)^3,x, algorithm="fricas")
```

```
[Out] [-1/16*(4*a*c^4*d^4 - 8*a*c^2*d^3*e + 4*a*d^2*e^2 + 8*(a*c^4*d^3*e - 2*a*c^
2*d^2*e^2 + a*d*e^3)*x^2 + (b*c^2*d^3 + (b*c^2*d*e^2 - 2*b*e^3)*x^4 - 2*b*d
^2*e + 2*(b*c^2*d^2*e - 2*b*d*e^2)*x^2)*sqrt(-c^2*d*e + e^2)*log((c^2*e*x^2
 - c^2*d - 2*sqrt(-c^2*d*e + e^2)*c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) + 2*e)/
(e*x^2 + d)) - 4*(b*c^4*d^4 - 2*b*c^2*d^3*e + b*d^2*e^2 + (b*c^4*d^2*e^2 -
2*b*c^2*d*e^3 + b*e^4)*x^4 + 2*(b*c^4*d^3*e - 2*b*c^2*d^2*e^2 + b*d*e^3)*x^
2)*log(c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) - c*x + 1) + 4*(b*c^4*d^4 - 2*b*c^
2*d^3*e + b*d^2*e^2 + (b*c^4*d^2*e^2 - 2*b*c^2*d*e^3 + b*e^4)*x^4 + 2*(b*c^
4*d^3*e - 2*b*c^2*d^2*e^2 + b*d*e^3)*x^2)*log(c*x*sqrt((c^2*x^2 + 1)/(c^2*x
^2)) - c*x - 1) + 4*(b*c^4*d^4 - 2*b*c^2*d^3*e + b*d^2*e^2 + 2*(b*c^4*d^3*e
 - 2*b*c^2*d^2*e^2 + b*d*e^3)*x^2)*log((c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) +
 1)/(c*x)) + 2*((b*c^3*d^2*e^2 - b*c*d*e^3)*x^3 + (b*c^3*d^3*e - b*c*d^2*e^
2)*x)*sqrt((c^2*x^2 + 1)/(c^2*x^2)))/(c^4*d^5*e^2 - 2*c^2*d^4*e^3 + d^3*e^4
 + (c^4*d^3*e^4 - 2*c^2*d^2*e^5 + d*e^6)*x^4 + 2*(c^4*d^4*e^3 - 2*c^2*d^3*e
^4 + d^2*e^5)*x^2), -1/8*(2*a*c^4*d^4 - 4*a*c^2*d^3*e + 2*a*d^2*e^2 + 4*(a*
c^4*d^3*e - 2*a*c^2*d^2*e^2 + a*d*e^3)*x^2 + (b*c^2*d^3 + (b*c^2*d*e^2 - 2*
b*e^3)*x^4 - 2*b*d^2*e + 2*(b*c^2*d^2*e - 2*b*d*e^2)*x^2)*sqrt(c^2*d*e - e^
2)*arctan(-sqrt(c^2*d*e - e^2)*c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2))/(c^2*d - e
)) - 2*(b*c^4*d^4 - 2*b*c^2*d^3*e + b*d^2*e^2 + (b*c^4*d^2*e^2 - 2*b*c^2*d*
e^3 + b*e^4)*x^4 + 2*(b*c^4*d^3*e - 2*b*c^2*d^2*e^2 + b*d*e^3)*x^2)*log(c*x
*sqrt((c^2*x^2 + 1)/(c^2*x^2)) - c*x + 1) + 2*(b*c^4*d^4 - 2*b*c^2*d^3*e +
b*d^2*e^2 + (b*c^4*d^2*e^2 - 2*b*c^2*d*e^3 + b*e^4)*x^4 + 2*(b*c^4*d^3*e -
2*b*c^2*d^2*e^2 + b*d*e^3)*x^2)*log(c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) - c*x
 - 1) + 2*(b*c^4*d^4 - 2*b*c^2*d^3*e + b*d^2*e^2 + 2*(b*c^4*d^3*e - 2*b*c^2
*d^2*e^2 + b*d*e^3)*x^2)*log((c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) + 1)/(c*x))
 + ((b*c^3*d^2*e^2 - b*c*d*e^3)*x^3 + (b*c^3*d^3*e - b*c*d^2*e^2)*x)*sqrt((
c^2*x^2 + 1)/(c^2*x^2)))/(c^4*d^5*e^2 - 2*c^2*d^4*e^3 + d^3*e^4 + (c^4*d^3*
e^4 - 2*c^2*d^2*e^5 + d*e^6)*x^4 + 2*(c^4*d^4*e^3 - 2*c^2*d^3*e^4 + d^2*e^5
)*x^2)]
```

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

$$\int \frac{(b \operatorname{arcsch}(cx) + a)x^3}{\left(ex^2 + d\right)^3}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^3*(a+b*arccsch(c*x))/(e*x^2+d)^3,x, algorithm="giac")
```

```
[Out] integrate((b*arccsch(c*x) + a)*x^3/(e*x^2 + d)^3, x)
```

**maple [B]** time = 0.09, size = 1922, normalized size = 11.51

result too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^3*(a+b*arccsch(c*x))/(e*x^2+d)^3,x)
```

```
[Out] 1/4*c^4*a/e^2*d/(c^2*e*x^2+c^2*d)^2-1/2*c^2*a/e^2/(c^2*e*x^2+c^2*d)+1/4*c^4
*b*arccsch(c*x)/e^2*d/(c^2*e*x^2+c^2*d)^2-1/2*c^2*b*arccsch(c*x)/e^2/(c^2*e
*x^2+c^2*d)-1/4*c^3*b*(c^2*x^2+1)^(1/2)/((c^2*x^2+1)/c^2/x^2)^(1/2)*x/(c^2*
d-e)/(c*x*e+(-c^2*d*e)^(1/2))/(-c*x*e+(-c^2*d*e)^(1/2))*arctanh(1/(c^2*x^2+
1)^(1/2))-1/4*c^3*b*(c^2*x^2+1)^(1/2)/e/((c^2*x^2+1)/c^2/x^2)^(1/2)/x*d/(c^
2*d-e)/(c*x*e+(-c^2*d*e)^(1/2))/(-c*x*e+(-c^2*d*e)^(1/2))*arctanh(1/(c^2*x^
2+1)^(1/2))+1/16*c^3*b*(c^2*x^2+1)^(1/2)/((c^2*x^2+1)/c^2/x^2)^(1/2)*x/(c^2
*d-e)/(c*x*e+(-c^2*d*e)^(1/2))/(-(c^2*d-e)/e)^(1/2)/(-c*x*e+(-c^2*d*e)^(1/2
))*ln(-2*(-(c^2*x^2+1)^(1/2)*(-(c^2*d-e)/e)^(1/2)*e+(-c^2*d*e)^(1/2)*c*x-e)
/(c*x*e+(-c^2*d*e)^(1/2)))+1/16*c^3*b*(c^2*x^2+1)^(1/2)/e/((c^2*x^2+1)/c^2/
x^2)^(1/2)/x*d/(c^2*d-e)/(c*x*e+(-c^2*d*e)^(1/2))/(-(c^2*d-e)/e)^(1/2)/(-c*
x*e+(-c^2*d*e)^(1/2))*ln(-2*(-(c^2*x^2+1)^(1/2)*(-(c^2*d-e)/e)^(1/2)*e+(-c^
2*d*e)^(1/2)*c*x-e)/(c*x*e+(-c^2*d*e)^(1/2)))+1/16*c^3*b*(c^2*x^2+1)^(1/2)/
((c^2*x^2+1)/c^2/x^2)^(1/2)*x/(c^2*d-e)/(c*x*e+(-c^2*d*e)^(1/2))/(-(c^2*d-e
)/e)^(1/2)/(-c*x*e+(-c^2*d*e)^(1/2))*ln(-2*((c^2*x^2+1)^(1/2)*(-(c^2*d-e)/e
)^(1/2)*e+(-c^2*d*e)^(1/2)*c*x+e)/(-c*x*e+(-c^2*d*e)^(1/2)))+1/16*c^3*b*(c^
2*x^2+1)^(1/2)/e/((c^2*x^2+1)/c^2/x^2)^(1/2)/x*d/(c^2*d-e)/(c*x*e+(-c^2*d*e
)^(1/2))/(-(c^2*d-e)/e)^(1/2)/(-c*x*e+(-c^2*d*e)^(1/2))*ln(-2*((c^2*x^2+1)^
(1/2)*(-(c^2*d-e)/e)^(1/2)*e+(-c^2*d*e)^(1/2)*c*x+e)/(-c*x*e+(-c^2*d*e)^(1/
2)))+1/8*c^3*b/((c^2*x^2+1)/c^2/x^2)^(1/2)*x/(c^2*d-e)/(c*x*e+(-c^2*d*e)^(1
/2))/(-c*x*e+(-c^2*d*e)^(1/2))+1/8*c*b/((c^2*x^2+1)/c^2/x^2)^(1/2)/x/(c^2*d
-e)/(c*x*e+(-c^2*d*e)^(1/2))/(-c*x*e+(-c^2*d*e)^(1/2))+1/4*c*b*(c^2*x^2+1)^
(1/2)*e/((c^2*x^2+1)/c^2/x^2)^(1/2)*x/d/(c^2*d-e)/(c*x*e+(-c^2*d*e)^(1/2))/
(-c*x*e+(-c^2*d*e)^(1/2))*arctanh(1/(c^2*x^2+1)^(1/2))+1/4*c*b*(c^2*x^2+1)^
(1/2)/((c^2*x^2+1)/c^2/x^2)^(1/2)/x/(c^2*d-e)/(c*x*e+(-c^2*d*e)^(1/2))/(-c*
x*e+(-c^2*d*e)^(1/2))*arctanh(1/(c^2*x^2+1)^(1/2))-1/8*c*b*(c^2*x^2+1)^(1/2
)*e/((c^2*x^2+1)/c^2/x^2)^(1/2)*x/d/(c^2*d-e)/(c*x*e+(-c^2*d*e)^(1/2))/(-(c
^2*d-e)/e)^(1/2)/(-c*x*e+(-c^2*d*e)^(1/2))*ln(-2*(-(c^2*x^2+1)^(1/2)*(-(c^2
*d-e)/e)^(1/2)*e+(-c^2*d*e)^(1/2)*c*x-e)/(c*x*e+(-c^2*d*e)^(1/2)))-1/8*c*b*
(c^2*x^2+1)^(1/2)/((c^2*x^2+1)/c^2/x^2)^(1/2)/x/(c^2*d-e)/(c*x*e+(-c^2*d*e)
^(1/2))/(-(c^2*d-e)/e)^(1/2)/(-c*x*e+(-c^2*d*e)^(1/2))*ln(-2*(-(c^2*x^2+1)^
(1/2)*(-(c^2*d-e)/e)^(1/2)*e+(-c^2*d*e)^(1/2)*c*x-e)/(c*x*e+(-c^2*d*e)^(1/2
```

```
)))-1/8*c*b*(c^2*x^2+1)^(1/2)*e/((c^2*x^2+1)/c^2/x^2)^(1/2)*x/d/(c^2*d-e)/(
c*x*e+(-c^2*d*e)^(1/2))/(-(c^2*d-e)/e)^(1/2)/(-c*x*e+(-c^2*d*e)^(1/2))*ln(-
2*((c^2*x^2+1)^(1/2)*(-(c^2*d-e)/e)^(1/2)*e+(-c^2*d*e)^(1/2)*c*x+e)/(-c*x*e
+(-c^2*d*e)^(1/2)))-1/8*c*b*(c^2*x^2+1)^(1/2)/((c^2*x^2+1)/c^2/x^2)^(1/2)/x
/(c^2*d-e)/(c*x*e+(-c^2*d*e)^(1/2))/(-(c^2*d-e)/e)^(1/2)/(-c*x*e+(-c^2*d*e)
^(1/2))*ln(-2*((c^2*x^2+1)^(1/2)*(-(c^2*d-e)/e)^(1/2)*e+(-c^2*d*e)^(1/2)*c*
x+e)/(-c*x*e+(-c^2*d*e)^(1/2)))
```

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

$$\frac{1}{8}b\left(\frac{2c^4d^4\log(c) - 2\left(c^4d^2e^2 - 2c^2de^3 + e^4\right)x^4\log(x) + 2d^2e^2\log(c) + d^2e^2 - \left(4d^3e\log(c) + d^3e\right)c^2 + \left(4c^4d^3e\,\mathrm{l}\right.}{}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^3*(a+b*arccsch(c*x))/(e*x^2+d)^3,x, algorithm="maxima")
```

```
[Out] 1/8*b*((2*c^4*d^4*log(c) - 2*(c^4*d^2*e^2 - 2*c^2*d*e^3 + e^4)*x^4*log(x) +
 2*d^2*e^2*log(c) + d^2*e^2 - (4*d^3*e*log(c) + d^3*e)*c^2 + (4*c^4*d^3*e*l
og(c) + 4*d*e^3*log(c) + d*e^3 - (8*d^2*e^2*log(c) + d^2*e^2)*c^2)*x^2 + (c
^4*d^4 - 2*c^2*d^3*e + (c^4*d^2*e^2 - 2*c^2*d*e^3)*x^4 + 2*(c^4*d^3*e - 2*c
^2*d^2*e^2)*x^2)*log(c^2*x^2 + 1) - 2*(c^4*d^4 - 2*c^2*d^3*e + d^2*e^2 + 2*
(c^4*d^3*e - 2*c^2*d^2*e^2 + d*e^3)*x^2)*log(sqrt(c^2*x^2 + 1) + 1))/(c^4*d
^5*e^2 - 2*c^2*d^4*e^3 + d^3*e^4 + (c^4*d^3*e^4 - 2*c^2*d^2*e^5 + d*e^6)*x^
4 + 2*(c^4*d^4*e^3 - 2*c^2*d^3*e^4 + d^2*e^5)*x^2) + log(e*x^2 + d)/(c^4*d^
3 - 2*c^2*d^2*e + d*e^2) - 8*integrate(1/4*(2*c^2*e*x^3 + c^2*d*x)/(c^2*e^4
*x^6 + (2*c^2*d*e^3 + e^4)*x^4 + d^2*e^2 + (c^2*d^2*e^2 + 2*d*e^3)*x^2 + (c
^2*e^4*x^6 + (2*c^2*d*e^3 + e^4)*x^4 + d^2*e^2 + (c^2*d^2*e^2 + 2*d*e^3)*x^
2)*sqrt(c^2*x^2 + 1)), x)) - 1/4*(2*e*x^2 + d)*a/(e^4*x^4 + 2*d*e^3*x^2 + d
^2*e^2)
```

**mupad** [F] time = 0.00, size = -1, normalized size = -0.01

$$\int \frac{x^3\left(a + b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)\right)}{\left(e\,x^2 + d\right)^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((x^3*(a + b*asinh(1/(c*x))))/(d + e*x^2)^3,x)
```

```
[Out] int((x^3*(a + b*asinh(1/(c*x))))/(d + e*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(x**3*(a+b*acsch(c*x))/(e*x**2+d)**3,x)
```

```
[Out] Timed out
```

# 3.113 $\int \frac{x\left(a+b\mathbf{csch}^{-1}(cx)\right)}{\left(d+ex^2\right)^3}\,dx$

**Optimal**. Leaf size=205

$$-\frac{a+b\text{csch}^{-1}(cx)}{4e\left(d+ex^2\right)^2}+\frac{bcx\tan^{-1}\left(\sqrt{-c^2x^2-1}\right)}{4d^2e\sqrt{-c^2x^2}}+\frac{bcx\left(3c^2d-2e\right)\tanh^{-1}\left(\frac{\sqrt{e}\sqrt{-c^2x^2-1}}{\sqrt{c^2d-e}}\right)}{8d^2\sqrt{e}\sqrt{-c^2x^2}\left(c^2d-e\right)^{3/2}}+\frac{bcx\sqrt{-c^2x^2-1}}{8d\sqrt{-c^2x^2}\left(c^2d-e\right)\left(d+ex^2\right)}$$

```
[Out] 1/4*(-a-b*arccsch(c*x))/e/(e*x^2+d)^2+1/4*b*c*x*arctan((-c^2*x^2-1)^(1/2))/
d^2/e/(-c^2*x^2)^(1/2)+1/8*b*c*(3*c^2*d-2*e)*x*arctanh(e^(1/2)*(-c^2*x^2-1)
^(1/2)/(c^2*d-e)^(1/2))/d^2/(c^2*d-e)^(3/2)/e^(1/2)/(-c^2*x^2)^(1/2)+1/8*b*
c*x*(-c^2*x^2-1)^(1/2)/d/(c^2*d-e)/(e*x^2+d)/(-c^2*x^2)^(1/2)
```

**Rubi** [A] time = 0.20, antiderivative size = 205, 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 = {6300, 446, 103, 156, 63, 205, 208}

$$-\frac{a+b\text{csch}^{-1}(cx)}{4e\left(d+ex^2\right)^2}+\frac{bcx\tan^{-1}\left(\sqrt{-c^2x^2-1}\right)}{4d^2e\sqrt{-c^2x^2}}+\frac{bcx\left(3c^2d-2e\right)\tanh^{-1}\left(\frac{\sqrt{e}\sqrt{-c^2x^2-1}}{\sqrt{c^2d-e}}\right)}{8d^2\sqrt{e}\sqrt{-c^2x^2}\left(c^2d-e\right)^{3/2}}+\frac{bcx\sqrt{-c^2x^2-1}}{8d\sqrt{-c^2x^2}\left(c^2d-e\right)\left(d+ex^2\right)}$$

Antiderivative was successfully verified.

```
[In] Int[(x*(a + b*ArcCsch[c*x]))/(d + e*x^2)^3,x]
```

```
[Out] (b*c*x*Sqrt[-1 - c^2*x^2])/(8*d*(c^2*d - e)*Sqrt[-(c^2*x^2)]*(d + e*x^2)) -
 (a + b*ArcCsch[c*x])/(4*e*(d + e*x^2)^2) + (b*c*x*ArcTan[Sqrt[-1 - c^2*x^2
]])/(4*d^2*e*Sqrt[-(c^2*x^2)]) + (b*c*(3*c^2*d - 2*e)*x*ArcTanh[(Sqrt[e]*Sq
rt[-1 - c^2*x^2])/Sqrt[c^2*d - e]])/(8*d^2*(c^2*d - e)^(3/2)*Sqrt[e]*Sqrt[-
(c^2*x^2)])
```

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 103

```
Int[((a_.) + (b_.)*(x_))^(m_)*((c_.) + (d_.)*(x_))^(n_.)*((e_.) + (f_.)*(x_
))^(p_.), x_Symbol] :> Simp[(b*(a + b*x)^(m + 1)*(c + d*x)^(n + 1)*(e + f*x
```

```
)^(p + 1))/((m + 1)*(b*c - a*d)*(b*e - a*f)), x] + Dist[1/((m + 1)*(b*c - a
*d)*(b*e - a*f)), Int[(a + b*x)^(m + 1)*(c + d*x)^n*(e + f*x)^p*Simp[a*d*f*
(m + 1) - b*(d*e*(m + n + 2) + c*f*(m + p + 2)) - b*d*f*(m + n + p + 3)*x,
x], x], x] /; FreeQ[{a, b, c, d, e, f, n, p}, x] && LtQ[m, -1] && IntegerQ[
m] && (IntegerQ[n] || IntegersQ[2*n, 2*p])
```

Rule 156

```
Int[(((e_.) + (f_.)*(x_))^(p_)*((g_.) + (h_.)*(x_)))/(((a_.) + (b_.)*(x_))*
((c_.) + (d_.)*(x_))), x_Symbol] :> Dist[(b*g - a*h)/(b*c - a*d), Int[(e +
f*x)^p/(a + b*x), x], x] - Dist[(d*g - c*h)/(b*c - a*d), Int[(e + f*x)^p/(c
 + d*x), x], x] /; FreeQ[{a, b, c, d, e, f, g, h}, 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 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 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 6300

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))*(x_)*((d_.) + (e_.)*(x_)^2)^(p_.),
x_Symbol] :> Simp[((d + e*x^2)^(p + 1)*(a + b*ArcCsch[c*x]))/(2*e*(p + 1)),
 x] - Dist[(b*c*x)/(2*e*(p + 1)*Sqrt[-(c^2*x^2)]), Int[(d + e*x^2)^(p + 1)/
(x*Sqrt[-1 - c^2*x^2]), x], x] /; FreeQ[{a, b, c, d, e, p}, x] && NeQ[p, -1
]
```

Rubi steps

$$\int \frac{x\left(a+b\text{csch}^{-1}(cx)\right)}{\left(d+ex^2\right)^3}\,dx = -\frac{a+b\text{csch}^{-1}(cx)}{4e\left(d+ex^2\right)^2}+\frac{(bcx)\int \frac{1}{x\sqrt{-1-c^2x^2}\left(d+ex^2\right)^2}\,dx}{4e\sqrt{-c^2x^2}}$$

$$= -\frac{a+b\text{csch}^{-1}(cx)}{4e\left(d+ex^2\right)^2}+\frac{(bcx)\,\text{Subst}\left(\int \frac{1}{x\sqrt{-1-c^2x}(d+ex)^2}\,dx,x,x^2\right)}{8e\sqrt{-c^2x^2}}$$

$$= \frac{bcx\sqrt{-1-c^2x^2}}{8d\left(c^2d-e\right)\sqrt{-c^2x^2}\left(d+ex^2\right)}-\frac{a+b\text{csch}^{-1}(cx)}{4e\left(d+ex^2\right)^2}+\frac{(bcx)\,\text{Subst}\left(\int \frac{c^2d-e-\frac{1}{2}c^2ex}{x\sqrt{-1-c^2x}(d+ex)}\,d\right.}{8d\left(c^2d-e\right)e\sqrt{-c^2x^2}}$$

$$= \frac{bcx\sqrt{-1-c^2x^2}}{8d\left(c^2d-e\right)\sqrt{-c^2x^2}\left(d+ex^2\right)}-\frac{a+b\text{csch}^{-1}(cx)}{4e\left(d+ex^2\right)^2}+\frac{(bcx)\,\text{Subst}\left(\int \frac{1}{x\sqrt{-1-c^2x}}\,dx,x,\right.}{8d^2e\sqrt{-c^2x^2}}$$

$$= \frac{bcx\sqrt{-1-c^2x^2}}{8d\left(c^2d-e\right)\sqrt{-c^2x^2}\left(d+ex^2\right)}-\frac{a+b\text{csch}^{-1}(cx)}{4e\left(d+ex^2\right)^2}-\frac{(bx)\,\text{Subst}\left(\int \frac{1}{-\frac{1}{c^2}-\frac{x^2}{c^2}}\,dx,x,\sqrt{-}\right.}{4cd^2e\sqrt{-c^2x^2}}$$

$$= \frac{bcx\sqrt{-1-c^2x^2}}{8d\left(c^2d-e\right)\sqrt{-c^2x^2}\left(d+ex^2\right)}-\frac{a+b\text{csch}^{-1}(cx)}{4e\left(d+ex^2\right)^2}+\frac{bcx\tan^{-1}\left(\sqrt{-1-c^2x^2}\right)}{4d^2e\sqrt{-c^2x^2}}+\frac{bc}{}$$

**Mathematica [C]** time = 0.96, size = 368, normalized size = 1.80

$$\frac{1}{16}\left(-\frac{4a}{e\left(d+ex^2\right)^2}+\frac{b\left(3c^2d-2e\right)\log\left(\frac{16d^2\sqrt{e}\sqrt{e-c^2d}\left(\sqrt{e}+cx\left(\sqrt{\frac{1}{c^2x^2}+1}\sqrt{e-c^2d}-ic\sqrt{d}\right)\right)}{b\left(2e-3c^2d\right)\left(\sqrt{e}x+i\sqrt{d}\right)}\right)}{d^2\sqrt{e}\left(e-c^2d\right)^{3/2}}+\frac{b\left(3c^2d-2e\right)\log\left(-\frac{16id^2\sqrt{e}}{}\right.}{d^2\sqrt{e}}\right.$$

Antiderivative was successfully verified.

```
[In] Integrate[(x*(a + b*ArcCsch[c*x]))/(d + e*x^2)^3,x]
```

```
[Out] ((-4*a)/(e*(d + e*x^2)^2) + (2*b*c*Sqrt[1 + 1/(c^2*x^2)]*x)/(d*(c^2*d - e)*
(d + e*x^2)) - (4*b*ArcCsch[c*x])/(e*(d + e*x^2)^2) + (4*b*ArcSinh[1/(c*x)]
)/(d^2*e) + (b*(3*c^2*d - 2*e)*Log[(16*d^2*Sqrt[e]*Sqrt[-(c^2*d) + e]*(Sqrt
```

```
[e] + c*((-I)*c*Sqrt[d] + Sqrt[-(c^2*d) + e]*Sqrt[1 + 1/(c^2*x^2)])*x))/(b*
(-3*c^2*d + 2*e)*(I*Sqrt[d] + Sqrt[e]*x))])/(d^2*Sqrt[e]*(-(c^2*d) + e)^(3/
2)) + (b*(3*c^2*d - 2*e)*Log[((-16*I)*d^2*Sqrt[e]*Sqrt[-(c^2*d) + e]*(Sqrt[
e] + c*(I*c*Sqrt[d] + Sqrt[-(c^2*d) + e]*Sqrt[1 + 1/(c^2*x^2)])*x))/(b*(3*c
^2*d - 2*e)*(Sqrt[d] + I*Sqrt[e]*x))])/(d^2*Sqrt[e]*(-(c^2*d) + e)^(3/2)))/
16
```

**fricas [B]** time = 1.43, size = 1256, normalized size = 6.13

result too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*(a+b*arccsch(c*x))/(e*x^2+d)^3,x, algorithm="fricas")
```

```
[Out] [-1/16*(4*a*c^4*d^4 - 8*a*c^2*d^3*e + 4*a*d^2*e^2 + (3*b*c^2*d^3 + (3*b*c^2
*d*e^2 - 2*b*e^3)*x^4 - 2*b*d^2*e + 2*(3*b*c^2*d^2*e - 2*b*d*e^2)*x^2)*sqrt
(-c^2*d*e + e^2)*log((c^2*e*x^2 - c^2*d - 2*sqrt(-c^2*d*e + e^2)*c*x*sqrt((
c^2*x^2 + 1)/(c^2*x^2)) + 2*e)/(e*x^2 + d)) - 4*(b*c^4*d^4 - 2*b*c^2*d^3*e
+ b*d^2*e^2 + (b*c^4*d^2*e^2 - 2*b*c^2*d*e^3 + b*e^4)*x^4 + 2*(b*c^4*d^3*e
- 2*b*c^2*d^2*e^2 + b*d*e^3)*x^2)*log(c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) - c
*x + 1) + 4*(b*c^4*d^4 - 2*b*c^2*d^3*e + b*d^2*e^2 + (b*c^4*d^2*e^2 - 2*b*c
^2*d*e^3 + b*e^4)*x^4 + 2*(b*c^4*d^3*e - 2*b*c^2*d^2*e^2 + b*d*e^3)*x^2)*lo
g(c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) - c*x - 1) + 4*(b*c^4*d^4 - 2*b*c^2*d^3
*e + b*d^2*e^2)*log((c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) + 1)/(c*x)) - 2*((b*
c^3*d^2*e^2 - b*c*d*e^3)*x^3 + (b*c^3*d^3*e - b*c*d^2*e^2)*x)*sqrt((c^2*x^2
 + 1)/(c^2*x^2)))/(c^4*d^6*e - 2*c^2*d^5*e^2 + d^4*e^3 + (c^4*d^4*e^3 - 2*c
^2*d^3*e^4 + d^2*e^5)*x^4 + 2*(c^4*d^5*e^2 - 2*c^2*d^4*e^3 + d^3*e^4)*x^2),
 -1/8*(2*a*c^4*d^4 - 4*a*c^2*d^3*e + 2*a*d^2*e^2 + (3*b*c^2*d^3 + (3*b*c^2*
d*e^2 - 2*b*e^3)*x^4 - 2*b*d^2*e + 2*(3*b*c^2*d^2*e - 2*b*d*e^2)*x^2)*sqrt(
c^2*d*e - e^2)*arctan(-sqrt(c^2*d*e - e^2)*c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)
)/(c^2*d - e)) - 2*(b*c^4*d^4 - 2*b*c^2*d^3*e + b*d^2*e^2 + (b*c^4*d^2*e^2
- 2*b*c^2*d*e^3 + b*e^4)*x^4 + 2*(b*c^4*d^3*e - 2*b*c^2*d^2*e^2 + b*d*e^3)*
x^2)*log(c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) - c*x + 1) + 2*(b*c^4*d^4 - 2*b*
c^2*d^3*e + b*d^2*e^2 + (b*c^4*d^2*e^2 - 2*b*c^2*d*e^3 + b*e^4)*x^4 + 2*(b*
c^4*d^3*e - 2*b*c^2*d^2*e^2 + b*d*e^3)*x^2)*log(c*x*sqrt((c^2*x^2 + 1)/(c^2
*x^2)) - c*x - 1) + 2*(b*c^4*d^4 - 2*b*c^2*d^3*e + b*d^2*e^2)*log((c*x*sqrt
((c^2*x^2 + 1)/(c^2*x^2)) + 1)/(c*x)) - ((b*c^3*d^2*e^2 - b*c*d*e^3)*x^3 +
(b*c^3*d^3*e - b*c*d^2*e^2)*x)*sqrt((c^2*x^2 + 1)/(c^2*x^2)))/(c^4*d^6*e -
2*c^2*d^5*e^2 + d^4*e^3 + (c^4*d^4*e^3 - 2*c^2*d^3*e^4 + d^2*e^5)*x^4 + 2*(
c^4*d^5*e^2 - 2*c^2*d^4*e^3 + d^3*e^4)*x^2)]
```

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

$$\int \frac{(b \operatorname{arcsch}(cx) + a)x}{\left(ex^2 + d\right)^3} \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

[In] integrate(x*(a+b*arccsch(c*x))/(e*x^2+d)^3,x, algorithm="giac")

[Out] integrate((b*arccsch(c*x) + a)*x/(e*x^2 + d)^3, x)

**maple [B]** time = 0.08, size = 1892, normalized size = 9.23

result too large to display

Verification of antiderivative is not currently implemented for this CAS.

[In] int(x*(a+b*arccsch(c*x))/(e*x^2+d)^3,x)

[Out] -1/4*c^4*a/e/(c^2*e*x^2+c^2*d)^2-1/4*c^4*b/e/(c^2*e*x^2+c^2*d)^2*arccsch(c*x)-1/4*c^3*b*(c^2*x^2+1)^(1/2)*e/((c^2*x^2+1)/c^2/x^2)^(1/2)*x/d/(c^2*d-e)/(c*x*e+(-c^2*d*e)^(1/2))/(-c*x*e+(-c^2*d*e)^(1/2))*arctanh(1/(c^2*x^2+1)^(1/2))-1/4*c^3*b*(c^2*x^2+1)^(1/2)/((c^2*x^2+1)/c^2/x^2)^(1/2)/x/(c^2*d-e)/(c*x*e+(-c^2*d*e)^(1/2))/(-c*x*e+(-c^2*d*e)^(1/2))*arctanh(1/(c^2*x^2+1)^(1/2))+3/16*c^3*b*(c^2*x^2+1)^(1/2)*e/((c^2*x^2+1)/c^2/x^2)^(1/2)*x/d/(c^2*d-e)/(c*x*e+(-c^2*d*e)^(1/2))/(-(c^2*d-e)/e)^(1/2)/(-c*x*e+(-c^2*d*e)^(1/2))*ln(-2*(-(c^2*x^2+1)^(1/2)*(-(c^2*d-e)/e)^(1/2)*e+(-c^2*d*e)^(1/2)*c*x-e)/(c*x*e+(-c^2*d*e)^(1/2)))+3/16*c^3*b*(c^2*x^2+1)^(1/2)/((c^2*x^2+1)/c^2/x^2)^(1/2)/x/(c^2*d-e)/(c*x*e+(-c^2*d*e)^(1/2))/(-(c^2*d-e)/e)^(1/2)/(-c*x*e+(-c^2*d*e)^(1/2))*ln(-2*(-(c^2*x^2+1)^(1/2)*(-(c^2*d-e)/e)^(1/2)*e+(-c^2*d*e)^(1/2)*c*x-e)/(c*x*e+(-c^2*d*e)^(1/2)))+3/16*c^3*b*(c^2*x^2+1)^(1/2)*e/((c^2*x^2+1)/c^2/x^2)^(1/2)*x/d/(c^2*d-e)/(c*x*e+(-c^2*d*e)^(1/2))/(-(c^2*d-e)/e)^(1/2)/(-c*x*e+(-c^2*d*e)^(1/2))*ln(-2*((c^2*x^2+1)^(1/2)*(-(c^2*d-e)/e)^(1/2)*e+(-c^2*d*e)^(1/2)*c*x+e)/(-c*x*e+(-c^2*d*e)^(1/2)))+3/16*c^3*b*(c^2*x^2+1)^(1/2)/((c^2*x^2+1)/c^2/x^2)^(1/2)/x/(c^2*d-e)/(c*x*e+(-c^2*d*e)^(1/2))/(-(c^2*d-e)/e)^(1/2)/(-c*x*e+(-c^2*d*e)^(1/2))*ln(-2*((c^2*x^2+1)^(1/2)*(-(c^2*d-e)/e)^(1/2)*e+(-c^2*d*e)^(1/2)*c*x+e)/(-c*x*e+(-c^2*d*e)^(1/2)))-1/8*c^3*b/((c^2*x^2+1)/c^2/x^2)^(1/2)*x/d/(c^2*d-e)/(c*x*e+(-c^2*d*e)^(1/2))/(-c*x*e+(-c^2*d*e)^(1/2))*e-1/8*c*b/((c^2*x^2+1)/c^2/x^2)^(1/2)/x/d/(c^2*d-e)/(c*x*e+(-c^2*d*e)^(1/2))/(-c*x*e+(-c^2*d*e)^(1/2))*e+1/4*c*b*(c^2*x^2+1)^(1/2)/((c^2*x^2+1)/c^2/x^2)^(1/2)*x/d^2/(c^2*d-e)/(c*x*e+(-c^2*d*e)^(1/2))/(-c*x*e+(-c^2*d*e)^(1/2))*arctanh(1/(c^2*x^2+1)^(1/2))*e^2+1/4*c*b*(c^2*x^2+1)^(1/2)/((c^2*x^2+1)/c^2/x^2)^(1/2)/x/d/(c^2*d-e)/(c*x*e+(-c^2*d*e)^(1/2))/(-c*x*e+(-c^2*d*e)^(1/2))*arctanh(1/(c^2*x^2+1)^(1/2))*e-1/8*c*b*(c^2*x^2+1)^(1/2)/((c^2*x^2+1)/c^2/x^2)^(1/2)*x/d^2/(c^2*d-e)/(c*x*e+(-c^2*d*e)^(1/2))/(-(c^2*d-e)/e)^(1/2)/(-c*x*e+(-c^2*d*e)^(1/2))*ln(-2*(-(c^2*x^2+1)^(1/2)*(-(c^2*d-e)/e)^(1/2)*e+(-c^2*d*e)^(1/2)*c*x-e)/(c*x*e+(-c^2*d*e)^(1/2)))*e^2-1/8*c*b*(c^2*x^2+1)^(1/2)/((c^2*x^2+1)/c^2/x^2)^(1/2)/x/d/(c^2*d-e)/(c*x*e+(-c^2*d*e)^(1/2))/(-(c^2*d-e)/e)^(1/2)/(-c*x*e+(-c^2*d*e)^(1/2))*ln(-2*(-(c^2*x^2+1)^(1/2)*(-(c^2*d-e)/e)^(1/2)*e+(-c^2*d*e)^(1/2)*c*x-e)/(c*x*e+(-c^2*d*e)^(1/2)))*e-1/8*c*b*(c^2*x^2+1)^(1/2)/((c^2*x^2+1)/c^2/x^2)^(1/2)*x/

```
d^2/(c^2*d-e)/(c*x*e+(-c^2*d*e)^(1/2))/(-(c^2*d-e)/e)^(1/2)/(-c*x*e+(-c^2*d
*e)^(1/2))*ln(-2*((c^2*x^2+1)^(1/2)*(-(c^2*d-e)/e)^(1/2)*e+(-c^2*d*e)^(1/2)
*c*x+e)/(-c*x*e+(-c^2*d*e)^(1/2)))*e^2-1/8*c*b*(c^2*x^2+1)^(1/2)/((c^2*x^2+
1)/c^2/x^2)^(1/2)/x/d/(c^2*d-e)/(c*x*e+(-c^2*d*e)^(1/2))/(-(c^2*d-e)/e)^(1/
2)/(-c*x*e+(-c^2*d*e)^(1/2))*ln(-2*((c^2*x^2+1)^(1/2)*(-(c^2*d-e)/e)^(1/2)*
e+(-c^2*d*e)^(1/2)*c*x+e)/(-c*x*e+(-c^2*d*e)^(1/2)))*e
```

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

$$-\frac{1}{8}\left(8\,c^2\int \frac{x}{4\left(c^2e^3x^6+\left(2\,c^2de^2+e^3\right)x^4+d^2e+\left(c^2d^2e+2\,de^2\right)x^2+\left(c^2e^3x^6+\left(2\,c^2de^2+e^3\right)x^4+d^2e+\left(c^2d^2e+2\right.\right.\right.}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*(a+b*arccsch(c*x))/(e*x^2+d)^3,x, algorithm="maxima")
```

```
[Out] -1/8*(8*c^2*integrate(1/4*x/(c^2*e^3*x^6 + (2*c^2*d*e^2 + e^3)*x^4 + d^2*e
+ (c^2*d^2*e + 2*d*e^2)*x^2 + (c^2*e^3*x^6 + (2*c^2*d*e^2 + e^3)*x^4 + d^2*
e + (c^2*d^2*e + 2*d*e^2)*x^2)*sqrt(c^2*x^2 + 1)), x) + (2*c^2*d - e)*log(e
*x^2 + d)/(c^4*d^4 - 2*c^2*d^3*e + d^2*e^2) - (2*c^4*d^4*log(c) + 2*d^2*e^2
*log(c) - d^2*e^2 - (4*d^3*e*log(c) - d^3*e)*c^2 + (c^2*d^2*e^2 - d*e^3)*x^
2 + (c^4*d^2*e^2*x^4 + 2*c^4*d^3*e*x^2 + c^4*d^4)*log(c^2*x^2 + 1) - 2*((c^
4*d^2*e^2 - 2*c^2*d*e^3 + e^4)*x^4 + 2*(c^4*d^3*e - 2*c^2*d^2*e^2 + d*e^3)*
x^2)*log(x) - 2*(c^4*d^4 - 2*c^2*d^3*e + d^2*e^2)*log(sqrt(c^2*x^2 + 1) + 1
))/(c^4*d^6*e - 2*c^2*d^5*e^2 + d^4*e^3 + (c^4*d^4*e^3 - 2*c^2*d^3*e^4 + d^
2*e^5)*x^4 + 2*(c^4*d^5*e^2 - 2*c^2*d^4*e^3 + d^3*e^4)*x^2))*b - 1/4*a/(e^3
*x^4 + 2*d*e^2*x^2 + d^2*e)
```

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

$$\int \frac{x\,\left(a+b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)\right)}{{\left(e\,x^2+d\right)}^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((x*(a + b*asinh(1/(c*x))))/(d + e*x^2)^3,x)
```

```
[Out] int((x*(a + b*asinh(1/(c*x))))/(d + e*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(x*(a+b*acsch(c*x))/(e*x**2+d)**3,x)
[Out] Timed out
```

# 3.114 $\int \frac{a+b\text{csch}^{-1}(cx)}{x(d+ex^2)^3} dx$

**Optimal**. Leaf size=657

$$-\frac{\left(a+b\text{csch}^{-1}(cx)\right)\log\left(1-\frac{c\sqrt{-d}\,e^{\text{csch}^{-1}(cx)}}{\sqrt{e}-\sqrt{e-c^2d}}\right)}{2d^3}-\frac{\left(a+b\text{csch}^{-1}(cx)\right)\log\left(\frac{c\sqrt{-d}\,e^{\text{csch}^{-1}(cx)}}{\sqrt{e}-\sqrt{e-c^2d}}+1\right)}{2d^3}-\frac{\left(a+b\text{csch}^{-1}(cx)\right)\log\left(1\right.}{2d^3}$$

```
[Out] 1/4*e^2*(a+b*arccsch(c*x))/d^3/(e+d/x^2)^2-e*(a+b*arccsch(c*x))/d^3/(e+d/x^
2)+1/2*(a+b*arccsch(c*x))^2/b/d^3-1/2*(a+b*arccsch(c*x))*ln(1-c*(1/c/x+(1+1
/c^2/x^2)^(1/2))*(-d)^(1/2)/(e^(1/2)-(-c^2*d+e)^(1/2)))/d^3-1/2*(a+b*arccsc
h(c*x))*ln(1+c*(1/c/x+(1+1/c^2/x^2)^(1/2))*(-d)^(1/2)/(e^(1/2)-(-c^2*d+e)^(
1/2)))/d^3-1/2*(a+b*arccsch(c*x))*ln(1-c*(1/c/x+(1+1/c^2/x^2)^(1/2))*(-d)^(
1/2)/(e^(1/2)+(-c^2*d+e)^(1/2)))/d^3-1/2*(a+b*arccsch(c*x))*ln(1+c*(1/c/x+(
1+1/c^2/x^2)^(1/2))*(-d)^(1/2)/(e^(1/2)+(-c^2*d+e)^(1/2)))/d^3-1/2*b*polylo
g(2,-c*(1/c/x+(1+1/c^2/x^2)^(1/2))*(-d)^(1/2)/(e^(1/2)-(-c^2*d+e)^(1/2)))/d
^3-1/2*b*polylog(2,c*(1/c/x+(1+1/c^2/x^2)^(1/2))*(-d)^(1/2)/(e^(1/2)-(-c^2*
d+e)^(1/2)))/d^3-1/2*b*polylog(2,-c*(1/c/x+(1+1/c^2/x^2)^(1/2))*(-d)^(1/2)/
(e^(1/2)+(-c^2*d+e)^(1/2)))/d^3-1/2*b*polylog(2,c*(1/c/x+(1+1/c^2/x^2)^(1/2
))*(-d)^(1/2)/(e^(1/2)+(-c^2*d+e)^(1/2)))/d^3-1/8*b*(c^2*d-2*e)*arctan((c^2
*d-e)^(1/2)/c/x/e^(1/2)/(1+1/c^2/x^2)^(1/2))*e^(1/2)/d^3/(c^2*d-e)^(3/2)+b*
arctan((c^2*d-e)^(1/2)/c/x/e^(1/2)/(1+1/c^2/x^2)^(1/2))*e^(1/2)/d^3/(c^2*d-
e)^(1/2)-1/8*b*c*e*(1+1/c^2/x^2)^(1/2)/d^2/(c^2*d-e)/(e+d/x^2)/x
```

**Rubi [A]** time = 1.32, antiderivative size = 657, normalized size of antiderivative = 1.00, number of steps used = 28, number of rules used = 11, integrand size = 21, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.524, Rules used = {6304, 5791, 5787, 382, 377, 205, 5799, 5561, 2190, 2279, 2391}

$$-\frac{b\text{PolyLog}\left(2,-\frac{c\sqrt{-d}\,e^{\text{csch}^{-1}(cx)}}{\sqrt{e}-\sqrt{e-c^2d}}\right)}{2d^3}-\frac{b\text{PolyLog}\left(2,\frac{c\sqrt{-d}\,e^{\text{csch}^{-1}(cx)}}{\sqrt{e}-\sqrt{e-c^2d}}\right)}{2d^3}-\frac{b\text{PolyLog}\left(2,-\frac{c\sqrt{-d}\,e^{\text{csch}^{-1}(cx)}}{\sqrt{e-c^2d}+\sqrt{e}}\right)}{2d^3}-\frac{b\text{PolyLog}\left(2,\frac{c\sqrt{-d}}{\sqrt{e-}}\right.}{2d^3}$$

Antiderivative was successfully verified.

```
[In] Int[(a + b*ArcCsch[c*x])/(x*(d + e*x^2)^3),x]
```

```
[Out] -(b*c*e*Sqrt[1 + 1/(c^2*x^2)])/(8*d^2*(c^2*d - e)*(e + d/x^2)*x) + (e^2*(a
+ b*ArcCsch[c*x]))/(4*d^3*(e + d/x^2)^2) - (e*(a + b*ArcCsch[c*x]))/(d^3*(e
```

```
 + d/x^2)) + (a + b*ArcCsch[c*x])^2/(2*b*d^3) - (b*(c^2*d - 2*e)*Sqrt[e]*Ar
cTan[Sqrt[c^2*d - e]/(c*Sqrt[e]*Sqrt[1 + 1/(c^2*x^2)]*x)])/(8*d^3*(c^2*d -
e)^(3/2)) + (b*Sqrt[e]*ArcTan[Sqrt[c^2*d - e]/(c*Sqrt[e]*Sqrt[1 + 1/(c^2*x^
2)]*x)])/(d^3*Sqrt[c^2*d - e]) - ((a + b*ArcCsch[c*x])*Log[1 - (c*Sqrt[-d]*
E^ArcCsch[c*x])/(Sqrt[e] - Sqrt[-(c^2*d) + e])])/(2*d^3) - ((a + b*ArcCsch[
c*x])*Log[1 + (c*Sqrt[-d]*E^ArcCsch[c*x])/(Sqrt[e] - Sqrt[-(c^2*d) + e])])/
(2*d^3) - ((a + b*ArcCsch[c*x])*Log[1 - (c*Sqrt[-d]*E^ArcCsch[c*x])/(Sqrt[e
] + Sqrt[-(c^2*d) + e])])/(2*d^3) - ((a + b*ArcCsch[c*x])*Log[1 + (c*Sqrt[-
d]*E^ArcCsch[c*x])/(Sqrt[e] + Sqrt[-(c^2*d) + e])])/(2*d^3) - (b*PolyLog[2,
 -((c*Sqrt[-d]*E^ArcCsch[c*x])/(Sqrt[e] - Sqrt[-(c^2*d) + e]))])/(2*d^3) -
(b*PolyLog[2, (c*Sqrt[-d]*E^ArcCsch[c*x])/(Sqrt[e] - Sqrt[-(c^2*d) + e])])/
(2*d^3) - (b*PolyLog[2, -((c*Sqrt[-d]*E^ArcCsch[c*x])/(Sqrt[e] + Sqrt[-(c^2
*d) + e]))])/(2*d^3) - (b*PolyLog[2, (c*Sqrt[-d]*E^ArcCsch[c*x])/(Sqrt[e] +
 Sqrt[-(c^2*d) + e])])/(2*d^3)
```

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 377

```
Int[((a_) + (b_.)*(x_)^(n_))^(p_)/((c_) + (d_.)*(x_)^(n_)), x_Symbol] :> Su
bst[Int[1/(c - (b*c - a*d)*x^n), x], x, x/(a + b*x^n)^(1/n)] /; FreeQ[{a, b
, c, d}, x] && NeQ[b*c - a*d, 0] && EqQ[n*p + 1, 0] && IntegerQ[n]
```

Rule 382

```
Int[((a_) + (b_.)*(x_)^(n_))^(p_)*((c_) + (d_.)*(x_)^(n_))^(q_), x_Symbol]
:> -Simp[(b*x*(a + b*x^n)^(p + 1)*(c + d*x^n)^(q + 1))/(a*n*(p + 1)*(b*c -
a*d)), x] + Dist[(b*c + n*(p + 1)*(b*c - a*d))/(a*n*(p + 1)*(b*c - a*d)), I
nt[(a + b*x^n)^(p + 1)*(c + d*x^n)^q, x], x] /; FreeQ[{a, b, c, d, n, q}, x
] && NeQ[b*c - a*d, 0] && EqQ[n*(p + q + 2) + 1, 0] && (LtQ[p, -1] ||  !LtQ
[q, -1]) && NeQ[p, -1]
```

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 5561

```
Int[(Cosh[(c_.) + (d_.)*(x_)]*((e_.) + (f_.)*(x_))^(m_.))/((a_) + (b_.)*Sin
h[(c_.) + (d_.)*(x_)]), x_Symbol] :> -Simp[(e + f*x)^(m + 1)/(b*f*(m + 1)),
 x] + (Int[((e + f*x)^m*E^(c + d*x))/(a - Rt[a^2 + b^2, 2] + b*E^(c + d*x))
, x] + Int[((e + f*x)^m*E^(c + d*x))/(a + Rt[a^2 + b^2, 2] + b*E^(c + d*x))
, x]) /; FreeQ[{a, b, c, d, e, f}, x] && IGtQ[m, 0] && NeQ[a^2 + b^2, 0]
```

Rule 5787

```
Int[((a_.) + ArcSinh[(c_.)*(x_)]*(b_.))*(x_)*((d_) + (e_.)*(x_)^2)^(p_.), x
_Symbol] :> Simp[((d + e*x^2)^(p + 1)*(a + b*ArcSinh[c*x]))/(2*e*(p + 1)),
x] - Dist[(b*c)/(2*e*(p + 1)), Int[(d + e*x^2)^(p + 1)/Sqrt[1 + c^2*x^2], x
], x] /; FreeQ[{a, b, c, d, e, p}, x] && NeQ[e, c^2*d] && NeQ[p, -1]
```

Rule 5791

```
Int[((a_.) + ArcSinh[(c_.)*(x_)]*(b_.))^(n_.)*((f_.)*(x_))^(m_.)*((d_) + (e
_.)*(x_)^2)^(p_.), x_Symbol] :> Int[ExpandIntegrand[(a + b*ArcSinh[c*x])^n,
 (f*x)^m*(d + e*x^2)^p, x], x] /; FreeQ[{a, b, c, d, e, f}, x] && NeQ[e, c^
2*d] && IGtQ[n, 0] && IntegerQ[p] && IntegerQ[m]
```

Rule 5799

```
Int[((a_.) + ArcSinh[(c_.)*(x_)]*(b_.))^(n_.)/((d_.) + (e_.)*(x_)), x_Symbo
l] :> Subst[Int[((a + b*x)^n*Cosh[x])/(c*d + e*Sinh[x]), x], x, ArcSinh[c*x
]] /; FreeQ[{a, b, c, d, e}, x] && IGtQ[n, 0]
```

Rule 6304

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))^(n_.)*(x_)^(m_.)*((d_.) + (e_.)*(x_
)^2)^(p_.), x_Symbol] :> -Subst[Int[((e + d*x^2)^p*(a + b*ArcSinh[x/c])^n)/
x^(m + 2*(p + 1)), x], x, 1/x] /; FreeQ[{a, b, c, d, e, n}, x] && IGtQ[n, 0
] && IntegersQ[m, p]
```

Rubi steps

$$\int \frac{a+b\text{csch}^{-1}(cx)}{x\left(d+ex^2\right)^3}\,dx = -\text{Subst}\left(\int \frac{x^5\left(a+b\sinh^{-1}\left(\frac{x}{c}\right)\right)}{\left(e+dx^2\right)^3}\,dx, x, \frac{1}{x}\right)$$

$$= -\text{Subst}\left(\int\left(\frac{e^2x\left(a+b\sinh^{-1}\left(\frac{x}{c}\right)\right)}{d^2\left(e+dx^2\right)^3} - \frac{2ex\left(a+b\sinh^{-1}\left(\frac{x}{c}\right)\right)}{d^2\left(e+dx^2\right)^2} + \frac{x\left(a+b\sinh^{-1}\left(\frac{x}{c}\right)\right)}{d^2\left(e+dx^2\right)}\right)\right.$$

$$= -\frac{\text{Subst}\left(\int \frac{x\left(a+b\sinh^{-1}\left(\frac{x}{c}\right)\right)}{e+dx^2}\,dx, x, \frac{1}{x}\right)}{d^2} + \frac{(2e)\,\text{Subst}\left(\int \frac{x\left(a+b\sinh^{-1}\left(\frac{x}{c}\right)\right)}{\left(e+dx^2\right)^2}\,dx, x, \frac{1}{x}\right)}{d^2} - \frac{e^2\,\text{Subst}}{}$$

$$= \frac{e^2\left(a+b\text{csch}^{-1}(cx)\right)}{4d^3\left(e+\frac{d}{x^2}\right)^2} - \frac{e\left(a+b\text{csch}^{-1}(cx)\right)}{d^3\left(e+\frac{d}{x^2}\right)} - \frac{\text{Subst}\left(\int\left(-\frac{\sqrt{-d}\left(a+b\sinh^{-1}\left(\frac{x}{c}\right)\right)}{2d\left(\sqrt{e}-\sqrt{-d}\,x\right)} + \frac{\sqrt{-d}\left(a+b\right.}{2d\left(\sqrt{e}-\right.}\right.\right.}{d^2}$$

$$= -\frac{bce\sqrt{1+\frac{1}{c^2x^2}}}{8d^2\left(c^2d-e\right)\left(e+\frac{d}{x^2}\right)x} + \frac{e^2\left(a+b\text{csch}^{-1}(cx)\right)}{4d^3\left(e+\frac{d}{x^2}\right)^2} - \frac{e\left(a+b\text{csch}^{-1}(cx)\right)}{d^3\left(e+\frac{d}{x^2}\right)} - \frac{\text{Subst}\left(\int \frac{a+}{}\right.}{2}$$

$$= -\frac{bce\sqrt{1+\frac{1}{c^2x^2}}}{8d^2\left(c^2d-e\right)\left(e+\frac{d}{x^2}\right)x} + \frac{e^2\left(a+b\text{csch}^{-1}(cx)\right)}{4d^3\left(e+\frac{d}{x^2}\right)^2} - \frac{e\left(a+b\text{csch}^{-1}(cx)\right)}{d^3\left(e+\frac{d}{x^2}\right)} + \frac{b\sqrt{e}\,\tan^{-1}\left(\right.}{d^3\sqrt{c}}$$

$$= -\frac{bce\sqrt{1+\frac{1}{c^2x^2}}}{8d^2\left(c^2d-e\right)\left(e+\frac{d}{x^2}\right)x} + \frac{e^2\left(a+b\text{csch}^{-1}(cx)\right)}{4d^3\left(e+\frac{d}{x^2}\right)^2} - \frac{e\left(a+b\text{csch}^{-1}(cx)\right)}{d^3\left(e+\frac{d}{x^2}\right)} + \frac{\left(a+b\text{csch}^{-1}\right.}{2bd^3}$$

$$= -\frac{bce\sqrt{1+\frac{1}{c^2x^2}}}{8d^2\left(c^2d-e\right)\left(e+\frac{d}{x^2}\right)x} + \frac{e^2\left(a+b\text{csch}^{-1}(cx)\right)}{4d^3\left(e+\frac{d}{x^2}\right)^2} - \frac{e\left(a+b\text{csch}^{-1}(cx)\right)}{d^3\left(e+\frac{d}{x^2}\right)} + \frac{\left(a+b\text{csch}^{-1}\right.}{2bd^3}$$

$$= -\frac{bce\sqrt{1+\frac{1}{c^2x^2}}}{8d^2\left(c^2d-e\right)\left(e+\frac{d}{x^2}\right)x} + \frac{e^2\left(a+b\text{csch}^{-1}(cx)\right)}{4d^3\left(e+\frac{d}{x^2}\right)^2} - \frac{e\left(a+b\text{csch}^{-1}(cx)\right)}{d^3\left(e+\frac{d}{x^2}\right)} + \frac{\left(a+b\text{csch}^{-1}\right.}{2bd^3}$$

**Mathematica** [F] time = 70.35, size = 0, normalized size = 0.00

$$\int \frac{a + b\mathrm{csch}^{-1}(cx)}{x\left(d + ex^2\right)^3}\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[(a + b*ArcCsch[c*x])/(x*(d + e*x^2)^3),x]
```

```
[Out] Integrate[(a + b*ArcCsch[c*x])/(x*(d + e*x^2)^3), x]
```

**fricas** [F] time = 0.84, size = 0, normalized size = 0.00

$$\mathrm{integral}\left(\frac{b\,\mathrm{arcsch}\,(cx) + a}{e^3x^7 + 3\,de^2x^5 + 3\,d^2ex^3 + d^3x}, x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))/x/(e*x^2+d)^3,x, algorithm="fricas")
```

```
[Out] integral((b*arccsch(c*x) + a)/(e^3*x^7 + 3*d*e^2*x^5 + 3*d^2*e*x^3 + d^3*x)
, x)
```

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

$$\int \frac{b\,\mathrm{arcsch}\,(cx) + a}{\left(ex^2 + d\right)^3 x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))/x/(e*x^2+d)^3,x, algorithm="giac")
```

```
[Out] integrate((b*arccsch(c*x) + a)/((e*x^2 + d)^3*x), x)
```

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

$$\int \frac{a + b\,\mathrm{arccsch}\,(cx)}{x\left(e\,x^2 + d\right)^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a+b*arccsch(c*x))/x/(e*x^2+d)^3,x)
```

```
[Out] int((a+b*arccsch(c*x))/x/(e*x^2+d)^3,x)
```

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

$$\frac{1}{4}a\left(\frac{2ex^2+3d}{d^2e^2x^4+2d^3ex^2+d^4}-\frac{2\log\left(ex^2+d\right)}{d^3}+\frac{4\log(x)}{d^3}\right)+b\int\frac{\log\left(\sqrt{\frac{1}{c^2x^2}+1}+\frac{1}{cx}\right)}{e^3x^7+3de^2x^5+3d^2ex^3+d^3x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))/x/(e*x^2+d)^3,x, algorithm="maxima")
```

```
[Out] 1/4*a*((2*e*x^2 + 3*d)/(d^2*e^2*x^4 + 2*d^3*e*x^2 + d^4) - 2*log(e*x^2 + d)
/d^3 + 4*log(x)/d^3) + b*integrate(log(sqrt(1/(c^2*x^2) + 1) + 1/(c*x))/(e^
3*x^7 + 3*d*e^2*x^5 + 3*d^2*e*x^3 + d^3*x), x)
```

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

$$\int\frac{a+b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)}{x\,\left(e\,x^2+d\right)^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a + b*asinh(1/(c*x)))/(x*(d + e*x^2)^3),x)
```

```
[Out] int((a + b*asinh(1/(c*x)))/(x*(d + e*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((a+b*acsch(c*x))/x/(e*x**2+d)**3,x)
```

```
[Out] Timed out
```

# 3.115 $\int \frac{x^4\left(a+b\,\mathbf{csch}^{-1}(cx)\right)}{\left(d+ex^2\right)^3}\,dx$

**Optimal**. Leaf size=1106

$$-\frac{b\sqrt{-d}\sqrt{1+\frac{1}{c^2x^2}}\,c}{16\left(c^2d-e\right)e^{3/2}\left(\sqrt{-d}\sqrt{e}-\frac{d}{x}\right)}-\frac{b\sqrt{-d}\sqrt{1+\frac{1}{c^2x^2}}\,c}{16\left(c^2d-e\right)e^{3/2}\left(\frac{d}{x}+\sqrt{-d}\sqrt{e}\right)}+\frac{3\left(a+b\,\mathrm{csch}^{-1}(cx)\right)}{16e^2\left(\sqrt{-d}\sqrt{e}-\frac{d}{x}\right)}-\frac{3\left(a+b\,\mathrm{csch}^{-1}(cx)\right)}{16e^2\left(\frac{d}{x}+\sqrt{-d}\sqrt{e}\right)}+\frac{\sqrt{-}}{16}$$

```
[Out] 3/16*(a+b*arccsch(c*x))*ln(1-c*(1/c/x+(1+1/c^2/x^2)^(1/2))*(-d)^(1/2)/(e^(1
/2)-(-c^2*d+e)^(1/2)))/e^(5/2)/(-d)^(1/2)-3/16*(a+b*arccsch(c*x))*ln(1+c*(1
/c/x+(1+1/c^2/x^2)^(1/2))*(-d)^(1/2)/(e^(1/2)-(-c^2*d+e)^(1/2)))/e^(5/2)/(-
d)^(1/2)+3/16*(a+b*arccsch(c*x))*ln(1-c*(1/c/x+(1+1/c^2/x^2)^(1/2))*(-d)^(1
/2)/(e^(1/2)+(-c^2*d+e)^(1/2)))/e^(5/2)/(-d)^(1/2)-3/16*(a+b*arccsch(c*x))*
ln(1+c*(1/c/x+(1+1/c^2/x^2)^(1/2))*(-d)^(1/2)/(e^(1/2)+(-c^2*d+e)^(1/2)))/e
^(5/2)/(-d)^(1/2)-3/16*b*polylog(2,-c*(1/c/x+(1+1/c^2/x^2)^(1/2))*(-d)^(1/2
)/(e^(1/2)-(-c^2*d+e)^(1/2)))/e^(5/2)/(-d)^(1/2)+3/16*b*polylog(2,c*(1/c/x+
(1+1/c^2/x^2)^(1/2))*(-d)^(1/2)/(e^(1/2)-(-c^2*d+e)^(1/2)))/e^(5/2)/(-d)^(1
/2)-3/16*b*polylog(2,-c*(1/c/x+(1+1/c^2/x^2)^(1/2))*(-d)^(1/2)/(e^(1/2)+(-c
^2*d+e)^(1/2)))/e^(5/2)/(-d)^(1/2)+3/16*b*polylog(2,c*(1/c/x+(1+1/c^2/x^2)^
(1/2))*(-d)^(1/2)/(e^(1/2)+(-c^2*d+e)^(1/2)))/e^(5/2)/(-d)^(1/2)+1/16*b*arc
tanh((c^2*d-(-d)^(1/2)*e^(1/2)/x)/c/d^(1/2)/(c^2*d-e)^(1/2)/(1+1/c^2/x^2)^(
1/2))/(c^2*d-e)^(3/2)/e/d^(1/2)+1/16*b*arctanh((c^2*d+(-d)^(1/2)*e^(1/2)/x)
/c/d^(1/2)/(c^2*d-e)^(1/2)/(1+1/c^2/x^2)^(1/2))/(c^2*d-e)^(3/2)/e/d^(1/2)-3
/16*b*arctanh((c^2*d-(-d)^(1/2)*e^(1/2)/x)/c/d^(1/2)/(c^2*d-e)^(1/2)/(1+1/c
^2/x^2)^(1/2))/e^2/d^(1/2)/(c^2*d-e)^(1/2)-3/16*b*arctanh((c^2*d+(-d)^(1/2)
*e^(1/2)/x)/c/d^(1/2)/(c^2*d-e)^(1/2)/(1+1/c^2/x^2)^(1/2))/e^2/d^(1/2)/(c^2
*d-e)^(1/2)+1/16*(a+b*arccsch(c*x))*(-d)^(1/2)/e^(3/2)/(-d/x+(-d)^(1/2)*e^(
1/2))^2+3/16*(a+b*arccsch(c*x))/e^2/(-d/x+(-d)^(1/2)*e^(1/2))-1/16*(a+b*arc
csch(c*x))*(-d)^(1/2)/e^(3/2)/(d/x+(-d)^(1/2)*e^(1/2))^2-3/16*(a+b*arccsch(
c*x))/e^2/(d/x+(-d)^(1/2)*e^(1/2))-1/16*b*c*(-d)^(1/2)*(1+1/c^2/x^2)^(1/2)/
(c^2*d-e)/e^(3/2)/(-d/x+(-d)^(1/2)*e^(1/2))-1/16*b*c*(-d)^(1/2)*(1+1/c^2/x^
2)^(1/2)/(c^2*d-e)/e^(3/2)/(d/x+(-d)^(1/2)*e^(1/2))
```

**Rubi [A]** time = 1.74, antiderivative size = 1106, normalized size of antiderivative = 1.00, number of steps used = 35, number of rules used = 11, integrand size = 21, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.524, Rules used = {6304, 5706, 5801, 731, 725, 206, 5799, 5561, 2190, 2279, 2391}

$$-\frac{b\sqrt{-d}\sqrt{1+\frac{1}{c^2x^2}}\,c}{16\left(c^2d-e\right)e^{3/2}\left(\sqrt{-d}\,\sqrt{e}-\frac{d}{x}\right)}-\frac{b\sqrt{-d}\sqrt{1+\frac{1}{c^2x^2}}\,c}{16\left(c^2d-e\right)e^{3/2}\left(\frac{d}{x}+\sqrt{-d}\,\sqrt{e}\right)}+\frac{3\left(a+b\operatorname{csch}^{-1}(cx)\right)}{16e^2\left(\sqrt{-d}\,\sqrt{e}-\frac{d}{x}\right)}-\frac{3\left(a+b\operatorname{csch}^{-1}(cx)\right)}{16e^2\left(\frac{d}{x}+\sqrt{-d}\,\sqrt{e}\right)}+\cdots$$

Antiderivative was successfully verified.

```
[In] Int[(x^4*(a + b*ArcCsch[c*x]))/(d + e*x^2)^3,x]
```

```
[Out] -(b*c*Sqrt[-d]*Sqrt[1 + 1/(c^2*x^2)])/(16*(c^2*d - e)*e^(3/2)*(Sqrt[-d]*Sqr
t[e] - d/x)) - (b*c*Sqrt[-d]*Sqrt[1 + 1/(c^2*x^2)])/(16*(c^2*d - e)*e^(3/2)
*(Sqrt[-d]*Sqrt[e] + d/x)) + (Sqrt[-d]*(a + b*ArcCsch[c*x]))/(16*e^(3/2)*(S
qrt[-d]*Sqrt[e] - d/x)^2) + (3*(a + b*ArcCsch[c*x]))/(16*e^2*(Sqrt[-d]*Sqrt
[e] - d/x)) - (Sqrt[-d]*(a + b*ArcCsch[c*x]))/(16*e^(3/2)*(Sqrt[-d]*Sqrt[e]
 + d/x)^2) - (3*(a + b*ArcCsch[c*x]))/(16*e^2*(Sqrt[-d]*Sqrt[e] + d/x)) - (
3*b*ArcTanh[(c^2*d - (Sqrt[-d]*Sqrt[e])/x)/(c*Sqrt[d]*Sqrt[c^2*d - e]*Sqrt[
1 + 1/(c^2*x^2)])])/(16*Sqrt[d]*Sqrt[c^2*d - e]*e^2) + (b*ArcTanh[(c^2*d -
(Sqrt[-d]*Sqrt[e])/x)/(c*Sqrt[d]*Sqrt[c^2*d - e]*Sqrt[1 + 1/(c^2*x^2)])])/(
16*Sqrt[d]*(c^2*d - e)^(3/2)*e) - (3*b*ArcTanh[(c^2*d + (Sqrt[-d]*Sqrt[e])/
x)/(c*Sqrt[d]*Sqrt[c^2*d - e]*Sqrt[1 + 1/(c^2*x^2)])])/(16*Sqrt[d]*Sqrt[c^2
*d - e]*e^2) + (b*ArcTanh[(c^2*d + (Sqrt[-d]*Sqrt[e])/x)/(c*Sqrt[d]*Sqrt[c^
2*d - e]*Sqrt[1 + 1/(c^2*x^2)])])/(16*Sqrt[d]*(c^2*d - e)^(3/2)*e) + (3*(a
+ b*ArcCsch[c*x])*Log[1 - (c*Sqrt[-d]*E^ArcCsch[c*x])/(Sqrt[e] - Sqrt[-(c^2
*d) + e])])/(16*Sqrt[-d]*e^(5/2)) - (3*(a + b*ArcCsch[c*x])*Log[1 + (c*Sqrt
[-d]*E^ArcCsch[c*x])/(Sqrt[e] - Sqrt[-(c^2*d) + e])])/(16*Sqrt[-d]*e^(5/2))
 + (3*(a + b*ArcCsch[c*x])*Log[1 - (c*Sqrt[-d]*E^ArcCsch[c*x])/(Sqrt[e] + S
qrt[-(c^2*d) + e])])/(16*Sqrt[-d]*e^(5/2)) - (3*(a + b*ArcCsch[c*x])*Log[1
+ (c*Sqrt[-d]*E^ArcCsch[c*x])/(Sqrt[e] + Sqrt[-(c^2*d) + e])])/(16*Sqrt[-d]
*e^(5/2)) - (3*b*PolyLog[2, -((c*Sqrt[-d]*E^ArcCsch[c*x])/(Sqrt[e] - Sqrt[-
(c^2*d) + e]))])/(16*Sqrt[-d]*e^(5/2)) + (3*b*PolyLog[2, (c*Sqrt[-d]*E^ArcC
sch[c*x])/(Sqrt[e] - Sqrt[-(c^2*d) + e])])/(16*Sqrt[-d]*e^(5/2)) - (3*b*Pol
yLog[2, -((c*Sqrt[-d]*E^ArcCsch[c*x])/(Sqrt[e] + Sqrt[-(c^2*d) + e]))])/(16
*Sqrt[-d]*e^(5/2)) + (3*b*PolyLog[2, (c*Sqrt[-d]*E^ArcCsch[c*x])/(Sqrt[e] +
 Sqrt[-(c^2*d) + e])])/(16*Sqrt[-d]*e^(5/2))
```

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 725

```
Int[1/(((d_) + (e_.)*(x_))*Sqrt[(a_) + (c_.)*(x_)^2]), x_Symbol] :> -Subst[
Int[1/(c*d^2 + a*e^2 - x^2), x], x, (a*e - c*d*x)/Sqrt[a + c*x^2]] /; FreeQ
[{a, c, d, e}, x]
```

Rule 731

```
Int[((d_) + (e_.)*(x_))^(m_)*((a_) + (c_.)*(x_)^2)^(p_), x_Symbol] :> Simp[
(e*(d + e*x)^(m + 1)*(a + c*x^2)^(p + 1))/((m + 1)*(c*d^2 + a*e^2)), x] + D
ist[(c*d)/(c*d^2 + a*e^2), Int[(d + e*x)^(m + 1)*(a + c*x^2)^p, x], x] /; F
reeQ[{a, c, d, e, m, p}, x] && NeQ[c*d^2 + a*e^2, 0] && EqQ[m + 2*p + 3, 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 5561

```
Int[(Cosh[(c_.) + (d_.)*(x_)]*((e_.) + (f_.)*(x_))^(m_.))/((a_) + (b_.)*Sin
h[(c_.) + (d_.)*(x_)]), x_Symbol] :> -Simp[(e + f*x)^(m + 1)/(b*f*(m + 1)),
 x] + (Int[((e + f*x)^m*E^(c + d*x))/(a - Rt[a^2 + b^2, 2] + b*E^(c + d*x))
, x] + Int[((e + f*x)^m*E^(c + d*x))/(a + Rt[a^2 + b^2, 2] + b*E^(c + d*x))
, x]) /; FreeQ[{a, b, c, d, e, f}, x] && IGtQ[m, 0] && NeQ[a^2 + b^2, 0]
```

Rule 5706

```
Int[((a_.) + ArcSinh[(c_.)*(x_)]*(b_.))^(n_.)*((d_) + (e_.)*(x_)^2)^(p_.),
x_Symbol] :> Int[ExpandIntegrand[(a + b*ArcSinh[c*x])^n, (d + e*x^2)^p, x],
 x] /; FreeQ[{a, b, c, d, e, n}, x] && NeQ[e, c^2*d] && IntegerQ[p] && (p >
 0 || IGtQ[n, 0])
```

Rule 5799

```
Int[((a_.) + ArcSinh[(c_.)*(x_)]*(b_.))^(n_.)/((d_.) + (e_.)*(x_)), x_Symbo
l] :> Subst[Int[((a + b*x)^n*Cosh[x])/(c*d + e*Sinh[x]), x], x, ArcSinh[c*x
]] /; FreeQ[{a, b, c, d, e}, x] && IGtQ[n, 0]
```

Rule 5801

```
Int[((a_.) + ArcSinh[(c_.)*(x_)]*(b_.))^(n_.)*((d_.) + (e_.)*(x_))^(m_.), x
_Symbol] :> Simp[((d + e*x)^(m + 1)*(a + b*ArcSinh[c*x])^n)/(e*(m + 1)), x]
 - Dist[(b*c*n)/(e*(m + 1)), Int[((d + e*x)^(m + 1)*(a + b*ArcSinh[c*x])^(n
 - 1))/Sqrt[1 + c^2*x^2], x], x] /; FreeQ[{a, b, c, d, e, m}, x] && IGtQ[n,
 0] && NeQ[m, -1]
```

Rule 6304

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))^(n_.)*(x_)^(m_.)*((d_.) + (e_.)*(x_
)^2)^(p_.), x_Symbol] :> -Subst[Int[((e + d*x^2)^p*(a + b*ArcSinh[x/c])^n)/
x^(m + 2*(p + 1)), x], x, 1/x] /; FreeQ[{a, b, c, d, e, n}, x] && IGtQ[n, 0
] && IntegersQ[m, p]
```

Rubi steps

$$\int \frac{x^4\left(a+b\text{csch}^{-1}(cx)\right)}{\left(d+ex^2\right)^3}\,dx = -\text{Subst}\left(\int \frac{a+b\sinh^{-1}\left(\frac{x}{c}\right)}{\left(e+dx^2\right)^3}\,dx, x, \frac{1}{x}\right)$$

$$= -\text{Subst}\left(\int\left(-\frac{d^3\left(a+b\sinh^{-1}\left(\frac{x}{c}\right)\right)}{8(-d)^{3/2}e^{3/2}\left(\sqrt{-d}\sqrt{e}-dx\right)^3} - \frac{3d\left(a+b\sinh^{-1}\left(\frac{x}{c}\right)\right)}{16e^2\left(\sqrt{-d}\sqrt{e}-dx\right)^2} - \frac{d^3\left(a+\right.}{8(-d)^{3/2}e^{3/2}}\right.\right.$$

$$= \frac{(3d)\,\text{Subst}\left(\int \frac{a+b\sinh^{-1}\left(\frac{x}{c}\right)}{\left(\sqrt{-d}\sqrt{e}-dx\right)^2}\,dx, x, \frac{1}{x}\right)}{16e^2} + \frac{(3d)\,\text{Subst}\left(\int \frac{a+b\sinh^{-1}\left(\frac{x}{c}\right)}{\left(\sqrt{-d}\sqrt{e}+dx\right)^2}\,dx, x, \frac{1}{x}\right)}{16e^2} + \frac{(3d)\,\text{S}}{}$$

$$= \frac{\sqrt{-d}\left(a+b\text{csch}^{-1}(cx)\right)}{16e^{3/2}\left(\sqrt{-d}\sqrt{e}-\frac{d}{x}\right)^2} + \frac{3\left(a+b\text{csch}^{-1}(cx)\right)}{16e^2\left(\sqrt{-d}\sqrt{e}-\frac{d}{x}\right)} - \frac{\sqrt{-d}\left(a+b\text{csch}^{-1}(cx)\right)}{16e^{3/2}\left(\sqrt{-d}\sqrt{e}+\frac{d}{x}\right)^2} - \frac{3\left(a+\right.}{16e^2\left(\right.}$$

$$= -\frac{bc\sqrt{-d}\sqrt{1+\frac{1}{c^2x^2}}}{16\left(c^2d-e\right)e^{3/2}\left(\sqrt{-d}\sqrt{e}-\frac{d}{x}\right)} - \frac{bc\sqrt{-d}\sqrt{1+\frac{1}{c^2x^2}}}{16\left(c^2d-e\right)e^{3/2}\left(\sqrt{-d}\sqrt{e}+\frac{d}{x}\right)} + \frac{\sqrt{-d}\left(a+b\text{cs}\right.}{16e^{3/2}\left(\sqrt{-d}\right.}$$

$$= -\frac{bc\sqrt{-d}\sqrt{1+\frac{1}{c^2x^2}}}{16\left(c^2d-e\right)e^{3/2}\left(\sqrt{-d}\sqrt{e}-\frac{d}{x}\right)} - \frac{bc\sqrt{-d}\sqrt{1+\frac{1}{c^2x^2}}}{16\left(c^2d-e\right)e^{3/2}\left(\sqrt{-d}\sqrt{e}+\frac{d}{x}\right)} + \frac{\sqrt{-d}\left(a+b\text{cs}\right.}{16e^{3/2}\left(\sqrt{-d}\right.}$$

$$= -\frac{bc\sqrt{-d}\sqrt{1+\frac{1}{c^2x^2}}}{16\left(c^2d-e\right)e^{3/2}\left(\sqrt{-d}\sqrt{e}-\frac{d}{x}\right)} - \frac{bc\sqrt{-d}\sqrt{1+\frac{1}{c^2x^2}}}{16\left(c^2d-e\right)e^{3/2}\left(\sqrt{-d}\sqrt{e}+\frac{d}{x}\right)} + \frac{\sqrt{-d}\left(a+b\text{cs}\right.}{16e^{3/2}\left(\sqrt{-d}\right.}$$

$$= -\frac{bc\sqrt{-d}\sqrt{1+\frac{1}{c^2x^2}}}{16\left(c^2d-e\right)e^{3/2}\left(\sqrt{-d}\sqrt{e}-\frac{d}{x}\right)} - \frac{bc\sqrt{-d}\sqrt{1+\frac{1}{c^2x^2}}}{16\left(c^2d-e\right)e^{3/2}\left(\sqrt{-d}\sqrt{e}+\frac{d}{x}\right)} + \frac{\sqrt{-d}\left(a+b\text{cs}\right.}{16e^{3/2}\left(\sqrt{-d}\right.}$$

$$= -\frac{bc\sqrt{-d}\sqrt{1+\frac{1}{c^2x^2}}}{16\left(c^2d-e\right)e^{3/2}\left(\sqrt{-d}\sqrt{e}-\frac{d}{x}\right)} - \frac{bc\sqrt{-d}\sqrt{1+\frac{1}{c^2x^2}}}{16\left(c^2d-e\right)e^{3/2}\left(\sqrt{-d}\sqrt{e}+\frac{d}{x}\right)} + \frac{\sqrt{-d}\left(a+b\text{cs}\right.}{16e^{3/2}\left(\sqrt{-d}\right.}$$

**Mathematica [C]** time = 6.21, size = 2045, normalized size = 1.85

Result too large to show

Warning: Unable to verify antiderivative.

```
[In] Integrate[(x^4*(a + b*ArcCsch[c*x]))/(d + e*x^2)^3,x]
```

```
[Out] (a*d*x)/(4*e^2*(d + e*x^2)^2) - (5*a*x)/(8*e^2*(d + e*x^2)) + (3*a*ArcTan[(
Sqrt[e]*x)/Sqrt[d]])/(8*Sqrt[d]*e^(5/2)) + b*(((I/16)*Sqrt[d]*((I*c*Sqrt[e]
*Sqrt[1 + 1/(c^2*x^2)]*x)/(Sqrt[d]*(c^2*d - e)*((-I)*Sqrt[d] + Sqrt[e]*x))
- ArcCsch[c*x]/(Sqrt[e]*((-I)*Sqrt[d] + Sqrt[e]*x)^2) - ArcSinh[1/(c*x)]/(d
*Sqrt[e]) + (I*(2*c^2*d - e)*Log[(4*d*Sqrt[c^2*d - e]*Sqrt[e]*(Sqrt[e] + I*
c*(c*Sqrt[d] - Sqrt[c^2*d - e]*Sqrt[1 + 1/(c^2*x^2)])*x))/((2*c^2*d - e)*(S
qrt[d] + I*Sqrt[e]*x))])/(d*(c^2*d - e)^(3/2))))/e^2 - ((I/16)*Sqrt[d]*(((-
I)*c*Sqrt[e]*Sqrt[1 + 1/(c^2*x^2)]*x)/(Sqrt[d]*(c^2*d - e)*(I*Sqrt[d] + Sqr
t[e]*x)) - ArcCsch[c*x]/(Sqrt[e]*(I*Sqrt[d] + Sqrt[e]*x)^2) - ArcSinh[1/(c*
x)]/(d*Sqrt[e]) + (I*(2*c^2*d - e)*Log[((4*I)*d*Sqrt[c^2*d - e]*Sqrt[e]*(I*
Sqrt[e] + c*(c*Sqrt[d] + Sqrt[c^2*d - e]*Sqrt[1 + 1/(c^2*x^2)])*x))/((2*c^2
*d - e)*(Sqrt[d] - I*Sqrt[e]*x))])/(d*(c^2*d - e)^(3/2))))/e^2 + (5*(-(ArcC
sch[c*x]/(I*Sqrt[d]*Sqrt[e] + e*x)) - (I*(ArcSinh[1/(c*x)]/Sqrt[e] - Log[(2
*Sqrt[d]*Sqrt[e]*(I*Sqrt[e] + c*(c*Sqrt[d] + I*Sqrt[-(c^2*d) + e]*Sqrt[1 +
1/(c^2*x^2)])*x))/(Sqrt[-(c^2*d) + e]*(I*Sqrt[d] + Sqrt[e]*x))]/Sqrt[-(c^2*
d) + e]))/Sqrt[d]))/(16*e^2) + (5*(-(ArcCsch[c*x]/((-I)*Sqrt[d]*Sqrt[e] + e
*x)) + (I*(ArcSinh[1/(c*x)]/Sqrt[e] - Log[(-2*Sqrt[d]*Sqrt[e]*(Sqrt[e] + c*
(I*c*Sqrt[d] + Sqrt[-(c^2*d) + e]*Sqrt[1 + 1/(c^2*x^2)])*x))/(Sqrt[-(c^2*d)
 + e]*(Sqrt[d] + I*Sqrt[e]*x))]/Sqrt[-(c^2*d) + e]))/Sqrt[d]))/(16*e^2) + (
((3*I)/128)*(Pi^2 - (4*I)*Pi*ArcCsch[c*x] - 8*ArcCsch[c*x]^2 + 32*ArcSin[Sq
rt[1 + Sqrt[e]/(c*Sqrt[d])]/Sqrt[2]]*ArcTan[((c*Sqrt[d] - Sqrt[e])*Cot[(Pi
+ (2*I)*ArcCsch[c*x])/4])/Sqrt[-(c^2*d) + e]] - 8*ArcCsch[c*x]*Log[1 - E^(-
2*ArcCsch[c*x])] + (4*I)*Pi*Log[1 - (I*(-Sqrt[e] + Sqrt[-(c^2*d) + e])*E^Ar
cCsch[c*x])/(c*Sqrt[d])] + 8*ArcCsch[c*x]*Log[1 - (I*(-Sqrt[e] + Sqrt[-(c^2
*d) + e])*E^ArcCsch[c*x])/(c*Sqrt[d])] + (16*I)*ArcSin[Sqrt[1 + Sqrt[e]/(c*
Sqrt[d])]/Sqrt[2]]*Log[1 - (I*(-Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x
])/(c*Sqrt[d])] + (4*I)*Pi*Log[1 + (I*(Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcC
sch[c*x])/(c*Sqrt[d])] + 8*ArcCsch[c*x]*Log[1 + (I*(Sqrt[e] + Sqrt[-(c^2*d)
 + e])*E^ArcCsch[c*x])/(c*Sqrt[d])] - (16*I)*ArcSin[Sqrt[1 + Sqrt[e]/(c*Sqr
t[d])]/Sqrt[2]]*Log[1 + (I*(Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])/(
c*Sqrt[d])] - (4*I)*Pi*Log[Sqrt[e] + (I*Sqrt[d])/x] + 4*PolyLog[2, E^(-2*Ar
cCsch[c*x])] + 8*PolyLog[2, (I*(-Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*
x])/(c*Sqrt[d])] + 8*PolyLog[2, ((-I)*(Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcC
sch[c*x])/(c*Sqrt[d])]))/(Sqrt[d]*e^(5/2)) - (((3*I)/128)*(Pi^2 - (4*I)*Pi*
ArcCsch[c*x] - 8*ArcCsch[c*x]^2 - 32*ArcSin[Sqrt[1 - Sqrt[e]/(c*Sqrt[d])]/S
qrt[2]]*ArcTan[((c*Sqrt[d] + Sqrt[e])*Cot[(Pi + (2*I)*ArcCsch[c*x])/4])/Sqr
t[-(c^2*d) + e]] - 8*ArcCsch[c*x]*Log[1 - E^(-2*ArcCsch[c*x])] + (4*I)*Pi*L
```

```
og[1 + (I*(-Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])/(c*Sqrt[d])] + 8*
ArcCsch[c*x]*Log[1 + (I*(-Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])/(c*
Sqrt[d])] + (16*I)*ArcSin[Sqrt[1 - Sqrt[e]/(c*Sqrt[d])]/Sqrt[2]]*Log[1 + (I
*(-Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])/(c*Sqrt[d])] + (4*I)*Pi*Lo
g[1 - (I*(Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])/(c*Sqrt[d])] + 8*Ar
cCsch[c*x]*Log[1 - (I*(Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])/(c*Sqr
t[d])] - (16*I)*ArcSin[Sqrt[1 - Sqrt[e]/(c*Sqrt[d])]/Sqrt[2]]*Log[1 - (I*(S
qrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])/(c*Sqrt[d])] - (4*I)*Pi*Log[Sq
rt[e] - (I*Sqrt[d])/x] + 4*PolyLog[2, E^(-2*ArcCsch[c*x])] + 8*PolyLog[2, (
(-I)*(-Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])/(c*Sqrt[d])] + 8*PolyL
og[2, (I*(Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])/(c*Sqrt[d])]))/(Sqr
t[d]*e^(5/2)))
```

**fricas [F]** time = 0.96, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{bx^4 \operatorname{arcsch}(cx) + ax^4}{e^3x^6 + 3\,de^2x^4 + 3\,d^2ex^2 + d^3}, x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^4*(a+b*arccsch(c*x))/(e*x^2+d)^3,x, algorithm="fricas")
```

```
[Out] integral((b*x^4*arccsch(c*x) + a*x^4)/(e^3*x^6 + 3*d*e^2*x^4 + 3*d^2*e*x^2
+ d^3), x)
```

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

$$\int \frac{(b \operatorname{arcsch}(cx) + a)x^4}{\left(ex^2 + d\right)^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^4*(a+b*arccsch(c*x))/(e*x^2+d)^3,x, algorithm="giac")
```

```
[Out] integrate((b*arccsch(c*x) + a)*x^4/(e*x^2 + d)^3, x)
```

**maple [F]** time = 3.80, size = 0, normalized size = 0.00

$$\int \frac{x^4\,(a + b \operatorname{arccsch}(cx))}{\left(e\,x^2 + d\right)^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^4*(a+b*arccsch(c*x))/(e*x^2+d)^3,x)
```

```
[Out] int(x^4*(a+b*arccsch(c*x))/(e*x^2+d)^3,x)
```

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

$$-\frac{1}{8}\,a\left(\frac{5\,ex^3+3\,dx}{e^4x^4+2\,de^3x^2+d^2e^2}-\frac{3\,\arctan\left(\frac{ex}{\sqrt{de}}\right)}{\sqrt{de}\,e^2}\right)+b\int\frac{x^4\log\left(\sqrt{\frac{1}{c^2x^2}+1}+\frac{1}{cx}\right)}{e^3x^6+3\,de^2x^4+3\,d^2ex^2+d^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^4*(a+b*arccsch(c*x))/(e*x^2+d)^3,x, algorithm="maxima")
```

```
[Out] -1/8*a*((5*e*x^3 + 3*d*x)/(e^4*x^4 + 2*d*e^3*x^2 + d^2*e^2) - 3*arctan(e*x/
sqrt(d*e))/(sqrt(d*e)*e^2)) + b*integrate(x^4*log(sqrt(1/(c^2*x^2) + 1) + 1
/(c*x))/(e^3*x^6 + 3*d*e^2*x^4 + 3*d^2*e*x^2 + d^3), x)
```

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

$$\int\frac{x^4\,\left(a+b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)\right)}{{\left(e\,x^2+d\right)}^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((x^4*(a + b*asinh(1/(c*x))))/(d + e*x^2)^3,x)
```

```
[Out] int((x^4*(a + b*asinh(1/(c*x))))/(d + e*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(x**4*(a+b*acsch(c*x))/(e*x**2+d)**3,x)
```

```
[Out] Timed out
```

# 3.116 $\int \frac{x^2\left(a+b\,\text{csch}^{-1}(cx)\right)}{\left(d+ex^2\right)^3}\,dx$

**Optimal**. Leaf size=1106

$$-\frac{b\sqrt{1+\frac{1}{c^2x^2}}\,c}{16\sqrt{-d}\,\left(c^2d-e\right)\sqrt{e}\,\left(\sqrt{-d}\,\sqrt{e}-\frac{d}{x}\right)}-\frac{b\sqrt{1+\frac{1}{c^2x^2}}\,c}{16\sqrt{-d}\,\left(c^2d-e\right)\sqrt{e}\,\left(\frac{d}{x}+\sqrt{-d}\,\sqrt{e}\right)}+\frac{a+b\text{csch}^{-1}(cx)}{16de\left(\sqrt{-d}\,\sqrt{e}-\frac{d}{x}\right)}-\frac{a+b\text{csch}^{-1}(}{16de\left(\frac{d}{x}+\sqrt{-d}\right.}$$

```
[Out] -1/16*b*arctanh((c^2*d-(-d)^(1/2)*e^(1/2)/x)/c/d^(1/2)/(c^2*d-e)^(1/2)/(1+1
/c^2/x^2)^(1/2))/d^(3/2)/(c^2*d-e)^(3/2)-1/16*b*arctanh((c^2*d+(-d)^(1/2)*e
^(1/2)/x)/c/d^(1/2)/(c^2*d-e)^(1/2)/(1+1/c^2/x^2)^(1/2))/d^(3/2)/(c^2*d-e)^
(3/2)-1/16*(a+b*arccsch(c*x))*ln(1-c*(1/c/x+(1+1/c^2/x^2)^(1/2))*(-d)^(1/2)
/(e^(1/2)-(-c^2*d+e)^(1/2)))/(-d)^(3/2)/e^(3/2)+1/16*(a+b*arccsch(c*x))*ln(
1+c*(1/c/x+(1+1/c^2/x^2)^(1/2))*(-d)^(1/2)/(e^(1/2)-(-c^2*d+e)^(1/2)))/(-d)
^(3/2)/e^(3/2)-1/16*(a+b*arccsch(c*x))*ln(1-c*(1/c/x+(1+1/c^2/x^2)^(1/2))*(
-d)^(1/2)/(e^(1/2)+(-c^2*d+e)^(1/2)))/(-d)^(3/2)/e^(3/2)+1/16*(a+b*arccsch(
c*x))*ln(1+c*(1/c/x+(1+1/c^2/x^2)^(1/2))*(-d)^(1/2)/(e^(1/2)+(-c^2*d+e)^(1/
2)))/(-d)^(3/2)/e^(3/2)+1/16*b*polylog(2,-c*(1/c/x+(1+1/c^2/x^2)^(1/2))*(-d
)^(1/2)/(e^(1/2)-(-c^2*d+e)^(1/2)))/(-d)^(3/2)/e^(3/2)-1/16*b*polylog(2,c*(
1/c/x+(1+1/c^2/x^2)^(1/2))*(-d)^(1/2)/(e^(1/2)-(-c^2*d+e)^(1/2)))/(-d)^(3/2
)/e^(3/2)+1/16*b*polylog(2,-c*(1/c/x+(1+1/c^2/x^2)^(1/2))*(-d)^(1/2)/(e^(1/
2)+(-c^2*d+e)^(1/2)))/(-d)^(3/2)/e^(3/2)-1/16*b*polylog(2,c*(1/c/x+(1+1/c^2
/x^2)^(1/2))*(-d)^(1/2)/(e^(1/2)+(-c^2*d+e)^(1/2)))/(-d)^(3/2)/e^(3/2)-1/16
*b*arctanh((c^2*d-(-d)^(1/2)*e^(1/2)/x)/c/d^(1/2)/(c^2*d-e)^(1/2)/(1+1/c^2/
x^2)^(1/2))/d^(3/2)/e/(c^2*d-e)^(1/2)-1/16*b*arctanh((c^2*d+(-d)^(1/2)*e^(1
/2)/x)/c/d^(1/2)/(c^2*d-e)^(1/2)/(1+1/c^2/x^2)^(1/2))/d^(3/2)/e/(c^2*d-e)^(
1/2)+1/16*(a+b*arccsch(c*x))/(-d)^(1/2)/e^(1/2)/(-d/x+(-d)^(1/2)*e^(1/2))^2
+1/16*(a+b*arccsch(c*x))/d/e/(-d/x+(-d)^(1/2)*e^(1/2))+1/16*(-a-b*arccsch(c
*x))/(-d)^(1/2)/e^(1/2)/(d/x+(-d)^(1/2)*e^(1/2))^2+1/16*(-a-b*arccsch(c*x))
/d/e/(d/x+(-d)^(1/2)*e^(1/2))-1/16*b*c*(1+1/c^2/x^2)^(1/2)/(c^2*d-e)/(-d)^(
1/2)/e^(1/2)/(-d/x+(-d)^(1/2)*e^(1/2))-1/16*b*c*(1+1/c^2/x^2)^(1/2)/(c^2*d-
e)/(-d)^(1/2)/e^(1/2)/(d/x+(-d)^(1/2)*e^(1/2))
```

**Rubi** [A] time = 3.05, antiderivative size = 1106, normalized size of antiderivative = 1.00, number of steps used = 63, number of rules used = 12, integrand size = 21, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.571, Rules used = {6304, 5791, 5706, 5801, 731, 725, 206, 5799, 5561, 2190, 2279, 2391}

$$-\frac{b\sqrt{1+\frac{1}{c^2x^2}}\,c}{16\sqrt{-d}\,\left(c^2d-e\right)\sqrt{e}\left(\sqrt{-d}\,\sqrt{e}-\frac{d}{x}\right)}-\frac{b\sqrt{1+\frac{1}{c^2x^2}}\,c}{16\sqrt{-d}\,\left(c^2d-e\right)\sqrt{e}\left(\frac{d}{x}+\sqrt{-d}\,\sqrt{e}\right)}+\frac{a+b\text{csch}^{-1}(cx)}{16de\left(\sqrt{-d}\,\sqrt{e}-\frac{d}{x}\right)}-\frac{a+b\text{csch}^{-}}{16de\left(\frac{d}{x}+\sqrt{-}\right.}$$

Antiderivative was successfully verified.

```
[In] Int[(x^2*(a + b*ArcCsch[c*x]))/(d + e*x^2)^3,x]
```

```
[Out] -(b*c*Sqrt[1 + 1/(c^2*x^2)])/(16*Sqrt[-d]*(c^2*d - e)*Sqrt[e]*(Sqrt[-d]*Sqr
t[e] - d/x)) - (b*c*Sqrt[1 + 1/(c^2*x^2)])/(16*Sqrt[-d]*(c^2*d - e)*Sqrt[e]
*(Sqrt[-d]*Sqrt[e] + d/x)) + (a + b*ArcCsch[c*x])/(16*Sqrt[-d]*Sqrt[e]*(Sqr
t[-d]*Sqrt[e] - d/x)^2) + (a + b*ArcCsch[c*x])/(16*d*e*(Sqrt[-d]*Sqrt[e] -
d/x)) - (a + b*ArcCsch[c*x])/(16*Sqrt[-d]*Sqrt[e]*(Sqrt[-d]*Sqrt[e] + d/x)^
2) - (a + b*ArcCsch[c*x])/(16*d*e*(Sqrt[-d]*Sqrt[e] + d/x)) - (b*ArcTanh[(c
^2*d - (Sqrt[-d]*Sqrt[e])/x)/(c*Sqrt[d]*Sqrt[c^2*d - e]*Sqrt[1 + 1/(c^2*x^2
)])])/(16*d^(3/2)*(c^2*d - e)^(3/2)) - (b*ArcTanh[(c^2*d - (Sqrt[-d]*Sqrt[e
])/x)/(c*Sqrt[d]*Sqrt[c^2*d - e]*Sqrt[1 + 1/(c^2*x^2)])])/(16*d^(3/2)*Sqrt[
c^2*d - e]*e) - (b*ArcTanh[(c^2*d + (Sqrt[-d]*Sqrt[e])/x)/(c*Sqrt[d]*Sqrt[c
^2*d - e]*Sqrt[1 + 1/(c^2*x^2)])])/(16*d^(3/2)*(c^2*d - e)^(3/2)) - (b*ArcT
anh[(c^2*d + (Sqrt[-d]*Sqrt[e])/x)/(c*Sqrt[d]*Sqrt[c^2*d - e]*Sqrt[1 + 1/(c
^2*x^2)])])/(16*d^(3/2)*Sqrt[c^2*d - e]*e) - ((a + b*ArcCsch[c*x])*Log[1 -
(c*Sqrt[-d]*E^ArcCsch[c*x])/(Sqrt[e] - Sqrt[-(c^2*d) + e])])/(16*(-d)^(3/2)
*e^(3/2)) + ((a + b*ArcCsch[c*x])*Log[1 + (c*Sqrt[-d]*E^ArcCsch[c*x])/(Sqrt
[e] - Sqrt[-(c^2*d) + e])])/(16*(-d)^(3/2)*e^(3/2)) - ((a + b*ArcCsch[c*x])
*Log[1 - (c*Sqrt[-d]*E^ArcCsch[c*x])/(Sqrt[e] + Sqrt[-(c^2*d) + e])])/(16*(
-d)^(3/2)*e^(3/2)) + ((a + b*ArcCsch[c*x])*Log[1 + (c*Sqrt[-d]*E^ArcCsch[c*
x])/(Sqrt[e] + Sqrt[-(c^2*d) + e])])/(16*(-d)^(3/2)*e^(3/2)) + (b*PolyLog[2
, -((c*Sqrt[-d]*E^ArcCsch[c*x])/(Sqrt[e] - Sqrt[-(c^2*d) + e]))])/(16*(-d)^
(3/2)*e^(3/2)) - (b*PolyLog[2, (c*Sqrt[-d]*E^ArcCsch[c*x])/(Sqrt[e] - Sqrt[
-(c^2*d) + e])])/(16*(-d)^(3/2)*e^(3/2)) + (b*PolyLog[2, -((c*Sqrt[-d]*E^Ar
cCsch[c*x])/(Sqrt[e] + Sqrt[-(c^2*d) + e]))])/(16*(-d)^(3/2)*e^(3/2)) - (b*
PolyLog[2, (c*Sqrt[-d]*E^ArcCsch[c*x])/(Sqrt[e] + Sqrt[-(c^2*d) + e])])/(16
*(-d)^(3/2)*e^(3/2))
```

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 725

```
Int[1/(((d_) + (e_.)*(x_))*Sqrt[(a_) + (c_.)*(x_)^2]), x_Symbol] :> -Subst[
Int[1/(c*d^2 + a*e^2 - x^2), x], x, (a*e - c*d*x)/Sqrt[a + c*x^2]] /; FreeQ
[{a, c, d, e}, x]
```

Rule 731

```
Int[((d_) + (e_.)*(x_))^(m_)*((a_) + (c_.)*(x_)^2)^(p_), x_Symbol] :> Simp[
(e*(d + e*x)^(m + 1)*(a + c*x^2)^(p + 1))/((m + 1)*(c*d^2 + a*e^2)), x] + D
ist[(c*d)/(c*d^2 + a*e^2), Int[(d + e*x)^(m + 1)*(a + c*x^2)^p, x], x] /; F
reeQ[{a, c, d, e, m, p}, x] && NeQ[c*d^2 + a*e^2, 0] && EqQ[m + 2*p + 3, 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 5561

```
Int[(Cosh[(c_.) + (d_.)*(x_)]*((e_.) + (f_.)*(x_))^(m_.))/((a_) + (b_.)*Sin
h[(c_.) + (d_.)*(x_)]), x_Symbol] :> -Simp[(e + f*x)^(m + 1)/(b*f*(m + 1)),
 x] + (Int[((e + f*x)^m*E^(c + d*x))/(a - Rt[a^2 + b^2, 2] + b*E^(c + d*x))
, x] + Int[((e + f*x)^m*E^(c + d*x))/(a + Rt[a^2 + b^2, 2] + b*E^(c + d*x))
, x]) /; FreeQ[{a, b, c, d, e, f}, x] && IGtQ[m, 0] && NeQ[a^2 + b^2, 0]
```

Rule 5706

```
Int[((a_.) + ArcSinh[(c_.)*(x_)]*(b_.))^(n_.)*((d_) + (e_.)*(x_)^2)^(p_.),
x_Symbol] :> Int[ExpandIntegrand[(a + b*ArcSinh[c*x])^n, (d + e*x^2)^p, x],
 x] /; FreeQ[{a, b, c, d, e, n}, x] && NeQ[e, c^2*d] && IntegerQ[p] && (p >
 0 || IGtQ[n, 0])
```

Rule 5791

```
Int[((a_.) + ArcSinh[(c_.)*(x_)]*(b_.))^(n_.)*((f_.)*(x_))^(m_.)*((d_) + (e
_.)*(x_)^2)^(p_.), x_Symbol] :> Int[ExpandIntegrand[(a + b*ArcSinh[c*x])^n,
 (f*x)^m*(d + e*x^2)^p, x], x] /; FreeQ[{a, b, c, d, e, f}, x] && NeQ[e, c^
2*d] && IGtQ[n, 0] && IntegerQ[p] && IntegerQ[m]
```

Rule 5799

```
Int[((a_.) + ArcSinh[(c_.)*(x_)]*(b_.))^(n_.)/((d_.) + (e_.)*(x_)), x_Symbo
l] :> Subst[Int[((a + b*x)^n*Cosh[x])/(c*d + e*Sinh[x]), x], x, ArcSinh[c*x
]] /; FreeQ[{a, b, c, d, e}, x] && IGtQ[n, 0]
```

Rule 5801

```
Int[((a_.) + ArcSinh[(c_.)*(x_)]*(b_.))^(n_.)*((d_.) + (e_.)*(x_))^(m_.), x
_Symbol] :> Simp[((d + e*x)^(m + 1)*(a + b*ArcSinh[c*x])^n)/(e*(m + 1)), x]
 - Dist[(b*c*n)/(e*(m + 1)), Int[((d + e*x)^(m + 1)*(a + b*ArcSinh[c*x])^(n
 - 1))/Sqrt[1 + c^2*x^2], x], x] /; FreeQ[{a, b, c, d, e, m}, x] && IGtQ[n,
 0] && NeQ[m, -1]
```

Rule 6304

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))^(n_.)*(x_)^(m_.)*((d_.) + (e_.)*(x_
)^2)^(p_.), x_Symbol] :> -Subst[Int[((e + d*x^2)^p*(a + b*ArcSinh[x/c])^n)/
x^(m + 2*(p + 1)), x], x, 1/x] /; FreeQ[{a, b, c, d, e, n}, x] && IGtQ[n, 0
] && IntegersQ[m, p]
```

Rubi steps

$$\int \frac{x^2\left(a+b\operatorname{csch}^{-1}(cx)\right)}{\left(d+ex^2\right)^3}\,dx = -\text{Subst}\left(\int \frac{x^2\left(a+b\sinh^{-1}\left(\frac{x}{c}\right)\right)}{\left(e+dx^2\right)^3}\,dx, x, \frac{1}{x}\right)$$

$$= -\text{Subst}\left(\int\left(-\frac{e\left(a+b\sinh^{-1}\left(\frac{x}{c}\right)\right)}{d\left(e+dx^2\right)^3}+\frac{a+b\sinh^{-1}\left(\frac{x}{c}\right)}{d\left(e+dx^2\right)^2}\right)dx, x, \frac{1}{x}\right)$$

$$= -\frac{\text{Subst}\left(\int \frac{a+b\sinh^{-1}\left(\frac{x}{c}\right)}{\left(e+dx^2\right)^2}\,dx, x, \frac{1}{x}\right)}{d}+\frac{e\,\text{Subst}\left(\int \frac{a+b\sinh^{-1}\left(\frac{x}{c}\right)}{\left(e+dx^2\right)^3}\,dx, x, \frac{1}{x}\right)}{d}$$

$$= -\frac{\text{Subst}\left(\int\left(-\frac{d\left(a+b\sinh^{-1}\left(\frac{x}{c}\right)\right)}{4e\left(\sqrt{-d}\sqrt{e}-dx\right)^2}-\frac{d\left(a+b\sinh^{-1}\left(\frac{x}{c}\right)\right)}{4e\left(\sqrt{-d}\sqrt{e}+dx\right)^2}-\frac{d\left(a+b\sinh^{-1}\left(\frac{x}{c}\right)\right)}{2e\left(-de-d^2x^2\right)}\right)dx, x, \frac{1}{x}\right)}{d}+\frac{e\,\text{Subst}\left(\right.}{}$$

$$= -\frac{3\,\text{Subst}\left(\int \frac{a+b\sinh^{-1}\left(\frac{x}{c}\right)}{\left(\sqrt{-d}\sqrt{e}-dx\right)^2}\,dx, x, \frac{1}{x}\right)}{16e}-\frac{3\,\text{Subst}\left(\int \frac{a+b\sinh^{-1}\left(\frac{x}{c}\right)}{\left(\sqrt{-d}\sqrt{e}+dx\right)^2}\,dx, x, \frac{1}{x}\right)}{16e}+\frac{\text{Subst}\left(\int\right.}{}$$

$$= \frac{a+b\operatorname{csch}^{-1}(cx)}{16\sqrt{-d}\sqrt{e}\left(\sqrt{-d}\sqrt{e}-\frac{d}{x}\right)^2}+\frac{a+b\operatorname{csch}^{-1}(cx)}{16de\left(\sqrt{-d}\sqrt{e}-\frac{d}{x}\right)}-\frac{a+b\operatorname{csch}^{-1}(cx)}{16\sqrt{-d}\sqrt{e}\left(\sqrt{-d}\sqrt{e}+\frac{d}{x}\right)^2}-$$

$$= -\frac{bc\sqrt{1+\frac{1}{c^2x^2}}}{16\sqrt{-d}\left(c^2d-e\right)\sqrt{e}\left(\sqrt{-d}\sqrt{e}-\frac{d}{x}\right)}-\frac{bc\sqrt{1+\frac{1}{c^2x^2}}}{16\sqrt{-d}\left(c^2d-e\right)\sqrt{e}\left(\sqrt{-d}\sqrt{e}+\frac{d}{x}\right)}+\frac{}{16\sqrt{}}$$

$$= -\frac{bc\sqrt{1+\frac{1}{c^2x^2}}}{16\sqrt{-d}\left(c^2d-e\right)\sqrt{e}\left(\sqrt{-d}\sqrt{e}-\frac{d}{x}\right)}-\frac{bc\sqrt{1+\frac{1}{c^2x^2}}}{16\sqrt{-d}\left(c^2d-e\right)\sqrt{e}\left(\sqrt{-d}\sqrt{e}+\frac{d}{x}\right)}+\frac{}{16\sqrt{}}$$

$$= -\frac{bc\sqrt{1+\frac{1}{c^2x^2}}}{16\sqrt{-d}\left(c^2d-e\right)\sqrt{e}\left(\sqrt{-d}\sqrt{e}-\frac{d}{x}\right)}-\frac{bc\sqrt{1+\frac{1}{c^2x^2}}}{16\sqrt{-d}\left(c^2d-e\right)\sqrt{e}\left(\sqrt{-d}\sqrt{e}+\frac{d}{x}\right)}+\frac{}{16\sqrt{}}$$

$$= -\frac{bc\sqrt{1+\frac{1}{c^2x^2}}}{16\sqrt{-d}\left(c^2d-e\right)\sqrt{e}\left(\sqrt{-d}\sqrt{e}-\frac{d}{x}\right)}-\frac{bc\sqrt{1+\frac{1}{c^2x^2}}}{16\sqrt{-d}\left(c^2d-e\right)\sqrt{e}\left(\sqrt{-d}\sqrt{e}+\frac{d}{x}\right)}+\frac{}{16\sqrt{}}$$

**Mathematica [C]** time = 6.15, size = 2053, normalized size = 1.86

Result too large to show

Warning: Unable to verify antiderivative.

```
[In] Integrate[(x^2*(a + b*ArcCsch[c*x]))/(d + e*x^2)^3,x]
```

```
[Out] -1/4*(a*x)/(e*(d + e*x^2)^2) + (a*x)/(8*d*e*(d + e*x^2)) + (a*ArcTan[(Sqrt[
e]*x)/Sqrt[d]])/(8*d^(3/2)*e^(3/2)) + b*(((-1/16*I)*((I*c*Sqrt[e]*Sqrt[1 +
1/(c^2*x^2)]*x)/(Sqrt[d]*(c^2*d - e)*((-I)*Sqrt[d] + Sqrt[e]*x)) - ArcCsch[
c*x]/(Sqrt[e]*((-I)*Sqrt[d] + Sqrt[e]*x)^2) - ArcSinh[1/(c*x)]/(d*Sqrt[e])
+ (I*(2*c^2*d - e)*Log[(4*d*Sqrt[c^2*d - e]*Sqrt[e]*(Sqrt[e] + I*c*(c*Sqrt[
d] - Sqrt[c^2*d - e]*Sqrt[1 + 1/(c^2*x^2)])*x))/((2*c^2*d - e)*(Sqrt[d] + I
*Sqrt[e]*x))])/(d*(c^2*d - e)^(3/2))))/(Sqrt[d]*e) + ((I/16)*(((-I)*c*Sqrt[
e]*Sqrt[1 + 1/(c^2*x^2)]*x)/(Sqrt[d]*(c^2*d - e)*(I*Sqrt[d] + Sqrt[e]*x)) -
 ArcCsch[c*x]/(Sqrt[e]*(I*Sqrt[d] + Sqrt[e]*x)^2) - ArcSinh[1/(c*x)]/(d*Sqr
t[e]) + (I*(2*c^2*d - e)*Log[((4*I)*d*Sqrt[c^2*d - e]*Sqrt[e]*(I*Sqrt[e] +
c*(c*Sqrt[d] + Sqrt[c^2*d - e]*Sqrt[1 + 1/(c^2*x^2)])*x))/((2*c^2*d - e)*(S
qrt[d] - I*Sqrt[e]*x))])/(d*(c^2*d - e)^(3/2))))/(Sqrt[d]*e) - (-(ArcCsch[c
*x]/(I*Sqrt[d]*Sqrt[e] + e*x)) - (I*(ArcSinh[1/(c*x)]/Sqrt[e] - Log[(2*Sqrt
[d]*Sqrt[e]*(I*Sqrt[e] + c*(c*Sqrt[d] + I*Sqrt[-(c^2*d) + e]*Sqrt[1 + 1/(c^
2*x^2)])*x))/(Sqrt[-(c^2*d) + e]*(I*Sqrt[d] + Sqrt[e]*x))]/Sqrt[-(c^2*d) +
e]))/Sqrt[d])/(16*d*e) - (-(ArcCsch[c*x]/((-I)*Sqrt[d]*Sqrt[e] + e*x)) + (I
*(ArcSinh[1/(c*x)]/Sqrt[e] - Log[(-2*Sqrt[d]*Sqrt[e]*(Sqrt[e] + c*(I*c*Sqrt
[d] + Sqrt[-(c^2*d) + e]*Sqrt[1 + 1/(c^2*x^2)])*x))/(Sqrt[-(c^2*d) + e]*(Sq
rt[d] + I*Sqrt[e]*x))]/Sqrt[-(c^2*d) + e]))/Sqrt[d])/(16*d*e) + ((I/128)*(P
i^2 - (4*I)*Pi*ArcCsch[c*x] - 8*ArcCsch[c*x]^2 + 32*ArcSin[Sqrt[1 + Sqrt[e]
/(c*Sqrt[d])]/Sqrt[2]]*ArcTan[((c*Sqrt[d] - Sqrt[e])*Cot[(Pi + (2*I)*ArcCsc
h[c*x])/4])/Sqrt[-(c^2*d) + e]] - 8*ArcCsch[c*x]*Log[1 - E^(-2*ArcCsch[c*x]
)] + (4*I)*Pi*Log[1 - (I*(-Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])/(c
*Sqrt[d])] + 8*ArcCsch[c*x]*Log[1 - (I*(-Sqrt[e] + Sqrt[-(c^2*d) + e])*E^Ar
cCsch[c*x])/(c*Sqrt[d])] + (16*I)*ArcSin[Sqrt[1 + Sqrt[e]/(c*Sqrt[d])]/Sqrt
[2]]*Log[1 - (I*(-Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])/(c*Sqrt[d])
] + (4*I)*Pi*Log[1 + (I*(Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])/(c*S
qrt[d])] + 8*ArcCsch[c*x]*Log[1 + (I*(Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCs
ch[c*x])/(c*Sqrt[d])] - (16*I)*ArcSin[Sqrt[1 + Sqrt[e]/(c*Sqrt[d])]/Sqrt[2]
]*Log[1 + (I*(Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])/(c*Sqrt[d])] -
(4*I)*Pi*Log[Sqrt[e] + (I*Sqrt[d])/x] + 4*PolyLog[2, E^(-2*ArcCsch[c*x])] +
 8*PolyLog[2, (I*(-Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])/(c*Sqrt[d]
)] + 8*PolyLog[2, ((-I)*(Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])/(c*S
qrt[d])]))/(d^(3/2)*e^(3/2)) - ((I/128)*(Pi^2 - (4*I)*Pi*ArcCsch[c*x] - 8*A
rcCsch[c*x]^2 - 32*ArcSin[Sqrt[1 - Sqrt[e]/(c*Sqrt[d])]/Sqrt[2]]*ArcTan[((c
*Sqrt[d] + Sqrt[e])*Cot[(Pi + (2*I)*ArcCsch[c*x])/4])/Sqrt[-(c^2*d) + e]] -
 8*ArcCsch[c*x]*Log[1 - E^(-2*ArcCsch[c*x])] + (4*I)*Pi*Log[1 + (I*(-Sqrt[e
```

```
] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])/(c*Sqrt[d])] + 8*ArcCsch[c*x]*Log[1
 + (I*(-Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])/(c*Sqrt[d])] + (16*I)
*ArcSin[Sqrt[1 - Sqrt[e]/(c*Sqrt[d])]/Sqrt[2]]*Log[1 + (I*(-Sqrt[e] + Sqrt[
-(c^2*d) + e])*E^ArcCsch[c*x])/(c*Sqrt[d])] + (4*I)*Pi*Log[1 - (I*(Sqrt[e]
+ Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])/(c*Sqrt[d])] + 8*ArcCsch[c*x]*Log[1 -
 (I*(Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])/(c*Sqrt[d])] - (16*I)*Ar
cSin[Sqrt[1 - Sqrt[e]/(c*Sqrt[d])]/Sqrt[2]]*Log[1 - (I*(Sqrt[e] + Sqrt[-(c^
2*d) + e])*E^ArcCsch[c*x])/(c*Sqrt[d])] - (4*I)*Pi*Log[Sqrt[e] - (I*Sqrt[d]
)/x] + 4*PolyLog[2, E^(-2*ArcCsch[c*x])] + 8*PolyLog[2, ((-I)*(-Sqrt[e] + S
qrt[-(c^2*d) + e])*E^ArcCsch[c*x])/(c*Sqrt[d])] + 8*PolyLog[2, (I*(Sqrt[e]
+ Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])/(c*Sqrt[d])]))/(d^(3/2)*e^(3/2)))
```

**fricas [F]** time = 0.66, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{bx^2\,\text{arcsch}\,(cx) + ax^2}{e^3x^6 + 3\,de^2x^4 + 3\,d^2ex^2 + d^3}, x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*(a+b*arccsch(c*x))/(e*x^2+d)^3,x, algorithm="fricas")
```

```
[Out] integral((b*x^2*arccsch(c*x) + a*x^2)/(e^3*x^6 + 3*d*e^2*x^4 + 3*d^2*e*x^2
+ d^3), x)
```

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

$$\int \frac{(b\,\text{arcsch}\,(cx) + a)x^2}{\left(ex^2 + d\right)^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*(a+b*arccsch(c*x))/(e*x^2+d)^3,x, algorithm="giac")
```

```
[Out] integrate((b*arccsch(c*x) + a)*x^2/(e*x^2 + d)^3, x)
```

**maple [F]** time = 5.01, size = 0, normalized size = 0.00

$$\int \frac{x^2\,(a + b\,\text{arccsch}\,(cx))}{\left(e\,x^2 + d\right)^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^2*(a+b*arccsch(c*x))/(e*x^2+d)^3,x)
```

```
[Out] int(x^2*(a+b*arccsch(c*x))/(e*x^2+d)^3,x)
```

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

$$\frac{1}{8}\,a\left(\frac{ex^3-dx}{de^3x^4+2\,d^2e^2x^2+d^3e}+\frac{\arctan\left(\frac{ex}{\sqrt{de}}\right)}{\sqrt{de}\,de}\right)+b\int\frac{x^2\log\left(\sqrt{\frac{1}{c^2x^2}+1}+\frac{1}{cx}\right)}{e^3x^6+3\,de^2x^4+3\,d^2ex^2+d^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*(a+b*arccsch(c*x))/(e*x^2+d)^3,x, algorithm="maxima")
```

```
[Out] 1/8*a*((e*x^3 - d*x)/(d*e^3*x^4 + 2*d^2*e^2*x^2 + d^3*e) + arctan(e*x/sqrt(
d*e))/(sqrt(d*e)*d*e)) + b*integrate(x^2*log(sqrt(1/(c^2*x^2) + 1) + 1/(c*x
))/(e^3*x^6 + 3*d*e^2*x^4 + 3*d^2*e*x^2 + d^3), x)
```

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

$$\int\frac{x^2\,\left(a+b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)\right)}{{\left(e\,x^2+d\right)}^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((x^2*(a + b*asinh(1/(c*x))))/(d + e*x^2)^3,x)
```

```
[Out] int((x^2*(a + b*asinh(1/(c*x))))/(d + e*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(x**2*(a+b*acsch(c*x))/(e*x**2+d)**3,x)
```

```
[Out] Timed out
```

# 3.117 $\int \frac{a+b\mathbf{csch}^{-1}(cx)}{(d+ex^2)^3}\,dx$

**Optimal**. Leaf size=1096

$$-\frac{b\sqrt{e}\sqrt{1+\frac{1}{c^2x^2}}\,c}{16(-d)^{3/2}\left(c^2d-e\right)\left(\sqrt{-d}\,\sqrt{e}\,-\frac{d}{x}\right)}-\frac{b\sqrt{e}\sqrt{1+\frac{1}{c^2x^2}}\,c}{16(-d)^{3/2}\left(c^2d-e\right)\left(\frac{d}{x}+\sqrt{-d}\,\sqrt{e}\right)}-\frac{5\left(a+b\mathrm{csch}^{-1}(cx)\right)}{16d^2\left(\sqrt{-d}\,\sqrt{e}\,-\frac{d}{x}\right)}+\frac{5\left(a+b\mathrm{csch}^{-1}(cx)\right)}{16d^2\left(\frac{d}{x}+\sqrt{-d}\,\sqrt{e}\right.}$$

```
[Out] 1/16*b*e*arctanh((c^2*d-(-d)^(1/2)*e^(1/2)/x)/c/d^(1/2)/(c^2*d-e)^(1/2)/(1+
1/c^2/x^2)^(1/2))/d^(5/2)/(c^2*d-e)^(3/2)+1/16*b*e*arctanh((c^2*d+(-d)^(1/2
)*e^(1/2)/x)/c/d^(1/2)/(c^2*d-e)^(1/2)/(1+1/c^2/x^2)^(1/2))/d^(5/2)/(c^2*d-
e)^(3/2)+5/16*b*arctanh((c^2*d-(-d)^(1/2)*e^(1/2)/x)/c/d^(1/2)/(c^2*d-e)^(1
/2)/(1+1/c^2/x^2)^(1/2))/d^(5/2)/(c^2*d-e)^(1/2)+5/16*b*arctanh((c^2*d+(-d)
^(1/2)*e^(1/2)/x)/c/d^(1/2)/(c^2*d-e)^(1/2)/(1+1/c^2/x^2)^(1/2))/d^(5/2)/(c
^2*d-e)^(1/2)+3/16*(a+b*arccsch(c*x))*ln(1-c*(1/c/x+(1+1/c^2/x^2)^(1/2))*(-
d)^(1/2)/(e^(1/2)-(-c^2*d+e)^(1/2)))/(-d)^(5/2)/e^(1/2)-3/16*(a+b*arccsch(c
*x))*ln(1+c*(1/c/x+(1+1/c^2/x^2)^(1/2))*(-d)^(1/2)/(e^(1/2)-(-c^2*d+e)^(1/2
)))/(-d)^(5/2)/e^(1/2)+3/16*(a+b*arccsch(c*x))*ln(1-c*(1/c/x+(1+1/c^2/x^2)^
(1/2))*(-d)^(1/2)/(e^(1/2)+(-c^2*d+e)^(1/2)))/(-d)^(5/2)/e^(1/2)-3/16*(a+b*
arccsch(c*x))*ln(1+c*(1/c/x+(1+1/c^2/x^2)^(1/2))*(-d)^(1/2)/(e^(1/2)+(-c^2*
d+e)^(1/2)))/(-d)^(5/2)/e^(1/2)-3/16*b*polylog(2,-c*(1/c/x+(1+1/c^2/x^2)^(1
/2))*(-d)^(1/2)/(e^(1/2)-(-c^2*d+e)^(1/2)))/(-d)^(5/2)/e^(1/2)+3/16*b*polyl
og(2,c*(1/c/x+(1+1/c^2/x^2)^(1/2))*(-d)^(1/2)/(e^(1/2)-(-c^2*d+e)^(1/2)))/(
-d)^(5/2)/e^(1/2)-3/16*b*polylog(2,-c*(1/c/x+(1+1/c^2/x^2)^(1/2))*(-d)^(1/2
)/(e^(1/2)+(-c^2*d+e)^(1/2)))/(-d)^(5/2)/e^(1/2)+3/16*b*polylog(2,c*(1/c/x+
(1+1/c^2/x^2)^(1/2))*(-d)^(1/2)/(e^(1/2)+(-c^2*d+e)^(1/2)))/(-d)^(5/2)/e^(1
/2)+1/16*(a+b*arccsch(c*x))*e^(1/2)/(-d)^(3/2)/(-d/x+(-d)^(1/2)*e^(1/2))^2-
5/16*(a+b*arccsch(c*x))/d^2/(-d/x+(-d)^(1/2)*e^(1/2))-1/16*(a+b*arccsch(c*x
))*e^(1/2)/(-d)^(3/2)/(d/x+(-d)^(1/2)*e^(1/2))^2+5/16*(a+b*arccsch(c*x))/d^
2/(d/x+(-d)^(1/2)*e^(1/2))-1/16*b*c*e^(1/2)*(1+1/c^2/x^2)^(1/2)/(-d)^(3/2)/
(c^2*d-e)/(-d/x+(-d)^(1/2)*e^(1/2))-1/16*b*c*e^(1/2)*(1+1/c^2/x^2)^(1/2)/(-
d)^(3/2)/(c^2*d-e)/(d/x+(-d)^(1/2)*e^(1/2))
```

**Rubi** [A] time = 3.74, antiderivative size = 1096, normalized size of antiderivative = 1.00, number of steps used = 81, number of rules used = 12, integrand size = 18, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.667, Rules used = {6294, 5791, 5706, 5801, 731, 725, 206, 5799, 5561, 2190, 2279, 2391}

$$-\frac{b\sqrt{e}\sqrt{1+\frac{1}{c^2x^2}}\,c}{16(-d)^{3/2}\left(c^2d-e\right)\left(\sqrt{-d}\,\sqrt{e}-\frac{d}{x}\right)}-\frac{b\sqrt{e}\sqrt{1+\frac{1}{c^2x^2}}\,c}{16(-d)^{3/2}\left(c^2d-e\right)\left(\frac{d}{x}+\sqrt{-d}\,\sqrt{e}\right)}-\frac{5\left(a+b\text{csch}^{-1}(cx)\right)}{16d^2\left(\sqrt{-d}\,\sqrt{e}-\frac{d}{x}\right)}+\frac{5\left(a+b\text{csch}^{-1}(c\right.}{16d^2\left(\frac{d}{x}+\sqrt{-d}\,\sqrt{\right.}}$$

Antiderivative was successfully verified.

```
[In] Int[(a + b*ArcCsch[c*x])/(d + e*x^2)^3,x]
```

```
[Out] -(b*c*Sqrt[e]*Sqrt[1 + 1/(c^2*x^2)])/(16*(-d)^(3/2)*(c^2*d - e)*(Sqrt[-d]*S
qrt[e] - d/x)) - (b*c*Sqrt[e]*Sqrt[1 + 1/(c^2*x^2)])/(16*(-d)^(3/2)*(c^2*d
- e)*(Sqrt[-d]*Sqrt[e] + d/x)) + (Sqrt[e]*(a + b*ArcCsch[c*x]))/(16*(-d)^(3
/2)*(Sqrt[-d]*Sqrt[e] - d/x)^2) - (5*(a + b*ArcCsch[c*x]))/(16*d^2*(Sqrt[-d
]*Sqrt[e] - d/x)) - (Sqrt[e]*(a + b*ArcCsch[c*x]))/(16*(-d)^(3/2)*(Sqrt[-d]
*Sqrt[e] + d/x)^2) + (5*(a + b*ArcCsch[c*x]))/(16*d^2*(Sqrt[-d]*Sqrt[e] + d
/x)) + (5*b*ArcTanh[(c^2*d - (Sqrt[-d]*Sqrt[e])/x)/(c*Sqrt[d]*Sqrt[c^2*d -
e]*Sqrt[1 + 1/(c^2*x^2)])])/(16*d^(5/2)*Sqrt[c^2*d - e]) + (b*e*ArcTanh[(c^
2*d - (Sqrt[-d]*Sqrt[e])/x)/(c*Sqrt[d]*Sqrt[c^2*d - e]*Sqrt[1 + 1/(c^2*x^2)
])])/(16*d^(5/2)*(c^2*d - e)^(3/2)) + (5*b*ArcTanh[(c^2*d + (Sqrt[-d]*Sqrt[
e])/x)/(c*Sqrt[d]*Sqrt[c^2*d - e]*Sqrt[1 + 1/(c^2*x^2)])])/(16*d^(5/2)*Sqrt
[c^2*d - e]) + (b*e*ArcTanh[(c^2*d + (Sqrt[-d]*Sqrt[e])/x)/(c*Sqrt[d]*Sqrt[
c^2*d - e]*Sqrt[1 + 1/(c^2*x^2)])])/(16*d^(5/2)*(c^2*d - e)^(3/2)) + (3*(a
+ b*ArcCsch[c*x])*Log[1 - (c*Sqrt[-d]*E^ArcCsch[c*x])/(Sqrt[e] - Sqrt[-(c^2
*d) + e])])/(16*(-d)^(5/2)*Sqrt[e]) - (3*(a + b*ArcCsch[c*x])*Log[1 + (c*Sq
rt[-d]*E^ArcCsch[c*x])/(Sqrt[e] - Sqrt[-(c^2*d) + e])])/(16*(-d)^(5/2)*Sqrt
[e]) + (3*(a + b*ArcCsch[c*x])*Log[1 - (c*Sqrt[-d]*E^ArcCsch[c*x])/(Sqrt[e]
 + Sqrt[-(c^2*d) + e])])/(16*(-d)^(5/2)*Sqrt[e]) - (3*(a + b*ArcCsch[c*x])*
Log[1 + (c*Sqrt[-d]*E^ArcCsch[c*x])/(Sqrt[e] + Sqrt[-(c^2*d) + e])])/(16*(-
d)^(5/2)*Sqrt[e]) - (3*b*PolyLog[2, -((c*Sqrt[-d]*E^ArcCsch[c*x])/(Sqrt[e]
- Sqrt[-(c^2*d) + e]))])/(16*(-d)^(5/2)*Sqrt[e]) + (3*b*PolyLog[2, (c*Sqrt[
-d]*E^ArcCsch[c*x])/(Sqrt[e] - Sqrt[-(c^2*d) + e])])/(16*(-d)^(5/2)*Sqrt[e]
) - (3*b*PolyLog[2, -((c*Sqrt[-d]*E^ArcCsch[c*x])/(Sqrt[e] + Sqrt[-(c^2*d)
+ e]))])/(16*(-d)^(5/2)*Sqrt[e]) + (3*b*PolyLog[2, (c*Sqrt[-d]*E^ArcCsch[c*
x])/(Sqrt[e] + Sqrt[-(c^2*d) + e])])/(16*(-d)^(5/2)*Sqrt[e])
```

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 725

```
Int[1/(((d_) + (e_.)*(x_))*Sqrt[(a_) + (c_.)*(x_)^2]), x_Symbol] :> -Subst[
Int[1/(c*d^2 + a*e^2 - x^2), x], x, (a*e - c*d*x)/Sqrt[a + c*x^2]] /; FreeQ
[{a, c, d, e}, x]
```

Rule 731

```
Int[((d_) + (e_.)*(x_))^(m_)*((a_) + (c_.)*(x_)^2)^(p_), x_Symbol] :> Simp[
(e*(d + e*x)^(m + 1)*(a + c*x^2)^(p + 1))/((m + 1)*(c*d^2 + a*e^2)), x] + D
ist[(c*d)/(c*d^2 + a*e^2), Int[(d + e*x)^(m + 1)*(a + c*x^2)^p, x], x] /; F
reeQ[{a, c, d, e, m, p}, x] && NeQ[c*d^2 + a*e^2, 0] && EqQ[m + 2*p + 3, 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 5561

```
Int[(Cosh[(c_.) + (d_.)*(x_)]*((e_.) + (f_.)*(x_))^(m_.))/((a_) + (b_.)*Sin
h[(c_.) + (d_.)*(x_)]), x_Symbol] :> -Simp[(e + f*x)^(m + 1)/(b*f*(m + 1)),
 x] + (Int[((e + f*x)^m*E^(c + d*x))/(a - Rt[a^2 + b^2, 2] + b*E^(c + d*x))
, x] + Int[((e + f*x)^m*E^(c + d*x))/(a + Rt[a^2 + b^2, 2] + b*E^(c + d*x))
, x]) /; FreeQ[{a, b, c, d, e, f}, x] && IGtQ[m, 0] && NeQ[a^2 + b^2, 0]
```

Rule 5706

```
Int[((a_.) + ArcSinh[(c_.)*(x_)]*(b_.))^(n_.)*((d_) + (e_.)*(x_)^2)^(p_.),
x_Symbol] :> Int[ExpandIntegrand[(a + b*ArcSinh[c*x])^n, (d + e*x^2)^p, x],
 x] /; FreeQ[{a, b, c, d, e, n}, x] && NeQ[e, c^2*d] && IntegerQ[p] && (p >
 0 || IGtQ[n, 0])
```

Rule 5791

```
Int[((a_.) + ArcSinh[(c_.)*(x_)]*(b_.))^(n_.)*((f_.)*(x_))^(m_.)*((d_) + (e
_.)*(x_)^2)^(p_.), x_Symbol] :> Int[ExpandIntegrand[(a + b*ArcSinh[c*x])^n,
 (f*x)^m*(d + e*x^2)^p, x], x] /; FreeQ[{a, b, c, d, e, f}, x] && NeQ[e, c^
2*d] && IGtQ[n, 0] && IntegerQ[p] && IntegerQ[m]
```

Rule 5799

```
Int[((a_.) + ArcSinh[(c_.)*(x_)]*(b_.))^(n_.)/((d_.) + (e_.)*(x_)), x_Symbo
l] :> Subst[Int[((a + b*x)^n*Cosh[x])/(c*d + e*Sinh[x]), x], x, ArcSinh[c*x
]] /; FreeQ[{a, b, c, d, e}, x] && IGtQ[n, 0]
```

Rule 5801

```
Int[((a_.) + ArcSinh[(c_.)*(x_)]*(b_.))^(n_.)*((d_.) + (e_.)*(x_))^(m_.), x
_Symbol] :> Simp[((d + e*x)^(m + 1)*(a + b*ArcSinh[c*x])^n)/(e*(m + 1)), x]
 - Dist[(b*c*n)/(e*(m + 1)), Int[((d + e*x)^(m + 1)*(a + b*ArcSinh[c*x])^(n
 - 1))/Sqrt[1 + c^2*x^2], x], x] /; FreeQ[{a, b, c, d, e, m}, x] && IGtQ[n,
 0] && NeQ[m, -1]
```

Rule 6294

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))^(n_.)*((d_.) + (e_.)*(x_)^2)^(p_.),
 x_Symbol] :> -Subst[Int[((e + d*x^2)^p*(a + b*ArcSinh[x/c])^n)/x^(2*(p + 1
)), x], x, 1/x] /; FreeQ[{a, b, c, d, e, n}, x] && IGtQ[n, 0] && IntegerQ[p
]
```

Rubi steps

$$\int \frac{a+b\text{csch}^{-1}(cx)}{\left(d+ex^2\right)^3}\,dx = -\text{Subst}\left(\int \frac{x^4\left(a+b\sinh^{-1}\left(\frac{x}{c}\right)\right)}{\left(e+dx^2\right)^3}\,dx, x, \frac{1}{x}\right)$$

$$= -\text{Subst}\left(\int\left(\frac{e^2\left(a+b\sinh^{-1}\left(\frac{x}{c}\right)\right)}{d^2\left(e+dx^2\right)^3} - \frac{2e\left(a+b\sinh^{-1}\left(\frac{x}{c}\right)\right)}{d^2\left(e+dx^2\right)^2} + \frac{a+b\sinh^{-1}\left(\frac{x}{c}\right)}{d^2\left(e+dx^2\right)}\right)dx, x, \frac{1}{x}$$

$$= -\frac{\text{Subst}\left(\int \frac{a+b\sinh^{-1}\left(\frac{x}{c}\right)}{e+dx^2}\,dx, x, \frac{1}{x}\right)}{d^2} + \frac{(2e)\,\text{Subst}\left(\int \frac{a+b\sinh^{-1}\left(\frac{x}{c}\right)}{\left(e+dx^2\right)^2}\,dx, x, \frac{1}{x}\right)}{d^2} - \frac{e^2\,\text{Subst}\left(\int \frac{a+b}{(}\right.}{}$$

$$= -\frac{\text{Subst}\left(\int\left(\frac{a+b\sinh^{-1}\left(\frac{x}{c}\right)}{2\sqrt{e}\left(\sqrt{e}-\sqrt{-d}\,x\right)} + \frac{a+b\sinh^{-1}\left(\frac{x}{c}\right)}{2\sqrt{e}\left(\sqrt{e}+\sqrt{-d}\,x\right)}\right)dx, x, \frac{1}{x}\right)}{d^2} + \frac{(2e)\,\text{Subst}\left(\int\left(-\frac{d\left(a+b\sinh^{-1}\left(\frac{x}{c}\right)\right)}{4e\left(\sqrt{-d}\,\sqrt{e}-dx\right)^2}\right.\right.}{}$$

$$= \frac{3\,\text{Subst}\left(\int \frac{a+b\sinh^{-1}\left(\frac{x}{c}\right)}{\left(\sqrt{-d}\,\sqrt{e}-dx\right)^2}\,dx, x, \frac{1}{x}\right)}{16d} + \frac{3\,\text{Subst}\left(\int \frac{a+b\sinh^{-1}\left(\frac{x}{c}\right)}{\left(\sqrt{-d}\,\sqrt{e}+dx\right)^2}\,dx, x, \frac{1}{x}\right)}{16d} + \frac{3\,\text{Subst}\left(\int \frac{a+b\sin}{-de}\right.}{8d}$$

$$= \frac{\sqrt{e}\left(a+b\text{csch}^{-1}(cx)\right)}{16(-d)^{3/2}\left(\sqrt{-d}\,\sqrt{e}-\frac{d}{x}\right)^2} - \frac{5\left(a+b\text{csch}^{-1}(cx)\right)}{16d^2\left(\sqrt{-d}\,\sqrt{e}-\frac{d}{x}\right)} - \frac{\sqrt{e}\left(a+b\text{csch}^{-1}(cx)\right)}{16(-d)^{3/2}\left(\sqrt{-d}\,\sqrt{e}+\frac{d}{x}\right)^2} + \frac{5\left(a+b\right.}{16d^2\left(\sqrt{}\right.}$$

$$= -\frac{bc\sqrt{e}\sqrt{1+\frac{1}{c^2x^2}}}{16(-d)^{3/2}\left(c^2d-e\right)\left(\sqrt{-d}\,\sqrt{e}-\frac{d}{x}\right)} - \frac{bc\sqrt{e}\sqrt{1+\frac{1}{c^2x^2}}}{16(-d)^{3/2}\left(c^2d-e\right)\left(\sqrt{-d}\,\sqrt{e}+\frac{d}{x}\right)} + \frac{\sqrt{e}\left(a+bc\right.}{16(-d)^{3/2}\left(\sqrt{}\right.}$$

$$= -\frac{bc\sqrt{e}\sqrt{1+\frac{1}{c^2x^2}}}{16(-d)^{3/2}\left(c^2d-e\right)\left(\sqrt{-d}\,\sqrt{e}-\frac{d}{x}\right)} - \frac{bc\sqrt{e}\sqrt{1+\frac{1}{c^2x^2}}}{16(-d)^{3/2}\left(c^2d-e\right)\left(\sqrt{-d}\,\sqrt{e}+\frac{d}{x}\right)} + \frac{\sqrt{e}\left(a+bc\right.}{16(-d)^{3/2}\left(\sqrt{}\right.}$$

$$= -\frac{bc\sqrt{e}\sqrt{1+\frac{1}{c^2x^2}}}{16(-d)^{3/2}\left(c^2d-e\right)\left(\sqrt{-d}\,\sqrt{e}-\frac{d}{x}\right)} - \frac{bc\sqrt{e}\sqrt{1+\frac{1}{c^2x^2}}}{16(-d)^{3/2}\left(c^2d-e\right)\left(\sqrt{-d}\,\sqrt{e}+\frac{d}{x}\right)} + \frac{\sqrt{e}\left(a+bc\right.}{16(-d)^{3/2}\left(\sqrt{}\right.}$$

$$= -\frac{bc\sqrt{e}\sqrt{1+\frac{1}{c^2x^2}}}{16(-d)^{3/2}\left(c^2d-e\right)\left(\sqrt{-d}\,\sqrt{e}-\frac{d}{x}\right)} - \frac{bc\sqrt{e}\sqrt{1+\frac{1}{c^2x^2}}}{16(-d)^{3/2}\left(c^2d-e\right)\left(\sqrt{-d}\,\sqrt{e}+\frac{d}{x}\right)} + \frac{\sqrt{e}\left(a+bc\right.}{16(-d)^{3/2}\left(\sqrt{}\right.}$$

**Mathematica [C]** time = 6.07, size = 2038, normalized size = 1.86

Result too large to show

Warning: Unable to verify antiderivative.

```
[In] Integrate[(a + b*ArcCsch[c*x])/(d + e*x^2)^3,x]
```

```
[Out] (a*x)/(4*d*(d + e*x^2)^2) + (3*a*x)/(8*d^2*(d + e*x^2)) + (3*a*ArcTan[(Sqrt
[e]*x)/Sqrt[d]])/(8*d^(5/2)*Sqrt[e]) + b*(((I/16)*((I*c*Sqrt[e]*Sqrt[1 + 1/
(c^2*x^2)]*x)/(Sqrt[d]*(c^2*d - e)*((-I)*Sqrt[d] + Sqrt[e]*x)) - ArcCsch[c*
x]/(Sqrt[e]*((-I)*Sqrt[d] + Sqrt[e]*x)^2) - ArcSinh[1/(c*x)]/(d*Sqrt[e]) +
(I*(2*c^2*d - e)*Log[(4*d*Sqrt[c^2*d - e]*Sqrt[e]*(Sqrt[e] + I*c*(c*Sqrt[d]
 - Sqrt[c^2*d - e]*Sqrt[1 + 1/(c^2*x^2)])*x))/((2*c^2*d - e)*(Sqrt[d] + I*S
qrt[e]*x))])/(d*(c^2*d - e)^(3/2))))/d^(3/2) - ((I/16)*(((-I)*c*Sqrt[e]*Sqr
t[1 + 1/(c^2*x^2)]*x)/(Sqrt[d]*(c^2*d - e)*(I*Sqrt[d] + Sqrt[e]*x)) - ArcCs
ch[c*x]/(Sqrt[e]*(I*Sqrt[d] + Sqrt[e]*x)^2) - ArcSinh[1/(c*x)]/(d*Sqrt[e])
+ (I*(2*c^2*d - e)*Log[((4*I)*d*Sqrt[c^2*d - e]*Sqrt[e]*(I*Sqrt[e] + c*(c*S
qrt[d] + Sqrt[c^2*d - e]*Sqrt[1 + 1/(c^2*x^2)])*x))/((2*c^2*d - e)*(Sqrt[d]
 - I*Sqrt[e]*x))])/(d*(c^2*d - e)^(3/2))))/d^(3/2) - (3*(-(ArcCsch[c*x]/(I*
Sqrt[d]*Sqrt[e] + e*x)) - (I*(ArcSinh[1/(c*x)]/Sqrt[e] - Log[(2*Sqrt[d]*Sqr
t[e]*(I*Sqrt[e] + c*(c*Sqrt[d] + I*Sqrt[-(c^2*d) + e]*Sqrt[1 + 1/(c^2*x^2)]
)*x))/(Sqrt[-(c^2*d) + e]*(I*Sqrt[d] + Sqrt[e]*x))]/Sqrt[-(c^2*d) + e]))/Sq
rt[d]))/(16*d^2) - (3*(-(ArcCsch[c*x]/((-I)*Sqrt[d]*Sqrt[e] + e*x)) + (I*(A
rcSinh[1/(c*x)]/Sqrt[e] - Log[(-2*Sqrt[d]*Sqrt[e]*(Sqrt[e] + c*(I*c*Sqrt[d]
 + Sqrt[-(c^2*d) + e]*Sqrt[1 + 1/(c^2*x^2)])*x))/(Sqrt[-(c^2*d) + e]*(Sqrt[
d] + I*Sqrt[e]*x))]/Sqrt[-(c^2*d) + e]))/Sqrt[d]))/(16*d^2) + (((3*I)/128)*
(Pi^2 - (4*I)*Pi*ArcCsch[c*x] - 8*ArcCsch[c*x]^2 + 32*ArcSin[Sqrt[1 + Sqrt[
e]/(c*Sqrt[d])]/Sqrt[2]]*ArcTan[((c*Sqrt[d] - Sqrt[e])*Cot[(Pi + (2*I)*ArcC
sch[c*x])/4])/Sqrt[-(c^2*d) + e]] - 8*ArcCsch[c*x]*Log[1 - E^(-2*ArcCsch[c*
x])] + (4*I)*Pi*Log[1 - (I*(-Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])/
(c*Sqrt[d])] + 8*ArcCsch[c*x]*Log[1 - (I*(-Sqrt[e] + Sqrt[-(c^2*d) + e])*E^
ArcCsch[c*x])/(c*Sqrt[d])] + (16*I)*ArcSin[Sqrt[1 + Sqrt[e]/(c*Sqrt[d])]/Sq
rt[2]]*Log[1 - (I*(-Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])/(c*Sqrt[d
])] + (4*I)*Pi*Log[1 + (I*(Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])/(c
*Sqrt[d])] + 8*ArcCsch[c*x]*Log[1 + (I*(Sqrt[e] + Sqrt[-(c^2*d) + e])*E^Arc
Csch[c*x])/(c*Sqrt[d])] - (16*I)*ArcSin[Sqrt[1 + Sqrt[e]/(c*Sqrt[d])]/Sqrt[
2]]*Log[1 + (I*(Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])/(c*Sqrt[d])]
- (4*I)*Pi*Log[Sqrt[e] + (I*Sqrt[d])/x] + 4*PolyLog[2, E^(-2*ArcCsch[c*x])]
 + 8*PolyLog[2, (I*(-Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])/(c*Sqrt[
d])] + 8*PolyLog[2, ((-I)*(Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])/(c
*Sqrt[d])]))/(d^(5/2)*Sqrt[e]) - (((3*I)/128)*(Pi^2 - (4*I)*Pi*ArcCsch[c*x]
 - 8*ArcCsch[c*x]^2 - 32*ArcSin[Sqrt[1 - Sqrt[e]/(c*Sqrt[d])]/Sqrt[2]]*ArcT
an[((c*Sqrt[d] + Sqrt[e])*Cot[(Pi + (2*I)*ArcCsch[c*x])/4])/Sqrt[-(c^2*d) +
 e]] - 8*ArcCsch[c*x]*Log[1 - E^(-2*ArcCsch[c*x])] + (4*I)*Pi*Log[1 + (I*(-
```

```
Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])/(c*Sqrt[d])] + 8*ArcCsch[c*x]
*Log[1 + (I*(-Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])/(c*Sqrt[d])] +
(16*I)*ArcSin[Sqrt[1 - Sqrt[e]/(c*Sqrt[d])]/Sqrt[2]]*Log[1 + (I*(-Sqrt[e] +
 Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])/(c*Sqrt[d])] + (4*I)*Pi*Log[1 - (I*(Sq
rt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])/(c*Sqrt[d])] + 8*ArcCsch[c*x]*L
og[1 - (I*(Sqrt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])/(c*Sqrt[d])] - (16
*I)*ArcSin[Sqrt[1 - Sqrt[e]/(c*Sqrt[d])]/Sqrt[2]]*Log[1 - (I*(Sqrt[e] + Sqr
t[-(c^2*d) + e])*E^ArcCsch[c*x])/(c*Sqrt[d])] - (4*I)*Pi*Log[Sqrt[e] - (I*S
qrt[d])/x] + 4*PolyLog[2, E^(-2*ArcCsch[c*x])] + 8*PolyLog[2, ((-I)*(-Sqrt[
e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])/(c*Sqrt[d])] + 8*PolyLog[2, (I*(Sq
rt[e] + Sqrt[-(c^2*d) + e])*E^ArcCsch[c*x])/(c*Sqrt[d])]))/(d^(5/2)*Sqrt[e]
))
```

**fricas [F]** time = 0.88, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{b\,\text{arcsch}\,(cx)+a}{e^3x^6+3\,de^2x^4+3\,d^2ex^2+d^3},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))/(e*x^2+d)^3,x, algorithm="fricas")
```

```
[Out] integral((b*arccsch(c*x) + a)/(e^3*x^6 + 3*d*e^2*x^4 + 3*d^2*e*x^2 + d^3),
x)
```

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

$$\int \frac{b\,\text{arcsch}\,(cx)+a}{\left(ex^2+d\right)^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))/(e*x^2+d)^3,x, algorithm="giac")
```

```
[Out] integrate((b*arccsch(c*x) + a)/(e*x^2 + d)^3, x)
```

**maple [F]** time = 3.77, size = 0, normalized size = 0.00

$$\int \frac{a+b\,\text{arccsch}\,(cx)}{\left(e\,x^2+d\right)^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a+b*arccsch(c*x))/(e*x^2+d)^3,x)
```

```
[Out] int((a+b*arccsch(c*x))/(e*x^2+d)^3,x)
```

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

$$\frac{1}{8}a\left(\frac{3ex^3+5dx}{d^2e^2x^4+2d^3ex^2+d^4}+\frac{3\arctan\left(\frac{ex}{\sqrt{de}}\right)}{\sqrt{de}\,d^2}\right)+b\int\frac{\log\left(\sqrt{\frac{1}{c^2x^2}+1}+\frac{1}{cx}\right)}{e^3x^6+3de^2x^4+3d^2ex^2+d^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))/(e*x^2+d)^3,x, algorithm="maxima")
```

```
[Out] 1/8*a*((3*e*x^3 + 5*d*x)/(d^2*e^2*x^4 + 2*d^3*e*x^2 + d^4) + 3*arctan(e*x/s
qrt(d*e))/(sqrt(d*e)*d^2)) + b*integrate(log(sqrt(1/(c^2*x^2) + 1) + 1/(c*x
))/(e^3*x^6 + 3*d*e^2*x^4 + 3*d^2*e*x^2 + d^3), x)
```

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

$$\int\frac{a+b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)}{\left(e\,x^2+d\right)^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a + b*asinh(1/(c*x)))/(d + e*x^2)^3,x)
```

```
[Out] int((a + b*asinh(1/(c*x)))/(d + e*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((a+b*acsch(c*x))/(e*x**2+d)**3,x)
```

```
[Out] Timed out
```

# 3.118 $\int x^5\sqrt{d+ex^2}\left(a+b\text{csch}^{-1}(cx)\right)dx$

**Optimal**. Leaf size=413

$$\frac{d^2\left(d+ex^2\right)^{3/2}\left(a+b\text{csch}^{-1}(cx)\right)}{3e^3}-\frac{2d\left(d+ex^2\right)^{5/2}\left(a+b\text{csch}^{-1}(cx)\right)}{5e^3}+\frac{\left(d+ex^2\right)^{7/2}\left(a+b\text{csch}^{-1}(cx)\right)}{7e^3}+\frac{8bcd^{7/2}x\text{ ta}}{105}$$

```
[Out] 1/3*d^2*(e*x^2+d)^(3/2)*(a+b*arccsch(c*x))/e^3-2/5*d*(e*x^2+d)^(5/2)*(a+b*a
rccsch(c*x))/e^3+1/7*(e*x^2+d)^(7/2)*(a+b*arccsch(c*x))/e^3+1/1680*b*(105*c
^6*d^3+35*c^4*d^2*e+63*c^2*d*e^2-75*e^3)*x*arctan(e^(1/2)*(-c^2*x^2-1)^(1/2
)/c/(e*x^2+d)^(1/2))/c^6/e^(5/2)/(-c^2*x^2)^(1/2)+8/105*b*c*d^(7/2)*x*arcta
n((e*x^2+d)^(1/2)/d^(1/2)/(-c^2*x^2-1)^(1/2))/e^3/(-c^2*x^2)^(1/2)-1/840*b*
(29*c^2*d+25*e)*x*(e*x^2+d)^(3/2)*(-c^2*x^2-1)^(1/2)/c^3/e^2/(-c^2*x^2)^(1/
2)+1/42*b*x*(e*x^2+d)^(5/2)*(-c^2*x^2-1)^(1/2)/c/e^2/(-c^2*x^2)^(1/2)-1/168
0*b*(23*c^4*d^2-12*c^2*d*e-75*e^2)*x*(-c^2*x^2-1)^(1/2)*(e*x^2+d)^(1/2)/c^5
/e^2/(-c^2*x^2)^(1/2)
```

**Rubi [A]** time = 1.41, antiderivative size = 413, normalized size of antiderivative = 1.00, number of steps used = 12, number of rules used = 12, integrand size = 23, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.522, Rules used = {266, 43, 6302, 12, 1615, 154, 157, 63, 217, 203, 93, 204}

$$\frac{d^2\left(d+ex^2\right)^{3/2}\left(a+b\text{csch}^{-1}(cx)\right)}{3e^3}-\frac{2d\left(d+ex^2\right)^{5/2}\left(a+b\text{csch}^{-1}(cx)\right)}{5e^3}+\frac{\left(d+ex^2\right)^{7/2}\left(a+b\text{csch}^{-1}(cx)\right)}{7e^3}-\frac{bx\sqrt{-c^2x^2}}{}$$

Antiderivative was successfully verified.

```
[In] Int[x^5*Sqrt[d + e*x^2]*(a + b*ArcCsch[c*x]),x]
```

```
[Out] -(b*(23*c^4*d^2 - 12*c^2*d*e - 75*e^2)*x*Sqrt[-1 - c^2*x^2]*Sqrt[d + e*x^2]
)/(1680*c^5*e^2*Sqrt[-(c^2*x^2)]) - (b*(29*c^2*d + 25*e)*x*Sqrt[-1 - c^2*x^
2]*(d + e*x^2)^(3/2))/(840*c^3*e^2*Sqrt[-(c^2*x^2)]) + (b*x*Sqrt[-1 - c^2*x
^2]*(d + e*x^2)^(5/2))/(42*c*e^2*Sqrt[-(c^2*x^2)]) + (d^2*(d + e*x^2)^(3/2)
*(a + b*ArcCsch[c*x]))/(3*e^3) - (2*d*(d + e*x^2)^(5/2)*(a + b*ArcCsch[c*x]
))/(5*e^3) + ((d + e*x^2)^(7/2)*(a + b*ArcCsch[c*x]))/(7*e^3) + (b*(105*c^6
*d^3 + 35*c^4*d^2*e + 63*c^2*d*e^2 - 75*e^3)*x*ArcTan[(Sqrt[e]*Sqrt[-1 - c^
2*x^2])/(c*Sqrt[d + e*x^2])])/(1680*c^6*e^(5/2)*Sqrt[-(c^2*x^2)]) + (8*b*c*
d^(7/2)*x*ArcTan[Sqrt[d + e*x^2]/(Sqrt[d]*Sqrt[-1 - c^2*x^2])])/(105*e^3*Sq
rt[-(c^2*x^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 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 93

```
Int[(((a_.) + (b_.)*(x_))^(m_)*((c_.) + (d_.)*(x_))^(n_))/((e_.) + (f_.)*(x
_)), x_Symbol] :> With[{q = Denominator[m]}, Dist[q, Subst[Int[x^(q*(m + 1)
 - 1)/(b*e - a*f - (d*e - c*f)*x^q), x], x, (a + b*x)^(1/q)/(c + d*x)^(1/q)
], x]] /; FreeQ[{a, b, c, d, e, f}, x] && EqQ[m + n + 1, 0] && RationalQ[n]
 && LtQ[-1, m, 0] && SimplerQ[a + b*x, c + d*x]
```

Rule 154

```
Int[((a_.) + (b_.)*(x_))^(m_)*((c_.) + (d_.)*(x_))^(n_)*((e_.) + (f_.)*(x_)
)^(p_)*((g_.) + (h_.)*(x_)), x_Symbol] :> Simp[(h*(a + b*x)^m*(c + d*x)^(n
+ 1)*(e + f*x)^(p + 1))/(d*f*(m + n + p + 2)), x] + Dist[1/(d*f*(m + n + p
+ 2)), Int[(a + b*x)^(m - 1)*(c + d*x)^n*(e + f*x)^p*Simp[a*d*f*g*(m + n +
p + 2) - h*(b*c*e*m + a*(d*e*(n + 1) + c*f*(p + 1))) + (b*d*f*g*(m + n + p
+ 2) + h*(a*d*f*m - b*(d*e*(m + n + 1) + c*f*(m + p + 1))))*x, x], x], x] /
; FreeQ[{a, b, c, d, e, f, g, h, n, p}, x] && GtQ[m, 0] && NeQ[m + n + p +
2, 0] && IntegersQ[2*m, 2*n, 2*p]
```

Rule 157

```
Int[(((c_.) + (d_.)*(x_))^(n_)*((e_.) + (f_.)*(x_))^(p_)*((g_.) + (h_.)*(x_
)))/((a_.) + (b_.)*(x_)), x_Symbol] :> Dist[h/b, Int[(c + d*x)^n*(e + f*x)^
p, x], x] + Dist[(b*g - a*h)/b, Int[((c + d*x)^n*(e + f*x)^p)/(a + b*x), x]
, x] /; FreeQ[{a, b, c, d, e, f, g, h, n, p}, x]
```

Rule 203

```
Int[((a_) + (b_.)*(x_)^2)^(-1), x_Symbol] :> Simp[(1*ArcTan[(Rt[b, 2]*x)/Rt
[a, 2]])/(Rt[a, 2]*Rt[b, 2]), x] /; FreeQ[{a, b}, x] && PosQ[a/b] && (GtQ[a
```

```
, 0] || GtQ[b, 0])
```

Rule 204

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

Rule 217

```
Int[1/Sqrt[(a_) + (b_.)*(x_)^2], x_Symbol] :> Subst[Int[1/(1 - b*x^2), x],
x, x/Sqrt[a + b*x^2]] /; FreeQ[{a, b}, x] &&  !GtQ[a, 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 1615

```
Int[(Px_)*((a_.) + (b_.)*(x_))^(m_.)*((c_.) + (d_.)*(x_))^(n_.)*((e_.) + (f
_.)*(x_))^(p_.), x_Symbol] :> With[{q = Expon[Px, x], k = Coeff[Px, x, Expo
n[Px, x]]}, Simp[(k*(a + b*x)^(m + q - 1)*(c + d*x)^(n + 1)*(e + f*x)^(p +
1))/(d*f*b^(q - 1)*(m + n + p + q + 1)), x] + Dist[1/(d*f*b^q*(m + n + p +
q + 1)), Int[(a + b*x)^m*(c + d*x)^n*(e + f*x)^p*ExpandToSum[d*f*b^q*(m + n
 + p + q + 1)*Px - d*f*k*(m + n + p + q + 1)*(a + b*x)^q + k*(a + b*x)^(q -
 2)*(a^2*d*f*(m + n + p + q + 1) - b*(b*c*e*(m + q - 1) + a*(d*e*(n + 1) +
c*f*(p + 1))) + b*(a*d*f*(2*(m + q) + n + p) - b*(d*e*(m + q + n) + c*f*(m
+ q + p)))*x), x], x], x] /; NeQ[m + n + p + q + 1, 0]] /; FreeQ[{a, b, c,
d, e, f, m, n, p}, x] && PolyQ[Px, x] && IntegersQ[2*m, 2*n, 2*p]
```

Rule 6302

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))*((f_.)*(x_))^(m_.)*((d_.) + (e_.)*(
x_)^2)^(p_.), x_Symbol] :> With[{u = IntHide[(f*x)^m*(d + e*x^2)^p, x]}, Di
st[a + b*ArcCsch[c*x], u, x] - Dist[(b*c*x)/Sqrt[-(c^2*x^2)], Int[SimplifyI
ntegrand[u/(x*Sqrt[-1 - c^2*x^2]), x], x], x]] /; FreeQ[{a, b, c, d, e, f,
m, p}, x] && ((IGtQ[p, 0] &&  !(ILtQ[(m - 1)/2, 0] && GtQ[m + 2*p + 3, 0]))
 || (IGtQ[(m + 1)/2, 0] &&  !(ILtQ[p, 0] && GtQ[m + 2*p + 3, 0])) || (ILtQ[
(m + 2*p + 1)/2, 0] &&  !ILtQ[(m - 1)/2, 0]))
```

Rubi steps

$$\int x^5\sqrt{d+ex^2}\left(a+b\operatorname{csch}^{-1}(cx)\right)dx = \frac{d^2\left(d+ex^2\right)^{3/2}\left(a+b\operatorname{csch}^{-1}(cx)\right)}{3e^3} - \frac{2d\left(d+ex^2\right)^{5/2}\left(a+b\operatorname{csch}^{-1}(cx)\right)}{5e^3} +$$

$$= \frac{d^2\left(d+ex^2\right)^{3/2}\left(a+b\operatorname{csch}^{-1}(cx)\right)}{3e^3} - \frac{2d\left(d+ex^2\right)^{5/2}\left(a+b\operatorname{csch}^{-1}(cx)\right)}{5e^3} +$$

$$= \frac{d^2\left(d+ex^2\right)^{3/2}\left(a+b\operatorname{csch}^{-1}(cx)\right)}{3e^3} - \frac{2d\left(d+ex^2\right)^{5/2}\left(a+b\operatorname{csch}^{-1}(cx)\right)}{5e^3} +$$

$$= \frac{bx\sqrt{-1-c^2x^2}\left(d+ex^2\right)^{5/2}}{42ce^2\sqrt{-c^2x^2}} + \frac{d^2\left(d+ex^2\right)^{3/2}\left(a+b\operatorname{csch}^{-1}(cx)\right)}{3e^3} - \frac{2d\left(d\right.}{}$$

$$= -\frac{b\left(29c^2d+25e\right)x\sqrt{-1-c^2x^2}\left(d+ex^2\right)^{3/2}}{840c^3e^2\sqrt{-c^2x^2}} + \frac{bx\sqrt{-1-c^2x^2}\left(d+ex^2\right)^{5/2}}{42ce^2\sqrt{-c^2x^2}}$$

$$= -\frac{b\left(23c^4d^2-12c^2de-75e^2\right)x\sqrt{-1-c^2x^2}\sqrt{d+ex^2}}{1680c^5e^2\sqrt{-c^2x^2}} - \frac{b\left(29c^2d+25e\right)x}{840c}$$

$$= -\frac{b\left(23c^4d^2-12c^2de-75e^2\right)x\sqrt{-1-c^2x^2}\sqrt{d+ex^2}}{1680c^5e^2\sqrt{-c^2x^2}} - \frac{b\left(29c^2d+25e\right)x}{840c}$$

$$= -\frac{b\left(23c^4d^2-12c^2de-75e^2\right)x\sqrt{-1-c^2x^2}\sqrt{d+ex^2}}{1680c^5e^2\sqrt{-c^2x^2}} - \frac{b\left(29c^2d+25e\right)x}{840c}$$

$$= -\frac{b\left(23c^4d^2-12c^2de-75e^2\right)x\sqrt{-1-c^2x^2}\sqrt{d+ex^2}}{1680c^5e^2\sqrt{-c^2x^2}} - \frac{b\left(29c^2d+25e\right)x}{840c}$$

$$= -\frac{b\left(23c^4d^2-12c^2de-75e^2\right)x\sqrt{-1-c^2x^2}\sqrt{d+ex^2}}{1680c^5e^2\sqrt{-c^2x^2}} - \frac{b\left(29c^2d+25e\right)x}{840c}$$

**Mathematica [C]** time = 0.70, size = 345, normalized size = 0.84

$$\frac{\sqrt{d+ex^2}\left(16ac^5\left(8d^3-4d^2ex^2+3de^2x^4+15e^3x^6\right)+16bc^5\operatorname{csch}^{-1}(cx)\left(8d^3-4d^2ex^2+3de^2x^4+15e^3x^6\right)+bex\sqrt{\ }\right.}{1680c^5e^3}$$

Warning: Unable to verify antiderivative.

```
[In] Integrate[x^5*Sqrt[d + e*x^2]*(a + b*ArcCsch[c*x]),x]
```

```
[Out] -1/3360*(b*(128*c^4*d^4*Sqrt[1 + d/(e*x^2)]*AppellF1[1, 1/2, 1/2, 2, -(1/(c
^2*x^2)), -(d/(e*x^2))] - (e*(105*c^6*d^3 + 35*c^4*d^2*e + 63*c^2*d*e^2 - 7
5*e^3)*Sqrt[1 + 1/(c^2*x^2)]*x^4*Sqrt[1 + (e*x^2)/d]*AppellF1[1, 1/2, 1/2,
2, -(c^2*x^2), -((e*x^2)/d)])/Sqrt[1 + c^2*x^2]))/(c^5*e^3*x*Sqrt[d + e*x^2
]) + (Sqrt[d + e*x^2]*(16*a*c^5*(8*d^3 - 4*d^2*e*x^2 + 3*d*e^2*x^4 + 15*e^3
*x^6) + b*e*Sqrt[1 + 1/(c^2*x^2)]*x*(75*e^2 - 2*c^2*e*(19*d + 25*e*x^2) + c
^4*(-41*d^2 + 22*d*e*x^2 + 40*e^2*x^4)) + 16*b*c^5*(8*d^3 - 4*d^2*e*x^2 + 3
*d*e^2*x^4 + 15*e^3*x^6)*ArcCsch[c*x]))/(1680*c^5*e^3)
```

**fricas [A]** time = 5.10, size = 1951, normalized size = 4.72

result too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^5*(a+b*arccsch(c*x))*(e*x^2+d)^(1/2),x, algorithm="fricas")
```

```
[Out] [1/6720*(128*b*c^7*d^(7/2)*log(((c^4*d^2 + 6*c^2*d*e + e^2)*x^4 + 8*(c^2*d^
2 + d*e)*x^2 - 4*((c^3*d + c*e)*x^3 + 2*c*d*x)*sqrt(e*x^2 + d)*sqrt(d)*sqrt
((c^2*x^2 + 1)/(c^2*x^2)) + 8*d^2)/x^4) - (105*b*c^6*d^3 + 35*b*c^4*d^2*e +
 63*b*c^2*d*e^2 - 75*b*e^3)*sqrt(e)*log(8*c^4*e^2*x^4 + c^4*d^2 + 6*c^2*d*e
 + 8*(c^4*d*e + c^2*e^2)*x^2 - 4*(2*c^4*e*x^3 + (c^4*d + c^2*e)*x)*sqrt(e*x
^2 + d)*sqrt(e)*sqrt((c^2*x^2 + 1)/(c^2*x^2)) + e^2) + 64*(15*b*c^7*e^3*x^6
 + 3*b*c^7*d*e^2*x^4 - 4*b*c^7*d^2*e*x^2 + 8*b*c^7*d^3)*sqrt(e*x^2 + d)*log
((c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) + 1)/(c*x)) + 4*(240*a*c^7*e^3*x^6 + 48
*a*c^7*d*e^2*x^4 - 64*a*c^7*d^2*e*x^2 + 128*a*c^7*d^3 + (40*b*c^6*e^3*x^5 +
 2*(11*b*c^6*d*e^2 - 25*b*c^4*e^3)*x^3 - (41*b*c^6*d^2*e + 38*b*c^4*d*e^2 -
 75*b*c^2*e^3)*x)*sqrt((c^2*x^2 + 1)/(c^2*x^2)))*sqrt(e*x^2 + d))/(c^7*e^3)
, 1/3360*(64*b*c^7*d^(7/2)*log(((c^4*d^2 + 6*c^2*d*e + e^2)*x^4 + 8*(c^2*d^
2 + d*e)*x^2 - 4*((c^3*d + c*e)*x^3 + 2*c*d*x)*sqrt(e*x^2 + d)*sqrt(d)*sqrt
((c^2*x^2 + 1)/(c^2*x^2)) + 8*d^2)/x^4) - (105*b*c^6*d^3 + 35*b*c^4*d^2*e +
 63*b*c^2*d*e^2 - 75*b*e^3)*sqrt(-e)*arctan(1/2*(2*c^2*e*x^3 + (c^2*d + e)*
x)*sqrt(e*x^2 + d)*sqrt(-e)*sqrt((c^2*x^2 + 1)/(c^2*x^2))/(c^2*e^2*x^4 + (c
^2*d*e + e^2)*x^2 + d*e)) + 32*(15*b*c^7*e^3*x^6 + 3*b*c^7*d*e^2*x^4 - 4*b*
```

```
c^7*d^2*e*x^2 + 8*b*c^7*d^3)*sqrt(e*x^2 + d)*log((c*x*sqrt((c^2*x^2 + 1)/(c
^2*x^2)) + 1)/(c*x)) + 2*(240*a*c^7*e^3*x^6 + 48*a*c^7*d*e^2*x^4 - 64*a*c^7
*d^2*e*x^2 + 128*a*c^7*d^3 + (40*b*c^6*e^3*x^5 + 2*(11*b*c^6*d*e^2 - 25*b*c
^4*e^3)*x^3 - (41*b*c^6*d^2*e + 38*b*c^4*d*e^2 - 75*b*c^2*e^3)*x)*sqrt((c^2
*x^2 + 1)/(c^2*x^2)))*sqrt(e*x^2 + d))/(c^7*e^3), 1/6720*(256*b*c^7*sqrt(-d
)*d^3*arctan(1/2*((c^3*d + c*e)*x^3 + 2*c*d*x)*sqrt(e*x^2 + d)*sqrt(-d)*sqr
t((c^2*x^2 + 1)/(c^2*x^2))/(c^2*d*e*x^4 + (c^2*d^2 + d*e)*x^2 + d^2)) - (10
5*b*c^6*d^3 + 35*b*c^4*d^2*e + 63*b*c^2*d*e^2 - 75*b*e^3)*sqrt(e)*log(8*c^4
*e^2*x^4 + c^4*d^2 + 6*c^2*d*e + 8*(c^4*d*e + c^2*e^2)*x^2 - 4*(2*c^4*e*x^3
 + (c^4*d + c^2*e)*x)*sqrt(e*x^2 + d)*sqrt(e)*sqrt((c^2*x^2 + 1)/(c^2*x^2))
 + e^2) + 64*(15*b*c^7*e^3*x^6 + 3*b*c^7*d*e^2*x^4 - 4*b*c^7*d^2*e*x^2 + 8*
b*c^7*d^3)*sqrt(e*x^2 + d)*log((c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) + 1)/(c*x
)) + 4*(240*a*c^7*e^3*x^6 + 48*a*c^7*d*e^2*x^4 - 64*a*c^7*d^2*e*x^2 + 128*a
*c^7*d^3 + (40*b*c^6*e^3*x^5 + 2*(11*b*c^6*d*e^2 - 25*b*c^4*e^3)*x^3 - (41*
b*c^6*d^2*e + 38*b*c^4*d*e^2 - 75*b*c^2*e^3)*x)*sqrt((c^2*x^2 + 1)/(c^2*x^2
)))*sqrt(e*x^2 + d))/(c^7*e^3), 1/3360*(128*b*c^7*sqrt(-d)*d^3*arctan(1/2*(
(c^3*d + c*e)*x^3 + 2*c*d*x)*sqrt(e*x^2 + d)*sqrt(-d)*sqrt((c^2*x^2 + 1)/(c
^2*x^2))/(c^2*d*e*x^4 + (c^2*d^2 + d*e)*x^2 + d^2)) - (105*b*c^6*d^3 + 35*b
*c^4*d^2*e + 63*b*c^2*d*e^2 - 75*b*e^3)*sqrt(-e)*arctan(1/2*(2*c^2*e*x^3 +
(c^2*d + e)*x)*sqrt(e*x^2 + d)*sqrt(-e)*sqrt((c^2*x^2 + 1)/(c^2*x^2))/(c^2*
e^2*x^4 + (c^2*d*e + e^2)*x^2 + d*e)) + 32*(15*b*c^7*e^3*x^6 + 3*b*c^7*d*e^
2*x^4 - 4*b*c^7*d^2*e*x^2 + 8*b*c^7*d^3)*sqrt(e*x^2 + d)*log((c*x*sqrt((c^2
*x^2 + 1)/(c^2*x^2)) + 1)/(c*x)) + 2*(240*a*c^7*e^3*x^6 + 48*a*c^7*d*e^2*x^
4 - 64*a*c^7*d^2*e*x^2 + 128*a*c^7*d^3 + (40*b*c^6*e^3*x^5 + 2*(11*b*c^6*d*
e^2 - 25*b*c^4*e^3)*x^3 - (41*b*c^6*d^2*e + 38*b*c^4*d*e^2 - 75*b*c^2*e^3)*
x)*sqrt((c^2*x^2 + 1)/(c^2*x^2)))*sqrt(e*x^2 + d))/(c^7*e^3)]
```

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

$$\int \sqrt{ex^2 + d}\,(b\,\text{arcsch}\,(cx) + a)x^5\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^5*(a+b*arccsch(c*x))*(e*x^2+d)^(1/2),x, algorithm="giac")
```

```
[Out] integrate(sqrt(e*x^2 + d)*(b*arccsch(c*x) + a)*x^5, x)
```

**maple [F]** time = 0.43, size = 0, normalized size = 0.00

$$\int x^5\,(a + b\,\text{arccsch}\,(cx))\,\sqrt{e\,x^2 + d}\;dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^5*(a+b*arccsch(c*x))*(e*x^2+d)^(1/2),x)
```

[Out] int(x^5*(a+b*arccsch(c*x))*(e*x^2+d)^(1/2),x)

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

$$\frac{1}{105}\left(\frac{15\left(ex^2+d\right)^{\frac{3}{2}}x^4}{e}-\frac{12\left(ex^2+d\right)^{\frac{3}{2}}dx^2}{e^2}+\frac{8\left(ex^2+d\right)^{\frac{3}{2}}d^2}{e^3}\right)a+\frac{1}{105}b\left(\frac{\left(15e^3x^6+3de^2x^4-4d^2ex^2+8d^3\right)\sqrt{ex^2+}}{e^3}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

[In] integrate(x^5*(a+b*arccsch(c*x))*(e*x^2+d)^(1/2),x, algorithm="maxima")

[Out] 1/105*(15*(e*x^2 + d)^(3/2)*x^4/e - 12*(e*x^2 + d)^(3/2)*d*x^2/e^2 + 8*(e*x^2 + d)^(3/2)*d^2/e^3)*a + 1/105*b*((15*e^3*x^6 + 3*d*e^2*x^4 - 4*d^2*e*x^2 + 8*d^3)*sqrt(e*x^2 + d)*log(sqrt(c^2*x^2 + 1) + 1)/e^3 + 105*integrate(1/105*(15*c^2*e^3*x^7 + 3*c^2*d*e^2*x^5 - 4*c^2*d^2*e*x^3 + 8*c^2*d^3*x)*sqrt(e*x^2 + d)/(c^2*e^3*x^2 + e^3 + (c^2*e^3*x^2 + e^3)*sqrt(c^2*x^2 + 1)), x) - 105*integrate(1/105*(15*(7*e^3*log(c) + e^3)*c^2*x^7 - 4*c^2*d^2*e*x^3 + 8*c^2*d^3*x + 3*(c^2*d*e^2 + 35*e^3*log(c))*x^5 + 105*(c^2*e^3*x^7 + e^3*x^5)*log(x))*sqrt(e*x^2 + d)/(c^2*e^3*x^2 + e^3), x))

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

$$\int x^5\sqrt{e\,x^2+d}\,\left(a+b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

[In] int(x^5*(d + e*x^2)^(1/2)*(a + b*asinh(1/(c*x))),x)

[Out] int(x^5*(d + e*x^2)^(1/2)*(a + b*asinh(1/(c*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**5*(a+b*acsch(c*x))*(e*x**2+d)**(1/2),x)

[Out] Timed out

# 3.119 $\int x^3\sqrt{d+ex^2}\left(a+b\text{csch}^{-1}(cx)\right)dx$

**Optimal**. Leaf size=302

$$-\frac{d\left(d+ex^2\right)^{3/2}\left(a+b\text{csch}^{-1}(cx)\right)}{3e^2}+\frac{\left(d+ex^2\right)^{5/2}\left(a+b\text{csch}^{-1}(cx)\right)}{5e^2}-\frac{2bcd^{5/2}x\tan^{-1}\left(\frac{\sqrt{d+ex^2}}{\sqrt{d}\sqrt{-c^2x^2-1}}\right)}{15e^2\sqrt{-c^2x^2}}+\frac{bx\sqrt{-c^2x^2-}}{20ce\sqrt{}}$$

```
[Out] -1/3*d*(e*x^2+d)^(3/2)*(a+b*arccsch(c*x))/e^2+1/5*(e*x^2+d)^(5/2)*(a+b*arcc
sch(c*x))/e^2-1/120*b*(15*c^4*d^2+10*c^2*d*e-9*e^2)*x*arctan(e^(1/2)*(-c^2*
x^2-1)^(1/2)/c/(e*x^2+d)^(1/2))/c^4/e^(3/2)/(-c^2*x^2)^(1/2)-2/15*b*c*d^(5/
2)*x*arctan((e*x^2+d)^(1/2)/d^(1/2)/(-c^2*x^2-1)^(1/2))/e^2/(-c^2*x^2)^(1/2
)+1/20*b*x*(e*x^2+d)^(3/2)*(-c^2*x^2-1)^(1/2)/c/e/(-c^2*x^2)^(1/2)+1/120*b*
(c^2*d-9*e)*x*(-c^2*x^2-1)^(1/2)*(e*x^2+d)^(1/2)/c^3/e/(-c^2*x^2)^(1/2)
```

**Rubi [A]** time = 0.43, antiderivative size = 302, normalized size of antiderivative = 1.00, number of steps used = 11, number of rules used = 12, integrand size = 23, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.522, Rules used = {266, 43, 6302, 12, 573, 154, 157, 63, 217, 203, 93, 204}

$$-\frac{d\left(d+ex^2\right)^{3/2}\left(a+b\text{csch}^{-1}(cx)\right)}{3e^2}+\frac{\left(d+ex^2\right)^{5/2}\left(a+b\text{csch}^{-1}(cx)\right)}{5e^2}-\frac{2bcd^{5/2}x\tan^{-1}\left(\frac{\sqrt{d+ex^2}}{\sqrt{d}\sqrt{-c^2x^2-1}}\right)}{15e^2\sqrt{-c^2x^2}}-\frac{bx\left(15c^4d^2+\right.}{}$$

Antiderivative was successfully verified.

```
[In] Int[x^3*Sqrt[d + e*x^2]*(a + b*ArcCsch[c*x]),x]
```

```
[Out] (b*(c^2*d - 9*e)*x*Sqrt[-1 - c^2*x^2]*Sqrt[d + e*x^2])/(120*c^3*e*Sqrt[-(c^
2*x^2)]) + (b*x*Sqrt[-1 - c^2*x^2]*(d + e*x^2)^(3/2))/(20*c*e*Sqrt[-(c^2*x^
2)]) - (d*(d + e*x^2)^(3/2)*(a + b*ArcCsch[c*x]))/(3*e^2) + ((d + e*x^2)^(5
/2)*(a + b*ArcCsch[c*x]))/(5*e^2) - (b*(15*c^4*d^2 + 10*c^2*d*e - 9*e^2)*x*
ArcTan[(Sqrt[e]*Sqrt[-1 - c^2*x^2])/(c*Sqrt[d + e*x^2])])/(120*c^4*e^(3/2)*
Sqrt[-(c^2*x^2)]) - (2*b*c*d^(5/2)*x*ArcTan[Sqrt[d + e*x^2]/(Sqrt[d]*Sqrt[-
1 - c^2*x^2])])/(15*e^2*Sqrt[-(c^2*x^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 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 93

```
Int[(((a_.) + (b_.)*(x_))^(m_)*((c_.) + (d_.)*(x_))^(n_))/((e_.) + (f_.)*(x
_)), x_Symbol] :> With[{q = Denominator[m]}, Dist[q, Subst[Int[x^(q*(m + 1)
 - 1)/(b*e - a*f - (d*e - c*f)*x^q), x], x, (a + b*x)^(1/q)/(c + d*x)^(1/q)
], x]] /; FreeQ[{a, b, c, d, e, f}, x] && EqQ[m + n + 1, 0] && RationalQ[n]
 && LtQ[-1, m, 0] && SimplerQ[a + b*x, c + d*x]
```

Rule 154

```
Int[((a_.) + (b_.)*(x_))^(m_)*((c_.) + (d_.)*(x_))^(n_)*((e_.) + (f_.)*(x_)
)^(p_)*((g_.) + (h_.)*(x_)), x_Symbol] :> Simp[(h*(a + b*x)^m*(c + d*x)^(n
+ 1)*(e + f*x)^(p + 1))/(d*f*(m + n + p + 2)), x] + Dist[1/(d*f*(m + n + p
+ 2)), Int[(a + b*x)^(m - 1)*(c + d*x)^n*(e + f*x)^p*Simp[a*d*f*g*(m + n +
p + 2) - h*(b*c*e*m + a*(d*e*(n + 1) + c*f*(p + 1))) + (b*d*f*g*(m + n + p
+ 2) + h*(a*d*f*m - b*(d*e*(m + n + 1) + c*f*(m + p + 1))))*x, x], x], x] /
; FreeQ[{a, b, c, d, e, f, g, h, n, p}, x] && GtQ[m, 0] && NeQ[m + n + p +
2, 0] && IntegersQ[2*m, 2*n, 2*p]
```

Rule 157

```
Int[(((c_.) + (d_.)*(x_))^(n_)*((e_.) + (f_.)*(x_))^(p_)*((g_.) + (h_.)*(x_
)))/((a_.) + (b_.)*(x_)), x_Symbol] :> Dist[h/b, Int[(c + d*x)^n*(e + f*x)^
p, x], x] + Dist[(b*g - a*h)/b, Int[((c + d*x)^n*(e + f*x)^p)/(a + b*x), x]
, x] /; FreeQ[{a, b, c, d, e, f, g, h, n, p}, x]
```

Rule 203

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

Rule 204

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

Rule 217

```
Int[1/Sqrt[(a_) + (b_.)*(x_)^2], x_Symbol] :> Subst[Int[1/(1 - b*x^2), x],
x, x/Sqrt[a + b*x^2]] /; FreeQ[{a, b}, x] &&  !GtQ[a, 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 573

```
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[x^(Simpl
ify[(m + 1)/n] - 1)*(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] && IntegerQ[Simplify[(m + 1)/n
]]
```

Rule 6302

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))*((f_.)*(x_))^(m_.)*((d_.) + (e_.)*(
x_)^2)^(p_.), x_Symbol] :> With[{u = IntHide[(f*x)^m*(d + e*x^2)^p, x]}, Di
st[a + b*ArcCsch[c*x], u, x] - Dist[(b*c*x)/Sqrt[-(c^2*x^2)], Int[SimplifyI
ntegrand[u/(x*Sqrt[-1 - c^2*x^2]), x], x], x]] /; FreeQ[{a, b, c, d, e, f,
m, p}, x] && ((IGtQ[p, 0] &&  !(ILtQ[(m - 1)/2, 0] && GtQ[m + 2*p + 3, 0]))
 || (IGtQ[(m + 1)/2, 0] &&  !(ILtQ[p, 0] && GtQ[m + 2*p + 3, 0])) || (ILtQ[
(m + 2*p + 1)/2, 0] &&  !ILtQ[(m - 1)/2, 0]))
```

Rubi steps

$$\int x^3\sqrt{d+ex^2}\left(a+b\text{csch}^{-1}(cx)\right)dx = -\frac{d\left(d+ex^2\right)^{3/2}\left(a+b\text{csch}^{-1}(cx)\right)}{3e^2}+\frac{\left(d+ex^2\right)^{5/2}\left(a+b\text{csch}^{-1}(cx)\right)}{5e^2}-\frac{(bcx}{}$$

$$= -\frac{d\left(d+ex^2\right)^{3/2}\left(a+b\text{csch}^{-1}(cx)\right)}{3e^2}+\frac{\left(d+ex^2\right)^{5/2}\left(a+b\text{csch}^{-1}(cx)\right)}{5e^2}-\frac{(bcx}{}$$

$$= -\frac{d\left(d+ex^2\right)^{3/2}\left(a+b\text{csch}^{-1}(cx)\right)}{3e^2}+\frac{\left(d+ex^2\right)^{5/2}\left(a+b\text{csch}^{-1}(cx)\right)}{5e^2}-\frac{(bcx}{}$$

$$= \frac{bx\sqrt{-1-c^2x^2}\left(d+ex^2\right)^{3/2}}{20ce\sqrt{-c^2x^2}}-\frac{d\left(d+ex^2\right)^{3/2}\left(a+b\text{csch}^{-1}(cx)\right)}{3e^2}+\frac{\left(d+ex^2\right)}{}$$

$$= \frac{b\left(c^2d-9e\right)x\sqrt{-1-c^2x^2}\sqrt{d+ex^2}}{120c^3e\sqrt{-c^2x^2}}+\frac{bx\sqrt{-1-c^2x^2}\left(d+ex^2\right)^{3/2}}{20ce\sqrt{-c^2x^2}}-\frac{d\left(d+\right.}{}$$

$$= \frac{b\left(c^2d-9e\right)x\sqrt{-1-c^2x^2}\sqrt{d+ex^2}}{120c^3e\sqrt{-c^2x^2}}+\frac{bx\sqrt{-1-c^2x^2}\left(d+ex^2\right)^{3/2}}{20ce\sqrt{-c^2x^2}}-\frac{d\left(d+\right.}{}$$

$$= \frac{b\left(c^2d-9e\right)x\sqrt{-1-c^2x^2}\sqrt{d+ex^2}}{120c^3e\sqrt{-c^2x^2}}+\frac{bx\sqrt{-1-c^2x^2}\left(d+ex^2\right)^{3/2}}{20ce\sqrt{-c^2x^2}}-\frac{d\left(d+\right.}{}$$

$$= \frac{b\left(c^2d-9e\right)x\sqrt{-1-c^2x^2}\sqrt{d+ex^2}}{120c^3e\sqrt{-c^2x^2}}+\frac{bx\sqrt{-1-c^2x^2}\left(d+ex^2\right)^{3/2}}{20ce\sqrt{-c^2x^2}}-\frac{d\left(d+\right.}{}$$

$$= \frac{b\left(c^2d-9e\right)x\sqrt{-1-c^2x^2}\sqrt{d+ex^2}}{120c^3e\sqrt{-c^2x^2}}+\frac{bx\sqrt{-1-c^2x^2}\left(d+ex^2\right)^{3/2}}{20ce\sqrt{-c^2x^2}}-\frac{d\left(d+\right.}{}$$

**Mathematica [A]** time = 0.75, size = 337, normalized size = 1.12

$$\frac{\sqrt{d+ex^2}\left(8ac^3\left(-2d^2+dex^2+3e^2x^4\right)+8bc^3\text{csch}^{-1}(cx)\left(-2d^2+dex^2+3e^2x^4\right)+bex\sqrt{\frac{1}{c^2x^2}+1}\left(c^2\left(7d+6ex^2\right)\right.\right.}{120c^3e^2}$$

Antiderivative was successfully verified.

```
[In] Integrate[x^3*Sqrt[d + e*x^2]*(a + b*ArcCsch[c*x]),x]
```

```
[Out] (Sqrt[d + e*x^2]*(8*a*c^3*(-2*d^2 + d*e*x^2 + 3*e^2*x^4) + b*e*Sqrt[1 + 1/(
c^2*x^2)]*x*(-9*e + c^2*(7*d + 6*e*x^2)) + 8*b*c^3*(-2*d^2 + d*e*x^2 + 3*e^
2*x^4)*ArcCsch[c*x]))/(120*c^3*e^2) + (b*Sqrt[1 + 1/(c^2*x^2)]*x*(-(Sqrt[c^
2]*Sqrt[c^2*d - e]*Sqrt[e]*(15*c^4*d^2 + 10*c^2*d*e - 9*e^2)*Sqrt[(c^2*(d +
 e*x^2))/(c^2*d - e)]*ArcSinh[(c*Sqrt[e]*Sqrt[1 + c^2*x^2])/(Sqrt[c^2]*Sqrt
[c^2*d - e])]) + 16*c^7*d^(5/2)*Sqrt[-d - e*x^2]*ArcTan[(Sqrt[d]*Sqrt[1 + c
^2*x^2])/Sqrt[-d - e*x^2]]))/(120*c^6*e^2*Sqrt[1 + c^2*x^2]*Sqrt[d + e*x^2]
)
```

**fricas [A]** time = 1.80, size = 1625, normalized size = 5.38

result too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^3*(a+b*arccsch(c*x))*(e*x^2+d)^(1/2),x, algorithm="fricas")
```

```
[Out] [1/480*(16*b*c^5*d^(5/2)*log(((c^4*d^2 + 6*c^2*d*e + e^2)*x^4 + 8*(c^2*d^2
+ d*e)*x^2 + 4*((c^3*d + c*e)*x^3 + 2*c*d*x)*sqrt(e*x^2 + d)*sqrt(d)*sqrt((
c^2*x^2 + 1)/(c^2*x^2)) + 8*d^2)/x^4) - (15*b*c^4*d^2 + 10*b*c^2*d*e - 9*b*
e^2)*sqrt(e)*log(8*c^4*e^2*x^4 + c^4*d^2 + 6*c^2*d*e + 8*(c^4*d*e + c^2*e^2
)*x^2 + 4*(2*c^4*e*x^3 + (c^4*d + c^2*e)*x)*sqrt(e*x^2 + d)*sqrt(e)*sqrt((c
^2*x^2 + 1)/(c^2*x^2)) + e^2) + 32*(3*b*c^5*e^2*x^4 + b*c^5*d*e*x^2 - 2*b*c
^5*d^2)*sqrt(e*x^2 + d)*log((c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) + 1)/(c*x))
+ 4*(24*a*c^5*e^2*x^4 + 8*a*c^5*d*e*x^2 - 16*a*c^5*d^2 + (6*b*c^4*e^2*x^3 +
 (7*b*c^4*d*e - 9*b*c^2*e^2)*x)*sqrt((c^2*x^2 + 1)/(c^2*x^2)))*sqrt(e*x^2 +
 d))/(c^5*e^2), 1/240*(8*b*c^5*d^(5/2)*log(((c^4*d^2 + 6*c^2*d*e + e^2)*x^4
 + 8*(c^2*d^2 + d*e)*x^2 + 4*((c^3*d + c*e)*x^3 + 2*c*d*x)*sqrt(e*x^2 + d)*
sqrt(d)*sqrt((c^2*x^2 + 1)/(c^2*x^2)) + 8*d^2)/x^4) + (15*b*c^4*d^2 + 10*b*
c^2*d*e - 9*b*e^2)*sqrt(-e)*arctan(1/2*(2*c^2*e*x^3 + (c^2*d + e)*x)*sqrt(e
*x^2 + d)*sqrt(-e)*sqrt((c^2*x^2 + 1)/(c^2*x^2))/(c^2*e^2*x^4 + (c^2*d*e +
e^2)*x^2 + d*e)) + 16*(3*b*c^5*e^2*x^4 + b*c^5*d*e*x^2 - 2*b*c^5*d^2)*sqrt(
e*x^2 + d)*log((c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) + 1)/(c*x)) + 2*(24*a*c^5
*e^2*x^4 + 8*a*c^5*d*e*x^2 - 16*a*c^5*d^2 + (6*b*c^4*e^2*x^3 + (7*b*c^4*d*e
 - 9*b*c^2*e^2)*x)*sqrt((c^2*x^2 + 1)/(c^2*x^2)))*sqrt(e*x^2 + d))/(c^5*e^2
), -1/480*(32*b*c^5*sqrt(-d)*d^2*arctan(1/2*((c^3*d + c*e)*x^3 + 2*c*d*x)*s
qrt(e*x^2 + d)*sqrt(-d)*sqrt((c^2*x^2 + 1)/(c^2*x^2))/(c^2*d*e*x^4 + (c^2*d
^2 + d*e)*x^2 + d^2)) + (15*b*c^4*d^2 + 10*b*c^2*d*e - 9*b*e^2)*sqrt(e)*log
(8*c^4*e^2*x^4 + c^4*d^2 + 6*c^2*d*e + 8*(c^4*d*e + c^2*e^2)*x^2 + 4*(2*c^4
*e*x^3 + (c^4*d + c^2*e)*x)*sqrt(e*x^2 + d)*sqrt(e)*sqrt((c^2*x^2 + 1)/(c^2
*x^2)) + e^2) - 32*(3*b*c^5*e^2*x^4 + b*c^5*d*e*x^2 - 2*b*c^5*d^2)*sqrt(e*x
^2 + d)*log((c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) + 1)/(c*x)) - 4*(24*a*c^5*e^
2*x^4 + 8*a*c^5*d*e*x^2 - 16*a*c^5*d^2 + (6*b*c^4*e^2*x^3 + (7*b*c^4*d*e -
9*b*c^2*e^2)*x)*sqrt((c^2*x^2 + 1)/(c^2*x^2)))*sqrt(e*x^2 + d))/(c^5*e^2),
```

```
-1/240*(16*b*c^5*sqrt(-d)*d^2*arctan(1/2*((c^3*d + c*e)*x^3 + 2*c*d*x)*sqrt
(e*x^2 + d)*sqrt(-d)*sqrt((c^2*x^2 + 1)/(c^2*x^2))/(c^2*d*e*x^4 + (c^2*d^2
+ d*e)*x^2 + d^2)) - (15*b*c^4*d^2 + 10*b*c^2*d*e - 9*b*e^2)*sqrt(-e)*arcta
n(1/2*(2*c^2*e*x^3 + (c^2*d + e)*x)*sqrt(e*x^2 + d)*sqrt(-e)*sqrt((c^2*x^2
+ 1)/(c^2*x^2))/(c^2*e^2*x^4 + (c^2*d*e + e^2)*x^2 + d*e)) - 16*(3*b*c^5*e^
2*x^4 + b*c^5*d*e*x^2 - 2*b*c^5*d^2)*sqrt(e*x^2 + d)*log((c*x*sqrt((c^2*x^2
 + 1)/(c^2*x^2)) + 1)/(c*x)) - 2*(24*a*c^5*e^2*x^4 + 8*a*c^5*d*e*x^2 - 16*a
*c^5*d^2 + (6*b*c^4*e^2*x^3 + (7*b*c^4*d*e - 9*b*c^2*e^2)*x)*sqrt((c^2*x^2
+ 1)/(c^2*x^2)))*sqrt(e*x^2 + d))/(c^5*e^2)]
```

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

$$\int \sqrt{ex^2+d}\,(b\,\text{arcsch}\,(cx)+a)x^3\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^3*(a+b*arccsch(c*x))*(e*x^2+d)^(1/2),x, algorithm="giac")
```

```
[Out] integrate(sqrt(e*x^2 + d)*(b*arccsch(c*x) + a)*x^3, x)
```

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

$$\int x^3\,(a+b\,\text{arccsch}\,(cx))\,\sqrt{e\,x^2+d}\;dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^3*(a+b*arccsch(c*x))*(e*x^2+d)^(1/2),x)
```

```
[Out] int(x^3*(a+b*arccsch(c*x))*(e*x^2+d)^(1/2),x)
```

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

$$\frac{1}{15}\left(\frac{3\left(ex^2+d\right)^{\frac{3}{2}}x^2}{e}-\frac{2\left(ex^2+d\right)^{\frac{3}{2}}d}{e^2}\right)a+\frac{1}{15}\,b\left(\frac{\left(3\,e^2x^4+dex^2-2\,d^2\right)\sqrt{ex^2+d}\,\log\left(\sqrt{c^2x^2+1}+1\right)}{e^2}+15\int\frac{\left(3\,c\cdots\right.}{15\left(c\cdots\right.}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^3*(a+b*arccsch(c*x))*(e*x^2+d)^(1/2),x, algorithm="maxima")
```

```
[Out] 1/15*(3*(e*x^2 + d)^(3/2)*x^2/e - 2*(e*x^2 + d)^(3/2)*d/e^2)*a + 1/15*b*((3
*e^2*x^4 + d*e*x^2 - 2*d^2)*sqrt(e*x^2 + d)*log(sqrt(c^2*x^2 + 1) + 1)/e^2
+ 15*integrate(1/15*(3*c^2*e^2*x^5 + c^2*d*e*x^3 - 2*c^2*d^2*x)*sqrt(e*x^2
+ d)/(c^2*e^2*x^2 + e^2 + (c^2*e^2*x^2 + e^2)*sqrt(c^2*x^2 + 1)), x) - 15*i
ntegrate(1/15*(3*(5*e^2*log(c) + e^2)*c^2*x^5 - 2*c^2*d^2*x + (c^2*d*e + 15
```

```
*e^2*log(c))*x^3 + 15*(c^2*e^2*x^5 + e^2*x^3)*log(x))*sqrt(e*x^2 + d)/(c^2*
e^2*x^2 + e^2), x))
```

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

$$\int x^3 \sqrt{e\,x^2+d}\,\left(a+b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^3*(d + e*x^2)^(1/2)*(a + b*asinh(1/(c*x))),x)
[Out] int(x^3*(d + e*x^2)^(1/2)*(a + b*asinh(1/(c*x))), x)
```

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

$$\int x^3 \left(a + b\,\mathrm{acsch}\,(cx)\right)\sqrt{d+ex^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**3*(a+b*acsch(c*x))*(e*x**2+d)**(1/2),x)
[Out] Integral(x**3*(a + b*acsch(c*x))*sqrt(d + e*x**2), x)
```

# 3.120 $\int x\sqrt{d+ex^2}\left(a+b\text{csch}^{-1}(cx)\right)dx$

**Optimal**. Leaf size=203

$$\frac{\left(d+ex^2\right)^{3/2}\left(a+b\text{csch}^{-1}(cx)\right)}{3e}+\frac{bcd^{3/2}x\tan^{-1}\left(\frac{\sqrt{d+ex^2}}{\sqrt{d}\sqrt{-c^2x^2-1}}\right)}{3e\sqrt{-c^2x^2}}+\frac{bx\sqrt{-c^2x^2-1}\sqrt{d+ex^2}}{6c\sqrt{-c^2x^2}}+\frac{bx\left(3c^2d-e\right)\tan^{-1}\left(\frac{\sqrt{e}\sqrt{-c^2x^2-1}}{c\sqrt{d+ex^2}}\right)}{6c^2\sqrt{e}\sqrt{-c^2x^2}}$$

```
[Out] 1/3*(e*x^2+d)^(3/2)*(a+b*arccsch(c*x))/e+1/3*b*c*d^(3/2)*x*arctan((e*x^2+d)
^(1/2)/d^(1/2)/(-c^2*x^2-1)^(1/2))/e/(-c^2*x^2)^(1/2)+1/6*b*(3*c^2*d-e)*x*a
rctan(e^(1/2)*(-c^2*x^2-1)^(1/2)/c/(e*x^2+d)^(1/2))/c^2/e^(1/2)/(-c^2*x^2)^
(1/2)+1/6*b*x*(-c^2*x^2-1)^(1/2)*(e*x^2+d)^(1/2)/c/(-c^2*x^2)^(1/2)
```

**Rubi [A]** time = 0.21, antiderivative size = 203, normalized size of antiderivative = 1.00, number of steps used = 9, number of rules used = 9, integrand size = 21, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.429, Rules used = {6300, 446, 102, 157, 63, 217, 203, 93, 204}

$$\frac{\left(d+ex^2\right)^{3/2}\left(a+b\text{csch}^{-1}(cx)\right)}{3e}+\frac{bcd^{3/2}x\tan^{-1}\left(\frac{\sqrt{d+ex^2}}{\sqrt{d}\sqrt{-c^2x^2-1}}\right)}{3e\sqrt{-c^2x^2}}+\frac{bx\sqrt{-c^2x^2-1}\sqrt{d+ex^2}}{6c\sqrt{-c^2x^2}}+\frac{bx\left(3c^2d-e\right)\tan^{-1}\left(\frac{\sqrt{e}\sqrt{-c^2x^2-1}}{c\sqrt{d+ex^2}}\right)}{6c^2\sqrt{e}\sqrt{-c^2x^2}}$$

Antiderivative was successfully verified.

```
[In] Int[x*Sqrt[d + e*x^2]*(a + b*ArcCsch[c*x]),x]
```

```
[Out] (b*x*Sqrt[-1 - c^2*x^2]*Sqrt[d + e*x^2])/(6*c*Sqrt[-(c^2*x^2)]) + ((d + e*x
^2)^(3/2)*(a + b*ArcCsch[c*x]))/(3*e) + (b*(3*c^2*d - e)*x*ArcTan[(Sqrt[e]*
Sqrt[-1 - c^2*x^2])/(c*Sqrt[d + e*x^2])])/(6*c^2*Sqrt[e]*Sqrt[-(c^2*x^2)])
 + (b*c*d^(3/2)*x*ArcTan[Sqrt[d + e*x^2]/(Sqrt[d]*Sqrt[-1 - c^2*x^2])])/(3*e
*Sqrt[-(c^2*x^2)])
```

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 93

```
Int[(((a_.) + (b_.)*(x_))^(m_)*((c_.) + (d_.)*(x_))^(n_))/((e_.) + (f_.)*(x
_)), x_Symbol] :> With[{q = Denominator[m]}, Dist[q, Subst[Int[x^(q*(m + 1)
 - 1)/(b*e - a*f - (d*e - c*f)*x^q), x], x, (a + b*x)^(1/q)/(c + d*x)^(1/q)
], x]] /; FreeQ[{a, b, c, d, e, f}, x] && EqQ[m + n + 1, 0] && RationalQ[n]
```

```
&& LtQ[-1, m, 0] && SimplerQ[a + b*x, c + d*x]
```

Rule 102

```
Int[((a_.) + (b_.)*(x_))^(m_)*((c_.) + (d_.)*(x_))^(n_.)*((e_.) + (f_.)*(x_
))^(p_.), x_Symbol] :> Simp[(b*(a + b*x)^(m - 1)*(c + d*x)^(n + 1)*(e + f*x
)^(p + 1))/(d*f*(m + n + p + 1)), x] + Dist[1/(d*f*(m + n + p + 1)), Int[(a
 + b*x)^(m - 2)*(c + d*x)^n*(e + f*x)^p*Simp[a^2*d*f*(m + n + p + 1) - b*(b
*c*e*(m - 1) + a*(d*e*(n + 1) + c*f*(p + 1))) + b*(a*d*f*(2*m + n + p) - b*
(d*e*(m + n) + c*f*(m + p)))*x, x], x], x] /; FreeQ[{a, b, c, d, e, f, n, p
}, x] && GtQ[m, 1] && NeQ[m + n + p + 1, 0] && IntegersQ[2*m, 2*n, 2*p]
```

Rule 157

```
Int[(((c_.) + (d_.)*(x_))^(n_)*((e_.) + (f_.)*(x_))^(p_)*((g_.) + (h_.)*(x_
)))/((a_.) + (b_.)*(x_)), x_Symbol] :> Dist[h/b, Int[(c + d*x)^n*(e + f*x)^
p, x], x] + Dist[(b*g - a*h)/b, Int[((c + d*x)^n*(e + f*x)^p)/(a + b*x), x]
, x] /; FreeQ[{a, b, c, d, e, f, g, h, n, p}, x]
```

Rule 203

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

Rule 204

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

Rule 217

```
Int[1/Sqrt[(a_) + (b_.)*(x_)^2], x_Symbol] :> Subst[Int[1/(1 - b*x^2), x],
x, x/Sqrt[a + b*x^2]] /; FreeQ[{a, b}, x] &&  !GtQ[a, 0]
```

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 6300

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))*(x_)*((d_.) + (e_.)*(x_)^2)^(p_.),
x_Symbol] :> Simp[((d + e*x^2)^(p + 1)*(a + b*ArcCsch[c*x]))/(2*e*(p + 1)),
 x] - Dist[(b*c*x)/(2*e*(p + 1)*Sqrt[-(c^2*x^2)]), Int[(d + e*x^2)^(p + 1)/
(x*Sqrt[-1 - c^2*x^2]), x], x] /; FreeQ[{a, b, c, d, e, p}, x] && NeQ[p, -1
]
```

Rubi steps

$$\int x\sqrt{d+ex^2}\left(a+b\operatorname{csch}^{-1}(cx)\right)dx=\frac{\left(d+ex^2\right)^{3/2}\left(a+b\operatorname{csch}^{-1}(cx)\right)}{3e}-\frac{(bcx)\int\frac{\left(d+ex^2\right)^{3/2}}{x\sqrt{-1-c^2x^2}}dx}{3e\sqrt{-c^2x^2}}$$

$$=\frac{\left(d+ex^2\right)^{3/2}\left(a+b\operatorname{csch}^{-1}(cx)\right)}{3e}-\frac{(bcx)\operatorname{Subst}\left(\int\frac{(d+ex)^{3/2}}{x\sqrt{-1-c^2x}}dx,x,x^2\right)}{6e\sqrt{-c^2x^2}}$$

$$=\frac{bx\sqrt{-1-c^2x^2}\sqrt{d+ex^2}}{6c\sqrt{-c^2x^2}}+\frac{\left(d+ex^2\right)^{3/2}\left(a+b\operatorname{csch}^{-1}(cx)\right)}{3e}+\frac{(bx)\operatorname{Subst}\left(\int\right.}{}$$

$$=\frac{bx\sqrt{-1-c^2x^2}\sqrt{d+ex^2}}{6c\sqrt{-c^2x^2}}+\frac{\left(d+ex^2\right)^{3/2}\left(a+b\operatorname{csch}^{-1}(cx)\right)}{3e}-\frac{\left(b\left(3c^2d-e\right)x\right.}{}$$

$$=\frac{bx\sqrt{-1-c^2x^2}\sqrt{d+ex^2}}{6c\sqrt{-c^2x^2}}+\frac{\left(d+ex^2\right)^{3/2}\left(a+b\operatorname{csch}^{-1}(cx)\right)}{3e}+\frac{\left(b\left(3c^2d-e\right)x\right.}{}$$

$$=\frac{bx\sqrt{-1-c^2x^2}\sqrt{d+ex^2}}{6c\sqrt{-c^2x^2}}+\frac{\left(d+ex^2\right)^{3/2}\left(a+b\operatorname{csch}^{-1}(cx)\right)}{3e}+\frac{bcd^{3/2}x\tan^{-1}(}{3e\sqrt{-}}$$

$$=\frac{bx\sqrt{-1-c^2x^2}\sqrt{d+ex^2}}{6c\sqrt{-c^2x^2}}+\frac{\left(d+ex^2\right)^{3/2}\left(a+b\operatorname{csch}^{-1}(cx)\right)}{3e}+\frac{b\left(3c^2d-e\right)x}{6c^2\sqrt{}}$$

**Mathematica [A]** time = 0.51, size = 278, normalized size = 1.37

$$\frac{\sqrt{d+ex^2}\left(2ac\left(d+ex^2\right)+bex\sqrt{\frac{1}{c^2x^2}+1}+2bc\operatorname{csch}^{-1}(cx)\left(d+ex^2\right)\right)}{6ce}-\frac{bx\sqrt{\frac{1}{c^2x^2}+1}\left(2c^5d^{3/2}\sqrt{-d-ex^2}\tan^{-1}\left(\frac{\sqrt{d}}{\sqrt{}}\right.\right.}{}$$

Antiderivative was successfully verified.

```
[In] Integrate[x*Sqrt[d + e*x^2]*(a + b*ArcCsch[c*x]),x]
```

```
[Out] (Sqrt[d + e*x^2]*(b*e*Sqrt[1 + 1/(c^2*x^2)]*x + 2*a*c*(d + e*x^2) + 2*b*c*(
d + e*x^2)*ArcCsch[c*x]))/(6*c*e) - (b*Sqrt[1 + 1/(c^2*x^2)]*x*(-(Sqrt[c^2]
*Sqrt[c^2*d - e]*(3*c^2*d - e)*Sqrt[e]*Sqrt[(c^2*(d + e*x^2))/(c^2*d - e)]*
ArcSinh[(c*Sqrt[e]*Sqrt[1 + c^2*x^2])/(Sqrt[c^2]*Sqrt[c^2*d - e])]) + 2*c^5
*d^(3/2)*Sqrt[-d - e*x^2]*ArcTan[(Sqrt[d]*Sqrt[1 + c^2*x^2])/Sqrt[-d - e*x^
2]]))/(6*c^4*e*Sqrt[1 + c^2*x^2]*Sqrt[d + e*x^2])
```

**fricas [A]** time = 1.10, size = 1342, normalized size = 6.61

result too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*(a+b*arccsch(c*x))*(e*x^2+d)^(1/2),x, algorithm="fricas")
```

```
[Out] [1/24*(2*b*c^3*d^(3/2)*log(((c^4*d^2 + 6*c^2*d*e + e^2)*x^4 + 8*(c^2*d^2 +
d*e)*x^2 - 4*((c^3*d + c*e)*x^3 + 2*c*d*x)*sqrt(e*x^2 + d)*sqrt(d)*sqrt((c^
2*x^2 + 1)/(c^2*x^2)) + 8*d^2)/x^4) - (3*b*c^2*d - b*e)*sqrt(e)*log(8*c^4*e
^2*x^4 + c^4*d^2 + 6*c^2*d*e + 8*(c^4*d*e + c^2*e^2)*x^2 - 4*(2*c^4*e*x^3 +
 (c^4*d + c^2*e)*x)*sqrt(e*x^2 + d)*sqrt(e)*sqrt((c^2*x^2 + 1)/(c^2*x^2)) +
 e^2) + 8*(b*c^3*e*x^2 + b*c^3*d)*sqrt(e*x^2 + d)*log((c*x*sqrt((c^2*x^2 +
1)/(c^2*x^2)) + 1)/(c*x)) + 4*(2*a*c^3*e*x^2 + b*c^2*e*x*sqrt((c^2*x^2 + 1)
/(c^2*x^2)) + 2*a*c^3*d)*sqrt(e*x^2 + d))/(c^3*e), 1/12*(b*c^3*d^(3/2)*log(
((c^4*d^2 + 6*c^2*d*e + e^2)*x^4 + 8*(c^2*d^2 + d*e)*x^2 - 4*((c^3*d + c*e)
*x^3 + 2*c*d*x)*sqrt(e*x^2 + d)*sqrt(d)*sqrt((c^2*x^2 + 1)/(c^2*x^2)) + 8*d
^2)/x^4) - (3*b*c^2*d - b*e)*sqrt(-e)*arctan(1/2*(2*c^2*e*x^3 + (c^2*d + e)
*x)*sqrt(e*x^2 + d)*sqrt(-e)*sqrt((c^2*x^2 + 1)/(c^2*x^2))/(c^2*e^2*x^4 + (
c^2*d*e + e^2)*x^2 + d*e)) + 4*(b*c^3*e*x^2 + b*c^3*d)*sqrt(e*x^2 + d)*log(
(c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) + 1)/(c*x)) + 2*(2*a*c^3*e*x^2 + b*c^2*e
*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) + 2*a*c^3*d)*sqrt(e*x^2 + d))/(c^3*e), 1/2
4*(4*b*c^3*sqrt(-d)*d*arctan(1/2*((c^3*d + c*e)*x^3 + 2*c*d*x)*sqrt(e*x^2 +
 d)*sqrt(-d)*sqrt((c^2*x^2 + 1)/(c^2*x^2))/(c^2*d*e*x^4 + (c^2*d^2 + d*e)*x
^2 + d^2)) - (3*b*c^2*d - b*e)*sqrt(e)*log(8*c^4*e^2*x^4 + c^4*d^2 + 6*c^2*
d*e + 8*(c^4*d*e + c^2*e^2)*x^2 - 4*(2*c^4*e*x^3 + (c^4*d + c^2*e)*x)*sqrt(
e*x^2 + d)*sqrt(e)*sqrt((c^2*x^2 + 1)/(c^2*x^2)) + e^2) + 8*(b*c^3*e*x^2 +
b*c^3*d)*sqrt(e*x^2 + d)*log((c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) + 1)/(c*x))
 + 4*(2*a*c^3*e*x^2 + b*c^2*e*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) + 2*a*c^3*d)*
sqrt(e*x^2 + d))/(c^3*e), 1/12*(2*b*c^3*sqrt(-d)*d*arctan(1/2*((c^3*d + c*e
)*x^3 + 2*c*d*x)*sqrt(e*x^2 + d)*sqrt(-d)*sqrt((c^2*x^2 + 1)/(c^2*x^2))/(c^
2*d*e*x^4 + (c^2*d^2 + d*e)*x^2 + d^2)) - (3*b*c^2*d - b*e)*sqrt(-e)*arctan
(1/2*(2*c^2*e*x^3 + (c^2*d + e)*x)*sqrt(e*x^2 + d)*sqrt(-e)*sqrt((c^2*x^2 +
 1)/(c^2*x^2))/(c^2*e^2*x^4 + (c^2*d*e + e^2)*x^2 + d*e)) + 4*(b*c^3*e*x^2
+ b*c^3*d)*sqrt(e*x^2 + d)*log((c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) + 1)/(c*x
)) + 2*(2*a*c^3*e*x^2 + b*c^2*e*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) + 2*a*c^3*d
)*sqrt(e*x^2 + d))/(c^3*e)]
```

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

$$\int \sqrt{ex^2+d}\,(b\,\mathrm{arcsch}\,(cx)+a)x\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*(a+b*arccsch(c*x))*(e*x^2+d)^(1/2),x, algorithm="giac")
```

```
[Out] integrate(sqrt(e*x^2 + d)*(b*arccsch(c*x) + a)*x, x)
```

**maple [F]** time = 0.48, size = 0, normalized size = 0.00

$$\int x\,(a+b\,\mathrm{arccsch}\,(cx))\,\sqrt{e\,x^2+d}\;dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x*(a+b*arccsch(c*x))*(e*x^2+d)^(1/2),x)
```

```
[Out] int(x*(a+b*arccsch(c*x))*(e*x^2+d)^(1/2),x)
```

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

$$\frac{1}{3}\left(\frac{\left(ex^2+d\right)^{\frac{3}{2}}\log\left(\sqrt{c^2x^2+1}+1\right)}{e}+3\int\frac{\left(c^2ex^3+c^2dx\right)\sqrt{ex^2+d}}{3\left(c^2ex^2+\left(c^2ex^2+e\right)\sqrt{c^2x^2+1}+e\right)}\,dx-3\int\frac{\left(\left(3\,e\log(c)+e\right)c^2x^3+\right.}{}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*(a+b*arccsch(c*x))*(e*x^2+d)^(1/2),x, algorithm="maxima")
```

```
[Out] 1/3*((e*x^2 + d)^(3/2)*log(sqrt(c^2*x^2 + 1) + 1)/e + 3*integrate(1/3*(c^2*
e*x^3 + c^2*d*x)*sqrt(e*x^2 + d)/(c^2*e*x^2 + (c^2*e*x^2 + e)*sqrt(c^2*x^2
+ 1) + e), x) - 3*integrate(1/3*((3*e*log(c) + e)*c^2*x^3 + (c^2*d + 3*e*lo
g(c))*x + 3*(c^2*e*x^3 + e*x)*log(x))*sqrt(e*x^2 + d)/(c^2*e*x^2 + e), x))*
b + 1/3*(e*x^2 + d)^(3/2)*a/e
```

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

$$\int x\,\sqrt{e\,x^2+d}\,\left(a+b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x*(d + e*x^2)^(1/2)*(a + b*asinh(1/(c*x))),x)
```

```
[Out] int(x*(d + e*x^2)^(1/2)*(a + b*asinh(1/(c*x))), x)
```

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

$$\int x\left(a+b\operatorname{acsch}\left(cx\right)\right)\sqrt{d+ex^{2}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*(a+b*acsch(c*x))*(e*x**2+d)**(1/2),x)
[Out] Integral(x*(a + b*acsch(c*x))*sqrt(d + e*x**2), x)
```

## 3.121 $\int \frac{\sqrt{d+ex^2}\left(a+b\mathbf{csch}^{-1}(cx)\right)}{x}\,dx$

**Optimal**. Leaf size=26

$$\mathrm{Int}\left(\frac{\sqrt{d+ex^2}\left(a+b\mathrm{csch}^{-1}(cx)\right)}{x},x\right)$$

```
[Out] Unintegrable((a+b*arccsch(c*x))*(e*x^2+d)^(1/2)/x,x)
```

**Rubi** [A] time = 0.10, 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 = {}

$$\int \frac{\sqrt{d+ex^2}\left(a+b\mathrm{csch}^{-1}(cx)\right)}{x}\,dx$$

Verification is Not applicable to the result.

```
[In] Int[(Sqrt[d + e*x^2]*(a + b*ArcCsch[c*x]))/x,x]
```

```
[Out] Defer[Int][(Sqrt[d + e*x^2]*(a + b*ArcCsch[c*x]))/x, x]
```

Rubi steps

$$\int \frac{\sqrt{d+ex^2}\left(a+b\mathrm{csch}^{-1}(cx)\right)}{x}\,dx=\int \frac{\sqrt{d+ex^2}\left(a+b\mathrm{csch}^{-1}(cx)\right)}{x}\,dx$$

**Mathematica** [A] time = 5.62, size = 0, normalized size = 0.00

$$\int \frac{\sqrt{d+ex^2}\left(a+b\mathrm{csch}^{-1}(cx)\right)}{x}\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[(Sqrt[d + e*x^2]*(a + b*ArcCsch[c*x]))/x,x]
```

```
[Out] Integrate[(Sqrt[d + e*x^2]*(a + b*ArcCsch[c*x]))/x, x]
```

**fricas** [A] time = 0.52, size = 0, normalized size = 0.00

$$\mathrm{integral}\left(\frac{\sqrt{ex^2+d}\,(b\,\mathrm{arcsch}\,(cx)+a)}{x},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))*(e*x^2+d)^(1/2)/x,x, algorithm="fricas")
```

```
[Out] integral(sqrt(e*x^2 + d)*(b*arccsch(c*x) + a)/x, x)
```

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

$$\int \frac{\sqrt{ex^2+d}\,(b\,\mathrm{arcsch}\,(cx)+a)}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))*(e*x^2+d)^(1/2)/x,x, algorithm="giac")
```

```
[Out] integrate(sqrt(e*x^2 + d)*(b*arccsch(c*x) + a)/x, x)
```

**maple [A]** time = 0.45, size = 0, normalized size = 0.00

$$\int \frac{(a+b\,\mathrm{arccsch}\,(cx))\,\sqrt{e\,x^2+d}}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a+b*arccsch(c*x))*(e*x^2+d)^(1/2)/x,x)
```

```
[Out] int((a+b*arccsch(c*x))*(e*x^2+d)^(1/2)/x,x)
```

**maxima [A]** time = 0.00, size = 0, normalized size = 0.00

$$-\left(\sqrt{d}\,\operatorname{arsinh}\left(\frac{d}{\sqrt{de}\,|x|}\right)-\sqrt{ex^2+d}\right)a+b\int \frac{\sqrt{ex^2+d}\,\log\left(\sqrt{\frac{1}{c^2x^2}+1}+\frac{1}{cx}\right)}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))*(e*x^2+d)^(1/2)/x,x, algorithm="maxima")
```

```
[Out] -(sqrt(d)*arcsinh(d/(sqrt(d*e)*abs(x))) - sqrt(e*x^2 + d))*a + b*integrate(
sqrt(e*x^2 + d)*log(sqrt(1/(c^2*x^2) + 1) + 1/(c*x))/x, x)
```

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

$$\int \frac{\sqrt{e\,x^2+d}\,\left(a+b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)\right)}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(((d + e*x^2)^(1/2)*(a + b*asinh(1/(c*x))))/x,x)
```

```
[Out] int(((d + e*x^2)^(1/2)*(a + b*asinh(1/(c*x))))/x, x)
```

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

$$\int \frac{(a+b\operatorname{acsch}(cx))\sqrt{d+ex^2}}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*acsch(c*x))*(e*x**2+d)**(1/2)/x,x)
```

```
[Out] Integral((a + b*acsch(c*x))*sqrt(d + e*x**2)/x, x)
```

# 3.122 $\int \frac{\sqrt{d+ex^2}\left(a+b\text{csch}^{-1}(cx)\right)}{x^3}\,dx$

**Optimal**. Leaf size=26

$$\text{Int}\left(\frac{\sqrt{d+ex^2}\left(a+b\text{csch}^{-1}(cx)\right)}{x^3},x\right)$$

[Out] Unintegrable((a+b*arccsch(c*x))*(e*x^2+d)^(1/2)/x^3,x)

**Rubi [A]** time = 0.11, 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 = {}

$$\int \frac{\sqrt{d+ex^2}\left(a+b\text{csch}^{-1}(cx)\right)}{x^3}\,dx$$

Verification is Not applicable to the result.

[In] Int[(Sqrt[d + e*x^2]*(a + b*ArcCsch[c*x]))/x^3,x]

[Out] Defer[Int][(Sqrt[d + e*x^2]*(a + b*ArcCsch[c*x]))/x^3, x]

Rubi steps

$$\int \frac{\sqrt{d+ex^2}\left(a+b\text{csch}^{-1}(cx)\right)}{x^3}\,dx=\int \frac{\sqrt{d+ex^2}\left(a+b\text{csch}^{-1}(cx)\right)}{x^3}\,dx$$

**Mathematica [A]** time = 5.40, size = 0, normalized size = 0.00

$$\int \frac{\sqrt{d+ex^2}\left(a+b\text{csch}^{-1}(cx)\right)}{x^3}\,dx$$

Verification is Not applicable to the result.

[In] Integrate[(Sqrt[d + e*x^2]*(a + b*ArcCsch[c*x]))/x^3,x]

[Out] Integrate[(Sqrt[d + e*x^2]*(a + b*ArcCsch[c*x]))/x^3, x]

**fricas [A]** time = 0.64, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{\sqrt{ex^2+d}\,(b\,\text{arcsch}\,(cx)+a)}{x^3},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))*(e*x^2+d)^(1/2)/x^3,x, algorithm="fricas")
```

```
[Out] integral(sqrt(e*x^2 + d)*(b*arccsch(c*x) + a)/x^3, x)
```

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

$$\int \frac{\sqrt{ex^2+d}\,(b\,\mathrm{arcsch}\,(cx)+a)}{x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))*(e*x^2+d)^(1/2)/x^3,x, algorithm="giac")
```

```
[Out] integrate(sqrt(e*x^2 + d)*(b*arccsch(c*x) + a)/x^3, x)
```

**maple [A]** time = 0.45, size = 0, normalized size = 0.00

$$\int \frac{(a+b\,\mathrm{arccsch}\,(cx))\sqrt{e\,x^2+d}}{x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a+b*arccsch(c*x))*(e*x^2+d)^(1/2)/x^3,x)
```

```
[Out] int((a+b*arccsch(c*x))*(e*x^2+d)^(1/2)/x^3,x)
```

**maxima [A]** time = 0.00, size = 0, normalized size = 0.00

$$-\frac{1}{2}\left(\frac{e\,\mathrm{arsinh}\left(\frac{d}{\sqrt{de}\,|x|}\right)}{\sqrt{d}}-\frac{\sqrt{ex^2+d}\,e}{d}+\frac{\left(ex^2+d\right)^{\frac{3}{2}}}{dx^2}\right)a+b\int \frac{\sqrt{ex^2+d}\,\log\left(\sqrt{\frac{1}{c^2x^2}+1}+\frac{1}{cx}\right)}{x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))*(e*x^2+d)^(1/2)/x^3,x, algorithm="maxima")
```

```
[Out] -1/2*(e*arcsinh(d/(sqrt(d*e)*abs(x)))/sqrt(d) - sqrt(e*x^2 + d)*e/d + (e*x^
2 + d)^(3/2)/(d*x^2))*a + b*integrate(sqrt(e*x^2 + d)*log(sqrt(1/(c^2*x^2)
+ 1) + 1/(c*x))/x^3, x)
```

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

$$\int \frac{\sqrt{e\,x^2+d}\,\left(a+b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)\right)}{x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(((d + e*x^2)^(1/2)*(a + b*asinh(1/(c*x))))/x^3,x)
```

```
[Out] int(((d + e*x^2)^(1/2)*(a + b*asinh(1/(c*x))))/x^3, x)
```

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

$$\int \frac{(a + b\,\mathrm{acsch}\,(cx))\,\sqrt{d + ex^2}}{x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*acsch(c*x))*(e*x**2+d)**(1/2)/x**3,x)
```

```
[Out] Integral((a + b*acsch(c*x))*sqrt(d + e*x**2)/x**3, x)
```

# 3.123 $\int x^2\sqrt{d+ex^2}\,\left(a+b\textbf{csch}^{-1}(cx)\right)\,dx$

**Optimal**. Leaf size=26

$$\mathrm{Int}\left(x^2\sqrt{d+ex^2}\,\left(a+b\mathrm{csch}^{-1}(cx)\right),x\right)$$

```
[Out] Unintegrable(x^2*(a+b*arccsch(c*x))*(e*x^2+d)^(1/2),x)
```

**Rubi [A]** time = 0.10, 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 = {}

$$\int x^2\sqrt{d+ex^2}\,\left(a+b\mathrm{csch}^{-1}(cx)\right)\,dx$$

Verification is Not applicable to the result.

```
[In] Int[x^2*Sqrt[d + e*x^2]*(a + b*ArcCsch[c*x]),x]
```

```
[Out] Defer[Int][x^2*Sqrt[d + e*x^2]*(a + b*ArcCsch[c*x]), x]
```

Rubi steps

$$\int x^2\sqrt{d+ex^2}\,\left(a+b\mathrm{csch}^{-1}(cx)\right)\,dx=\int x^2\sqrt{d+ex^2}\,\left(a+b\mathrm{csch}^{-1}(cx)\right)\,dx$$

**Mathematica [A]** time = 9.31, size = 0, normalized size = 0.00

$$\int x^2\sqrt{d+ex^2}\,\left(a+b\mathrm{csch}^{-1}(cx)\right)\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[x^2*Sqrt[d + e*x^2]*(a + b*ArcCsch[c*x]),x]
```

```
[Out] Integrate[x^2*Sqrt[d + e*x^2]*(a + b*ArcCsch[c*x]), x]
```

**fricas [A]** time = 0.66, size = 0, normalized size = 0.00

$$\mathrm{integral}\left(\left(bx^2\,\mathrm{arcsch}\,(cx)+ax^2\right)\sqrt{ex^2+d},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*(a+b*arccsch(c*x))*(e*x^2+d)^(1/2),x, algorithm="fricas")
```

```
[Out] integral((b*x^2*arccsch(c*x) + a*x^2)*sqrt(e*x^2 + d), x)
```

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

$$\int \sqrt{ex^2 + d}\,(b\,\mathrm{arcsch}\,(cx) + a)x^2\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*(a+b*arccsch(c*x))*(e*x^2+d)^(1/2),x, algorithm="giac")
[Out] integrate(sqrt(e*x^2 + d)*(b*arccsch(c*x) + a)*x^2, x)
```

**maple [A]** time = 0.43, size = 0, normalized size = 0.00

$$\int x^2\,(a + b\,\mathrm{arccsch}\,(cx))\,\sqrt{e\,x^2 + d}\,\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^2*(a+b*arccsch(c*x))*(e*x^2+d)^(1/2),x)
[Out] int(x^2*(a+b*arccsch(c*x))*(e*x^2+d)^(1/2),x)
```

**maxima [A]** time = 0.00, size = 0, normalized size = 0.00

$$\frac{1}{8}\left(\frac{2\left(ex^2 + d\right)^{\frac{3}{2}}x}{e} - \frac{\sqrt{ex^2 + d}\,dx}{e} - \frac{d^2\,\mathrm{arsinh}\left(\frac{ex}{\sqrt{de}}\right)}{e^{\frac{3}{2}}}\right)a + b\int \sqrt{ex^2 + d}\,x^2\log\left(\sqrt{\frac{1}{c^2x^2} + 1} + \frac{1}{cx}\right)dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*(a+b*arccsch(c*x))*(e*x^2+d)^(1/2),x, algorithm="maxima")
[Out] 1/8*(2*(e*x^2 + d)^(3/2)*x/e - sqrt(e*x^2 + d)*d*x/e - d^2*arcsinh(e*x/sqrt
(d*e))/e^(3/2))*a + b*integrate(sqrt(e*x^2 + d)*x^2*log(sqrt(1/(c^2*x^2) +
1) + 1/(c*x)), x)
```

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

$$\int x^2\,\sqrt{e\,x^2 + d}\,\,\left(a + b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)\right)dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^2*(d + e*x^2)^(1/2)*(a + b*asinh(1/(c*x))),x)
[Out] int(x^2*(d + e*x^2)^(1/2)*(a + b*asinh(1/(c*x))), x)
```

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

$$\int x^2 (a + b\,\text{acsch}\,(cx))\sqrt{d + ex^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**2*(a+b*acsch(c*x))*(e*x**2+d)**(1/2),x)
```

```
[Out] Integral(x**2*(a + b*acsch(c*x))*sqrt(d + e*x**2), x)
```

# 3.124 $\int \sqrt{d+ex^2} \left(a+b\operatorname{csch}^{-1}(cx)\right) dx$

**Optimal**. Leaf size=23

$$\operatorname{Int}\left(\sqrt{d+ex^2} \left(a+b\operatorname{csch}^{-1}(cx)\right),x\right)$$

```
[Out] Unintegrable((a+b*arccsch(c*x))*(e*x^2+d)^(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 = {}

$$\int \sqrt{d+ex^2} \left(a+b\operatorname{csch}^{-1}(cx)\right) dx$$

Verification is Not applicable to the result.

```
[In] Int[Sqrt[d + e*x^2]*(a + b*ArcCsch[c*x]),x]
[Out] Defer[Int][Sqrt[d + e*x^2]*(a + b*ArcCsch[c*x]), x]
```

Rubi steps

$$\int \sqrt{d+ex^2} \left(a+b\operatorname{csch}^{-1}(cx)\right) dx = \int \sqrt{d+ex^2} \left(a+b\operatorname{csch}^{-1}(cx)\right) dx$$

**Mathematica** [A] time = 2.66, size = 0, normalized size = 0.00

$$\int \sqrt{d+ex^2} \left(a+b\operatorname{csch}^{-1}(cx)\right) dx$$

Verification is Not applicable to the result.

```
[In] Integrate[Sqrt[d + e*x^2]*(a + b*ArcCsch[c*x]),x]
[Out] Integrate[Sqrt[d + e*x^2]*(a + b*ArcCsch[c*x]), x]
```

**fricas** [A] time = 0.43, size = 0, normalized size = 0.00

$$\operatorname{integral}\left(\sqrt{ex^2+d}\,(b\operatorname{arcsch}(cx)+a),x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))*(e*x^2+d)^(1/2),x, algorithm="fricas")
[Out] integral(sqrt(e*x^2 + d)*(b*arccsch(c*x) + a), x)
```

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

$$\int \sqrt{ex^2 + d}\,(b\,\mathrm{arcsch}\,(cx) + a)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))*(e*x^2+d)^(1/2),x, algorithm="giac")
```

```
[Out] integrate(sqrt(e*x^2 + d)*(b*arccsch(c*x) + a), x)
```

**maple** [A] time = 0.42, size = 0, normalized size = 0.00

$$\int (a + b\,\mathrm{arccsch}\,(cx))\,\sqrt{e\,x^2 + d}\;dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a+b*arccsch(c*x))*(e*x^2+d)^(1/2),x)
```

```
[Out] int((a+b*arccsch(c*x))*(e*x^2+d)^(1/2),x)
```

**maxima** [A] time = 0.00, size = 0, normalized size = 0.00

$$\frac{1}{2}\left(\sqrt{ex^2 + d}\,x + \frac{d\,\mathrm{arsinh}\left(\frac{ex}{\sqrt{de}}\right)}{\sqrt{e}}\right)a + b\int \sqrt{ex^2 + d}\,\log\left(\sqrt{\frac{1}{c^2x^2} + 1} + \frac{1}{cx}\right)dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))*(e*x^2+d)^(1/2),x, algorithm="maxima")
```

```
[Out] 1/2*(sqrt(e*x^2 + d)*x + d*arcsinh(e*x/sqrt(d*e))/sqrt(e))*a + b*integrate(
sqrt(e*x^2 + d)*log(sqrt(1/(c^2*x^2) + 1) + 1/(c*x)), x)
```

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

$$\int \sqrt{e\,x^2 + d}\;\left(a + b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)\right)dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((d + e*x^2)^(1/2)*(a + b*asinh(1/(c*x))),x)
```

```
[Out] int((d + e*x^2)^(1/2)*(a + b*asinh(1/(c*x))), x)
```

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

$$\int (a + b\,\mathrm{acsch}\,(cx))\,\sqrt{d + ex^2}\;dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*acsch(c*x))*(e*x**2+d)**(1/2),x)
```

```
[Out] Integral((a + b*acsch(c*x))*sqrt(d + e*x**2), x)
```

# 3.125 $\int \frac{\sqrt{d+ex^2}\left(a+b\text{csch}^{-1}(cx)\right)}{x^2}\,dx$

**Optimal**. Leaf size=26

$$\text{Int}\left(\frac{\sqrt{d+ex^2}\left(a+b\text{csch}^{-1}(cx)\right)}{x^2},x\right)$$

```
[Out] Unintegrable((a+b*arccsch(c*x))*(e*x^2+d)^(1/2)/x^2,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 = {}

$$\int \frac{\sqrt{d+ex^2}\left(a+b\text{csch}^{-1}(cx)\right)}{x^2}\,dx$$

Verification is Not applicable to the result.

```
[In] Int[(Sqrt[d + e*x^2]*(a + b*ArcCsch[c*x]))/x^2,x]
```

```
[Out] Defer[Int][(Sqrt[d + e*x^2]*(a + b*ArcCsch[c*x]))/x^2, x]
```

Rubi steps

$$\int \frac{\sqrt{d+ex^2}\left(a+b\text{csch}^{-1}(cx)\right)}{x^2}\,dx=\int \frac{\sqrt{d+ex^2}\left(a+b\text{csch}^{-1}(cx)\right)}{x^2}\,dx$$

**Mathematica [A]** time = 1.78, size = 0, normalized size = 0.00

$$\int \frac{\sqrt{d+ex^2}\left(a+b\text{csch}^{-1}(cx)\right)}{x^2}\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[(Sqrt[d + e*x^2]*(a + b*ArcCsch[c*x]))/x^2,x]
```

```
[Out] Integrate[(Sqrt[d + e*x^2]*(a + b*ArcCsch[c*x]))/x^2, x]
```

**fricas [A]** time = 0.53, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{\sqrt{ex^2+d}\,(b\,\text{arcsch}\,(cx)+a)}{x^2},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))*(e*x^2+d)^(1/2)/x^2,x, algorithm="fricas")
```

```
[Out] integral(sqrt(e*x^2 + d)*(b*arccsch(c*x) + a)/x^2, x)
```

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

$$\int \frac{\sqrt{ex^2 + d}\,(b\,\mathrm{arcsch}\,(cx) + a)}{x^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))*(e*x^2+d)^(1/2)/x^2,x, algorithm="giac")
```

```
[Out] integrate(sqrt(e*x^2 + d)*(b*arccsch(c*x) + a)/x^2, x)
```

**maple [A]** time = 0.46, size = 0, normalized size = 0.00

$$\int \frac{(a + b\,\mathrm{arccsch}\,(cx))\,\sqrt{e\,x^2 + d}}{x^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a+b*arccsch(c*x))*(e*x^2+d)^(1/2)/x^2,x)
```

```
[Out] int((a+b*arccsch(c*x))*(e*x^2+d)^(1/2)/x^2,x)
```

**maxima [A]** time = 0.00, size = 0, normalized size = 0.00

$$\left(\sqrt{e}\,\mathrm{arsinh}\left(\frac{ex}{\sqrt{de}}\right) - \frac{\sqrt{ex^2 + d}}{x}\right)a + b\int \frac{\sqrt{ex^2 + d}\,\log\left(\sqrt{\frac{1}{c^2x^2} + 1} + \frac{1}{cx}\right)}{x^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))*(e*x^2+d)^(1/2)/x^2,x, algorithm="maxima")
```

```
[Out] (sqrt(e)*arcsinh(e*x/sqrt(d*e)) - sqrt(e*x^2 + d)/x)*a + b*integrate(sqrt(e
*x^2 + d)*log(sqrt(1/(c^2*x^2) + 1) + 1/(c*x))/x^2, x)
```

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

$$\int \frac{\sqrt{e\,x^2 + d}\,\left(a + b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)\right)}{x^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(((d + e*x^2)^(1/2)*(a + b*asinh(1/(c*x))))/x^2,x)
```

```
[Out] int(((d + e*x^2)^(1/2)*(a + b*asinh(1/(c*x))))/x^2, x)
```

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

$$\int \frac{(a+b\,\mathrm{acsch}\,(cx))\,\sqrt{d+ex^2}}{x^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*acsch(c*x))*(e*x**2+d)**(1/2)/x**2,x)
```

```
[Out] Integral((a + b*acsch(c*x))*sqrt(d + e*x**2)/x**2, x)
```

## 3.126 $\int \frac{\sqrt{d+ex^2}\left(a+b\operatorname{csch}^{-1}(cx)\right)}{x^4}\,dx$

**Optimal**. Leaf size=389

$$-\frac{\left(d+ex^2\right)^{3/2}\left(a+b\operatorname{csch}^{-1}(cx)\right)}{3dx^3}-\frac{bex\left(c^2d-3e\right)\sqrt{d+ex^2}\,F\left(\tan^{-1}(cx)|1-\frac{e}{c^2d}\right)}{9d^2\sqrt{-c^2x^2}\sqrt{-c^2x^2-1}\sqrt{\frac{d+ex^2}{d\left(c^2x^2+1\right)}}}-\frac{2bc\sqrt{-c^2x^2-1}\left(c^2d-2e\right)\sqrt{d+}}{9d\sqrt{-c^2x^2}}$$

```
[Out] -1/3*(e*x^2+d)^(3/2)*(a+b*arccsch(c*x))/d/x^3-2/9*b*c^3*(c^2*d-2*e)*x^2*(e*
x^2+d)^(1/2)/d/(-c^2*x^2)^(1/2)/(-c^2*x^2-1)^(1/2)-2/9*b*c*(c^2*d-2*e)*(-c^
2*x^2-1)^(1/2)*(e*x^2+d)^(1/2)/d/(-c^2*x^2)^(1/2)+1/9*b*c*(-c^2*x^2-1)^(1/2
)*(e*x^2+d)^(1/2)/x^2/(-c^2*x^2)^(1/2)+2/9*b*c^2*(c^2*d-2*e)*x*(1/(c^2*x^2+
1))^(1/2)*(c^2*x^2+1)^(1/2)*EllipticE(c*x/(c^2*x^2+1)^(1/2),(1-e/c^2/d)^(1/
2))*(e*x^2+d)^(1/2)/d/(-c^2*x^2)^(1/2)/(-c^2*x^2-1)^(1/2)/((e*x^2+d)/d/(c^2
*x^2+1))^(1/2)-1/9*b*(c^2*d-3*e)*e*x*(1/(c^2*x^2+1))^(1/2)*(c^2*x^2+1)^(1/2
)*EllipticF(c*x/(c^2*x^2+1)^(1/2),(1-e/c^2/d)^(1/2))*(e*x^2+d)^(1/2)/d^2/(-
c^2*x^2)^(1/2)/(-c^2*x^2-1)^(1/2)/((e*x^2+d)/d/(c^2*x^2+1))^(1/2)
```

**Rubi** [A] time = 0.43, antiderivative size = 389, normalized size of antiderivative = 1.00, number of steps used = 8, number of rules used = 9, integrand size = 23, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.391, Rules used = {264, 6302, 12, 474, 583, 531, 418, 492, 411}

$$-\frac{\left(d+ex^2\right)^{3/2}\left(a+b\operatorname{csch}^{-1}(cx)\right)}{3dx^3}-\frac{bex\left(c^2d-3e\right)\sqrt{d+ex^2}\,F\left(\tan^{-1}(cx)|1-\frac{e}{c^2d}\right)}{9d^2\sqrt{-c^2x^2}\sqrt{-c^2x^2-1}\sqrt{\frac{d+ex^2}{d\left(c^2x^2+1\right)}}}-\frac{2bc^3x^2\left(c^2d-2e\right)\sqrt{d+ex^2}}{9d\sqrt{-c^2x^2}\sqrt{-c^2x^2-1}}-\frac{2b}{}$$

Antiderivative was successfully verified.

```
[In] Int[(Sqrt[d + e*x^2]*(a + b*ArcCsch[c*x]))/x^4,x]
```

```
[Out] (-2*b*c^3*(c^2*d - 2*e)*x^2*Sqrt[d + e*x^2])/(9*d*Sqrt[-(c^2*x^2)]*Sqrt[-1
- c^2*x^2]) - (2*b*c*(c^2*d - 2*e)*Sqrt[-1 - c^2*x^2]*Sqrt[d + e*x^2])/(9*d
*Sqrt[-(c^2*x^2)]) + (b*c*Sqrt[-1 - c^2*x^2]*Sqrt[d + e*x^2])/(9*x^2*Sqrt[-
(c^2*x^2)]) - ((d + e*x^2)^(3/2)*(a + b*ArcCsch[c*x]))/(3*d*x^3) + (2*b*c^2
*(c^2*d - 2*e)*x*Sqrt[d + e*x^2]*EllipticE[ArcTan[c*x], 1 - e/(c^2*d)])/(9*
d*Sqrt[-(c^2*x^2)]*Sqrt[-1 - c^2*x^2]*Sqrt[(d + e*x^2)/(d*(1 + c^2*x^2))])
- (b*(c^2*d - 3*e)*e*x*Sqrt[d + e*x^2]*EllipticF[ArcTan[c*x], 1 - e/(c^2*d)
])/(9*d^2*Sqrt[-(c^2*x^2)]*Sqrt[-1 - c^2*x^2]*Sqrt[(d + e*x^2)/(d*(1 + c^2*
x^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 264

```
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] /; FreeQ[{a, b, c, m, n,
 p}, x] && EqQ[(m + 1)/n + p + 1, 0] && NeQ[m, -1]
```

Rule 411

```
Int[Sqrt[(a_) + (b_.)*(x_)^2]/((c_) + (d_.)*(x_)^2)^(3/2), x_Symbol] :> Sim
p[(Sqrt[a + b*x^2]*EllipticE[ArcTan[Rt[d/c, 2]*x], 1 - (b*c)/(a*d)])/(c*Rt[
d/c, 2]*Sqrt[c + d*x^2]*Sqrt[(c*(a + b*x^2))/(a*(c + d*x^2))]), x] /; FreeQ
[{a, b, c, d}, x] && PosQ[b/a] && PosQ[d/c]
```

Rule 418

```
Int[1/(Sqrt[(a_) + (b_.)*(x_)^2]*Sqrt[(c_) + (d_.)*(x_)^2]), x_Symbol] :> S
imp[(Sqrt[a + b*x^2]*EllipticF[ArcTan[Rt[d/c, 2]*x], 1 - (b*c)/(a*d)])/(a*R
t[d/c, 2]*Sqrt[c + d*x^2]*Sqrt[(c*(a + b*x^2))/(a*(c + d*x^2))]), x] /; Fre
eQ[{a, b, c, d}, x] && PosQ[d/c] && PosQ[b/a] &&  !SimplerSqrtQ[b/a, d/c]
```

Rule 474

```
Int[((e_.)*(x_))^(m_)*((a_) + (b_.)*(x_)^(n_))^(p_)*((c_) + (d_.)*(x_)^(n_)
)^(q_), x_Symbol] :> Simp[(c*(e*x)^(m + 1)*(a + b*x^n)^(p + 1)*(c + d*x^n)^
(q - 1))/(a*e*(m + 1)), x] - Dist[1/(a*e^n*(m + 1)), Int[(e*x)^(m + n)*(a +
 b*x^n)^p*(c + d*x^n)^(q - 2)*Simp[c*(c*b - a*d)*(m + 1) + c*n*(b*c*(p + 1)
 + a*d*(q - 1)) + d*((c*b - a*d)*(m + 1) + c*b*n*(p + q))*x^n, x], x], x] /
; FreeQ[{a, b, c, d, e, p}, x] && NeQ[b*c - a*d, 0] && IGtQ[n, 0] && GtQ[q,
 1] && LtQ[m, -1] && IntBinomialQ[a, b, c, d, e, m, n, p, q, x]
```

Rule 492

```
Int[(x_)^2/(Sqrt[(a_) + (b_.)*(x_)^2]*Sqrt[(c_) + (d_.)*(x_)^2]), x_Symbol]
 :> Simp[(x*Sqrt[a + b*x^2])/(b*Sqrt[c + d*x^2]), x] - Dist[c/b, Int[Sqrt[a
 + b*x^2]/(c + d*x^2)^(3/2), x], x] /; FreeQ[{a, b, c, d}, x] && NeQ[b*c -
a*d, 0] && PosQ[b/a] && PosQ[d/c] &&  !SimplerSqrtQ[b/a, d/c]
```

Rule 531

```
Int[((a_) + (b_.)*(x_)^(n_))^(p_.)*((c_) + (d_.)*(x_)^(n_))^(q_.)*((e_) + (
f_.)*(x_)^(n_)), x_Symbol] :> Dist[e, Int[(a + b*x^n)^p*(c + d*x^n)^q, x],
x] + Dist[f, Int[x^n*(a + b*x^n)^p*(c + d*x^n)^q, x], x] /; FreeQ[{a, b, c,
 d, e, f, n, p, q}, x]
```

Rule 583

```
Int[((g_.)*(x_))^(m_)*((a_) + (b_.)*(x_)^(n_))^(p_.)*((c_) + (d_.)*(x_)^(n_
))^(q_.)*((e_) + (f_.)*(x_)^(n_)), x_Symbol] :> Simp[(e*(g*x)^(m + 1)*(a +
b*x^n)^(p + 1)*(c + d*x^n)^(q + 1))/(a*c*g*(m + 1)), x] + Dist[1/(a*c*g^n*(
m + 1)), Int[(g*x)^(m + n)*(a + b*x^n)^p*(c + d*x^n)^q*Simp[a*f*c*(m + 1) -
 e*(b*c + a*d)*(m + n + 1) - e*n*(b*c*p + a*d*q) - b*e*d*(m + n*(p + q + 2)
 + 1)*x^n, x], x], x] /; FreeQ[{a, b, c, d, e, f, g, p, q}, x] && IGtQ[n, 0
] && LtQ[m, -1]
```

Rule 6302

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))*((f_.)*(x_))^(m_.)*((d_.) + (e_.)*(
x_)^2)^(p_.), x_Symbol] :> With[{u = IntHide[(f*x)^m*(d + e*x^2)^p, x]}, Di
st[a + b*ArcCsch[c*x], u, x] - Dist[(b*c*x)/Sqrt[-(c^2*x^2)], Int[SimplifyI
ntegrand[u/(x*Sqrt[-1 - c^2*x^2]), x], x], x]] /; FreeQ[{a, b, c, d, e, f,
m, p}, x] && ((IGtQ[p, 0] &&  !(ILtQ[(m - 1)/2, 0] && GtQ[m + 2*p + 3, 0]))
 || (IGtQ[(m + 1)/2, 0] &&  !(ILtQ[p, 0] && GtQ[m + 2*p + 3, 0])) || (ILtQ[
(m + 2*p + 1)/2, 0] &&  !ILtQ[(m - 1)/2, 0]))
```

Rubi steps

$$\int \frac{\sqrt{d+ex^2}\left(a+b\operatorname{csch}^{-1}(cx)\right)}{x^4}\,dx = -\frac{\left(d+ex^2\right)^{3/2}\left(a+b\operatorname{csch}^{-1}(cx)\right)}{3dx^3} - \frac{(bcx)\int -\frac{\left(d+ex^2\right)^{3/2}}{3dx^4\sqrt{-1-c^2x^2}}\,dx}{\sqrt{-c^2x^2}}$$

$$= -\frac{\left(d+ex^2\right)^{3/2}\left(a+b\operatorname{csch}^{-1}(cx)\right)}{3dx^3} + \frac{(bcx)\int \frac{\left(d+ex^2\right)^{3/2}}{x^4\sqrt{-1-c^2x^2}}\,dx}{3d\sqrt{-c^2x^2}}$$

$$= \frac{bc\sqrt{-1-c^2x^2}\sqrt{d+ex^2}}{9x^2\sqrt{-c^2x^2}} - \frac{\left(d+ex^2\right)^{3/2}\left(a+b\operatorname{csch}^{-1}(cx)\right)}{3dx^3} - \frac{(bcx)\int \frac{2d\left(c^2d-2e\right.}{x^2\sqrt{-1-}}}{9d\sqrt{-}}$$

$$= -\frac{2bc\left(c^2d-2e\right)\sqrt{-1-c^2x^2}\sqrt{d+ex^2}}{9d\sqrt{-c^2x^2}} + \frac{bc\sqrt{-1-c^2x^2}\sqrt{d+ex^2}}{9x^2\sqrt{-c^2x^2}} - \frac{\left(d+ex^2\right.}{}$$

$$= -\frac{2bc\left(c^2d-2e\right)\sqrt{-1-c^2x^2}\sqrt{d+ex^2}}{9d\sqrt{-c^2x^2}} + \frac{bc\sqrt{-1-c^2x^2}\sqrt{d+ex^2}}{9x^2\sqrt{-c^2x^2}} - \frac{\left(d+ex^2\right.}{}$$

$$= -\frac{2bc^3\left(c^2d-2e\right)x^2\sqrt{d+ex^2}}{9d\sqrt{-c^2x^2}\sqrt{-1-c^2x^2}} - \frac{2bc\left(c^2d-2e\right)\sqrt{-1-c^2x^2}\sqrt{d+ex^2}}{9d\sqrt{-c^2x^2}} + \frac{bc\sqrt{-}}{}$$

$$= -\frac{2bc^3\left(c^2d-2e\right)x^2\sqrt{d+ex^2}}{9d\sqrt{-c^2x^2}\sqrt{-1-c^2x^2}} - \frac{2bc\left(c^2d-2e\right)\sqrt{-1-c^2x^2}\sqrt{d+ex^2}}{9d\sqrt{-c^2x^2}} + \frac{bc\sqrt{-}}{}$$

**Mathematica [C]** time = 0.62, size = 237, normalized size = 0.61

$$-\frac{\sqrt{d+ex^2}\left(3a\left(d+ex^2\right)+bcx\sqrt{\frac{1}{c^2x^2}+1}\left(2c^2dx^2-d-4ex^2\right)+3b\operatorname{csch}^{-1}(cx)\left(d+ex^2\right)\right)}{9dx^3} - \frac{ibcx\sqrt{\frac{1}{c^2x^2}+1}\sqrt{\frac{ex^2}{d}+1}}{}$$

Antiderivative was successfully verified.

```
[In] Integrate[(Sqrt[d + e*x^2]*(a + b*ArcCsch[c*x]))/x^4,x]
```

```
[Out] -1/9*(Sqrt[d + e*x^2]*(b*c*Sqrt[1 + 1/(c^2*x^2)]*x*(-d + 2*c^2*d*x^2 - 4*e*
x^2) + 3*a*(d + e*x^2) + 3*b*(d + e*x^2)*ArcCsch[c*x]))/(d*x^3) - ((I/9)*b*
c*Sqrt[1 + 1/(c^2*x^2)]*x*Sqrt[1 + (e*x^2)/d]*(2*c^2*d*(c^2*d - 2*e)*Ellipt
icE[I*ArcSinh[Sqrt[c^2]*x], e/(c^2*d)] + (-2*c^4*d^2 + 5*c^2*d*e - 3*e^2)*E
llipticF[I*ArcSinh[Sqrt[c^2]*x], e/(c^2*d)]))/(Sqrt[c^2]*d*Sqrt[1 + c^2*x^2
]*Sqrt[d + e*x^2])
```

**fricas [F]** time = 0.66, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{\sqrt{ex^2+d}\,(b\,\text{arcsch}\,(cx)+a)}{x^4},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))*(e*x^2+d)^(1/2)/x^4,x, algorithm="fricas")
[Out] integral(sqrt(e*x^2 + d)*(b*arccsch(c*x) + a)/x^4, x)
```

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

$$\int \frac{\sqrt{ex^2+d}\,(b\,\text{arcsch}\,(cx)+a)}{x^4}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))*(e*x^2+d)^(1/2)/x^4,x, algorithm="giac")
[Out] integrate(sqrt(e*x^2 + d)*(b*arccsch(c*x) + a)/x^4, x)
```

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

$$\int \frac{(a+b\,\text{arccsch}\,(cx))\sqrt{e\,x^2+d}}{x^4}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a+b*arccsch(c*x))*(e*x^2+d)^(1/2)/x^4,x)
[Out] int((a+b*arccsch(c*x))*(e*x^2+d)^(1/2)/x^4,x)
```

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

$$-\frac{1}{3}\,b\left(\frac{\left(ex^2+d\right)^{\frac{3}{2}}\log\left(\sqrt{c^2x^2+1}\,+1\right)}{dx^3}+3\int -\frac{\left(c^2ex^4-\left(3\,d\log(c)-d\right)c^2x^2-3\,d\log(c)-3\left(c^2dx^2+d\right)\log(x)\right)}{3\left(c^2dx^6+dx^4\right)}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))*(e*x^2+d)^(1/2)/x^4,x, algorithm="maxima")
[Out] -1/3*b*((e*x^2 + d)^(3/2)*log(sqrt(c^2*x^2 + 1) + 1)/(d*x^3) + 3*integrate(
-1/3*(c^2*e*x^4 - (3*d*log(c) - d)*c^2*x^2 - 3*d*log(c) - 3*(c^2*d*x^2 + d)
*log(x))*sqrt(e*x^2 + d)/(c^2*d*x^6 + d*x^4), x) + 3*integrate(1/3*(c^2*e*x
```

```
^2 + c^2*d)*sqrt(e*x^2 + d)/(c^2*d*x^4 + d*x^2 + (c^2*d*x^4 + d*x^2)*sqrt(c
^2*x^2 + 1)), x)) - 1/3*(e*x^2 + d)^(3/2)*a/(d*x^3)
```

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

$$\int \frac{\sqrt{e\,x^2+d}\,\left(a+b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)\right)}{x^4}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(((d + e*x^2)^(1/2)*(a + b*asinh(1/(c*x))))/x^4,x)
```

```
[Out] int(((d + e*x^2)^(1/2)*(a + b*asinh(1/(c*x))))/x^4, x)
```

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

$$\int \frac{(a + b\,\mathrm{acsch}\,(cx))\,\sqrt{d + ex^2}}{x^4}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*acsch(c*x))*(e*x**2+d)**(1/2)/x**4,x)
```

```
[Out] Integral((a + b*acsch(c*x))*sqrt(d + e*x**2)/x**4, x)
```

# 3.127 $\int \frac{\sqrt{d+ex^2}\left(a+b\mathbf{csch}^{-1}(cx)\right)}{x^6}\,dx$

**Optimal**. Leaf size=527

$$\frac{2e\left(d+ex^2\right)^{3/2}\left(a+b\text{csch}^{-1}(cx)\right)}{15d^2x^3}-\frac{\left(d+ex^2\right)^{3/2}\left(a+b\text{csch}^{-1}(cx)\right)}{5dx^5}-\frac{bc\sqrt{-c^2x^2-1}\left(12c^2d+e\right)\sqrt{d+ex^2}}{225dx^2\sqrt{-c^2x^2}}+\frac{bc\sqrt{-c}}{2}$$

```
[Out] -1/5*(e*x^2+d)^(3/2)*(a+b*arccsch(c*x))/d/x^5+2/15*e*(e*x^2+d)^(3/2)*(a+b*a
rccsch(c*x))/d^2/x^3-1/45*b*c^3*(2*c^2*d-e)*e*x^2*(e*x^2+d)^(1/2)/d^2/(-c^2
*x^2)^(1/2)/(-c^2*x^2-1)^(1/2)-2/15*b*c^3*e^2*x^2*(e*x^2+d)^(1/2)/d^2/(-c^2
*x^2)^(1/2)/(-c^2*x^2-1)^(1/2)+1/75*b*c^3*(8*c^4*d^2-3*c^2*d*e-2*e^2)*x^2*(
e*x^2+d)^(1/2)/d^2/(-c^2*x^2)^(1/2)/(-c^2*x^2-1)^(1/2)-1/45*b*c*(2*c^2*d-e)
*e*(-c^2*x^2-1)^(1/2)*(e*x^2+d)^(1/2)/d^2/(-c^2*x^2)^(1/2)-2/15*b*c*e^2*(-c
^2*x^2-1)^(1/2)*(e*x^2+d)^(1/2)/d^2/(-c^2*x^2)^(1/2)+1/75*b*c*(8*c^4*d^2-3*
c^2*d*e-2*e^2)*(-c^2*x^2-1)^(1/2)*(e*x^2+d)^(1/2)/d^2/(-c^2*x^2)^(1/2)+1/25
*b*c*(-c^2*x^2-1)^(1/2)*(e*x^2+d)^(1/2)/x^4/(-c^2*x^2)^(1/2)-1/75*b*c*(4*c^
2*d-e)*(-c^2*x^2-1)^(1/2)*(e*x^2+d)^(1/2)/d/x^2/(-c^2*x^2)^(1/2)+1/45*b*c*e
*(-c^2*x^2-1)^(1/2)*(e*x^2+d)^(1/2)/d/x^2/(-c^2*x^2)^(1/2)+1/45*b*c^2*(2*c^
2*d-e)*e*x*(1/(c^2*x^2+1))^(1/2)*(c^2*x^2+1)^(1/2)*EllipticE(c*x/(c^2*x^2+1
)^(1/2),(1-e/c^2/d)^(1/2))*(e*x^2+d)^(1/2)/d^2/(-c^2*x^2)^(1/2)/(-c^2*x^2-1
)^(1/2)/((e*x^2+d)/d/(c^2*x^2+1))^(1/2)+2/15*b*c^2*e^2*x*(1/(c^2*x^2+1))^(1
/2)*(c^2*x^2+1)^(1/2)*EllipticE(c*x/(c^2*x^2+1)^(1/2),(1-e/c^2/d)^(1/2))*(e
*x^2+d)^(1/2)/d^2/(-c^2*x^2)^(1/2)/(-c^2*x^2-1)^(1/2)/((e*x^2+d)/d/(c^2*x^2
+1))^(1/2)-1/75*b*c^2*(8*c^4*d^2-3*c^2*d*e-2*e^2)*x*(1/(c^2*x^2+1))^(1/2)*(
c^2*x^2+1)^(1/2)*EllipticE(c*x/(c^2*x^2+1)^(1/2),(1-e/c^2/d)^(1/2))*(e*x^2+
d)^(1/2)/d^2/(-c^2*x^2)^(1/2)/(-c^2*x^2-1)^(1/2)/((e*x^2+d)/d/(c^2*x^2+1))^
(1/2)+1/75*b*c^2*(4*c^2*d-e)*e*x*(1/(c^2*x^2+1))^(1/2)*(c^2*x^2+1)^(1/2)*El
lipticF(c*x/(c^2*x^2+1)^(1/2),(1-e/c^2/d)^(1/2))*(e*x^2+d)^(1/2)/d^2/(-c^2*
x^2)^(1/2)/(-c^2*x^2-1)^(1/2)/((e*x^2+d)/d/(c^2*x^2+1))^(1/2)-1/45*b*c^2*e^
2*x*(1/(c^2*x^2+1))^(1/2)*(c^2*x^2+1)^(1/2)*EllipticF(c*x/(c^2*x^2+1)^(1/2)
,(1-e/c^2/d)^(1/2))*(e*x^2+d)^(1/2)/d^2/(-c^2*x^2)^(1/2)/(-c^2*x^2-1)^(1/2)
/((e*x^2+d)/d/(c^2*x^2+1))^(1/2)-2/15*b*e^3*x*(1/(c^2*x^2+1))^(1/2)*(c^2*x^
2+1)^(1/2)*EllipticF(c*x/(c^2*x^2+1)^(1/2),(1-e/c^2/d)^(1/2))*(e*x^2+d)^(1/
2)/d^3/(-c^2*x^2)^(1/2)/(-c^2*x^2-1)^(1/2)/((e*x^2+d)/d/(c^2*x^2+1))^(1/2)
```

**Rubi [A]** time = 0.64, antiderivative size = 527, normalized size of antiderivative = 1.00, number of steps used = 9, number of rules used = 10, integrand size = 23, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.435, Rules used = {271, 264, 6302, 12, 580, 583, 531, 418, 492, 411}

$$\frac{2e\left(d+ex^2\right)^{3/2}\left(a+b\text{csch}^{-1}(cx)\right)}{15d^2x^3}-\frac{\left(d+ex^2\right)^{3/2}\left(a+b\text{csch}^{-1}(cx)\right)}{5dx^5}+\frac{bc^3x^2\left(24c^4d^2-19c^2de-31e^2\right)\sqrt{d+ex^2}}{225d^2\sqrt{-c^2x^2}\sqrt{-c^2x^2-1}}+\frac{b}{}$$

Antiderivative was successfully verified.

```
[In] Int[(Sqrt[d + e*x^2]*(a + b*ArcCsch[c*x]))/x^6,x]
```

```
[Out] (b*c^3*(24*c^4*d^2 - 19*c^2*d*e - 31*e^2)*x^2*Sqrt[d + e*x^2])/(225*d^2*Sqr
t[-(c^2*x^2)]*Sqrt[-1 - c^2*x^2]) + (b*c*(24*c^4*d^2 - 19*c^2*d*e - 31*e^2)
*Sqrt[-1 - c^2*x^2]*Sqrt[d + e*x^2])/(225*d^2*Sqrt[-(c^2*x^2)]) - (b*c*(12*
c^2*d + e)*Sqrt[-1 - c^2*x^2]*Sqrt[d + e*x^2])/(225*d*x^2*Sqrt[-(c^2*x^2)])
 + (b*c*Sqrt[-1 - c^2*x^2]*(d + e*x^2)^(3/2))/(25*d*x^4*Sqrt[-(c^2*x^2)]) -
 ((d + e*x^2)^(3/2)*(a + b*ArcCsch[c*x]))/(5*d*x^5) + (2*e*(d + e*x^2)^(3/2
)*(a + b*ArcCsch[c*x]))/(15*d^2*x^3) - (b*c^2*(24*c^4*d^2 - 19*c^2*d*e - 31
*e^2)*x*Sqrt[d + e*x^2]*EllipticE[ArcTan[c*x], 1 - e/(c^2*d)])/(225*d^2*Sqr
t[-(c^2*x^2)]*Sqrt[-1 - c^2*x^2]*Sqrt[(d + e*x^2)/(d*(1 + c^2*x^2))]) + (2*
b*e*(6*c^4*d^2 - 4*c^2*d*e - 15*e^2)*x*Sqrt[d + e*x^2]*EllipticF[ArcTan[c*x
], 1 - e/(c^2*d)])/(225*d^3*Sqrt[-(c^2*x^2)]*Sqrt[-1 - c^2*x^2]*Sqrt[(d + e
*x^2)/(d*(1 + c^2*x^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 264

```
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] /; FreeQ[{a, b, c, m, n,
 p}, x] && EqQ[(m + 1)/n + p + 1, 0] && NeQ[m, -1]
```

Rule 271

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

Rule 411

```
Int[Sqrt[(a_) + (b_.)*(x_)^2]/((c_) + (d_.)*(x_)^2)^(3/2), x_Symbol] :> Sim
p[(Sqrt[a + b*x^2]*EllipticE[ArcTan[Rt[d/c, 2]*x], 1 - (b*c)/(a*d)])/(c*Rt[
d/c, 2]*Sqrt[c + d*x^2]*Sqrt[(c*(a + b*x^2))/(a*(c + d*x^2))]), x] /; FreeQ
[{a, b, c, d}, x] && PosQ[b/a] && PosQ[d/c]
```

Rule 418

```
Int[1/(Sqrt[(a_) + (b_.)*(x_)^2]*Sqrt[(c_) + (d_.)*(x_)^2]), x_Symbol] :> S
imp[(Sqrt[a + b*x^2]*EllipticF[ArcTan[Rt[d/c, 2]*x], 1 - (b*c)/(a*d)])/(a*R
t[d/c, 2]*Sqrt[c + d*x^2]*Sqrt[(c*(a + b*x^2))/(a*(c + d*x^2))]), x] /; Fre
```

```
eQ[{a, b, c, d}, x] && PosQ[d/c] && PosQ[b/a] &&  !SimplerSqrtQ[b/a, d/c]
```

Rule 492

```
Int[(x_)^2/(Sqrt[(a_) + (b_.)*(x_)^2]*Sqrt[(c_) + (d_.)*(x_)^2]), x_Symbol]
 :> Simp[(x*Sqrt[a + b*x^2])/(b*Sqrt[c + d*x^2]), x] - Dist[c/b, Int[Sqrt[a
 + b*x^2]/(c + d*x^2)^(3/2), x], x] /; FreeQ[{a, b, c, d}, x] && NeQ[b*c -
a*d, 0] && PosQ[b/a] && PosQ[d/c] &&  !SimplerSqrtQ[b/a, d/c]
```

Rule 531

```
Int[((a_) + (b_.)*(x_)^(n_))^(p_.)*((c_) + (d_.)*(x_)^(n_))^(q_.)*((e_) + (
f_.)*(x_)^(n_)), x_Symbol] :> Dist[e, Int[(a + b*x^n)^p*(c + d*x^n)^q, x],
x] + Dist[f, Int[x^n*(a + b*x^n)^p*(c + d*x^n)^q, x], x] /; FreeQ[{a, b, c,
 d, e, f, n, p, q}, x]
```

Rule 580

```
Int[((g_.)*(x_))^(m_)*((a_) + (b_.)*(x_)^(n_))^(p_.)*((c_) + (d_.)*(x_)^(n_
))^(q_.)*((e_) + (f_.)*(x_)^(n_)), x_Symbol] :> Simp[(e*(g*x)^(m + 1)*(a +
b*x^n)^(p + 1)*(c + d*x^n)^q)/(a*g*(m + 1)), x] - Dist[1/(a*g^n*(m + 1)), I
nt[(g*x)^(m + n)*(a + b*x^n)^p*(c + d*x^n)^(q - 1)*Simp[c*(b*e - a*f)*(m +
1) + e*n*(b*c*(p + 1) + a*d*q) + d*((b*e - a*f)*(m + 1) + b*e*n*(p + q + 1)
)*x^n, x], x], x] /; FreeQ[{a, b, c, d, e, f, g, p}, x] && IGtQ[n, 0] && Gt
Q[q, 0] && LtQ[m, -1] &&  !(EqQ[q, 1] && SimplerQ[e + f*x^n, c + d*x^n])
```

Rule 583

```
Int[((g_.)*(x_))^(m_)*((a_) + (b_.)*(x_)^(n_))^(p_.)*((c_) + (d_.)*(x_)^(n_
))^(q_.)*((e_) + (f_.)*(x_)^(n_)), x_Symbol] :> Simp[(e*(g*x)^(m + 1)*(a +
b*x^n)^(p + 1)*(c + d*x^n)^(q + 1))/(a*c*g*(m + 1)), x] + Dist[1/(a*c*g^n*(
m + 1)), Int[(g*x)^(m + n)*(a + b*x^n)^p*(c + d*x^n)^q*Simp[a*f*c*(m + 1) -
 e*(b*c + a*d)*(m + n + 1) - e*n*(b*c*p + a*d*q) - b*e*d*(m + n*(p + q + 2)
 + 1)*x^n, x], x], x] /; FreeQ[{a, b, c, d, e, f, g, p, q}, x] && IGtQ[n, 0
] && LtQ[m, -1]
```

Rule 6302

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))*((f_.)*(x_))^(m_.)*((d_.) + (e_.)*(
x_)^2)^(p_.), x_Symbol] :> With[{u = IntHide[(f*x)^m*(d + e*x^2)^p, x]}, Di
st[a + b*ArcCsch[c*x], u, x] - Dist[(b*c*x)/Sqrt[-(c^2*x^2)], Int[SimplifyI
ntegrand[u/(x*Sqrt[-1 - c^2*x^2]), x], x], x]] /; FreeQ[{a, b, c, d, e, f,
m, p}, x] && ((IGtQ[p, 0] &&  !(ILtQ[(m - 1)/2, 0] && GtQ[m + 2*p + 3, 0]))
 || (IGtQ[(m + 1)/2, 0] &&  !(ILtQ[p, 0] && GtQ[m + 2*p + 3, 0])) || (ILtQ[
```

```
(m + 2*p + 1)/2, 0] &&  !ILtQ[(m - 1)/2, 0]))
```

Rubi steps

$$\int \frac{\sqrt{d+ex^2}\left(a+b\text{csch}^{-1}(cx)\right)}{x^6}\,dx = -\frac{\left(d+ex^2\right)^{3/2}\left(a+b\text{csch}^{-1}(cx)\right)}{5dx^5} + \frac{2e\left(d+ex^2\right)^{3/2}\left(a+b\text{csch}^{-1}(cx)\right)}{15d^2x^3} - \frac{(bcx)}{}$$

$$= -\frac{\left(d+ex^2\right)^{3/2}\left(a+b\text{csch}^{-1}(cx)\right)}{5dx^5} + \frac{2e\left(d+ex^2\right)^{3/2}\left(a+b\text{csch}^{-1}(cx)\right)}{15d^2x^3} - \frac{(bcx)}{}$$

$$= \frac{bc\sqrt{-1-c^2x^2}\left(d+ex^2\right)^{3/2}}{25dx^4\sqrt{-c^2x^2}} - \frac{\left(d+ex^2\right)^{3/2}\left(a+b\text{csch}^{-1}(cx)\right)}{5dx^5} + \frac{2e\left(d+ex^2\right)^{3/2}}{}$$

$$= -\frac{bc\left(12c^2d+e\right)\sqrt{-1-c^2x^2}\sqrt{d+ex^2}}{225dx^2\sqrt{-c^2x^2}} + \frac{bc\sqrt{-1-c^2x^2}\left(d+ex^2\right)^{3/2}}{25dx^4\sqrt{-c^2x^2}} - \frac{\left(d+e\right.}{}$$

$$= \frac{bc\left(24c^4d^2-19c^2de-31e^2\right)\sqrt{-1-c^2x^2}\sqrt{d+ex^2}}{225d^2\sqrt{-c^2x^2}} - \frac{bc\left(12c^2d+e\right)\sqrt{-1-c^2}}{225dx^2\sqrt{-c^2}}$$

$$= \frac{bc\left(24c^4d^2-19c^2de-31e^2\right)\sqrt{-1-c^2x^2}\sqrt{d+ex^2}}{225d^2\sqrt{-c^2x^2}} - \frac{bc\left(12c^2d+e\right)\sqrt{-1-c^2}}{225dx^2\sqrt{-c^2}}$$

$$= \frac{bc^3\left(24c^4d^2-19c^2de-31e^2\right)x^2\sqrt{d+ex^2}}{225d^2\sqrt{-c^2x^2}\sqrt{-1-c^2x^2}} + \frac{bc\left(24c^4d^2-19c^2de-31e^2\right)\sqrt{-}}{225d^2\sqrt{-c^2x^2}}$$

$$= \frac{bc^3\left(24c^4d^2-19c^2de-31e^2\right)x^2\sqrt{d+ex^2}}{225d^2\sqrt{-c^2x^2}\sqrt{-1-c^2x^2}} + \frac{bc\left(24c^4d^2-19c^2de-31e^2\right)\sqrt{-}}{225d^2\sqrt{-c^2x^2}}$$

**Mathematica [C]** time = 0.70, size = 314, normalized size = 0.60

$$\frac{\sqrt{d+ex^2}\left(-15a\left(3d^2+dex^2-2e^2x^4\right)+bcx\sqrt{\frac{1}{c^2x^2}+1}\left(dex^2\left(8-19c^2x^2\right)+3d^2\left(8c^4x^4-4c^2x^2+3\right)-31e^2x^4\right)-1\right.}{225d^2x^5}$$

Antiderivative was successfully verified.

```
[In] Integrate[(Sqrt[d + e*x^2]*(a + b*ArcCsch[c*x]))/x^6,x]
```

```
[Out] (Sqrt[d + e*x^2]*(-15*a*(3*d^2 + d*e*x^2 - 2*e^2*x^4) + b*c*Sqrt[1 + 1/(c^2
*x^2)]*x*(-31*e^2*x^4 + d*e*x^2*(8 - 19*c^2*x^2) + 3*d^2*(3 - 4*c^2*x^2 + 8
*c^4*x^4)) - 15*b*(3*d^2 + d*e*x^2 - 2*e^2*x^4)*ArcCsch[c*x]))/(225*d^2*x^5
) + ((I/225)*b*c*Sqrt[1 + 1/(c^2*x^2)]*x*Sqrt[1 + (e*x^2)/d]*(c^2*d*(24*c^4
*d^2 - 19*c^2*d*e - 31*e^2)*EllipticE[I*ArcSinh[Sqrt[c^2]*x], e/(c^2*d)] +
(-24*c^6*d^3 + 31*c^4*d^2*e + 23*c^2*d*e^2 - 30*e^3)*EllipticF[I*ArcSinh[Sq
rt[c^2]*x], e/(c^2*d)]))/(Sqrt[c^2]*d^2*Sqrt[1 + c^2*x^2]*Sqrt[d + e*x^2])
```

**fricas [F]** time = 0.71, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{\sqrt{ex^2+d}\,(b\,\text{arcsch}\,(cx)+a)}{x^6},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))*(e*x^2+d)^(1/2)/x^6,x, algorithm="fricas")
```

```
[Out] integral(sqrt(e*x^2 + d)*(b*arccsch(c*x) + a)/x^6, x)
```

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

$$\int \frac{\sqrt{ex^2+d}\,(b\,\text{arcsch}\,(cx)+a)}{x^6}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))*(e*x^2+d)^(1/2)/x^6,x, algorithm="giac")
```

```
[Out] integrate(sqrt(e*x^2 + d)*(b*arccsch(c*x) + a)/x^6, x)
```

**maple [F]** time = 0.43, size = 0, normalized size = 0.00

$$\int \frac{(a+b\,\text{arccsch}\,(cx))\,\sqrt{e\,x^2+d}}{x^6}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a+b*arccsch(c*x))*(e*x^2+d)^(1/2)/x^6,x)
```

```
[Out] int((a+b*arccsch(c*x))*(e*x^2+d)^(1/2)/x^6,x)
```

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

$$\frac{1}{15}\,a\left(\frac{2\left(ex^2+d\right)^{\frac{3}{2}}e}{d^2x^3}-\frac{3\left(ex^2+d\right)^{\frac{3}{2}}}{dx^5}\right)+\frac{1}{15}\,b\left(\frac{\left(2\,e^2x^4-dex^2-3\,d^2\right)\sqrt{ex^2+d}\,\log\left(\sqrt{c^2x^2+1}\,+1\right)}{d^2x^5}-15\int\frac{\left(2\,c^2e^2\right.}{}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))*(e*x^2+d)^(1/2)/x^6,x, algorithm="maxima")
```

```
[Out] 1/15*a*(2*(e*x^2 + d)^(3/2)*e/(d^2*x^3) - 3*(e*x^2 + d)^(3/2)/(d*x^5)) + 1/
15*b*((2*e^2*x^4 - d*e*x^2 - 3*d^2)*sqrt(e*x^2 + d)*log(sqrt(c^2*x^2 + 1) +
 1)/(d^2*x^5) - 15*integrate(1/15*(2*c^2*e^2*x^6 - c^2*d*e*x^4 + 3*(5*d^2*l
og(c) - d^2)*c^2*x^2 + 15*d^2*log(c) + 15*(c^2*d^2*x^2 + d^2)*log(x))*sqrt(
e*x^2 + d)/(c^2*d^2*x^8 + d^2*x^6), x) + 15*integrate(1/15*(2*c^2*e^2*x^4 -
 c^2*d*e*x^2 - 3*c^2*d^2)*sqrt(e*x^2 + d)/(c^2*d^2*x^6 + d^2*x^4 + (c^2*d^2
*x^6 + d^2*x^4)*sqrt(c^2*x^2 + 1)), x))
```

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

$$\int \frac{\sqrt{e\,x^2+d}\,\left(a+b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)\right)}{x^6}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(((d + e*x^2)^(1/2)*(a + b*asinh(1/(c*x))))/x^6,x)
```

```
[Out] int(((d + e*x^2)^(1/2)*(a + b*asinh(1/(c*x))))/x^6, x)
```

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

$$\int \frac{(a+b\,\mathrm{acsch}\,(cx))\,\sqrt{d+ex^2}}{x^6}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*acsch(c*x))*(e*x**2+d)**(1/2)/x**6,x)
```

```
[Out] Integral((a + b*acsch(c*x))*sqrt(d + e*x**2)/x**6, x)
```

# 3.128 $\int x^3 \left(d+ex^2\right)^{3/2} \left(a+b\,\mathbf{csch}^{-1}(cx)\right)\,dx$

**Optimal**. Leaf size=384

$$-\frac{d\left(d+ex^2\right)^{5/2}\left(a+b\operatorname{csch}^{-1}(cx)\right)}{5e^2}+\frac{\left(d+ex^2\right)^{7/2}\left(a+b\operatorname{csch}^{-1}(cx)\right)}{7e^2}-\frac{2bcd^{7/2}x\tan^{-1}\left(\frac{\sqrt{d+ex^2}}{\sqrt{d}\sqrt{-c^2x^2-1}}\right)}{35e^2\sqrt{-c^2x^2}}+\frac{bx\sqrt{-c^2x^2-1}}{42ce\sqrt{}}$$

```
[Out] -1/5*d*(e*x^2+d)^(5/2)*(a+b*arccsch(c*x))/e^2+1/7*(e*x^2+d)^(7/2)*(a+b*arcc
sch(c*x))/e^2-1/560*b*(35*c^6*d^3+35*c^4*d^2*e-63*c^2*d*e^2+25*e^3)*x*arcta
n(e^(1/2)*(-c^2*x^2-1)^(1/2)/c/(e*x^2+d)^(1/2))/c^6/e^(3/2)/(-c^2*x^2)^(1/2
)-2/35*b*c*d^(7/2)*x*arctan((e*x^2+d)^(1/2)/d^(1/2)/(-c^2*x^2-1)^(1/2))/e^2
/(-c^2*x^2)^(1/2)+1/840*b*(13*c^2*d-25*e)*x*(e*x^2+d)^(3/2)*(-c^2*x^2-1)^(1
/2)/c^3/e/(-c^2*x^2)^(1/2)+1/42*b*x*(e*x^2+d)^(5/2)*(-c^2*x^2-1)^(1/2)/c/e/
(-c^2*x^2)^(1/2)-1/560*b*(3*c^4*d^2+38*c^2*d*e-25*e^2)*x*(-c^2*x^2-1)^(1/2)
*(e*x^2+d)^(1/2)/c^5/e/(-c^2*x^2)^(1/2)
```

**Rubi [A]** time = 0.51, antiderivative size = 384, normalized size of antiderivative = 1.00, number of steps used = 12, number of rules used = 12, integrand size = 23, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.522, Rules used = {266, 43, 6302, 12, 573, 154, 157, 63, 217, 203, 93, 204}

$$-\frac{d\left(d+ex^2\right)^{5/2}\left(a+b\operatorname{csch}^{-1}(cx)\right)}{5e^2}+\frac{\left(d+ex^2\right)^{7/2}\left(a+b\operatorname{csch}^{-1}(cx)\right)}{7e^2}-\frac{bx\sqrt{-c^2x^2-1}\left(3c^4d^2+38c^2de-25e^2\right)\sqrt{d+}}{560c^5e\sqrt{-c^2x^2}}$$

Antiderivative was successfully verified.

```
[In] Int[x^3*(d + e*x^2)^(3/2)*(a + b*ArcCsch[c*x]),x]
```

```
[Out] -(b*(3*c^4*d^2 + 38*c^2*d*e - 25*e^2)*x*Sqrt[-1 - c^2*x^2]*Sqrt[d + e*x^2])
/(560*c^5*e*Sqrt[-(c^2*x^2)]) + (b*(13*c^2*d - 25*e)*x*Sqrt[-1 - c^2*x^2]*(
d + e*x^2)^(3/2))/(840*c^3*e*Sqrt[-(c^2*x^2)]) + (b*x*Sqrt[-1 - c^2*x^2]*(d
 + e*x^2)^(5/2))/(42*c*e*Sqrt[-(c^2*x^2)]) - (d*(d + e*x^2)^(5/2)*(a + b*Ar
cCsch[c*x]))/(5*e^2) + ((d + e*x^2)^(7/2)*(a + b*ArcCsch[c*x]))/(7*e^2) - (
b*(35*c^6*d^3 + 35*c^4*d^2*e - 63*c^2*d*e^2 + 25*e^3)*x*ArcTan[(Sqrt[e]*Sqr
t[-1 - c^2*x^2])/(c*Sqrt[d + e*x^2])])/(560*c^6*e^(3/2)*Sqrt[-(c^2*x^2)]) -
 (2*b*c*d^(7/2)*x*ArcTan[Sqrt[d + e*x^2]/(Sqrt[d]*Sqrt[-1 - c^2*x^2])])/(35
*e^2*Sqrt[-(c^2*x^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 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 93

```
Int[(((a_.) + (b_.)*(x_))^(m_)*((c_.) + (d_.)*(x_))^(n_))/((e_.) + (f_.)*(x
_)), x_Symbol] :> With[{q = Denominator[m]}, Dist[q, Subst[Int[x^(q*(m + 1)
 - 1)/(b*e - a*f - (d*e - c*f)*x^q), x], x, (a + b*x)^(1/q)/(c + d*x)^(1/q)
], x]] /; FreeQ[{a, b, c, d, e, f}, x] && EqQ[m + n + 1, 0] && RationalQ[n]
 && LtQ[-1, m, 0] && SimplerQ[a + b*x, c + d*x]
```

Rule 154

```
Int[((a_.) + (b_.)*(x_))^(m_)*((c_.) + (d_.)*(x_))^(n_)*((e_.) + (f_.)*(x_)
)^(p_)*((g_.) + (h_.)*(x_)), x_Symbol] :> Simp[(h*(a + b*x)^m*(c + d*x)^(n
+ 1)*(e + f*x)^(p + 1))/(d*f*(m + n + p + 2)), x] + Dist[1/(d*f*(m + n + p
+ 2)), Int[(a + b*x)^(m - 1)*(c + d*x)^n*(e + f*x)^p*Simp[a*d*f*g*(m + n +
p + 2) - h*(b*c*e*m + a*(d*e*(n + 1) + c*f*(p + 1))) + (b*d*f*g*(m + n + p
+ 2) + h*(a*d*f*m - b*(d*e*(m + n + 1) + c*f*(m + p + 1))))*x, x], x], x] /
; FreeQ[{a, b, c, d, e, f, g, h, n, p}, x] && GtQ[m, 0] && NeQ[m + n + p +
2, 0] && IntegersQ[2*m, 2*n, 2*p]
```

Rule 157

```
Int[(((c_.) + (d_.)*(x_))^(n_)*((e_.) + (f_.)*(x_))^(p_)*((g_.) + (h_.)*(x_
)))/((a_.) + (b_.)*(x_)), x_Symbol] :> Dist[h/b, Int[(c + d*x)^n*(e + f*x)^
p, x], x] + Dist[(b*g - a*h)/b, Int[((c + d*x)^n*(e + f*x)^p)/(a + b*x), x]
, x] /; FreeQ[{a, b, c, d, e, f, g, h, n, p}, x]
```

Rule 203

```
Int[((a_) + (b_.)*(x_)^2)^(-1), x_Symbol] :> Simp[(1*ArcTan[(Rt[b, 2]*x)/Rt
[a, 2]])/(Rt[a, 2]*Rt[b, 2]), x] /; FreeQ[{a, b}, x] && PosQ[a/b] && (GtQ[a
```

```
, 0] || GtQ[b, 0])
```

Rule 204

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

Rule 217

```
Int[1/Sqrt[(a_) + (b_.)*(x_)^2], x_Symbol] :> Subst[Int[1/(1 - b*x^2), x],
x, x/Sqrt[a + b*x^2]] /; FreeQ[{a, b}, x] &&  !GtQ[a, 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 573

```
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[x^(Simpl
ify[(m + 1)/n] - 1)*(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] && IntegerQ[Simplify[(m + 1)/n
]]
```

Rule 6302

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))*((f_.)*(x_))^(m_.)*((d_.) + (e_.)*(
x_)^2)^(p_.), x_Symbol] :> With[{u = IntHide[(f*x)^m*(d + e*x^2)^p, x]}, Di
st[a + b*ArcCsch[c*x], u, x] - Dist[(b*c*x)/Sqrt[-(c^2*x^2)], Int[SimplifyI
ntegrand[u/(x*Sqrt[-1 - c^2*x^2]), x], x], x]] /; FreeQ[{a, b, c, d, e, f,
m, p}, x] && ((IGtQ[p, 0] &&  !(ILtQ[(m - 1)/2, 0] && GtQ[m + 2*p + 3, 0]))
 || (IGtQ[(m + 1)/2, 0] &&  !(ILtQ[p, 0] && GtQ[m + 2*p + 3, 0])) || (ILtQ[
(m + 2*p + 1)/2, 0] &&  !ILtQ[(m - 1)/2, 0]))
```

Rubi steps

$$\int x^3\left(d+ex^2\right)^{3/2}\left(a+b\text{csch}^{-1}(cx)\right)\,dx=-\frac{d\left(d+ex^2\right)^{5/2}\left(a+b\text{csch}^{-1}(cx)\right)}{5e^2}+\frac{\left(d+ex^2\right)^{7/2}\left(a+b\text{csch}^{-1}(cx)\right)}{7e^2}-$$

$$=-\frac{d\left(d+ex^2\right)^{5/2}\left(a+b\text{csch}^{-1}(cx)\right)}{5e^2}+\frac{\left(d+ex^2\right)^{7/2}\left(a+b\text{csch}^{-1}(cx)\right)}{7e^2}-$$

$$=-\frac{d\left(d+ex^2\right)^{5/2}\left(a+b\text{csch}^{-1}(cx)\right)}{5e^2}+\frac{\left(d+ex^2\right)^{7/2}\left(a+b\text{csch}^{-1}(cx)\right)}{7e^2}-$$

$$=\frac{bx\sqrt{-1-c^2x^2}\left(d+ex^2\right)^{5/2}}{42ce\sqrt{-c^2x^2}}-\frac{d\left(d+ex^2\right)^{5/2}\left(a+b\text{csch}^{-1}(cx)\right)}{5e^2}+$$

$$=\frac{b\left(13c^2d-25e\right)x\sqrt{-1-c^2x^2}\left(d+ex^2\right)^{3/2}}{840c^3e\sqrt{-c^2x^2}}+\frac{bx\sqrt{-1-c^2x^2}\left(d+ex^2\right)^{5/2}}{42ce\sqrt{-c^2x^2}}$$

$$=-\frac{b\left(3c^4d^2+38c^2de-25e^2\right)x\sqrt{-1-c^2x^2}\sqrt{d+ex^2}}{560c^5e\sqrt{-c^2x^2}}+$$

$$=-\frac{b\left(3c^4d^2+38c^2de-25e^2\right)x\sqrt{-1-c^2x^2}\sqrt{d+ex^2}}{560c^5e\sqrt{-c^2x^2}}+$$

$$=-\frac{b\left(3c^4d^2+38c^2de-25e^2\right)x\sqrt{-1-c^2x^2}\sqrt{d+ex^2}}{560c^5e\sqrt{-c^2x^2}}+$$

$$=-\frac{b\left(3c^4d^2+38c^2de-25e^2\right)x\sqrt{-1-c^2x^2}\sqrt{d+ex^2}}{560c^5e\sqrt{-c^2x^2}}+$$

$$=-\frac{b\left(3c^4d^2+38c^2de-25e^2\right)x\sqrt{-1-c^2x^2}\sqrt{d+ex^2}}{560c^5e\sqrt{-c^2x^2}}+$$

**Mathematica [C]** time = 0.77, size = 318, normalized size = 0.83

$$\frac{\sqrt{d+ex^2}\left(-48ac^5\left(2d-5ex^2\right)\left(d+ex^2\right)^2-48bc^5\text{csch}^{-1}(cx)\left(2d-5ex^2\right)\left(d+ex^2\right)^2+bex\sqrt{\frac{1}{c^2x^2}+1}\left(c^4\left(57d^2+\right.\right.\right.}{1680c^5e^2}$$

Warning: Unable to verify antiderivative.

```
[In] Integrate[x^3*(d + e*x^2)^(3/2)*(a + b*ArcCsch[c*x]),x]
```

```
[Out] -1/1120*(b*(-32*c^4*d^4*Sqrt[1 + d/(e*x^2)]*AppellF1[1, 1/2, 1/2, 2, -(1/(c
^2*x^2)), -(d/(e*x^2))] + (e*(35*c^6*d^3 + 35*c^4*d^2*e - 63*c^2*d*e^2 + 25
*e^3)*Sqrt[1 + 1/(c^2*x^2)]*x^4*Sqrt[1 + (e*x^2)/d]*AppellF1[1, 1/2, 1/2, 2
, -(c^2*x^2), -((e*x^2)/d)])/Sqrt[1 + c^2*x^2]))/(c^5*e^2*x*Sqrt[d + e*x^2]
) + (Sqrt[d + e*x^2]*(-48*a*c^5*(2*d - 5*e*x^2)*(d + e*x^2)^2 + b*e*Sqrt[1
+ 1/(c^2*x^2)]*x*(75*e^2 - 2*c^2*e*(82*d + 25*e*x^2) + c^4*(57*d^2 + 106*d*
e*x^2 + 40*e^2*x^4)) - 48*b*c^5*(2*d - 5*e*x^2)*(d + e*x^2)^2*ArcCsch[c*x])
)/(1680*c^5*e^2)
```

**fricas [A]** time = 3.41, size = 1943, normalized size = 5.06

result too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^3*(e*x^2+d)^(3/2)*(a+b*arccsch(c*x)),x, algorithm="fricas")
```

```
[Out] [1/6720*(96*b*c^7*d^(7/2)*log(((c^4*d^2 + 6*c^2*d*e + e^2)*x^4 + 8*(c^2*d^2
 + d*e)*x^2 + 4*((c^3*d + c*e)*x^3 + 2*c*d*x)*sqrt(e*x^2 + d)*sqrt(d)*sqrt(
(c^2*x^2 + 1)/(c^2*x^2)) + 8*d^2)/x^4) + 3*(35*b*c^6*d^3 + 35*b*c^4*d^2*e -
 63*b*c^2*d*e^2 + 25*b*e^3)*sqrt(e)*log(8*c^4*e^2*x^4 + c^4*d^2 + 6*c^2*d*e
 + 8*(c^4*d*e + c^2*e^2)*x^2 - 4*(2*c^4*e*x^3 + (c^4*d + c^2*e)*x)*sqrt(e*x
^2 + d)*sqrt(e)*sqrt((c^2*x^2 + 1)/(c^2*x^2)) + e^2) + 192*(5*b*c^7*e^3*x^6
 + 8*b*c^7*d*e^2*x^4 + b*c^7*d^2*e*x^2 - 2*b*c^7*d^3)*sqrt(e*x^2 + d)*log((
c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) + 1)/(c*x)) + 4*(240*a*c^7*e^3*x^6 + 384*
a*c^7*d*e^2*x^4 + 48*a*c^7*d^2*e*x^2 - 96*a*c^7*d^3 + (40*b*c^6*e^3*x^5 + 2
*(53*b*c^6*d*e^2 - 25*b*c^4*e^3)*x^3 + (57*b*c^6*d^2*e - 164*b*c^4*d*e^2 +
75*b*c^2*e^3)*x)*sqrt((c^2*x^2 + 1)/(c^2*x^2)))*sqrt(e*x^2 + d))/(c^7*e^2),
 1/3360*(48*b*c^7*d^(7/2)*log(((c^4*d^2 + 6*c^2*d*e + e^2)*x^4 + 8*(c^2*d^2
 + d*e)*x^2 + 4*((c^3*d + c*e)*x^3 + 2*c*d*x)*sqrt(e*x^2 + d)*sqrt(d)*sqrt(
(c^2*x^2 + 1)/(c^2*x^2)) + 8*d^2)/x^4) + 3*(35*b*c^6*d^3 + 35*b*c^4*d^2*e -
 63*b*c^2*d*e^2 + 25*b*e^3)*sqrt(-e)*arctan(1/2*(2*c^2*e*x^3 + (c^2*d + e)*
x)*sqrt(e*x^2 + d)*sqrt(-e)*sqrt((c^2*x^2 + 1)/(c^2*x^2))/(c^2*e^2*x^4 + (c
^2*d*e + e^2)*x^2 + d*e)) + 96*(5*b*c^7*e^3*x^6 + 8*b*c^7*d*e^2*x^4 + b*c^7
```

```
*d^2*e*x^2 - 2*b*c^7*d^3)*sqrt(e*x^2 + d)*log((c*x*sqrt((c^2*x^2 + 1)/(c^2*
x^2)) + 1)/(c*x)) + 2*(240*a*c^7*e^3*x^6 + 384*a*c^7*d*e^2*x^4 + 48*a*c^7*d
^2*e*x^2 - 96*a*c^7*d^3 + (40*b*c^6*e^3*x^5 + 2*(53*b*c^6*d*e^2 - 25*b*c^4*
e^3)*x^3 + (57*b*c^6*d^2*e - 164*b*c^4*d*e^2 + 75*b*c^2*e^3)*x)*sqrt((c^2*x
^2 + 1)/(c^2*x^2)))*sqrt(e*x^2 + d))/(c^7*e^2), -1/6720*(192*b*c^7*sqrt(-d)
*d^3*arctan(1/2*((c^3*d + c*e)*x^3 + 2*c*d*x)*sqrt(e*x^2 + d)*sqrt(-d)*sqrt
((c^2*x^2 + 1)/(c^2*x^2))/(c^2*d*e*x^4 + (c^2*d^2 + d*e)*x^2 + d^2)) - 3*(3
5*b*c^6*d^3 + 35*b*c^4*d^2*e - 63*b*c^2*d*e^2 + 25*b*e^3)*sqrt(e)*log(8*c^4
*e^2*x^4 + c^4*d^2 + 6*c^2*d*e + 8*(c^4*d*e + c^2*e^2)*x^2 - 4*(2*c^4*e*x^3
 + (c^4*d + c^2*e)*x)*sqrt(e*x^2 + d)*sqrt(e)*sqrt((c^2*x^2 + 1)/(c^2*x^2))
 + e^2) - 192*(5*b*c^7*e^3*x^6 + 8*b*c^7*d*e^2*x^4 + b*c^7*d^2*e*x^2 - 2*b*
c^7*d^3)*sqrt(e*x^2 + d)*log((c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) + 1)/(c*x))
 - 4*(240*a*c^7*e^3*x^6 + 384*a*c^7*d*e^2*x^4 + 48*a*c^7*d^2*e*x^2 - 96*a*c
^7*d^3 + (40*b*c^6*e^3*x^5 + 2*(53*b*c^6*d*e^2 - 25*b*c^4*e^3)*x^3 + (57*b*
c^6*d^2*e - 164*b*c^4*d*e^2 + 75*b*c^2*e^3)*x)*sqrt((c^2*x^2 + 1)/(c^2*x^2)
))*sqrt(e*x^2 + d))/(c^7*e^2), -1/3360*(96*b*c^7*sqrt(-d)*d^3*arctan(1/2*((
c^3*d + c*e)*x^3 + 2*c*d*x)*sqrt(e*x^2 + d)*sqrt(-d)*sqrt((c^2*x^2 + 1)/(c^
2*x^2))/(c^2*d*e*x^4 + (c^2*d^2 + d*e)*x^2 + d^2)) - 3*(35*b*c^6*d^3 + 35*b
*c^4*d^2*e - 63*b*c^2*d*e^2 + 25*b*e^3)*sqrt(-e)*arctan(1/2*(2*c^2*e*x^3 +
(c^2*d + e)*x)*sqrt(e*x^2 + d)*sqrt(-e)*sqrt((c^2*x^2 + 1)/(c^2*x^2))/(c^2*
e^2*x^4 + (c^2*d*e + e^2)*x^2 + d*e)) - 96*(5*b*c^7*e^3*x^6 + 8*b*c^7*d*e^2
*x^4 + b*c^7*d^2*e*x^2 - 2*b*c^7*d^3)*sqrt(e*x^2 + d)*log((c*x*sqrt((c^2*x^
2 + 1)/(c^2*x^2)) + 1)/(c*x)) - 2*(240*a*c^7*e^3*x^6 + 384*a*c^7*d*e^2*x^4
+ 48*a*c^7*d^2*e*x^2 - 96*a*c^7*d^3 + (40*b*c^6*e^3*x^5 + 2*(53*b*c^6*d*e^2
 - 25*b*c^4*e^3)*x^3 + (57*b*c^6*d^2*e - 164*b*c^4*d*e^2 + 75*b*c^2*e^3)*x)
*sqrt((c^2*x^2 + 1)/(c^2*x^2)))*sqrt(e*x^2 + d))/(c^7*e^2)]
```

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

$$\int \left(ex^2 + d\right)^{\frac{3}{2}} (b \operatorname{arcsch}(cx) + a) x^3 \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^3*(e*x^2+d)^(3/2)*(a+b*arccsch(c*x)),x, algorithm="giac")
```

```
[Out] integrate((e*x^2 + d)^(3/2)*(b*arccsch(c*x) + a)*x^3, x)
```

**maple [F]** time = 0.48, size = 0, normalized size = 0.00

$$\int x^3 \left(e\,x^2 + d\right)^{\frac{3}{2}} \left(a + b \operatorname{arccsch}(cx)\right) dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^3*(e*x^2+d)^(3/2)*(a+b*arccsch(c*x)),x)
```

```
[Out] int(x^3*(e*x^2+d)^(3/2)*(a+b*arccsch(c*x)),x)
```

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

$$\frac{1}{35}\left(\frac{5\left(ex^2+d\right)^{\frac{5}{2}}x^2}{e}-\frac{2\left(ex^2+d\right)^{\frac{5}{2}}d}{e^2}\right)a+\frac{1}{35}b\left(\frac{\left(5e^3x^6+8de^2x^4+d^2ex^2-2d^3\right)\sqrt{ex^2+d}\log\left(\sqrt{c^2x^2+1}+1\right)}{e^2}+\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^3*(e*x^2+d)^(3/2)*(a+b*arccsch(c*x)),x, algorithm="maxima")
```

```
[Out] 1/35*(5*(e*x^2 + d)^(5/2)*x^2/e - 2*(e*x^2 + d)^(5/2)*d/e^2)*a + 1/35*b*((5
*e^3*x^6 + 8*d*e^2*x^4 + d^2*e*x^2 - 2*d^3)*sqrt(e*x^2 + d)*log(sqrt(c^2*x^
2 + 1) + 1)/e^2 + 35*integrate(1/35*(5*c^2*e^3*x^7 + 8*c^2*d*e^2*x^5 + c^2*
d^2*e*x^3 - 2*c^2*d^3*x)*sqrt(e*x^2 + d)/(c^2*e^2*x^2 + e^2 + (c^2*e^2*x^2
+ e^2)*sqrt(c^2*x^2 + 1)), x) - 35*integrate(1/35*(5*(7*e^3*log(c) + e^3)*c
^2*x^7 - 2*c^2*d^3*x + (35*e^3*log(c) + (35*d*e^2*log(c) + 8*d*e^2)*c^2)*x^
5 + (c^2*d^2*e + 35*d*e^2*log(c))*x^3 + 35*(c^2*e^3*x^7 + d*e^2*x^3 + (c^2*
d*e^2 + e^3)*x^5)*log(x))*sqrt(e*x^2 + d)/(c^2*e^2*x^2 + e^2), x))
```

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

$$\int x^3\left(e\,x^2+d\right)^{3/2}\left(a+b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^3*(d + e*x^2)^(3/2)*(a + b*asinh(1/(c*x))),x)
```

```
[Out] int(x^3*(d + e*x^2)^(3/2)*(a + b*asinh(1/(c*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**3*(e*x**2+d)**(3/2)*(a+b*acsch(c*x)),x)
```

```
[Out] Timed out
```

# 3.129 $\int x\left(d+ex^2\right)^{3/2}\left(a+b\,\mathbf{csch}^{-1}(cx)\right)\,dx$

**Optimal**. Leaf size=270

$$\frac{\left(d+ex^2\right)^{5/2}\left(a+b\,\text{csch}^{-1}(cx)\right)}{5e}+\frac{bcd^{5/2}x\tan^{-1}\left(\frac{\sqrt{d+ex^2}}{\sqrt{d}\sqrt{-c^2x^2-1}}\right)}{5e\sqrt{-c^2x^2}}+\frac{bx\sqrt{-c^2x^2-1}\left(d+ex^2\right)^{3/2}}{20c\sqrt{-c^2x^2}}+\frac{bx\left(15c^4d^2-10c^2de+\cdots\right.}{40c^4\sqrt{e\cdots}}$$

```
[Out] 1/5*(e*x^2+d)^(5/2)*(a+b*arccsch(c*x))/e+1/5*b*c*d^(5/2)*x*arctan((e*x^2+d)
^(1/2)/d^(1/2)/(-c^2*x^2-1)^(1/2))/e/(-c^2*x^2)^(1/2)+1/40*b*(15*c^4*d^2-10
*c^2*d*e+3*e^2)*x*arctan(e^(1/2)*(-c^2*x^2-1)^(1/2)/c/(e*x^2+d)^(1/2))/c^4/
e^(1/2)/(-c^2*x^2)^(1/2)+1/20*b*x*(e*x^2+d)^(3/2)*(-c^2*x^2-1)^(1/2)/c/(-c^
2*x^2)^(1/2)+1/40*b*(7*c^2*d-3*e)*x*(-c^2*x^2-1)^(1/2)*(e*x^2+d)^(1/2)/c^3/
(-c^2*x^2)^(1/2)
```

**Rubi [A]** time = 0.28, antiderivative size = 270, normalized size of antiderivative = 1.00, number of steps used = 10, number of rules used = 10, integrand size = 21, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.476, Rules used = {6300, 446, 102, 154, 157, 63, 217, 203, 93, 204}

$$\frac{\left(d+ex^2\right)^{5/2}\left(a+b\,\text{csch}^{-1}(cx)\right)}{5e}+\frac{bx\left(15c^4d^2-10c^2de+3e^2\right)\tan^{-1}\left(\frac{\sqrt{e}\sqrt{-c^2x^2-1}}{c\sqrt{d+ex^2}}\right)}{40c^4\sqrt{e}\sqrt{-c^2x^2}}+\frac{bcd^{5/2}x\tan^{-1}\left(\frac{\sqrt{d+ex^2}}{\sqrt{d}\sqrt{-c^2x^2-1}}\right)}{5e\sqrt{-c^2x^2}}+\frac{bx\cdots}{\cdots}$$

Antiderivative was successfully verified.

```
[In] Int[x*(d + e*x^2)^(3/2)*(a + b*ArcCsch[c*x]),x]
```

```
[Out] (b*(7*c^2*d - 3*e)*x*Sqrt[-1 - c^2*x^2]*Sqrt[d + e*x^2])/(40*c^3*Sqrt[-(c^2
*x^2)]) + (b*x*Sqrt[-1 - c^2*x^2]*(d + e*x^2)^(3/2))/(20*c*Sqrt[-(c^2*x^2)]
) + ((d + e*x^2)^(5/2)*(a + b*ArcCsch[c*x]))/(5*e) + (b*(15*c^4*d^2 - 10*c^
2*d*e + 3*e^2)*x*ArcTan[(Sqrt[e]*Sqrt[-1 - c^2*x^2])/(c*Sqrt[d + e*x^2])])/
(40*c^4*Sqrt[e]*Sqrt[-(c^2*x^2)]) + (b*c*d^(5/2)*x*ArcTan[Sqrt[d + e*x^2]/(
Sqrt[d]*Sqrt[-1 - c^2*x^2])])/(5*e*Sqrt[-(c^2*x^2)])
```

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 93

```
Int[(((a_.) + (b_.)*(x_))^(m_)*((c_.) + (d_.)*(x_))^(n_))/((e_.) + (f_.)*(x
_)), x_Symbol] :> With[{q = Denominator[m]}, Dist[q, Subst[Int[x^(q*(m + 1)
 - 1)/(b*e - a*f - (d*e - c*f)*x^q), x], x, (a + b*x)^(1/q)/(c + d*x)^(1/q)
], x]] /; FreeQ[{a, b, c, d, e, f}, x] && EqQ[m + n + 1, 0] && RationalQ[n]
 && LtQ[-1, m, 0] && SimplerQ[a + b*x, c + d*x]
```

Rule 102

```
Int[((a_.) + (b_.)*(x_))^(m_)*((c_.) + (d_.)*(x_))^(n_.)*((e_.) + (f_.)*(x_
))^(p_.), x_Symbol] :> Simp[(b*(a + b*x)^(m - 1)*(c + d*x)^(n + 1)*(e + f*x
)^(p + 1))/(d*f*(m + n + p + 1)), x] + Dist[1/(d*f*(m + n + p + 1)), Int[(a
 + b*x)^(m - 2)*(c + d*x)^n*(e + f*x)^p*Simp[a^2*d*f*(m + n + p + 1) - b*(b
*c*e*(m - 1) + a*(d*e*(n + 1) + c*f*(p + 1))) + b*(a*d*f*(2*m + n + p) - b*
(d*e*(m + n) + c*f*(m + p)))*x, x], x], x] /; FreeQ[{a, b, c, d, e, f, n, p
}, x] && GtQ[m, 1] && NeQ[m + n + p + 1, 0] && IntegersQ[2*m, 2*n, 2*p]
```

Rule 154

```
Int[((a_.) + (b_.)*(x_))^(m_)*((c_.) + (d_.)*(x_))^(n_)*((e_.) + (f_.)*(x_)
)^(p_)*((g_.) + (h_.)*(x_)), x_Symbol] :> Simp[(h*(a + b*x)^m*(c + d*x)^(n
+ 1)*(e + f*x)^(p + 1))/(d*f*(m + n + p + 2)), x] + Dist[1/(d*f*(m + n + p
+ 2)), Int[(a + b*x)^(m - 1)*(c + d*x)^n*(e + f*x)^p*Simp[a*d*f*g*(m + n +
p + 2) - h*(b*c*e*m + a*(d*e*(n + 1) + c*f*(p + 1))) + (b*d*f*g*(m + n + p
+ 2) + h*(a*d*f*m - b*(d*e*(m + n + 1) + c*f*(m + p + 1))))*x, x], x], x] /
; FreeQ[{a, b, c, d, e, f, g, h, n, p}, x] && GtQ[m, 0] && NeQ[m + n + p +
2, 0] && IntegersQ[2*m, 2*n, 2*p]
```

Rule 157

```
Int[(((c_.) + (d_.)*(x_))^(n_)*((e_.) + (f_.)*(x_))^(p_)*((g_.) + (h_.)*(x_
)))/((a_.) + (b_.)*(x_)), x_Symbol] :> Dist[h/b, Int[(c + d*x)^n*(e + f*x)^
p, x], x] + Dist[(b*g - a*h)/b, Int[((c + d*x)^n*(e + f*x)^p)/(a + b*x), x]
, x] /; FreeQ[{a, b, c, d, e, f, g, h, n, p}, x]
```

Rule 203

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

Rule 204

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

```
a, 0] || LtQ[b, 0])
```

Rule 217

```
Int[1/Sqrt[(a_) + (b_.)*(x_)^2], x_Symbol] :> Subst[Int[1/(1 - b*x^2), x],
x, x/Sqrt[a + b*x^2]] /; FreeQ[{a, b}, x] &&  !GtQ[a, 0]
```

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 6300

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))*(x_)*((d_.) + (e_.)*(x_)^2)^(p_.),
x_Symbol] :> Simp[((d + e*x^2)^(p + 1)*(a + b*ArcCsch[c*x]))/(2*e*(p + 1)),
 x] - Dist[(b*c*x)/(2*e*(p + 1)*Sqrt[-(c^2*x^2)]), Int[(d + e*x^2)^(p + 1)/
(x*Sqrt[-1 - c^2*x^2]), x], x] /; FreeQ[{a, b, c, d, e, p}, x] && NeQ[p, -1
]
```

Rubi steps

$$\int x\left(d+ex^2\right)^{3/2}\left(a+b\text{csch}^{-1}(cx)\right)dx=\frac{\left(d+ex^2\right)^{5/2}\left(a+b\text{csch}^{-1}(cx)\right)}{5e}-\frac{(bcx)\int\frac{\left(d+ex^2\right)^{5/2}}{x\sqrt{-1-c^2x^2}}dx}{5e\sqrt{-c^2x^2}}$$

$$=\frac{\left(d+ex^2\right)^{5/2}\left(a+b\text{csch}^{-1}(cx)\right)}{5e}-\frac{(bcx)\,\text{Subst}\left(\int\frac{(d+ex)^{5/2}}{x\sqrt{-1-c^2x}}dx,x,x^2\right)}{10e\sqrt{-c^2x^2}}$$

$$=\frac{bx\sqrt{-1-c^2x^2}\left(d+ex^2\right)^{3/2}}{20c\sqrt{-c^2x^2}}+\frac{\left(d+ex^2\right)^{5/2}\left(a+b\text{csch}^{-1}(cx)\right)}{5e}+\frac{(bx)\,\text{Su}}{}$$

$$=\frac{b\left(7c^2d-3e\right)x\sqrt{-1-c^2x^2}\sqrt{d+ex^2}}{40c^3\sqrt{-c^2x^2}}+\frac{bx\sqrt{-1-c^2x^2}\left(d+ex^2\right)^{3/2}}{20c\sqrt{-c^2x^2}}+$$

$$=\frac{b\left(7c^2d-3e\right)x\sqrt{-1-c^2x^2}\sqrt{d+ex^2}}{40c^3\sqrt{-c^2x^2}}+\frac{bx\sqrt{-1-c^2x^2}\left(d+ex^2\right)^{3/2}}{20c\sqrt{-c^2x^2}}+$$

$$=\frac{b\left(7c^2d-3e\right)x\sqrt{-1-c^2x^2}\sqrt{d+ex^2}}{40c^3\sqrt{-c^2x^2}}+\frac{bx\sqrt{-1-c^2x^2}\left(d+ex^2\right)^{3/2}}{20c\sqrt{-c^2x^2}}+$$

$$=\frac{b\left(7c^2d-3e\right)x\sqrt{-1-c^2x^2}\sqrt{d+ex^2}}{40c^3\sqrt{-c^2x^2}}+\frac{bx\sqrt{-1-c^2x^2}\left(d+ex^2\right)^{3/2}}{20c\sqrt{-c^2x^2}}+$$

$$=\frac{b\left(7c^2d-3e\right)x\sqrt{-1-c^2x^2}\sqrt{d+ex^2}}{40c^3\sqrt{-c^2x^2}}+\frac{bx\sqrt{-1-c^2x^2}\left(d+ex^2\right)^{3/2}}{20c\sqrt{-c^2x^2}}+$$

**Mathematica [A]** time = 0.80, size = 314, normalized size = 1.16

$$\frac{\sqrt{d+ex^2}\left(8ac^3\left(d+ex^2\right)^2+8bc^3\text{csch}^{-1}(cx)\left(d+ex^2\right)^2+bex\sqrt{\frac{1}{c^2x^2}+1}\left(c^2\left(9d+2ex^2\right)-3e\right)\right)}{40c^3e}-\frac{bx\sqrt{\frac{1}{c^2x^2}+1}\left(8\right.}{}$$

Antiderivative was successfully verified.

```
[In] Integrate[x*(d + e*x^2)^(3/2)*(a + b*ArcCsch[c*x]),x]
```

```
[Out] (Sqrt[d + e*x^2]*(8*a*c^3*(d + e*x^2)^2 + b*e*Sqrt[1 + 1/(c^2*x^2)]*x*(-3*e
 + c^2*(9*d + 2*e*x^2)) + 8*b*c^3*(d + e*x^2)^2*ArcCsch[c*x]))/(40*c^3*e) -
 (b*Sqrt[1 + 1/(c^2*x^2)]*x*(Sqrt[c^2]*Sqrt[c^2*d - e]*Sqrt[e]*(-15*c^4*d^2
 + 10*c^2*d*e - 3*e^2)*Sqrt[(c^2*(d + e*x^2))/(c^2*d - e)]*ArcSinh[(c*Sqrt[
e]*Sqrt[1 + c^2*x^2])/(Sqrt[c^2]*Sqrt[c^2*d - e])] + 8*c^7*d^(5/2)*Sqrt[-d
- e*x^2]*ArcTan[(Sqrt[d]*Sqrt[1 + c^2*x^2])/Sqrt[-d - e*x^2]]))/(40*c^6*e*S
qrt[1 + c^2*x^2]*Sqrt[d + e*x^2])
```

**fricas [A]** time = 2.01, size = 1625, normalized size = 6.02

result too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*(e*x^2+d)^(3/2)*(a+b*arccsch(c*x)),x, algorithm="fricas")
```

```
[Out] [1/160*(8*b*c^5*d^(5/2)*log(((c^4*d^2 + 6*c^2*d*e + e^2)*x^4 + 8*(c^2*d^2 +
 d*e)*x^2 - 4*((c^3*d + c*e)*x^3 + 2*c*d*x)*sqrt(e*x^2 + d)*sqrt(d)*sqrt((c
^2*x^2 + 1)/(c^2*x^2)) + 8*d^2)/x^4) + (15*b*c^4*d^2 - 10*b*c^2*d*e + 3*b*e
^2)*sqrt(e)*log(8*c^4*e^2*x^4 + c^4*d^2 + 6*c^2*d*e + 8*(c^4*d*e + c^2*e^2)
*x^2 + 4*(2*c^4*e*x^3 + (c^4*d + c^2*e)*x)*sqrt(e*x^2 + d)*sqrt(e)*sqrt((c^
2*x^2 + 1)/(c^2*x^2)) + e^2) + 32*(b*c^5*e^2*x^4 + 2*b*c^5*d*e*x^2 + b*c^5*
d^2)*sqrt(e*x^2 + d)*log((c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) + 1)/(c*x)) + 4
*(8*a*c^5*e^2*x^4 + 16*a*c^5*d*e*x^2 + 8*a*c^5*d^2 + (2*b*c^4*e^2*x^3 + 3*(
3*b*c^4*d*e - b*c^2*e^2)*x)*sqrt((c^2*x^2 + 1)/(c^2*x^2)))*sqrt(e*x^2 + d))
/(c^5*e), 1/80*(4*b*c^5*d^(5/2)*log(((c^4*d^2 + 6*c^2*d*e + e^2)*x^4 + 8*(c
^2*d^2 + d*e)*x^2 - 4*((c^3*d + c*e)*x^3 + 2*c*d*x)*sqrt(e*x^2 + d)*sqrt(d)
*sqrt((c^2*x^2 + 1)/(c^2*x^2)) + 8*d^2)/x^4) - (15*b*c^4*d^2 - 10*b*c^2*d*e
 + 3*b*e^2)*sqrt(-e)*arctan(1/2*(2*c^2*e*x^3 + (c^2*d + e)*x)*sqrt(e*x^2 +
d)*sqrt(-e)*sqrt((c^2*x^2 + 1)/(c^2*x^2))/(c^2*e^2*x^4 + (c^2*d*e + e^2)*x^
2 + d*e)) + 16*(b*c^5*e^2*x^4 + 2*b*c^5*d*e*x^2 + b*c^5*d^2)*sqrt(e*x^2 + d
)*log((c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) + 1)/(c*x)) + 2*(8*a*c^5*e^2*x^4 +
 16*a*c^5*d*e*x^2 + 8*a*c^5*d^2 + (2*b*c^4*e^2*x^3 + 3*(3*b*c^4*d*e - b*c^2
*e^2)*x)*sqrt((c^2*x^2 + 1)/(c^2*x^2)))*sqrt(e*x^2 + d))/(c^5*e), 1/160*(16
*b*c^5*sqrt(-d)*d^2*arctan(1/2*((c^3*d + c*e)*x^3 + 2*c*d*x)*sqrt(e*x^2 + d
)*sqrt(-d)*sqrt((c^2*x^2 + 1)/(c^2*x^2))/(c^2*d*e*x^4 + (c^2*d^2 + d*e)*x^2
 + d^2)) + (15*b*c^4*d^2 - 10*b*c^2*d*e + 3*b*e^2)*sqrt(e)*log(8*c^4*e^2*x^
4 + c^4*d^2 + 6*c^2*d*e + 8*(c^4*d*e + c^2*e^2)*x^2 + 4*(2*c^4*e*x^3 + (c^4
*d + c^2*e)*x)*sqrt(e*x^2 + d)*sqrt(e)*sqrt((c^2*x^2 + 1)/(c^2*x^2)) + e^2)
 + 32*(b*c^5*e^2*x^4 + 2*b*c^5*d*e*x^2 + b*c^5*d^2)*sqrt(e*x^2 + d)*log((c*
x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) + 1)/(c*x)) + 4*(8*a*c^5*e^2*x^4 + 16*a*c^5
*d*e*x^2 + 8*a*c^5*d^2 + (2*b*c^4*e^2*x^3 + 3*(3*b*c^4*d*e - b*c^2*e^2)*x)*
sqrt((c^2*x^2 + 1)/(c^2*x^2)))*sqrt(e*x^2 + d))/(c^5*e), 1/80*(8*b*c^5*sqrt
(-d)*d^2*arctan(1/2*((c^3*d + c*e)*x^3 + 2*c*d*x)*sqrt(e*x^2 + d)*sqrt(-d)*
sqrt((c^2*x^2 + 1)/(c^2*x^2))/(c^2*d*e*x^4 + (c^2*d^2 + d*e)*x^2 + d^2)) -
(15*b*c^4*d^2 - 10*b*c^2*d*e + 3*b*e^2)*sqrt(-e)*arctan(1/2*(2*c^2*e*x^3 +
```

```
(c^2*d + e)*x)*sqrt(e*x^2 + d)*sqrt(-e)*sqrt((c^2*x^2 + 1)/(c^2*x^2))/(c^2*
e^2*x^4 + (c^2*d*e + e^2)*x^2 + d*e)) + 16*(b*c^5*e^2*x^4 + 2*b*c^5*d*e*x^2
 + b*c^5*d^2)*sqrt(e*x^2 + d)*log((c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) + 1)/(
c*x)) + 2*(8*a*c^5*e^2*x^4 + 16*a*c^5*d*e*x^2 + 8*a*c^5*d^2 + (2*b*c^4*e^2*
x^3 + 3*(3*b*c^4*d*e - b*c^2*e^2)*x)*sqrt((c^2*x^2 + 1)/(c^2*x^2)))*sqrt(e*
x^2 + d))/(c^5*e)]
```

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

$$\int \left(ex^2+d\right)^{\frac{3}{2}}(b\operatorname{arcsch}(cx)+a)x\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*(e*x^2+d)^(3/2)*(a+b*arccsch(c*x)),x, algorithm="giac")
[Out] integrate((e*x^2 + d)^(3/2)*(b*arccsch(c*x) + a)*x, x)
```

**maple [F]** time = 0.43, size = 0, normalized size = 0.00

$$\int x\left(e\,x^2+d\right)^{\frac{3}{2}}(a+b\,\mathrm{arccsch}\,(cx))\;dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x*(e*x^2+d)^(3/2)*(a+b*arccsch(c*x)),x)
[Out] int(x*(e*x^2+d)^(3/2)*(a+b*arccsch(c*x)),x)
```

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

$$\frac{\left(ex^2+d\right)^{\frac{5}{2}}a}{5e}+\frac{1}{5}\left(\frac{\left(e^2x^4+2\,dex^2+d^2\right)\sqrt{ex^2+d}\,\log\left(\sqrt{c^2x^2+1}\,+1\right)}{e}+5\int\frac{\left(c^2e^2x^5+2\,c^2dex^3+c^2d^2x\right)\sqrt{ex^2+}}{5\left(c^2ex^2+\left(c^2ex^2+e\right)\sqrt{c^2x^2+1}\,+\right.}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*(e*x^2+d)^(3/2)*(a+b*arccsch(c*x)),x, algorithm="maxima")
[Out] 1/5*(e*x^2 + d)^(5/2)*a/e + 1/5*((e^2*x^4 + 2*d*e*x^2 + d^2)*sqrt(e*x^2 + d
)*log(sqrt(c^2*x^2 + 1) + 1)/e + 5*integrate(1/5*(c^2*e^2*x^5 + 2*c^2*d*e*x
^3 + c^2*d^2*x)*sqrt(e*x^2 + d)/(c^2*e*x^2 + (c^2*e*x^2 + e)*sqrt(c^2*x^2 +
 1) + e), x) - 5*integrate(1/5*((5*e^2*log(c) + e^2)*c^2*x^5 + ((5*d*e*log(
c) + 2*d*e)*c^2 + 5*e^2*log(c))*x^3 + (c^2*d^2 + 5*d*e*log(c))*x + 5*(c^2*e
^2*x^5 + (c^2*d*e + e^2)*x^3 + d*e*x)*log(x))*sqrt(e*x^2 + d)/(c^2*e*x^2 +
e), x))*b
```

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

$$\int x\left(e\,x^2+d\right)^{3/2}\,\left(a+b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x*(d + e*x^2)^(3/2)*(a + b*asinh(1/(c*x))),x)
[Out] int(x*(d + e*x^2)^(3/2)*(a + b*asinh(1/(c*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*(e*x**2+d)**(3/2)*(a+b*acsch(c*x)),x)
[Out] Timed out
```

## 3.130 $\int \frac{\left(d+ex^2\right)^{3/2}\left(a+b\textbf{csch}^{-1}(cx)\right)}{x}\,dx$

**Optimal**. Leaf size=26

$$\text{Int}\left(\frac{\left(d+ex^2\right)^{3/2}\left(a+b\text{csch}^{-1}(cx)\right)}{x},x\right)$$

```
[Out] Unintegrable((e*x^2+d)^(3/2)*(a+b*arccsch(c*x))/x,x)
```

**Rubi [A]** time = 0.12, 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 = {}

$$\int \frac{\left(d+ex^2\right)^{3/2}\left(a+b\text{csch}^{-1}(cx)\right)}{x}\,dx$$

Verification is Not applicable to the result.

```
[In] Int[((d + e*x^2)^(3/2)*(a + b*ArcCsch[c*x]))/x,x]
```

```
[Out] Defer[Int][((d + e*x^2)^(3/2)*(a + b*ArcCsch[c*x]))/x, x]
```

Rubi steps

$$\int \frac{\left(d+ex^2\right)^{3/2}\left(a+b\text{csch}^{-1}(cx)\right)}{x}\,dx=\int \frac{\left(d+ex^2\right)^{3/2}\left(a+b\text{csch}^{-1}(cx)\right)}{x}\,dx$$

**Mathematica [A]** time = 6.56, size = 0, normalized size = 0.00

$$\int \frac{\left(d+ex^2\right)^{3/2}\left(a+b\text{csch}^{-1}(cx)\right)}{x}\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[((d + e*x^2)^(3/2)*(a + b*ArcCsch[c*x]))/x,x]
```

```
[Out] Integrate[((d + e*x^2)^(3/2)*(a + b*ArcCsch[c*x]))/x, x]
```

**fricas [A]** time = 0.65, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{\left(aex^2+ad+\left(bex^2+bd\right)\text{arcsch}\left(cx\right)\right)\sqrt{ex^2+d}}{x},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((e*x^2+d)^(3/2)*(a+b*arccsch(c*x))/x,x, algorithm="fricas")
```

```
[Out] integral((a*e*x^2 + a*d + (b*e*x^2 + b*d)*arccsch(c*x))*sqrt(e*x^2 + d)/x,
x)
```

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

$$\int \frac{\left(ex^2+d\right)^{\frac{3}{2}}\left(b \operatorname{arcsch}(cx)+a\right)}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((e*x^2+d)^(3/2)*(a+b*arccsch(c*x))/x,x, algorithm="giac")
```

```
[Out] integrate((e*x^2 + d)^(3/2)*(b*arccsch(c*x) + a)/x, x)
```

**maple [A]** time = 0.43, size = 0, normalized size = 0.00

$$\int \frac{\left(e\,x^2+d\right)^{\frac{3}{2}}\left(a+b \operatorname{arccsch}(cx)\right)}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((e*x^2+d)^(3/2)*(a+b*arccsch(c*x))/x,x)
```

```
[Out] int((e*x^2+d)^(3/2)*(a+b*arccsch(c*x))/x,x)
```

**maxima [A]** time = 0.00, size = 0, normalized size = 0.00

$$-\frac{1}{3}\left(3\,d^{\frac{3}{2}} \operatorname{arsinh}\left(\frac{d}{\sqrt{de}\,|x|}\right)-\left(ex^2+d\right)^{\frac{3}{2}}-3\,\sqrt{ex^2+d}\,d\right)a+b\int \frac{\left(ex^2+d\right)^{\frac{3}{2}}\log\left(\sqrt{\frac{1}{c^2x^2}+1}+\frac{1}{cx}\right)}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((e*x^2+d)^(3/2)*(a+b*arccsch(c*x))/x,x, algorithm="maxima")
```

```
[Out] -1/3*(3*d^(3/2)*arcsinh(d/(sqrt(d*e)*abs(x))) - (e*x^2 + d)^(3/2) - 3*sqrt(
e*x^2 + d)*d)*a + b*integrate((e*x^2 + d)^(3/2)*log(sqrt(1/(c^2*x^2) + 1) +
 1/(c*x))/x, x)
```

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

$$\int \frac{\left(e\,x^2+d\right)^{3/2}\,\left(a+b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)\right)}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(((d + e*x^2)^(3/2)*(a + b*asinh(1/(c*x))))/x,x)
```

```
[Out] int(((d + e*x^2)^(3/2)*(a + b*asinh(1/(c*x))))/x, x)
```

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

$$\int \frac{(a + b\,\mathrm{acsch}\,(cx))\left(d + ex^2\right)^{\frac{3}{2}}}{x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((e*x**2+d)**(3/2)*(a+b*acsch(c*x))/x,x)
```

```
[Out] Integral((a + b*acsch(c*x))*(d + e*x**2)**(3/2)/x, x)
```

## 3.131 $\int \frac{\left(d+ex^2\right)^{3/2}\left(a+b\textbf{csch}^{-1}(cx)\right)}{x^3}\,dx$

**Optimal**. Leaf size=26

$$\text{Int}\left(\frac{\left(d+ex^2\right)^{3/2}\left(a+b\text{csch}^{-1}(cx)\right)}{x^3},x\right)$$

```
[Out] Unintegrable((e*x^2+d)^(3/2)*(a+b*arccsch(c*x))/x^3,x)
```

**Rubi** [A] time = 0.12, 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 = {}

$$\int \frac{\left(d+ex^2\right)^{3/2}\left(a+b\text{csch}^{-1}(cx)\right)}{x^3}\,dx$$

Verification is Not applicable to the result.

```
[In] Int[((d + e*x^2)^(3/2)*(a + b*ArcCsch[c*x]))/x^3,x]
```

```
[Out] Defer[Int][((d + e*x^2)^(3/2)*(a + b*ArcCsch[c*x]))/x^3, x]
```

Rubi steps

$$\int \frac{\left(d+ex^2\right)^{3/2}\left(a+b\text{csch}^{-1}(cx)\right)}{x^3}\,dx=\int \frac{\left(d+ex^2\right)^{3/2}\left(a+b\text{csch}^{-1}(cx)\right)}{x^3}\,dx$$

**Mathematica** [A] time = 5.86, size = 0, normalized size = 0.00

$$\int \frac{\left(d+ex^2\right)^{3/2}\left(a+b\text{csch}^{-1}(cx)\right)}{x^3}\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[((d + e*x^2)^(3/2)*(a + b*ArcCsch[c*x]))/x^3,x]
```

```
[Out] Integrate[((d + e*x^2)^(3/2)*(a + b*ArcCsch[c*x]))/x^3, x]
```

**fricas** [A] time = 0.73, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{\left(aex^2+ad+\left(bex^2+bd\right)\text{arcsch}\,(cx)\right)\sqrt{ex^2+d}}{x^3},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((e*x^2+d)^(3/2)*(a+b*arccsch(c*x))/x^3,x, algorithm="fricas")
```

```
[Out] integral((a*e*x^2 + a*d + (b*e*x^2 + b*d)*arccsch(c*x))*sqrt(e*x^2 + d)/x^3
, x)
```

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

$$\int \frac{\left(ex^2+d\right)^{\frac{3}{2}}\left(b \operatorname{arcsch}\left(cx\right)+a\right)}{x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((e*x^2+d)^(3/2)*(a+b*arccsch(c*x))/x^3,x, algorithm="giac")
```

```
[Out] integrate((e*x^2 + d)^(3/2)*(b*arccsch(c*x) + a)/x^3, x)
```

**maple [A]** time = 0.42, size = 0, normalized size = 0.00

$$\int \frac{\left(e\,x^2+d\right)^{\frac{3}{2}}\left(a+b \operatorname{arccsch}\left(cx\right)\right)}{x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((e*x^2+d)^(3/2)*(a+b*arccsch(c*x))/x^3,x)
```

```
[Out] int((e*x^2+d)^(3/2)*(a+b*arccsch(c*x))/x^3,x)
```

**maxima [A]** time = 0.00, size = 0, normalized size = 0.00

$$-\frac{1}{2}\left(3\sqrt{d}\,e\operatorname{arsinh}\left(\frac{d}{\sqrt{de}\,|x|}\right)-3\sqrt{ex^2+d}\,e-\frac{\left(ex^2+d\right)^{\frac{3}{2}}e}{d}+\frac{\left(ex^2+d\right)^{\frac{5}{2}}}{dx^2}\right)a+b\int \frac{\left(ex^2+d\right)^{\frac{3}{2}}\log\left(\sqrt{\frac{1}{c^2x^2}+1}+\frac{1}{cx}\right.}{x^3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((e*x^2+d)^(3/2)*(a+b*arccsch(c*x))/x^3,x, algorithm="maxima")
```

```
[Out] -1/2*(3*sqrt(d)*e*arcsinh(d/(sqrt(d*e)*abs(x))) - 3*sqrt(e*x^2 + d)*e - (e*
x^2 + d)^(3/2)*e/d + (e*x^2 + d)^(5/2)/(d*x^2))*a + b*integrate((e*x^2 + d)
^(3/2)*log(sqrt(1/(c^2*x^2) + 1) + 1/(c*x))/x^3, x)
```

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

$$\int \frac{\left(e\,x^2+d\right)^{3/2}\,\left(a+b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)\right)}{x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(((d + e*x^2)^(3/2)*(a + b*asinh(1/(c*x))))/x^3,x)
[Out] int(((d + e*x^2)^(3/2)*(a + b*asinh(1/(c*x))))/x^3, x)
```

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

$$\int \frac{(a + b\,\mathrm{acsch}\,(cx))\left(d + ex^2\right)^{\frac{3}{2}}}{x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((e*x**2+d)**(3/2)*(a+b*acsch(c*x))/x**3,x)
[Out] Integral((a + b*acsch(c*x))*(d + e*x**2)**(3/2)/x**3, x)
```

# 3.132 $\int x^2 \left(d+e x^2\right)^{3/2} \left(a+b \mathbf{csch}^{-1}(c x)\right) \, dx$

**Optimal**. Leaf size=26

$$\text{Int}\left(x^2 \left(d+e x^2\right)^{3/2} \left(a+b \text{csch}^{-1}(c x)\right),x\right)$$

```
[Out] Unintegrable(x^2*(e*x^2+d)^(3/2)*(a+b*arccsch(c*x)),x)
```

**Rubi [A]** time = 0.12, 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 = {}

$$\int x^2 \left(d+e x^2\right)^{3/2} \left(a+b \text{csch}^{-1}(c x)\right) \, dx$$

Verification is Not applicable to the result.

```
[In] Int[x^2*(d + e*x^2)^(3/2)*(a + b*ArcCsch[c*x]),x]
```

```
[Out] Defer[Int][x^2*(d + e*x^2)^(3/2)*(a + b*ArcCsch[c*x]), x]
```

Rubi steps

$$\int x^2 \left(d+e x^2\right)^{3/2} \left(a+b \text{csch}^{-1}(c x)\right) \, dx=\int x^2 \left(d+e x^2\right)^{3/2} \left(a+b \text{csch}^{-1}(c x)\right) \, dx$$

**Mathematica [A]** time = 9.67, size = 0, normalized size = 0.00

$$\int x^2 \left(d+e x^2\right)^{3/2} \left(a+b \text{csch}^{-1}(c x)\right) \, dx$$

Verification is Not applicable to the result.

```
[In] Integrate[x^2*(d + e*x^2)^(3/2)*(a + b*ArcCsch[c*x]),x]
```

```
[Out] Integrate[x^2*(d + e*x^2)^(3/2)*(a + b*ArcCsch[c*x]), x]
```

**fricas [A]** time = 0.70, size = 0, normalized size = 0.00

$$\text{integral}\left(\left(a e x^4 + a d x^2 + \left(b e x^4 + b d x^2\right) \operatorname{arcsch}\left(c x\right)\right) \sqrt{e x^2 + d}, x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*(e*x^2+d)^(3/2)*(a+b*arccsch(c*x)),x, algorithm="fricas")
```

```
[Out] integral((a*e*x^4 + a*d*x^2 + (b*e*x^4 + b*d*x^2)*arccsch(c*x))*sqrt(e*x^2
+ d), x)
```

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

$$\int \left(ex^2+d\right)^{\frac{3}{2}}(b\,\mathrm{arcsch}\,(cx)+a)x^2\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*(e*x^2+d)^(3/2)*(a+b*arccsch(c*x)),x, algorithm="giac")
```

```
[Out] integrate((e*x^2 + d)^(3/2)*(b*arccsch(c*x) + a)*x^2, x)
```

**maple [A]** time = 0.61, size = 0, normalized size = 0.00

$$\int x^2\left(e\,x^2+d\right)^{\frac{3}{2}}\left(a+b\,\mathrm{arccsch}\,(cx)\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^2*(e*x^2+d)^(3/2)*(a+b*arccsch(c*x)),x)
```

```
[Out] int(x^2*(e*x^2+d)^(3/2)*(a+b*arccsch(c*x)),x)
```

**maxima [A]** time = 0.00, size = 0, normalized size = 0.00

$$\frac{1}{48}\left(\frac{8\left(ex^2+d\right)^{\frac{5}{2}}x}{e}-\frac{2\left(ex^2+d\right)^{\frac{3}{2}}dx}{e}-\frac{3\sqrt{ex^2+d}\,d^2x}{e}-\frac{3\,d^3\,\mathrm{arsinh}\left(\frac{ex}{\sqrt{de}}\right)}{e^{\frac{3}{2}}}\right)a+b\int\left(ex^2+d\right)^{\frac{3}{2}}x^2\log\left(\sqrt{\frac{1}{c^2x^2}+1}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*(e*x^2+d)^(3/2)*(a+b*arccsch(c*x)),x, algorithm="maxima")
```

```
[Out] 1/48*(8*(e*x^2 + d)^(5/2)*x/e - 2*(e*x^2 + d)^(3/2)*d*x/e - 3*sqrt(e*x^2 +
d)*d^2*x/e - 3*d^3*arcsinh(e*x/sqrt(d*e))/e^(3/2))*a + b*integrate((e*x^2 +
 d)^(3/2)*x^2*log(sqrt(1/(c^2*x^2) + 1) + 1/(c*x)), x)
```

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

$$\int x^2\left(e\,x^2+d\right)^{3/2}\left(a+b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^2*(d + e*x^2)^(3/2)*(a + b*asinh(1/(c*x))),x)
```

```
[Out] int(x^2*(d + e*x^2)^(3/2)*(a + b*asinh(1/(c*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*(e*x**2+d)**(3/2)*(a+b*acsch(c*x)),x)
```

```
[Out] Timed out
```

# 3.133 $\int \left(d+ex^2\right)^{3/2} \left(a+b\operatorname{csch}^{-1}(cx)\right) dx$

**Optimal**. Leaf size=23

$$\operatorname{Int}\left(\left(d+ex^2\right)^{3/2} \left(a+b\operatorname{csch}^{-1}(cx)\right),x\right)$$

```
[Out] Unintegrable((e*x^2+d)^(3/2)*(a+b*arccsch(c*x)),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 = {}

$$\int \left(d+ex^2\right)^{3/2} \left(a+b\operatorname{csch}^{-1}(cx)\right) dx$$

Verification is Not applicable to the result.

```
[In] Int[(d + e*x^2)^(3/2)*(a + b*ArcCsch[c*x]),x]
```

```
[Out] Defer[Int][(d + e*x^2)^(3/2)*(a + b*ArcCsch[c*x]), x]
```

Rubi steps

$$\int \left(d+ex^2\right)^{3/2} \left(a+b\operatorname{csch}^{-1}(cx)\right) dx = \int \left(d+ex^2\right)^{3/2} \left(a+b\operatorname{csch}^{-1}(cx)\right) dx$$

**Mathematica [A]** time = 3.52, size = 0, normalized size = 0.00

$$\int \left(d+ex^2\right)^{3/2} \left(a+b\operatorname{csch}^{-1}(cx)\right) dx$$

Verification is Not applicable to the result.

```
[In] Integrate[(d + e*x^2)^(3/2)*(a + b*ArcCsch[c*x]),x]
```

```
[Out] Integrate[(d + e*x^2)^(3/2)*(a + b*ArcCsch[c*x]), x]
```

**fricas [A]** time = 0.43, size = 0, normalized size = 0.00

$$\operatorname{integral}\left(\left(aex^2+ad+\left(bex^2+bd\right)\operatorname{arcsch}(cx)\right)\sqrt{ex^2+d},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((e*x^2+d)^(3/2)*(a+b*arccsch(c*x)),x, algorithm="fricas")
```

```
[Out] integral((a*e*x^2 + a*d + (b*e*x^2 + b*d)*arccsch(c*x))*sqrt(e*x^2 + d), x)
```

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

$$\int \left(ex^2+d\right)^{\frac{3}{2}}(b\operatorname{arcsch}(cx)+a)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((e*x^2+d)^(3/2)*(a+b*arccsch(c*x)),x, algorithm="giac")
[Out] integrate((e*x^2 + d)^(3/2)*(b*arccsch(c*x) + a), x)
```

**maple [A]** time = 0.44, size = 0, normalized size = 0.00

$$\int \left(e\,x^2+d\right)^{\frac{3}{2}}\left(a+b\operatorname{arccsch}(cx)\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((e*x^2+d)^(3/2)*(a+b*arccsch(c*x)),x)
[Out] int((e*x^2+d)^(3/2)*(a+b*arccsch(c*x)),x)
```

**maxima [A]** time = 0.00, size = 0, normalized size = 0.00

$$\frac{1}{8}\left(2\left(ex^2+d\right)^{\frac{3}{2}}x+3\sqrt{ex^2+d}\,dx+\frac{3\,d^2\operatorname{arsinh}\left(\frac{ex}{\sqrt{de}}\right)}{\sqrt{e}}\right)a+b\int\left(ex^2+d\right)^{\frac{3}{2}}\log\left(\sqrt{\frac{1}{c^2x^2}+1}+\frac{1}{cx}\right)dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((e*x^2+d)^(3/2)*(a+b*arccsch(c*x)),x, algorithm="maxima")
[Out] 1/8*(2*(e*x^2 + d)^(3/2)*x + 3*sqrt(e*x^2 + d)*d*x + 3*d^2*arcsinh(e*x/sqrt
(d*e))/sqrt(e))*a + b*integrate((e*x^2 + d)^(3/2)*log(sqrt(1/(c^2*x^2) + 1)
 + 1/(c*x)), x)
```

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

$$\int \left(e\,x^2+d\right)^{3/2}\left(a+b\,\operatorname{asinh}\left(\frac{1}{c\,x}\right)\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((d + e*x^2)^(3/2)*(a + b*asinh(1/(c*x))),x)
[Out] int((d + e*x^2)^(3/2)*(a + b*asinh(1/(c*x))), x)
```

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

$$\int (a + b\,\mathrm{acsch}\,(cx))\left(d + ex^2\right)^{\frac{3}{2}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((e*x**2+d)**(3/2)*(a+b*acsch(c*x)),x)
[Out] Integral((a + b*acsch(c*x))*(d + e*x**2)**(3/2), x)
```

# 3.134 $\int \frac{\left(d+ex^2\right)^{3/2}\left(a+b\,\mathrm{csch}^{-1}(cx)\right)}{x^2}\,dx$

**Optimal**. Leaf size=26

$$\mathrm{Int}\left(\frac{\left(d+ex^2\right)^{3/2}\left(a+b\,\mathrm{csch}^{-1}(cx)\right)}{x^2},x\right)$$

```
[Out] Unintegrable((e*x^2+d)^(3/2)*(a+b*arccsch(c*x))/x^2,x)
```

**Rubi** [A] time = 0.11, 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 = {}

$$\int \frac{\left(d+ex^2\right)^{3/2}\left(a+b\,\mathrm{csch}^{-1}(cx)\right)}{x^2}\,dx$$

Verification is Not applicable to the result.

```
[In] Int[((d + e*x^2)^(3/2)*(a + b*ArcCsch[c*x]))/x^2,x]
```

```
[Out] Defer[Int][((d + e*x^2)^(3/2)*(a + b*ArcCsch[c*x]))/x^2, x]
```

Rubi steps

$$\int \frac{\left(d+ex^2\right)^{3/2}\left(a+b\,\mathrm{csch}^{-1}(cx)\right)}{x^2}\,dx=\int \frac{\left(d+ex^2\right)^{3/2}\left(a+b\,\mathrm{csch}^{-1}(cx)\right)}{x^2}\,dx$$

**Mathematica** [A] time = 5.79, size = 0, normalized size = 0.00

$$\int \frac{\left(d+ex^2\right)^{3/2}\left(a+b\,\mathrm{csch}^{-1}(cx)\right)}{x^2}\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[((d + e*x^2)^(3/2)*(a + b*ArcCsch[c*x]))/x^2,x]
```

```
[Out] Integrate[((d + e*x^2)^(3/2)*(a + b*ArcCsch[c*x]))/x^2, x]
```

**fricas** [A] time = 0.65, size = 0, normalized size = 0.00

$$\mathrm{integral}\left(\frac{\left(aex^2+ad+\left(bex^2+bd\right)\mathrm{arcsch}\left(cx\right)\right)\sqrt{ex^2+d}}{x^2},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((e*x^2+d)^(3/2)*(a+b*arccsch(c*x))/x^2,x, algorithm="fricas")
```

```
[Out] integral((a*e*x^2 + a*d + (b*e*x^2 + b*d)*arccsch(c*x))*sqrt(e*x^2 + d)/x^2
, x)
```

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

$$\int \frac{\left(ex^2+d\right)^{\frac{3}{2}}\left(b\operatorname{arcsch}\left(cx\right)+a\right)}{x^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((e*x^2+d)^(3/2)*(a+b*arccsch(c*x))/x^2,x, algorithm="giac")
```

```
[Out] integrate((e*x^2 + d)^(3/2)*(b*arccsch(c*x) + a)/x^2, x)
```

**maple [A]** time = 0.45, size = 0, normalized size = 0.00

$$\int \frac{\left(e\,x^2+d\right)^{\frac{3}{2}}\left(a+b\operatorname{arccsch}\left(cx\right)\right)}{x^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((e*x^2+d)^(3/2)*(a+b*arccsch(c*x))/x^2,x)
```

```
[Out] int((e*x^2+d)^(3/2)*(a+b*arccsch(c*x))/x^2,x)
```

**maxima [A]** time = 0.00, size = 0, normalized size = 0.00

$$\frac{1}{2}\left(3\sqrt{ex^2+d}\,ex+3\,d\sqrt{e}\,\operatorname{arsinh}\left(\frac{ex}{\sqrt{de}}\right)-\frac{2\left(ex^2+d\right)^{\frac{3}{2}}}{x}\right)a+b\int \frac{\left(ex^2+d\right)^{\frac{3}{2}}\log\left(\sqrt{\frac{1}{c^2x^2}+1}+\frac{1}{cx}\right)}{x^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((e*x^2+d)^(3/2)*(a+b*arccsch(c*x))/x^2,x, algorithm="maxima")
```

```
[Out] 1/2*(3*sqrt(e*x^2 + d)*e*x + 3*d*sqrt(e)*arcsinh(e*x/sqrt(d*e)) - 2*(e*x^2
+ d)^(3/2)/x)*a + b*integrate((e*x^2 + d)^(3/2)*log(sqrt(1/(c^2*x^2) + 1) +
 1/(c*x))/x^2, x)
```

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

$$\int \frac{\left(e\,x^2+d\right)^{3/2}\,\left(a+b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)\right)}{x^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(((d + e*x^2)^(3/2)*(a + b*asinh(1/(c*x))))/x^2,x)
```

```
[Out] int(((d + e*x^2)^(3/2)*(a + b*asinh(1/(c*x))))/x^2, x)
```

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

$$\int \frac{(a + b \operatorname{acsch}(cx)) \left(d + ex^2\right)^{\frac{3}{2}}}{x^2} \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((e*x**2+d)**(3/2)*(a+b*acsch(c*x))/x**2,x)
```

```
[Out] Integral((a + b*acsch(c*x))*(d + e*x**2)**(3/2)/x**2, x)
```

# 3.135 $\int \frac{\left(d+ex^2\right)^{3/2}\left(a+b\mathbf{csch}^{-1}(cx)\right)}{x^4}\,dx$

**Optimal**. Leaf size=26

$$\mathrm{Int}\left(\frac{\left(d+ex^2\right)^{3/2}\left(a+b\operatorname{csch}^{-1}(cx)\right)}{x^4},x\right)$$

```
[Out] Unintegrable((e*x^2+d)^(3/2)*(a+b*arccsch(c*x))/x^4,x)
```

**Rubi [A]** time = 0.11, 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 = {}

$$\int \frac{\left(d+ex^2\right)^{3/2}\left(a+b\operatorname{csch}^{-1}(cx)\right)}{x^4}\,dx$$

Verification is Not applicable to the result.

```
[In] Int[((d + e*x^2)^(3/2)*(a + b*ArcCsch[c*x]))/x^4,x]
[Out] Defer[Int][((d + e*x^2)^(3/2)*(a + b*ArcCsch[c*x]))/x^4, x]
```

Rubi steps

$$\int \frac{\left(d+ex^2\right)^{3/2}\left(a+b\operatorname{csch}^{-1}(cx)\right)}{x^4}\,dx=\int \frac{\left(d+ex^2\right)^{3/2}\left(a+b\operatorname{csch}^{-1}(cx)\right)}{x^4}\,dx$$

**Mathematica [A]** time = 15.97, size = 0, normalized size = 0.00

$$\int \frac{\left(d+ex^2\right)^{3/2}\left(a+b\operatorname{csch}^{-1}(cx)\right)}{x^4}\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[((d + e*x^2)^(3/2)*(a + b*ArcCsch[c*x]))/x^4,x]
[Out] Integrate[((d + e*x^2)^(3/2)*(a + b*ArcCsch[c*x]))/x^4, x]
```

**fricas [A]** time = 0.59, size = 0, normalized size = 0.00

$$\mathrm{integral}\left(\frac{\left(aex^2+ad+\left(bex^2+bd\right)\operatorname{arcsch}(cx)\right)\sqrt{ex^2+d}}{x^4},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((e*x^2+d)^(3/2)*(a+b*arccsch(c*x))/x^4,x, algorithm="fricas")
```

```
[Out] integral((a*e*x^2 + a*d + (b*e*x^2 + b*d)*arccsch(c*x))*sqrt(e*x^2 + d)/x^4
, x)
```

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

$$\int \frac{\left(ex^2+d\right)^{\frac{3}{2}}\left(b\operatorname{arcsch}\left(cx\right)+a\right)}{x^4}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((e*x^2+d)^(3/2)*(a+b*arccsch(c*x))/x^4,x, algorithm="giac")
```

```
[Out] integrate((e*x^2 + d)^(3/2)*(b*arccsch(c*x) + a)/x^4, x)
```

**maple** [A] time = 0.45, size = 0, normalized size = 0.00

$$\int \frac{\left(e\,x^2+d\right)^{\frac{3}{2}}\left(a+b\operatorname{arccsch}\left(cx\right)\right)}{x^4}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((e*x^2+d)^(3/2)*(a+b*arccsch(c*x))/x^4,x)
```

```
[Out] int((e*x^2+d)^(3/2)*(a+b*arccsch(c*x))/x^4,x)
```

**maxima** [A] time = 0.00, size = 0, normalized size = 0.00

$$\frac{1}{3}\left(\frac{3\sqrt{ex^2+d}\,e^2x}{d}+3\,e^{\frac{3}{2}}\operatorname{arsinh}\left(\frac{ex}{\sqrt{de}}\right)-\frac{2\left(ex^2+d\right)^{\frac{3}{2}}e}{dx}-\frac{\left(ex^2+d\right)^{\frac{5}{2}}}{dx^3}\right)a+b\int \frac{\left(ex^2+d\right)^{\frac{3}{2}}\log\left(\sqrt{\frac{1}{c^2x^2}+1}+\frac{1}{cx}\right)}{x^4}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((e*x^2+d)^(3/2)*(a+b*arccsch(c*x))/x^4,x, algorithm="maxima")
```

```
[Out] 1/3*(3*sqrt(e*x^2 + d)*e^2*x/d + 3*e^(3/2)*arcsinh(e*x/sqrt(d*e)) - 2*(e*x^
2 + d)^(3/2)*e/(d*x) - (e*x^2 + d)^(5/2)/(d*x^3))*a + b*integrate((e*x^2 +
d)^(3/2)*log(sqrt(1/(c^2*x^2) + 1) + 1/(c*x))/x^4, x)
```

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

$$\int \frac{{\left(e\,x^2+d\right)}^{3/2}\,\left(a+b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)\right)}{x^4}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(((d + e*x^2)^(3/2)*(a + b*asinh(1/(c*x))))/x^4,x)
[Out] int(((d + e*x^2)^(3/2)*(a + b*asinh(1/(c*x))))/x^4, x)
```

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

$$\int \frac{(a + b\operatorname{acsch}(cx))\left(d + ex^2\right)^{\frac{3}{2}}}{x^4}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((e*x**2+d)**(3/2)*(a+b*acsch(c*x))/x**4,x)
[Out] Integral((a + b*acsch(c*x))*(d + e*x**2)**(3/2)/x**4, x)
```

# 3.136 $\int \frac{\left(d+ex^2\right)^{3/2}\left(a+b\,\mathbf{csch}^{-1}(cx)\right)}{x^6}\,dx$

**Optimal**. Leaf size=492

$$-\frac{\left(d+ex^2\right)^{5/2}\left(a+b\text{csch}^{-1}(cx)\right)}{5dx^5}-\frac{4bc\sqrt{-c^2x^2-1}\,\left(c^2d-2e\right)\sqrt{d+ex^2}}{75x^2\sqrt{-c^2x^2}}+\frac{bc\sqrt{-c^2x^2-1}\,\left(d+ex^2\right)^{3/2}}{25x^4\sqrt{-c^2x^2}}+\frac{bc\sqrt{-c^2x^2-}}{}$$

```
[Out] -1/5*(e*x^2+d)^(5/2)*(a+b*arccsch(c*x))/d/x^5+1/25*b*c*(e*x^2+d)^(3/2)*(-c^
2*x^2-1)^(1/2)/x^4/(-c^2*x^2)^(1/2)+1/75*b*c^3*(8*c^4*d^2-23*c^2*d*e+23*e^2
)*x^2*(e*x^2+d)^(1/2)/d/(-c^2*x^2)^(1/2)/(-c^2*x^2-1)^(1/2)+1/75*b*c*(8*c^4
*d^2-23*c^2*d*e+23*e^2)*(-c^2*x^2-1)^(1/2)*(e*x^2+d)^(1/2)/d/(-c^2*x^2)^(1/
2)-4/75*b*c*(c^2*d-2*e)*(-c^2*x^2-1)^(1/2)*(e*x^2+d)^(1/2)/x^2/(-c^2*x^2)^(
1/2)-1/75*b*c^2*(8*c^4*d^2-23*c^2*d*e+23*e^2)*x*(1/(c^2*x^2+1))^(1/2)*(c^2*
x^2+1)^(1/2)*EllipticE(c*x/(c^2*x^2+1)^(1/2),(1-e/c^2/d)^(1/2))*(e*x^2+d)^(
1/2)/d/(-c^2*x^2)^(1/2)/(-c^2*x^2-1)^(1/2)/((e*x^2+d)/d/(c^2*x^2+1))^(1/2)+
1/75*b*e*(4*c^4*d^2-11*c^2*d*e+15*e^2)*x*(1/(c^2*x^2+1))^(1/2)*(c^2*x^2+1)^
(1/2)*EllipticF(c*x/(c^2*x^2+1)^(1/2),(1-e/c^2/d)^(1/2))*(e*x^2+d)^(1/2)/d^
2/(-c^2*x^2)^(1/2)/(-c^2*x^2-1)^(1/2)/((e*x^2+d)/d/(c^2*x^2+1))^(1/2)
```

**Rubi [A]** time = 0.58, antiderivative size = 492, normalized size of antiderivative = 1.00, number of steps used = 9, number of rules used = 10, integrand size = 23, $\frac{\text{number of rules}}{\text{integrand size}} = 0.435$, Rules used = {264, 6302, 12, 474, 580, 583, 531, 418, 492, 411}

$$-\frac{\left(d+ex^2\right)^{5/2}\left(a+b\text{csch}^{-1}(cx)\right)}{5dx^5}+\frac{bc^3x^2\left(8c^4d^2-23c^2de+23e^2\right)\sqrt{d+ex^2}}{75d\sqrt{-c^2x^2}\sqrt{-c^2x^2-1}}+\frac{bc\sqrt{-c^2x^2-1}\,\left(8c^4d^2-23c^2de+23\right.}{75d\sqrt{-c^2x^2}}$$

Antiderivative was successfully verified.

```
[In] Int[((d + e*x^2)^(3/2)*(a + b*ArcCsch[c*x]))/x^6,x]
```

```
[Out] (b*c^3*(8*c^4*d^2 - 23*c^2*d*e + 23*e^2)*x^2*Sqrt[d + e*x^2])/(75*d*Sqrt[-(
c^2*x^2)]*Sqrt[-1 - c^2*x^2]) + (b*c*(8*c^4*d^2 - 23*c^2*d*e + 23*e^2)*Sqrt
[-1 - c^2*x^2]*Sqrt[d + e*x^2])/(75*d*Sqrt[-(c^2*x^2)]) - (4*b*c*(c^2*d - 2
*e)*Sqrt[-1 - c^2*x^2]*Sqrt[d + e*x^2])/(75*x^2*Sqrt[-(c^2*x^2)]) + (b*c*Sq
rt[-1 - c^2*x^2]*(d + e*x^2)^(3/2))/(25*x^4*Sqrt[-(c^2*x^2)]) - ((d + e*x^2
)^(5/2)*(a + b*ArcCsch[c*x]))/(5*d*x^5) - (b*c^2*(8*c^4*d^2 - 23*c^2*d*e +
23*e^2)*x*Sqrt[d + e*x^2]*EllipticE[ArcTan[c*x], 1 - e/(c^2*d)])/(75*d*Sqrt
[-(c^2*x^2)]*Sqrt[-1 - c^2*x^2]*Sqrt[(d + e*x^2)/(d*(1 + c^2*x^2))]) + (b*e
*(4*c^4*d^2 - 11*c^2*d*e + 15*e^2)*x*Sqrt[d + e*x^2]*EllipticF[ArcTan[c*x],
 1 - e/(c^2*d)])/(75*d^2*Sqrt[-(c^2*x^2)]*Sqrt[-1 - c^2*x^2]*Sqrt[(d + e*x^
2)/(d*(1 + c^2*x^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 264

```
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] /; FreeQ[{a, b, c, m, n,
 p}, x] && EqQ[(m + 1)/n + p + 1, 0] && NeQ[m, -1]
```

Rule 411

```
Int[Sqrt[(a_) + (b_.)*(x_)^2]/((c_) + (d_.)*(x_)^2)^(3/2), x_Symbol] :> Sim
p[(Sqrt[a + b*x^2]*EllipticE[ArcTan[Rt[d/c, 2]*x], 1 - (b*c)/(a*d)])/(c*Rt[
d/c, 2]*Sqrt[c + d*x^2]*Sqrt[(c*(a + b*x^2))/(a*(c + d*x^2))]), x] /; FreeQ
[{a, b, c, d}, x] && PosQ[b/a] && PosQ[d/c]
```

Rule 418

```
Int[1/(Sqrt[(a_) + (b_.)*(x_)^2]*Sqrt[(c_) + (d_.)*(x_)^2]), x_Symbol] :> S
imp[(Sqrt[a + b*x^2]*EllipticF[ArcTan[Rt[d/c, 2]*x], 1 - (b*c)/(a*d)])/(a*R
t[d/c, 2]*Sqrt[c + d*x^2]*Sqrt[(c*(a + b*x^2))/(a*(c + d*x^2))]), x] /; Fre
eQ[{a, b, c, d}, x] && PosQ[d/c] && PosQ[b/a] &&  !SimplerSqrtQ[b/a, d/c]
```

Rule 474

```
Int[((e_.)*(x_))^(m_)*((a_) + (b_.)*(x_)^(n_))^(p_)*((c_) + (d_.)*(x_)^(n_)
)^(q_), x_Symbol] :> Simp[(c*(e*x)^(m + 1)*(a + b*x^n)^(p + 1)*(c + d*x^n)^
(q - 1))/(a*e*(m + 1)), x] - Dist[1/(a*e^n*(m + 1)), Int[(e*x)^(m + n)*(a +
 b*x^n)^p*(c + d*x^n)^(q - 2)*Simp[c*(c*b - a*d)*(m + 1) + c*n*(b*c*(p + 1)
 + a*d*(q - 1)) + d*((c*b - a*d)*(m + 1) + c*b*n*(p + q))*x^n, x], x], x] /
; FreeQ[{a, b, c, d, e, p}, x] && NeQ[b*c - a*d, 0] && IGtQ[n, 0] && GtQ[q,
 1] && LtQ[m, -1] && IntBinomialQ[a, b, c, d, e, m, n, p, q, x]
```

Rule 492

```
Int[(x_)^2/(Sqrt[(a_) + (b_.)*(x_)^2]*Sqrt[(c_) + (d_.)*(x_)^2]), x_Symbol]
 :> Simp[(x*Sqrt[a + b*x^2])/(b*Sqrt[c + d*x^2]), x] - Dist[c/b, Int[Sqrt[a
 + b*x^2]/(c + d*x^2)^(3/2), x], x] /; FreeQ[{a, b, c, d}, x] && NeQ[b*c -
a*d, 0] && PosQ[b/a] && PosQ[d/c] &&  !SimplerSqrtQ[b/a, d/c]
```

Rule 531

```
Int[((a_) + (b_.)*(x_)^(n_))^(p_.)*((c_) + (d_.)*(x_)^(n_))^(q_.)*((e_) + (
```

```
f_.)*(x_)^(n_)), x_Symbol] :> Dist[e, Int[(a + b*x^n)^p*(c + d*x^n)^q, x],
x] + Dist[f, Int[x^n*(a + b*x^n)^p*(c + d*x^n)^q, x], x] /; FreeQ[{a, b, c,
 d, e, f, n, p, q}, x]
```

Rule 580

```
Int[((g_.)*(x_))^(m_)*((a_) + (b_.)*(x_)^(n_))^(p_.)*((c_) + (d_.)*(x_)^(n_
))^(q_.)*((e_) + (f_.)*(x_)^(n_)), x_Symbol] :> Simp[(e*(g*x)^(m + 1)*(a +
b*x^n)^(p + 1)*(c + d*x^n)^q)/(a*g*(m + 1)), x] - Dist[1/(a*g^n*(m + 1)), I
nt[(g*x)^(m + n)*(a + b*x^n)^p*(c + d*x^n)^(q - 1)*Simp[c*(b*e - a*f)*(m +
1) + e*n*(b*c*(p + 1) + a*d*q) + d*((b*e - a*f)*(m + 1) + b*e*n*(p + q + 1)
)*x^n, x], x], x] /; FreeQ[{a, b, c, d, e, f, g, p}, x] && IGtQ[n, 0] && Gt
Q[q, 0] && LtQ[m, -1] &&  !(EqQ[q, 1] && SimplerQ[e + f*x^n, c + d*x^n])
```

Rule 583

```
Int[((g_.)*(x_))^(m_)*((a_) + (b_.)*(x_)^(n_))^(p_.)*((c_) + (d_.)*(x_)^(n_
))^(q_.)*((e_) + (f_.)*(x_)^(n_)), x_Symbol] :> Simp[(e*(g*x)^(m + 1)*(a +
b*x^n)^(p + 1)*(c + d*x^n)^(q + 1))/(a*c*g*(m + 1)), x] + Dist[1/(a*c*g^n*(
m + 1)), Int[(g*x)^(m + n)*(a + b*x^n)^p*(c + d*x^n)^q*Simp[a*f*c*(m + 1) -
 e*(b*c + a*d)*(m + n + 1) - e*n*(b*c*p + a*d*q) - b*e*d*(m + n*(p + q + 2)
 + 1)*x^n, x], x], x] /; FreeQ[{a, b, c, d, e, f, g, p, q}, x] && IGtQ[n, 0
] && LtQ[m, -1]
```

Rule 6302

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))*((f_.)*(x_))^(m_.)*((d_.) + (e_.)*(
x_)^2)^(p_.), x_Symbol] :> With[{u = IntHide[(f*x)^m*(d + e*x^2)^p, x]}, Di
st[a + b*ArcCsch[c*x], u, x] - Dist[(b*c*x)/Sqrt[-(c^2*x^2)], Int[SimplifyI
ntegrand[u/(x*Sqrt[-1 - c^2*x^2]), x], x], x]] /; FreeQ[{a, b, c, d, e, f,
m, p}, x] && ((IGtQ[p, 0] &&  !(ILtQ[(m - 1)/2, 0] && GtQ[m + 2*p + 3, 0]))
 || (IGtQ[(m + 1)/2, 0] &&  !(ILtQ[p, 0] && GtQ[m + 2*p + 3, 0])) || (ILtQ[
(m + 2*p + 1)/2, 0] &&  !ILtQ[(m - 1)/2, 0]))
```

Rubi steps

$$\int \frac{\left(d+ex^2\right)^{3/2}\left(a+b\text{csch}^{-1}(cx)\right)}{x^6}\,dx = -\frac{\left(d+ex^2\right)^{5/2}\left(a+b\text{csch}^{-1}(cx)\right)}{5dx^5} - \frac{(bcx)\int -\frac{\left(d+ex^2\right)^{5/2}}{5dx^6\sqrt{-1-c^2x^2}}\,dx}{\sqrt{-c^2x^2}}$$

$$= -\frac{\left(d+ex^2\right)^{5/2}\left(a+b\text{csch}^{-1}(cx)\right)}{5dx^5} + \frac{(bcx)\int \frac{\left(d+ex^2\right)^{5/2}}{x^6\sqrt{-1-c^2x^2}}\,dx}{5d\sqrt{-c^2x^2}}$$

$$= \frac{bc\sqrt{-1-c^2x^2}\left(d+ex^2\right)^{3/2}}{25x^4\sqrt{-c^2x^2}} - \frac{\left(d+ex^2\right)^{5/2}\left(a+b\text{csch}^{-1}(cx)\right)}{5dx^5} - \frac{(bcx)\int \frac{\sqrt{d\cdots}}{\cdots}}{\cdots}$$

$$= -\frac{4bc\left(c^2d-2e\right)\sqrt{-1-c^2x^2}\sqrt{d+ex^2}}{75x^2\sqrt{-c^2x^2}} + \frac{bc\sqrt{-1-c^2x^2}\left(d+ex^2\right)^{3/2}}{25x^4\sqrt{-c^2x^2}} - \frac{(d\cdots}{\cdots}$$

$$= \frac{bc\left(8c^4d^2-23c^2de+23e^2\right)\sqrt{-1-c^2x^2}\sqrt{d+ex^2}}{75d\sqrt{-c^2x^2}} - \frac{4bc\left(c^2d-2e\right)\sqrt{-1-\cdots}}{75x^2\sqrt{-c^2\cdots}}$$

$$= \frac{bc\left(8c^4d^2-23c^2de+23e^2\right)\sqrt{-1-c^2x^2}\sqrt{d+ex^2}}{75d\sqrt{-c^2x^2}} - \frac{4bc\left(c^2d-2e\right)\sqrt{-1-\cdots}}{75x^2\sqrt{-c^2\cdots}}$$

$$= \frac{bc^3\left(8c^4d^2-23c^2de+23e^2\right)x^2\sqrt{d+ex^2}}{75d\sqrt{-c^2x^2}\sqrt{-1-c^2x^2}} + \frac{bc\left(8c^4d^2-23c^2de+23e^2\right)\sqrt{-\cdots}}{75d\sqrt{-c^2x^2}\cdots}$$

$$= \frac{bc^3\left(8c^4d^2-23c^2de+23e^2\right)x^2\sqrt{d+ex^2}}{75d\sqrt{-c^2x^2}\sqrt{-1-c^2x^2}} + \frac{bc\left(8c^4d^2-23c^2de+23e^2\right)\sqrt{-\cdots}}{75d\sqrt{-c^2x^2}\cdots}$$

**Mathematica [C]** time = 0.70, size = 291, normalized size = 0.59

$$\frac{\sqrt{d+ex^2}\left(-15a\left(d+ex^2\right)^2 + bcx\sqrt{\frac{1}{c^2x^2}+1}\left(dex^2\left(11-23c^2x^2\right)+d^2\left(8c^4x^4-4c^2x^2+3\right)+23e^2x^4\right)-15b\text{csch}^{-1}(\cdots\right.}{75dx^5}$$

Antiderivative was successfully verified.

```
[In] Integrate[((d + e*x^2)^(3/2)*(a + b*ArcCsch[c*x]))/x^6,x]
```

```
[Out] (Sqrt[d + e*x^2]*(-15*a*(d + e*x^2)^2 + b*c*Sqrt[1 + 1/(c^2*x^2)]*x*(23*e^2
*x^4 + d*e*x^2*(11 - 23*c^2*x^2) + d^2*(3 - 4*c^2*x^2 + 8*c^4*x^4)) - 15*b*
```

```
(d + e*x^2)^2*ArcCsch[c*x]))/(75*d*x^5) + ((I/75)*b*c*Sqrt[1 + 1/(c^2*x^2)]
*x*Sqrt[1 + (e*x^2)/d]*(c^2*d*(8*c^4*d^2 - 23*c^2*d*e + 23*e^2)*EllipticE[I
*ArcSinh[Sqrt[c^2]*x], e/(c^2*d)] + (-8*c^6*d^3 + 27*c^4*d^2*e - 34*c^2*d*e
^2 + 15*e^3)*EllipticF[I*ArcSinh[Sqrt[c^2]*x], e/(c^2*d)]))/(Sqrt[c^2]*d*Sq
rt[1 + c^2*x^2]*Sqrt[d + e*x^2])
```

**fricas [F]** time = 0.58, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{\left(aex^2 + ad + \left(bex^2 + bd\right)\text{arcsch}\,(cx)\right)\sqrt{ex^2 + d}}{x^6}, x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((e*x^2+d)^(3/2)*(a+b*arccsch(c*x))/x^6,x, algorithm="fricas")
```

```
[Out] integral((a*e*x^2 + a*d + (b*e*x^2 + b*d)*arccsch(c*x))*sqrt(e*x^2 + d)/x^6
, x)
```

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

$$\int \frac{\left(ex^2 + d\right)^{\frac{3}{2}}(b\,\text{arcsch}\,(cx) + a)}{x^6}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((e*x^2+d)^(3/2)*(a+b*arccsch(c*x))/x^6,x, algorithm="giac")
```

```
[Out] integrate((e*x^2 + d)^(3/2)*(b*arccsch(c*x) + a)/x^6, x)
```

**maple [F]** time = 0.43, size = 0, normalized size = 0.00

$$\int \frac{\left(e\,x^2 + d\right)^{\frac{3}{2}}(a + b\,\text{arccsch}\,(cx))}{x^6}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((e*x^2+d)^(3/2)*(a+b*arccsch(c*x))/x^6,x)
```

```
[Out] int((e*x^2+d)^(3/2)*(a+b*arccsch(c*x))/x^6,x)
```

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

$$-\frac{1}{5}\,b\left(\frac{\left(e^2x^4 + 2\,dex^2 + d^2\right)\sqrt{ex^2 + d}\,\log\left(\sqrt{c^2x^2 + 1} + 1\right)}{dx^5} + 5\int -\frac{\left(c^2e^2x^6 - \left(5\,de\log(c) - 2\,de\right)c^2x^4 - \left(\left(5\,d^2\log\right.\right.\right.}{}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((e*x^2+d)^(3/2)*(a+b*arccsch(c*x))/x^6,x, algorithm="maxima")
```

```
[Out] -1/5*b*((e^2*x^4 + 2*d*e*x^2 + d^2)*sqrt(e*x^2 + d)*log(sqrt(c^2*x^2 + 1) +
 1)/(d*x^5) + 5*integrate(-1/5*(c^2*e^2*x^6 - (5*d*e*log(c) - 2*d*e)*c^2*x^
4 - ((5*d^2*log(c) - d^2)*c^2 + 5*d*e*log(c))*x^2 - 5*d^2*log(c) - 5*(c^2*d
*e*x^4 + (c^2*d^2 + d*e)*x^2 + d^2)*log(x))*sqrt(e*x^2 + d)/(c^2*d*x^8 + d*
x^6), x) + 5*integrate(1/5*(c^2*e^2*x^4 + 2*c^2*d*e*x^2 + c^2*d^2)*sqrt(e*x
^2 + d)/(c^2*d*x^6 + d*x^4 + (c^2*d*x^6 + d*x^4)*sqrt(c^2*x^2 + 1)), x)) -
1/5*(e*x^2 + d)^(5/2)*a/(d*x^5)
```

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

$$\int \frac{\left(e\,x^2+d\right)^{3/2}\,\left(a+b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)\right)}{x^6}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(((d + e*x^2)^(3/2)*(a + b*asinh(1/(c*x))))/x^6,x)
```

```
[Out] int(((d + e*x^2)^(3/2)*(a + b*asinh(1/(c*x))))/x^6, 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((e*x**2+d)**(3/2)*(a+b*acsch(c*x))/x**6,x)
```

```
[Out] Timed out
```

# 3.137 $\int \frac{\left(d+ex^2\right)^{3/2}\left(a+b\mathbf{csch}^{-1}(cx)\right)}{x^8}\,dx$

**Optimal**. Leaf size=643

$$\frac{2e\left(d+ex^2\right)^{5/2}\left(a+b\text{csch}^{-1}(cx)\right)}{35d^2x^5}-\frac{\left(d+ex^2\right)^{5/2}\left(a+b\text{csch}^{-1}(cx)\right)}{7dx^7}+\frac{bc\sqrt{-c^2x^2-1}\left(d+ex^2\right)^{5/2}}{49dx^6\sqrt{-c^2x^2}}-\frac{bc\sqrt{-c^2x^2-1}\,(3}{1225}$$

```
[Out] -1/7*(e*x^2+d)^(5/2)*(a+b*arccsch(c*x))/d/x^7+2/35*e*(e*x^2+d)^(5/2)*(a+b*a
rccsch(c*x))/d^2/x^5-1/1225*b*c*(30*c^2*d-11*e)*(e*x^2+d)^(3/2)*(-c^2*x^2-1
)^(1/2)/d/x^4/(-c^2*x^2)^(1/2)+1/49*b*c*(e*x^2+d)^(5/2)*(-c^2*x^2-1)^(1/2)/
d/x^6/(-c^2*x^2)^(1/2)-1/3675*b*c^3*(240*c^6*d^3-528*c^4*d^2*e+193*c^2*d*e^
2+247*e^3)*x^2*(e*x^2+d)^(1/2)/d^2/(-c^2*x^2)^(1/2)/(-c^2*x^2-1)^(1/2)-1/36
75*b*c*(240*c^6*d^3-528*c^4*d^2*e+193*c^2*d*e^2+247*e^3)*(-c^2*x^2-1)^(1/2)
*(e*x^2+d)^(1/2)/d^2/(-c^2*x^2)^(1/2)+1/3675*b*c*(120*c^4*d^2-159*c^2*d*e-3
7*e^2)*(-c^2*x^2-1)^(1/2)*(e*x^2+d)^(1/2)/d/x^2/(-c^2*x^2)^(1/2)+1/3675*b*c
^2*(240*c^6*d^3-528*c^4*d^2*e+193*c^2*d*e^2+247*e^3)*x*(1/(c^2*x^2+1))^(1/2
)*(c^2*x^2+1)^(1/2)*EllipticE(c*x/(c^2*x^2+1)^(1/2),(1-e/c^2/d)^(1/2))*(e*x
^2+d)^(1/2)/d^2/(-c^2*x^2)^(1/2)/(-c^2*x^2-1)^(1/2)/((e*x^2+d)/d/(c^2*x^2+1
))^(1/2)-1/3675*b*e*(120*c^6*d^3-249*c^4*d^2*e+71*c^2*d*e^2+210*e^3)*x*(1/(
c^2*x^2+1))^(1/2)*(c^2*x^2+1)^(1/2)*EllipticF(c*x/(c^2*x^2+1)^(1/2),(1-e/c^
2/d)^(1/2))*(e*x^2+d)^(1/2)/d^3/(-c^2*x^2)^(1/2)/(-c^2*x^2-1)^(1/2)/((e*x^2
+d)/d/(c^2*x^2+1))^(1/2)
```

**Rubi** [A] time = 0.87, antiderivative size = 643, normalized size of antiderivative = 1.00, number of steps used = 10, number of rules used = 10, integrand size = 23, $\frac{\text{number of rules}}{\text{integrand size}} = 0.435$, Rules used = {271, 264, 6302, 12, 580, 583, 531, 418, 492, 411}

$$\frac{2e\left(d+ex^2\right)^{5/2}\left(a+b\text{csch}^{-1}(cx)\right)}{35d^2x^5}-\frac{\left(d+ex^2\right)^{5/2}\left(a+b\text{csch}^{-1}(cx)\right)}{7dx^7}-\frac{bc^3x^2\left(-528c^4d^2e+240c^6d^3+193c^2de^2+24\right.}{3675d^2\sqrt{-c^2x^2}\sqrt{-c^2x^2-1}}$$

Antiderivative was successfully verified.

```
[In] Int[((d + e*x^2)^(3/2)*(a + b*ArcCsch[c*x]))/x^8,x]
```

```
[Out] -(b*c^3*(240*c^6*d^3 - 528*c^4*d^2*e + 193*c^2*d*e^2 + 247*e^3)*x^2*Sqrt[d
+ e*x^2])/(3675*d^2*Sqrt[-(c^2*x^2)]*Sqrt[-1 - c^2*x^2]) - (b*c*(240*c^6*d^
3 - 528*c^4*d^2*e + 193*c^2*d*e^2 + 247*e^3)*Sqrt[-1 - c^2*x^2]*Sqrt[d + e*
x^2])/(3675*d^2*Sqrt[-(c^2*x^2)]) + (b*c*(120*c^4*d^2 - 159*c^2*d*e - 37*e^
2)*Sqrt[-1 - c^2*x^2]*Sqrt[d + e*x^2])/(3675*d*x^2*Sqrt[-(c^2*x^2)]) - (b*c
*(30*c^2*d - 11*e)*Sqrt[-1 - c^2*x^2]*(d + e*x^2)^(3/2))/(1225*d*x^4*Sqrt[-
```

```
(c^2*x^2)]) + (b*c*Sqrt[-1 - c^2*x^2]*(d + e*x^2)^(5/2))/(49*d*x^6*Sqrt[-(c
^2*x^2)]) - ((d + e*x^2)^(5/2)*(a + b*ArcCsch[c*x]))/(7*d*x^7) + (2*e*(d +
e*x^2)^(5/2)*(a + b*ArcCsch[c*x]))/(35*d^2*x^5) + (b*c^2*(240*c^6*d^3 - 528
*c^4*d^2*e + 193*c^2*d*e^2 + 247*e^3)*x*Sqrt[d + e*x^2]*EllipticE[ArcTan[c*
x], 1 - e/(c^2*d)])/(3675*d^2*Sqrt[-(c^2*x^2)]*Sqrt[-1 - c^2*x^2]*Sqrt[(d +
 e*x^2)/(d*(1 + c^2*x^2))]) - (b*e*(120*c^6*d^3 - 249*c^4*d^2*e + 71*c^2*d*
e^2 + 210*e^3)*x*Sqrt[d + e*x^2]*EllipticF[ArcTan[c*x], 1 - e/(c^2*d)])/(36
75*d^3*Sqrt[-(c^2*x^2)]*Sqrt[-1 - c^2*x^2]*Sqrt[(d + e*x^2)/(d*(1 + c^2*x^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 264

```
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] /; FreeQ[{a, b, c, m, n,
 p}, x] && EqQ[(m + 1)/n + p + 1, 0] && NeQ[m, -1]
```

Rule 271

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

Rule 411

```
Int[Sqrt[(a_) + (b_.)*(x_)^2]/((c_) + (d_.)*(x_)^2)^(3/2), x_Symbol] :> Sim
p[(Sqrt[a + b*x^2]*EllipticE[ArcTan[Rt[d/c, 2]*x], 1 - (b*c)/(a*d)])/(c*Rt[
d/c, 2]*Sqrt[c + d*x^2]*Sqrt[(c*(a + b*x^2))/(a*(c + d*x^2))]), x] /; FreeQ
[{a, b, c, d}, x] && PosQ[b/a] && PosQ[d/c]
```

Rule 418

```
Int[1/(Sqrt[(a_) + (b_.)*(x_)^2]*Sqrt[(c_) + (d_.)*(x_)^2]), x_Symbol] :> S
imp[(Sqrt[a + b*x^2]*EllipticF[ArcTan[Rt[d/c, 2]*x], 1 - (b*c)/(a*d)])/(a*R
t[d/c, 2]*Sqrt[c + d*x^2]*Sqrt[(c*(a + b*x^2))/(a*(c + d*x^2))]), x] /; Fre
eQ[{a, b, c, d}, x] && PosQ[d/c] && PosQ[b/a] &&  !SimplerSqrtQ[b/a, d/c]
```

Rule 492

```
Int[(x_)^2/(Sqrt[(a_) + (b_.)*(x_)^2]*Sqrt[(c_) + (d_.)*(x_)^2]), x_Symbol]
 :> Simp[(x*Sqrt[a + b*x^2])/(b*Sqrt[c + d*x^2]), x] - Dist[c/b, Int[Sqrt[a
```

```
 + b*x^2]/(c + d*x^2)^(3/2), x], x] /; FreeQ[{a, b, c, d}, x] && NeQ[b*c -
a*d, 0] && PosQ[b/a] && PosQ[d/c] &&  !SimplerSqrtQ[b/a, d/c]
```

Rule 531

```
Int[((a_) + (b_.)*(x_)^(n_))^(p_.)*((c_) + (d_.)*(x_)^(n_))^(q_.)*((e_) + (
f_.)*(x_)^(n_)), x_Symbol] :> Dist[e, Int[(a + b*x^n)^p*(c + d*x^n)^q, x],
x] + Dist[f, Int[x^n*(a + b*x^n)^p*(c + d*x^n)^q, x], x] /; FreeQ[{a, b, c,
 d, e, f, n, p, q}, x]
```

Rule 580

```
Int[((g_.)*(x_))^(m_)*((a_) + (b_.)*(x_)^(n_))^(p_.)*((c_) + (d_.)*(x_)^(n_
))^(q_.)*((e_) + (f_.)*(x_)^(n_)), x_Symbol] :> Simp[(e*(g*x)^(m + 1)*(a +
b*x^n)^(p + 1)*(c + d*x^n)^q)/(a*g*(m + 1)), x] - Dist[1/(a*g^n*(m + 1)), I
nt[(g*x)^(m + n)*(a + b*x^n)^p*(c + d*x^n)^(q - 1)*Simp[c*(b*e - a*f)*(m +
1) + e*n*(b*c*(p + 1) + a*d*q) + d*((b*e - a*f)*(m + 1) + b*e*n*(p + q + 1)
)*x^n, x], x], x] /; FreeQ[{a, b, c, d, e, f, g, p}, x] && IGtQ[n, 0] && Gt
Q[q, 0] && LtQ[m, -1] &&  !(EqQ[q, 1] && SimplerQ[e + f*x^n, c + d*x^n])
```

Rule 583

```
Int[((g_.)*(x_))^(m_)*((a_) + (b_.)*(x_)^(n_))^(p_.)*((c_) + (d_.)*(x_)^(n_
))^(q_.)*((e_) + (f_.)*(x_)^(n_)), x_Symbol] :> Simp[(e*(g*x)^(m + 1)*(a +
b*x^n)^(p + 1)*(c + d*x^n)^(q + 1))/(a*c*g*(m + 1)), x] + Dist[1/(a*c*g^n*(
m + 1)), Int[(g*x)^(m + n)*(a + b*x^n)^p*(c + d*x^n)^q*Simp[a*f*c*(m + 1) -
 e*(b*c + a*d)*(m + n + 1) - e*n*(b*c*p + a*d*q) - b*e*d*(m + n*(p + q + 2)
 + 1)*x^n, x], x], x] /; FreeQ[{a, b, c, d, e, f, g, p, q}, x] && IGtQ[n, 0
] && LtQ[m, -1]
```

Rule 6302

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))*((f_.)*(x_))^(m_.)*((d_.) + (e_.)*(
x_)^2)^(p_.), x_Symbol] :> With[{u = IntHide[(f*x)^m*(d + e*x^2)^p, x]}, Di
st[a + b*ArcCsch[c*x], u, x] - Dist[(b*c*x)/Sqrt[-(c^2*x^2)], Int[SimplifyI
ntegrand[u/(x*Sqrt[-1 - c^2*x^2]), x], x], x]] /; FreeQ[{a, b, c, d, e, f,
m, p}, x] && ((IGtQ[p, 0] &&  !(ILtQ[(m - 1)/2, 0] && GtQ[m + 2*p + 3, 0]))
 || (IGtQ[(m + 1)/2, 0] &&  !(ILtQ[p, 0] && GtQ[m + 2*p + 3, 0])) || (ILtQ[
(m + 2*p + 1)/2, 0] &&  !ILtQ[(m - 1)/2, 0]))
```

Rubi steps

$$\int \frac{\left(d+ex^2\right)^{3/2}\left(a+b\operatorname{csch}^{-1}(cx)\right)}{x^8}\,dx = -\frac{\left(d+ex^2\right)^{5/2}\left(a+b\operatorname{csch}^{-1}(cx)\right)}{7dx^7}+\frac{2e\left(d+ex^2\right)^{5/2}\left(a+b\operatorname{csch}^{-1}(cx)\right)}{35d^2x^5}-\frac{(bc}{}$$

$$= -\frac{\left(d+ex^2\right)^{5/2}\left(a+b\operatorname{csch}^{-1}(cx)\right)}{7dx^7}+\frac{2e\left(d+ex^2\right)^{5/2}\left(a+b\operatorname{csch}^{-1}(cx)\right)}{35d^2x^5}-\frac{(bc}{}$$

$$= \frac{bc\sqrt{-1-c^2x^2}\left(d+ex^2\right)^{5/2}}{49dx^6\sqrt{-c^2x^2}}-\frac{\left(d+ex^2\right)^{5/2}\left(a+b\operatorname{csch}^{-1}(cx)\right)}{7dx^7}+\frac{2e\left(d+ex^2\right.}{}$$

$$= -\frac{bc\left(30c^2d-11e\right)\sqrt{-1-c^2x^2}\left(d+ex^2\right)^{3/2}}{1225dx^4\sqrt{-c^2x^2}}+\frac{bc\sqrt{-1-c^2x^2}\left(d+ex^2\right)^{5/2}}{49dx^6\sqrt{-c^2x^2}}-$$

$$= \frac{bc\left(120c^4d^2-159c^2de-37e^2\right)\sqrt{-1-c^2x^2}\sqrt{d+ex^2}}{3675dx^2\sqrt{-c^2x^2}}-\frac{bc\left(30c^2d-11e\right)\sqrt{}}{1225d}$$

$$= -\frac{bc\left(240c^6d^3-528c^4d^2e+193c^2de^2+247e^3\right)\sqrt{-1-c^2x^2}\sqrt{d+ex^2}}{3675d^2\sqrt{-c^2x^2}}+\frac{bc}{}$$

$$= -\frac{bc\left(240c^6d^3-528c^4d^2e+193c^2de^2+247e^3\right)\sqrt{-1-c^2x^2}\sqrt{d+ex^2}}{3675d^2\sqrt{-c^2x^2}}+\frac{bc}{}$$

$$= -\frac{bc^3\left(240c^6d^3-528c^4d^2e+193c^2de^2+247e^3\right)x^2\sqrt{d+ex^2}}{3675d^2\sqrt{-c^2x^2}\sqrt{-1-c^2x^2}}-\frac{bc\left(240c^6d^3\right.}{}$$

$$= -\frac{bc^3\left(240c^6d^3-528c^4d^2e+193c^2de^2+247e^3\right)x^2\sqrt{d+ex^2}}{3675d^2\sqrt{-c^2x^2}\sqrt{-1-c^2x^2}}-\frac{bc\left(240c^6d^3\right.}{}$$

**Mathematica** [C] time = 0.83, size = 372, normalized size = 0.58

$$-\frac{\sqrt{d+ex^2}\left(105a\left(5d-2ex^2\right)\left(d+ex^2\right)^2+bcx\sqrt{\frac{1}{c^2x^2}+1}\left(de^2x^4\left(193c^2x^2-71\right)-3d^2ex^2\left(176c^4x^4-83c^2x^2+61\right)\right.\right.}{3675d^2x^7}$$

Antiderivative was successfully verified.

```
[In] Integrate[((d + e*x^2)^(3/2)*(a + b*ArcCsch[c*x]))/x^8,x]
```

```
[Out] -1/3675*(Sqrt[d + e*x^2]*(105*a*(5*d - 2*e*x^2)*(d + e*x^2)^2 + b*c*Sqrt[1
+ 1/(c^2*x^2)]*x*(247*e^3*x^6 + d*e^2*x^4*(-71 + 193*c^2*x^2) - 3*d^2*e*x^2
*(61 - 83*c^2*x^2 + 176*c^4*x^4) + 15*d^3*(-5 + 6*c^2*x^2 - 8*c^4*x^4 + 16*
c^6*x^6)) + 105*b*(5*d - 2*e*x^2)*(d + e*x^2)^2*ArcCsch[c*x]))/(d^2*x^7) -
((I/3675)*b*c*Sqrt[1 + 1/(c^2*x^2)]*x*Sqrt[1 + (e*x^2)/d]*(c^2*d*(240*c^6*d
^3 - 528*c^4*d^2*e + 193*c^2*d*e^2 + 247*e^3)*EllipticE[I*ArcSinh[Sqrt[c^2]
*x], e/(c^2*d)] - 2*(120*c^8*d^4 - 324*c^6*d^3*e + 221*c^4*d^2*e^2 + 88*c^2
*d*e^3 - 105*e^4)*EllipticF[I*ArcSinh[Sqrt[c^2]*x], e/(c^2*d)]))/(Sqrt[c^2]
*d^2*Sqrt[1 + c^2*x^2]*Sqrt[d + e*x^2])
```

**fricas [F]** time = 0.63, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{\left(aex^2 + ad + \left(bex^2 + bd\right)\text{arcsch}\left(cx\right)\right)\sqrt{ex^2 + d}}{x^8}, x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((e*x^2+d)^(3/2)*(a+b*arccsch(c*x))/x^8,x, algorithm="fricas")
```

```
[Out] integral((a*e*x^2 + a*d + (b*e*x^2 + b*d)*arccsch(c*x))*sqrt(e*x^2 + d)/x^8
, x)
```

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

$$\int \frac{\left(ex^2 + d\right)^{\frac{3}{2}}\left(b\,\text{arcsch}\left(cx\right) + a\right)}{x^8}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((e*x^2+d)^(3/2)*(a+b*arccsch(c*x))/x^8,x, algorithm="giac")
```

```
[Out] integrate((e*x^2 + d)^(3/2)*(b*arccsch(c*x) + a)/x^8, x)
```

**maple [F]** time = 0.46, size = 0, normalized size = 0.00

$$\int \frac{\left(e\,x^2 + d\right)^{\frac{3}{2}}\left(a + b\,\text{arccsch}\left(cx\right)\right)}{x^8}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((e*x^2+d)^(3/2)*(a+b*arccsch(c*x))/x^8,x)
```

```
[Out] int((e*x^2+d)^(3/2)*(a+b*arccsch(c*x))/x^8,x)
```

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

$$\frac{1}{35}\,a\left(\frac{2\left(ex^2+d\right)^{\frac{5}{2}}e}{d^2x^5}-\frac{5\left(ex^2+d\right)^{\frac{5}{2}}}{dx^7}\right)+\frac{1}{35}\,b\left(\frac{\left(2\,e^3x^6-de^2x^4-8\,d^2ex^2-5\,d^3\right)\sqrt{ex^2+d}\,\log\left(\sqrt{c^2x^2+1}\,+1\right)}{d^2x^7}-35\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((e*x^2+d)^(3/2)*(a+b*arccsch(c*x))/x^8,x, algorithm="maxima")
```

```
[Out] 1/35*a*(2*(e*x^2 + d)^(5/2)*e/(d^2*x^5) - 5*(e*x^2 + d)^(5/2)/(d*x^7)) + 1/
35*b*((2*e^3*x^6 - d*e^2*x^4 - 8*d^2*e*x^2 - 5*d^3)*sqrt(e*x^2 + d)*log(sqr
t(c^2*x^2 + 1) + 1)/(d^2*x^7) - 35*integrate(1/35*(2*c^2*e^3*x^8 - c^2*d*e^
2*x^6 + (35*d^2*e*log(c) - 8*d^2*e)*c^2*x^4 + 35*d^3*log(c) + 5*(7*d^2*e*lo
g(c) + (7*d^3*log(c) - d^3)*c^2)*x^2 + 35*(c^2*d^2*e*x^4 + d^3 + (c^2*d^3 +
 d^2*e)*x^2)*log(x))*sqrt(e*x^2 + d)/(c^2*d^2*x^10 + d^2*x^8), x) + 35*inte
grate(1/35*(2*c^2*e^3*x^6 - c^2*d*e^2*x^4 - 8*c^2*d^2*e*x^2 - 5*c^2*d^3)*sq
rt(e*x^2 + d)/(c^2*d^2*x^8 + d^2*x^6 + (c^2*d^2*x^8 + d^2*x^6)*sqrt(c^2*x^2
 + 1)), x))
```

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

$$\int \frac{\left(e\,x^2+d\right)^{3/2}\,\left(a+b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)\right)}{x^8}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(((d + e*x^2)^(3/2)*(a + b*asinh(1/(c*x))))/x^8,x)
```

```
[Out] int(((d + e*x^2)^(3/2)*(a + b*asinh(1/(c*x))))/x^8, 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((e*x**2+d)**(3/2)*(a+b*acsch(c*x))/x**8,x)
```

```
[Out] Timed out
```

# 3.138 $\int \frac{x^5\left(a+b\text{csch}^{-1}(cx)\right)}{\sqrt{d+ex^2}}\,dx$

**Optimal**. Leaf size=329

$$\frac{d^2\sqrt{d+ex^2}\left(a+b\text{csch}^{-1}(cx)\right)}{e^3}-\frac{2d\left(d+ex^2\right)^{3/2}\left(a+b\text{csch}^{-1}(cx)\right)}{3e^3}+\frac{\left(d+ex^2\right)^{5/2}\left(a+b\text{csch}^{-1}(cx)\right)}{5e^3}+\frac{8bcd^{5/2}x\tan}{15e^3}$$

```
[Out] -2/3*d*(e*x^2+d)^(3/2)*(a+b*arccsch(c*x))/e^3+1/5*(e*x^2+d)^(5/2)*(a+b*arcc
sch(c*x))/e^3+1/120*b*(45*c^4*d^2+10*c^2*d*e+9*e^2)*x*arctan(e^(1/2)*(-c^2*
x^2-1)^(1/2)/c/(e*x^2+d)^(1/2))/c^4/e^(5/2)/(-c^2*x^2)^(1/2)+8/15*b*c*d^(5/
2)*x*arctan((e*x^2+d)^(1/2)/d^(1/2)/(-c^2*x^2-1)^(1/2))/e^3/(-c^2*x^2)^(1/2
)+1/20*b*x*(e*x^2+d)^(3/2)*(-c^2*x^2-1)^(1/2)/c/e^2/(-c^2*x^2)^(1/2)+d^2*(a
+b*arccsch(c*x))*(e*x^2+d)^(1/2)/e^3-1/120*b*(19*c^2*d+9*e)*x*(-c^2*x^2-1)^
(1/2)*(e*x^2+d)^(1/2)/c^3/e^2/(-c^2*x^2)^(1/2)
```

**Rubi [A]** time = 1.18, antiderivative size = 329, normalized size of antiderivative = 1.00, number of steps used = 11, number of rules used = 12, integrand size = 23, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.522, Rules used = {266, 43, 6302, 12, 1615, 154, 157, 63, 217, 203, 93, 204}

$$\frac{d^2\sqrt{d+ex^2}\left(a+b\text{csch}^{-1}(cx)\right)}{e^3}-\frac{2d\left(d+ex^2\right)^{3/2}\left(a+b\text{csch}^{-1}(cx)\right)}{3e^3}+\frac{\left(d+ex^2\right)^{5/2}\left(a+b\text{csch}^{-1}(cx)\right)}{5e^3}+\frac{8bcd^{5/2}x\tan}{15e^3}$$

Antiderivative was successfully verified.

```
[In] Int[(x^5*(a + b*ArcCsch[c*x]))/Sqrt[d + e*x^2],x]
```

```
[Out] -(b*(19*c^2*d + 9*e)*x*Sqrt[-1 - c^2*x^2]*Sqrt[d + e*x^2])/(120*c^3*e^2*Sqr
t[-(c^2*x^2)]) + (b*x*Sqrt[-1 - c^2*x^2]*(d + e*x^2)^(3/2))/(20*c*e^2*Sqrt[
-(c^2*x^2)]) + (d^2*Sqrt[d + e*x^2]*(a + b*ArcCsch[c*x]))/e^3 - (2*d*(d + e
*x^2)^(3/2)*(a + b*ArcCsch[c*x]))/(3*e^3) + ((d + e*x^2)^(5/2)*(a + b*ArcCs
ch[c*x]))/(5*e^3) + (b*(45*c^4*d^2 + 10*c^2*d*e + 9*e^2)*x*ArcTan[(Sqrt[e]*
Sqrt[-1 - c^2*x^2])/(c*Sqrt[d + e*x^2])])/(120*c^4*e^(5/2)*Sqrt[-(c^2*x^2)]
) + (8*b*c*d^(5/2)*x*ArcTan[Sqrt[d + e*x^2]/(Sqrt[d]*Sqrt[-1 - c^2*x^2])])/
(15*e^3*Sqrt[-(c^2*x^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 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 93

```
Int[(((a_.) + (b_.)*(x_))^(m_)*((c_.) + (d_.)*(x_))^(n_))/((e_.) + (f_.)*(x
_)), x_Symbol] :> With[{q = Denominator[m]}, Dist[q, Subst[Int[x^(q*(m + 1)
 - 1)/(b*e - a*f - (d*e - c*f)*x^q), x], x, (a + b*x)^(1/q)/(c + d*x)^(1/q)
], x]] /; FreeQ[{a, b, c, d, e, f}, x] && EqQ[m + n + 1, 0] && RationalQ[n]
 && LtQ[-1, m, 0] && SimplerQ[a + b*x, c + d*x]
```

Rule 154

```
Int[((a_.) + (b_.)*(x_))^(m_)*((c_.) + (d_.)*(x_))^(n_)*((e_.) + (f_.)*(x_)
)^(p_)*((g_.) + (h_.)*(x_)), x_Symbol] :> Simp[(h*(a + b*x)^m*(c + d*x)^(n
+ 1)*(e + f*x)^(p + 1))/(d*f*(m + n + p + 2)), x] + Dist[1/(d*f*(m + n + p
+ 2)), Int[(a + b*x)^(m - 1)*(c + d*x)^n*(e + f*x)^p*Simp[a*d*f*g*(m + n +
p + 2) - h*(b*c*e*m + a*(d*e*(n + 1) + c*f*(p + 1))) + (b*d*f*g*(m + n + p
+ 2) + h*(a*d*f*m - b*(d*e*(m + n + 1) + c*f*(m + p + 1))))*x, x], x], x] /
; FreeQ[{a, b, c, d, e, f, g, h, n, p}, x] && GtQ[m, 0] && NeQ[m + n + p +
2, 0] && IntegersQ[2*m, 2*n, 2*p]
```

Rule 157

```
Int[(((c_.) + (d_.)*(x_))^(n_)*((e_.) + (f_.)*(x_))^(p_)*((g_.) + (h_.)*(x_
)))/((a_.) + (b_.)*(x_)), x_Symbol] :> Dist[h/b, Int[(c + d*x)^n*(e + f*x)^
p, x], x] + Dist[(b*g - a*h)/b, Int[((c + d*x)^n*(e + f*x)^p)/(a + b*x), x]
, x] /; FreeQ[{a, b, c, d, e, f, g, h, n, p}, x]
```

Rule 203

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

Rule 204

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

Rule 217

```
Int[1/Sqrt[(a_) + (b_.)*(x_)^2], x_Symbol] :> Subst[Int[1/(1 - b*x^2), x],
x, x/Sqrt[a + b*x^2]] /; FreeQ[{a, b}, x] &&  !GtQ[a, 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 1615

```
Int[(Px_)*((a_.) + (b_.)*(x_))^(m_.)*((c_.) + (d_.)*(x_))^(n_.)*((e_.) + (f
_.)*(x_))^(p_.), x_Symbol] :> With[{q = Expon[Px, x], k = Coeff[Px, x, Expo
n[Px, x]]}, Simp[(k*(a + b*x)^(m + q - 1)*(c + d*x)^(n + 1)*(e + f*x)^(p +
1))/(d*f*b^(q - 1)*(m + n + p + q + 1)), x] + Dist[1/(d*f*b^q*(m + n + p +
q + 1)), Int[(a + b*x)^m*(c + d*x)^n*(e + f*x)^p*ExpandToSum[d*f*b^q*(m + n
 + p + q + 1)*Px - d*f*k*(m + n + p + q + 1)*(a + b*x)^q + k*(a + b*x)^(q -
 2)*(a^2*d*f*(m + n + p + q + 1) - b*(b*c*e*(m + q - 1) + a*(d*e*(n + 1) +
c*f*(p + 1))) + b*(a*d*f*(2*(m + q) + n + p) - b*(d*e*(m + q + n) + c*f*(m
+ q + p)))*x), x], x], x] /; NeQ[m + n + p + q + 1, 0]] /; FreeQ[{a, b, c,
d, e, f, m, n, p}, x] && PolyQ[Px, x] && IntegersQ[2*m, 2*n, 2*p]
```

Rule 6302

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))*((f_.)*(x_))^(m_.)*((d_.) + (e_.)*(
x_)^2)^(p_.), x_Symbol] :> With[{u = IntHide[(f*x)^m*(d + e*x^2)^p, x]}, Di
st[a + b*ArcCsch[c*x], u, x] - Dist[(b*c*x)/Sqrt[-(c^2*x^2)], Int[SimplifyI
ntegrand[u/(x*Sqrt[-1 - c^2*x^2]), x], x], x]] /; FreeQ[{a, b, c, d, e, f,
m, p}, x] && ((IGtQ[p, 0] &&  !(ILtQ[(m - 1)/2, 0] && GtQ[m + 2*p + 3, 0]))
 || (IGtQ[(m + 1)/2, 0] &&  !(ILtQ[p, 0] && GtQ[m + 2*p + 3, 0])) || (ILtQ[
(m + 2*p + 1)/2, 0] &&  !ILtQ[(m - 1)/2, 0]))
```

Rubi steps

$$\int \frac{x^5 \left(a+b\text{csch}^{-1}(cx)\right)}{\sqrt{d+ex^2}}\,dx = \frac{d^2\sqrt{d+ex^2}\,\left(a+b\text{csch}^{-1}(cx)\right)}{e^3} - \frac{2d\left(d+ex^2\right)^{3/2}\left(a+b\text{csch}^{-1}(cx)\right)}{3e^3} + \frac{\left(d+ex^2\right)^{5/2}\left(\right.}{}$$

$$= \frac{d^2\sqrt{d+ex^2}\,\left(a+b\text{csch}^{-1}(cx)\right)}{e^3} - \frac{2d\left(d+ex^2\right)^{3/2}\left(a+b\text{csch}^{-1}(cx)\right)}{3e^3} + \frac{\left(d+ex^2\right)^{5/2}\left(\right.}{}$$

$$= \frac{d^2\sqrt{d+ex^2}\,\left(a+b\text{csch}^{-1}(cx)\right)}{e^3} - \frac{2d\left(d+ex^2\right)^{3/2}\left(a+b\text{csch}^{-1}(cx)\right)}{3e^3} + \frac{\left(d+ex^2\right)^{5/2}\left(\right.}{}$$

$$= \frac{bx\sqrt{-1-c^2x^2}\,\left(d+ex^2\right)^{3/2}}{20ce^2\sqrt{-c^2x^2}} + \frac{d^2\sqrt{d+ex^2}\,\left(a+b\text{csch}^{-1}(cx)\right)}{e^3} - \frac{2d\left(d+ex^2\right)^{3/2}\left(a+\right.}{3e^3}$$

$$= -\frac{b\left(19c^2d+9e\right)x\sqrt{-1-c^2x^2}\,\sqrt{d+ex^2}}{120c^3e^2\sqrt{-c^2x^2}} + \frac{bx\sqrt{-1-c^2x^2}\,\left(d+ex^2\right)^{3/2}}{20ce^2\sqrt{-c^2x^2}} + \frac{d^2\sqrt{d+ex^2}}{}$$

$$= -\frac{b\left(19c^2d+9e\right)x\sqrt{-1-c^2x^2}\,\sqrt{d+ex^2}}{120c^3e^2\sqrt{-c^2x^2}} + \frac{bx\sqrt{-1-c^2x^2}\,\left(d+ex^2\right)^{3/2}}{20ce^2\sqrt{-c^2x^2}} + \frac{d^2\sqrt{d+ex^2}}{}$$

$$= -\frac{b\left(19c^2d+9e\right)x\sqrt{-1-c^2x^2}\,\sqrt{d+ex^2}}{120c^3e^2\sqrt{-c^2x^2}} + \frac{bx\sqrt{-1-c^2x^2}\,\left(d+ex^2\right)^{3/2}}{20ce^2\sqrt{-c^2x^2}} + \frac{d^2\sqrt{d+ex^2}}{}$$

$$= -\frac{b\left(19c^2d+9e\right)x\sqrt{-1-c^2x^2}\,\sqrt{d+ex^2}}{120c^3e^2\sqrt{-c^2x^2}} + \frac{bx\sqrt{-1-c^2x^2}\,\left(d+ex^2\right)^{3/2}}{20ce^2\sqrt{-c^2x^2}} + \frac{d^2\sqrt{d+ex^2}}{}$$

$$= -\frac{b\left(19c^2d+9e\right)x\sqrt{-1-c^2x^2}\,\sqrt{d+ex^2}}{120c^3e^2\sqrt{-c^2x^2}} + \frac{bx\sqrt{-1-c^2x^2}\,\left(d+ex^2\right)^{3/2}}{20ce^2\sqrt{-c^2x^2}} + \frac{d^2\sqrt{d+ex^2}}{}$$

**Mathematica** [A] time = 0.79, size = 339, normalized size = 1.03

$$\frac{\sqrt{d+ex^2}\left(8ac^3\left(8d^2-4dex^2+3e^2x^4\right)+8bc^3\text{csch}^{-1}(cx)\left(8d^2-4dex^2+3e^2x^4\right)+bex\sqrt{\frac{1}{c^2x^2}+1}\left(c^2\left(6ex^2-13d\right)\right.\right.}{120c^3e^3}$$

Antiderivative was successfully verified.

```
[In] Integrate[(x^5*(a + b*ArcCsch[c*x]))/Sqrt[d + e*x^2],x]
```

```
[Out] (Sqrt[d + e*x^2]*(8*a*c^3*(8*d^2 - 4*d*e*x^2 + 3*e^2*x^4) + b*e*Sqrt[1 + 1/
(c^2*x^2)]*x*(-9*e + c^2*(-13*d + 6*e*x^2)) + 8*b*c^3*(8*d^2 - 4*d*e*x^2 +
3*e^2*x^4)*ArcCsch[c*x]))/(120*c^3*e^3) - (b*Sqrt[1 + 1/(c^2*x^2)]*x*(-(Sqr
t[c^2]*Sqrt[c^2*d - e]*Sqrt[e]*(45*c^4*d^2 + 10*c^2*d*e + 9*e^2)*Sqrt[(c^2*
(d + e*x^2))/(c^2*d - e)]*ArcSinh[(c*Sqrt[e]*Sqrt[1 + c^2*x^2])/(Sqrt[c^2]*
Sqrt[c^2*d - e])]) + 64*c^7*d^(5/2)*Sqrt[-d - e*x^2]*ArcTan[(Sqrt[d]*Sqrt[1
 + c^2*x^2])/Sqrt[-d - e*x^2]]))/(120*c^6*e^3*Sqrt[1 + c^2*x^2]*Sqrt[d + e*
x^2])
```

**fricas [A]** time = 1.82, size = 1633, normalized size = 4.96

result too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^5*(a+b*arccsch(c*x))/(e*x^2+d)^(1/2),x, algorithm="fricas")
```

```
[Out] [1/480*(64*b*c^5*d^(5/2)*log(((c^4*d^2 + 6*c^2*d*e + e^2)*x^4 + 8*(c^2*d^2
+ d*e)*x^2 - 4*((c^3*d + c*e)*x^3 + 2*c*d*x)*sqrt(e*x^2 + d)*sqrt(d)*sqrt((
c^2*x^2 + 1)/(c^2*x^2)) + 8*d^2)/x^4) + (45*b*c^4*d^2 + 10*b*c^2*d*e + 9*b*
e^2)*sqrt(e)*log(8*c^4*e^2*x^4 + c^4*d^2 + 6*c^2*d*e + 8*(c^4*d*e + c^2*e^2
)*x^2 + 4*(2*c^4*e*x^3 + (c^4*d + c^2*e)*x)*sqrt(e*x^2 + d)*sqrt(e)*sqrt((c
^2*x^2 + 1)/(c^2*x^2)) + e^2) + 32*(3*b*c^5*e^2*x^4 - 4*b*c^5*d*e*x^2 + 8*b
*c^5*d^2)*sqrt(e*x^2 + d)*log((c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) + 1)/(c*x)
) + 4*(24*a*c^5*e^2*x^4 - 32*a*c^5*d*e*x^2 + 64*a*c^5*d^2 + (6*b*c^4*e^2*x^
3 - (13*b*c^4*d*e + 9*b*c^2*e^2)*x)*sqrt((c^2*x^2 + 1)/(c^2*x^2)))*sqrt(e*x
^2 + d))/(c^5*e^3), 1/240*(32*b*c^5*d^(5/2)*log(((c^4*d^2 + 6*c^2*d*e + e^2
)*x^4 + 8*(c^2*d^2 + d*e)*x^2 - 4*((c^3*d + c*e)*x^3 + 2*c*d*x)*sqrt(e*x^2
+ d)*sqrt(d)*sqrt((c^2*x^2 + 1)/(c^2*x^2)) + 8*d^2)/x^4) - (45*b*c^4*d^2 +
10*b*c^2*d*e + 9*b*e^2)*sqrt(-e)*arctan(1/2*(2*c^2*e*x^3 + (c^2*d + e)*x)*s
qrt(e*x^2 + d)*sqrt(-e)*sqrt((c^2*x^2 + 1)/(c^2*x^2))/(c^2*e^2*x^4 + (c^2*d
*e + e^2)*x^2 + d*e)) + 16*(3*b*c^5*e^2*x^4 - 4*b*c^5*d*e*x^2 + 8*b*c^5*d^2
)*sqrt(e*x^2 + d)*log((c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) + 1)/(c*x)) + 2*(2
4*a*c^5*e^2*x^4 - 32*a*c^5*d*e*x^2 + 64*a*c^5*d^2 + (6*b*c^4*e^2*x^3 - (13*
b*c^4*d*e + 9*b*c^2*e^2)*x)*sqrt((c^2*x^2 + 1)/(c^2*x^2)))*sqrt(e*x^2 + d))
/(c^5*e^3), 1/480*(128*b*c^5*sqrt(-d)*d^2*arctan(1/2*((c^3*d + c*e)*x^3 + 2
*c*d*x)*sqrt(e*x^2 + d)*sqrt(-d)*sqrt((c^2*x^2 + 1)/(c^2*x^2))/(c^2*d*e*x^4
 + (c^2*d^2 + d*e)*x^2 + d^2)) + (45*b*c^4*d^2 + 10*b*c^2*d*e + 9*b*e^2)*sq
rt(e)*log(8*c^4*e^2*x^4 + c^4*d^2 + 6*c^2*d*e + 8*(c^4*d*e + c^2*e^2)*x^2 +
 4*(2*c^4*e*x^3 + (c^4*d + c^2*e)*x)*sqrt(e*x^2 + d)*sqrt(e)*sqrt((c^2*x^2
+ 1)/(c^2*x^2)) + e^2) + 32*(3*b*c^5*e^2*x^4 - 4*b*c^5*d*e*x^2 + 8*b*c^5*d^
2)*sqrt(e*x^2 + d)*log((c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) + 1)/(c*x)) + 4*(
24*a*c^5*e^2*x^4 - 32*a*c^5*d*e*x^2 + 64*a*c^5*d^2 + (6*b*c^4*e^2*x^3 - (13
*b*c^4*d*e + 9*b*c^2*e^2)*x)*sqrt((c^2*x^2 + 1)/(c^2*x^2)))*sqrt(e*x^2 + d)
```

```
)/(c^5*e^3), 1/240*(64*b*c^5*sqrt(-d)*d^2*arctan(1/2*((c^3*d + c*e)*x^3 + 2
*c*d*x)*sqrt(e*x^2 + d)*sqrt(-d)*sqrt((c^2*x^2 + 1)/(c^2*x^2))/(c^2*d*e*x^4
 + (c^2*d^2 + d*e)*x^2 + d^2)) - (45*b*c^4*d^2 + 10*b*c^2*d*e + 9*b*e^2)*sq
rt(-e)*arctan(1/2*(2*c^2*e*x^3 + (c^2*d + e)*x)*sqrt(e*x^2 + d)*sqrt(-e)*sq
rt((c^2*x^2 + 1)/(c^2*x^2))/(c^2*e^2*x^4 + (c^2*d*e + e^2)*x^2 + d*e)) + 16
*(3*b*c^5*e^2*x^4 - 4*b*c^5*d*e*x^2 + 8*b*c^5*d^2)*sqrt(e*x^2 + d)*log((c*x
*sqrt((c^2*x^2 + 1)/(c^2*x^2)) + 1)/(c*x)) + 2*(24*a*c^5*e^2*x^4 - 32*a*c^5
*d*e*x^2 + 64*a*c^5*d^2 + (6*b*c^4*e^2*x^3 - (13*b*c^4*d*e + 9*b*c^2*e^2)*x
)*sqrt((c^2*x^2 + 1)/(c^2*x^2)))*sqrt(e*x^2 + d))/(c^5*e^3)]
```

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

$$\int \frac{(b\,\mathrm{arcsch}\,(cx) + a)x^5}{\sqrt{ex^2 + d}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^5*(a+b*arccsch(c*x))/(e*x^2+d)^(1/2),x, algorithm="giac")
```

```
[Out] integrate((b*arccsch(c*x) + a)*x^5/sqrt(e*x^2 + d), x)
```

**maple [F]** time = 0.45, size = 0, normalized size = 0.00

$$\int \frac{x^5\,(a + b\,\mathrm{arccsch}\,(cx))}{\sqrt{e\,x^2 + d}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^5*(a+b*arccsch(c*x))/(e*x^2+d)^(1/2),x)
```

```
[Out] int(x^5*(a+b*arccsch(c*x))/(e*x^2+d)^(1/2),x)
```

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

$$\frac{1}{15}\left(\frac{3\,\sqrt{ex^2 + d}\,x^4}{e} - \frac{4\,\sqrt{ex^2 + d}\,dx^2}{e^2} + \frac{8\,\sqrt{ex^2 + d}\,d^2}{e^3}\right)a + \frac{1}{15}\,b\left(\frac{\left(3\,e^3x^6 - de^2x^4 + 4\,d^2ex^2 + 8\,d^3\right)\log\left(\sqrt{c^2x^2 + 1}\right. +}{\sqrt{ex^2 + d}\,e^3}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^5*(a+b*arccsch(c*x))/(e*x^2+d)^(1/2),x, algorithm="maxima")
```

```
[Out] 1/15*(3*sqrt(e*x^2 + d)*x^4/e - 4*sqrt(e*x^2 + d)*d*x^2/e^2 + 8*sqrt(e*x^2
+ d)*d^2/e^3)*a + 1/15*b*((3*e^3*x^6 - d*e^2*x^4 + 4*d^2*e*x^2 + 8*d^3)*log
(sqrt(c^2*x^2 + 1) + 1)/(sqrt(e*x^2 + d)*e^3) + 15*integrate(1/15*(3*c^2*e^
3*x^7 - c^2*d*e^2*x^5 + 4*c^2*d^2*e*x^3 + 8*c^2*d^3*x)/((c^2*e^3*x^2 + e^3)
```

```
*sqrt(c^2*x^2 + 1)*sqrt(e*x^2 + d) + (c^2*e^3*x^2 + e^3)*sqrt(e*x^2 + d)),
x) - 15*integrate(1/15*(3*(5*e^3*log(c) + e^3)*c^2*x^7 + 4*c^2*d^2*e*x^3 +
8*c^2*d^3*x - (c^2*d*e^2 - 15*e^3*log(c))*x^5 + 15*(c^2*e^3*x^7 + e^3*x^5)*
log(x))/((c^2*e^3*x^2 + e^3)*sqrt(e*x^2 + d)), x))
```

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

$$\int \frac{x^5\,\left(a+b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)\right)}{\sqrt{e\,x^2+d}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((x^5*(a + b*asinh(1/(c*x))))/(d + e*x^2)^(1/2),x)
```

```
[Out] int((x^5*(a + b*asinh(1/(c*x))))/(d + e*x^2)^(1/2), x)
```

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

$$\int \frac{x^5\,(a+b\,\mathrm{acsch}\,(cx))}{\sqrt{d+ex^2}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**5*(a+b*acsch(c*x))/(e*x**2+d)**(1/2),x)
```

```
[Out] Integral(x**5*(a + b*acsch(c*x))/sqrt(d + e*x**2), x)
```

# 3.139 $\int \frac{x^3\left(a+b\,\mathrm{csch}^{-1}(cx)\right)}{\sqrt{d+ex^2}}\,dx$

**Optimal**. Leaf size=229

$$-\frac{d\sqrt{d+ex^2}\left(a+b\,\mathrm{csch}^{-1}(cx)\right)}{e^2}+\frac{\left(d+ex^2\right)^{3/2}\left(a+b\,\mathrm{csch}^{-1}(cx)\right)}{3e^2}-\frac{2bcd^{3/2}x\tan^{-1}\left(\frac{\sqrt{d+ex^2}}{\sqrt{d}\sqrt{-c^2x^2-1}}\right)}{3e^2\sqrt{-c^2x^2}}-\frac{bx\left(3c^2d+e\right)\tan}{6c^2e^{3/2}\sqrt{}}$$

```
[Out] 1/3*(e*x^2+d)^(3/2)*(a+b*arccsch(c*x))/e^2-1/6*b*(3*c^2*d+e)*x*arctan(e^(1/
2)*(-c^2*x^2-1)^(1/2)/c/(e*x^2+d)^(1/2))/c^2/e^(3/2)/(-c^2*x^2)^(1/2)-2/3*b
*c*d^(3/2)*x*arctan((e*x^2+d)^(1/2)/d^(1/2)/(-c^2*x^2-1)^(1/2))/e^2/(-c^2*x
^2)^(1/2)-d*(a+b*arccsch(c*x))*(e*x^2+d)^(1/2)/e^2+1/6*b*x*(-c^2*x^2-1)^(1/
2)*(e*x^2+d)^(1/2)/c/e/(-c^2*x^2)^(1/2)
```

**Rubi [A]** time = 0.32, antiderivative size = 229, normalized size of antiderivative = 1.00, number of steps used = 10, number of rules used = 12, integrand size = 23, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.522, Rules used = {266, 43, 6302, 12, 573, 154, 157, 63, 217, 203, 93, 204}

$$-\frac{d\sqrt{d+ex^2}\left(a+b\,\mathrm{csch}^{-1}(cx)\right)}{e^2}+\frac{\left(d+ex^2\right)^{3/2}\left(a+b\,\mathrm{csch}^{-1}(cx)\right)}{3e^2}-\frac{2bcd^{3/2}x\tan^{-1}\left(\frac{\sqrt{d+ex^2}}{\sqrt{d}\sqrt{-c^2x^2-1}}\right)}{3e^2\sqrt{-c^2x^2}}-\frac{bx\left(3c^2d+e\right)\tan}{6c^2e^{3/2}\sqrt{}}$$

Antiderivative was successfully verified.

```
[In] Int[(x^3*(a + b*ArcCsch[c*x]))/Sqrt[d + e*x^2],x]
```

```
[Out] (b*x*Sqrt[-1 - c^2*x^2]*Sqrt[d + e*x^2])/(6*c*e*Sqrt[-(c^2*x^2)]) - (d*Sqrt
[d + e*x^2]*(a + b*ArcCsch[c*x]))/e^2 + ((d + e*x^2)^(3/2)*(a + b*ArcCsch[c
*x]))/(3*e^2) - (b*(3*c^2*d + e)*x*ArcTan[(Sqrt[e]*Sqrt[-1 - c^2*x^2])/(c*S
qrt[d + e*x^2])])/(6*c^2*e^(3/2)*Sqrt[-(c^2*x^2)]) - (2*b*c*d^(3/2)*x*ArcTa
n[Sqrt[d + e*x^2]/(Sqrt[d]*Sqrt[-1 - c^2*x^2])])/(3*e^2*Sqrt[-(c^2*x^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 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 93

```
Int[(((a_.) + (b_.)*(x_))^(m_)*((c_.) + (d_.)*(x_))^(n_))/((e_.) + (f_.)*(x
_)), x_Symbol] :> With[{q = Denominator[m]}, Dist[q, Subst[Int[x^(q*(m + 1)
 - 1)/(b*e - a*f - (d*e - c*f)*x^q), x], x, (a + b*x)^(1/q)/(c + d*x)^(1/q)
], x]] /; FreeQ[{a, b, c, d, e, f}, x] && EqQ[m + n + 1, 0] && RationalQ[n]
 && LtQ[-1, m, 0] && SimplerQ[a + b*x, c + d*x]
```

Rule 154

```
Int[((a_.) + (b_.)*(x_))^(m_)*((c_.) + (d_.)*(x_))^(n_)*((e_.) + (f_.)*(x_)
)^(p_)*((g_.) + (h_.)*(x_)), x_Symbol] :> Simp[(h*(a + b*x)^m*(c + d*x)^(n
+ 1)*(e + f*x)^(p + 1))/(d*f*(m + n + p + 2)), x] + Dist[1/(d*f*(m + n + p
+ 2)), Int[(a + b*x)^(m - 1)*(c + d*x)^n*(e + f*x)^p*Simp[a*d*f*g*(m + n +
p + 2) - h*(b*c*e*m + a*(d*e*(n + 1) + c*f*(p + 1))) + (b*d*f*g*(m + n + p
+ 2) + h*(a*d*f*m - b*(d*e*(m + n + 1) + c*f*(m + p + 1))))*x, x], x], x] /
; FreeQ[{a, b, c, d, e, f, g, h, n, p}, x] && GtQ[m, 0] && NeQ[m + n + p +
2, 0] && IntegersQ[2*m, 2*n, 2*p]
```

Rule 157

```
Int[(((c_.) + (d_.)*(x_))^(n_)*((e_.) + (f_.)*(x_))^(p_)*((g_.) + (h_.)*(x_
)))/((a_.) + (b_.)*(x_)), x_Symbol] :> Dist[h/b, Int[(c + d*x)^n*(e + f*x)^
p, x], x] + Dist[(b*g - a*h)/b, Int[((c + d*x)^n*(e + f*x)^p)/(a + b*x), x]
, x] /; FreeQ[{a, b, c, d, e, f, g, h, n, p}, x]
```

Rule 203

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

Rule 204

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

```
a, 0] || LtQ[b, 0])
```

Rule 217

```
Int[1/Sqrt[(a_) + (b_.)*(x_)^2], x_Symbol] :> Subst[Int[1/(1 - b*x^2), x],
x, x/Sqrt[a + b*x^2]] /; FreeQ[{a, b}, x] &&  !GtQ[a, 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 573

```
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[x^(Simpl
ify[(m + 1)/n] - 1)*(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] && IntegerQ[Simplify[(m + 1)/n
]]
```

Rule 6302

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))*((f_.)*(x_))^(m_.)*((d_.) + (e_.)*(
x_)^2)^(p_.), x_Symbol] :> With[{u = IntHide[(f*x)^m*(d + e*x^2)^p, x]}, Di
st[a + b*ArcCsch[c*x], u, x] - Dist[(b*c*x)/Sqrt[-(c^2*x^2)], Int[SimplifyI
ntegrand[u/(x*Sqrt[-1 - c^2*x^2]), x], x], x]] /; FreeQ[{a, b, c, d, e, f,
m, p}, x] && ((IGtQ[p, 0] &&  !(ILtQ[(m - 1)/2, 0] && GtQ[m + 2*p + 3, 0]))
 || (IGtQ[(m + 1)/2, 0] &&  !(ILtQ[p, 0] && GtQ[m + 2*p + 3, 0])) || (ILtQ[
(m + 2*p + 1)/2, 0] &&  !ILtQ[(m - 1)/2, 0]))
```

Rubi steps

$$\int \frac{x^3\left(a+b\operatorname{csch}^{-1}(cx)\right)}{\sqrt{d+ex^2}}\,dx = -\frac{d\sqrt{d+ex^2}\left(a+b\operatorname{csch}^{-1}(cx)\right)}{e^2} + \frac{\left(d+ex^2\right)^{3/2}\left(a+b\operatorname{csch}^{-1}(cx)\right)}{3e^2} - \frac{(bcx)\int \frac{\left(-2d+ex\right.}{3e^2x\sqrt{}}}{\sqrt{-c^2}}$$

$$= -\frac{d\sqrt{d+ex^2}\left(a+b\operatorname{csch}^{-1}(cx)\right)}{e^2} + \frac{\left(d+ex^2\right)^{3/2}\left(a+b\operatorname{csch}^{-1}(cx)\right)}{3e^2} - \frac{(bcx)\int \frac{\left(-2d+ex\right.}{x\sqrt{-}}}{3e^2\sqrt{-}}$$

$$= -\frac{d\sqrt{d+ex^2}\left(a+b\operatorname{csch}^{-1}(cx)\right)}{e^2} + \frac{\left(d+ex^2\right)^{3/2}\left(a+b\operatorname{csch}^{-1}(cx)\right)}{3e^2} - \frac{(bcx)\,\mathrm{Subst}\left(\int\right.}{6}$$

$$= \frac{bx\sqrt{-1-c^2x^2}\sqrt{d+ex^2}}{6ce\sqrt{-c^2x^2}} - \frac{d\sqrt{d+ex^2}\left(a+b\operatorname{csch}^{-1}(cx)\right)}{e^2} + \frac{\left(d+ex^2\right)^{3/2}\left(a+b\operatorname{csc}\right.}{3e^2}$$

$$= \frac{bx\sqrt{-1-c^2x^2}\sqrt{d+ex^2}}{6ce\sqrt{-c^2x^2}} - \frac{d\sqrt{d+ex^2}\left(a+b\operatorname{csch}^{-1}(cx)\right)}{e^2} + \frac{\left(d+ex^2\right)^{3/2}\left(a+b\operatorname{csc}\right.}{3e^2}$$

$$= \frac{bx\sqrt{-1-c^2x^2}\sqrt{d+ex^2}}{6ce\sqrt{-c^2x^2}} - \frac{d\sqrt{d+ex^2}\left(a+b\operatorname{csch}^{-1}(cx)\right)}{e^2} + \frac{\left(d+ex^2\right)^{3/2}\left(a+b\operatorname{csc}\right.}{3e^2}$$

$$= \frac{bx\sqrt{-1-c^2x^2}\sqrt{d+ex^2}}{6ce\sqrt{-c^2x^2}} - \frac{d\sqrt{d+ex^2}\left(a+b\operatorname{csch}^{-1}(cx)\right)}{e^2} + \frac{\left(d+ex^2\right)^{3/2}\left(a+b\operatorname{csc}\right.}{3e^2}$$

$$= \frac{bx\sqrt{-1-c^2x^2}\sqrt{d+ex^2}}{6ce\sqrt{-c^2x^2}} - \frac{d\sqrt{d+ex^2}\left(a+b\operatorname{csch}^{-1}(cx)\right)}{e^2} + \frac{\left(d+ex^2\right)^{3/2}\left(a+b\operatorname{csc}\right.}{3e^2}$$

**Mathematica [A]** time = 0.56, size = 280, normalized size = 1.22

$$\frac{\sqrt{d+ex^2}\left(-4acd+2acex^2+bex\sqrt{\frac{1}{c^2x^2}+1}+2bc\operatorname{csch}^{-1}(cx)\left(ex^2-2d\right)\right)}{6ce^2} + \frac{bx\sqrt{\frac{1}{c^2x^2}+1}\left(4c^5d^{3/2}\sqrt{-d-ex^2}\tan^{-}\right.}{}$$

Antiderivative was successfully verified.

```
[In] Integrate[(x^3*(a + b*ArcCsch[c*x]))/Sqrt[d + e*x^2],x]
```

```
[Out] (Sqrt[d + e*x^2]*(-4*a*c*d + b*e*Sqrt[1 + 1/(c^2*x^2)]*x + 2*a*c*e*x^2 + 2*
b*c*(-2*d + e*x^2)*ArcCsch[c*x]))/(6*c*e^2) + (b*Sqrt[1 + 1/(c^2*x^2)]*x*(-
```

```
(Sqrt[c^2]*Sqrt[c^2*d - e]*Sqrt[e]*(3*c^2*d + e)*Sqrt[(c^2*(d + e*x^2))/(c^
2*d - e)]*ArcSinh[(c*Sqrt[e]*Sqrt[1 + c^2*x^2])/(Sqrt[c^2]*Sqrt[c^2*d - e])
]) + 4*c^5*d^(3/2)*Sqrt[-d - e*x^2]*ArcTan[(Sqrt[d]*Sqrt[1 + c^2*x^2])/Sqrt
[-d - e*x^2]]))/(6*c^4*e^2*Sqrt[1 + c^2*x^2]*Sqrt[d + e*x^2])
```

**fricas [A]** time = 1.02, size = 1341, normalized size = 5.86

result too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^3*(a+b*arccsch(c*x))/(e*x^2+d)^(1/2),x, algorithm="fricas")
```

```
[Out] [1/24*(4*b*c^3*d^(3/2)*log(((c^4*d^2 + 6*c^2*d*e + e^2)*x^4 + 8*(c^2*d^2 +
d*e)*x^2 + 4*((c^3*d + c*e)*x^3 + 2*c*d*x)*sqrt(e*x^2 + d)*sqrt(d)*sqrt((c^
2*x^2 + 1)/(c^2*x^2)) + 8*d^2)/x^4) + (3*b*c^2*d + b*e)*sqrt(e)*log(8*c^4*e
^2*x^4 + c^4*d^2 + 6*c^2*d*e + 8*(c^4*d*e + c^2*e^2)*x^2 - 4*(2*c^4*e*x^3 +
 (c^4*d + c^2*e)*x)*sqrt(e*x^2 + d)*sqrt(e)*sqrt((c^2*x^2 + 1)/(c^2*x^2)) +
 e^2) + 8*(b*c^3*e*x^2 - 2*b*c^3*d)*sqrt(e*x^2 + d)*log((c*x*sqrt((c^2*x^2
+ 1)/(c^2*x^2)) + 1)/(c*x)) + 4*(2*a*c^3*e*x^2 + b*c^2*e*x*sqrt((c^2*x^2 +
1)/(c^2*x^2)) - 4*a*c^3*d)*sqrt(e*x^2 + d))/(c^3*e^2), 1/12*(2*b*c^3*d^(3/2
)*log(((c^4*d^2 + 6*c^2*d*e + e^2)*x^4 + 8*(c^2*d^2 + d*e)*x^2 + 4*((c^3*d
+ c*e)*x^3 + 2*c*d*x)*sqrt(e*x^2 + d)*sqrt(d)*sqrt((c^2*x^2 + 1)/(c^2*x^2))
 + 8*d^2)/x^4) + (3*b*c^2*d + b*e)*sqrt(-e)*arctan(1/2*(2*c^2*e*x^3 + (c^2*
d + e)*x)*sqrt(e*x^2 + d)*sqrt(-e)*sqrt((c^2*x^2 + 1)/(c^2*x^2))/(c^2*e^2*x
^4 + (c^2*d*e + e^2)*x^2 + d*e)) + 4*(b*c^3*e*x^2 - 2*b*c^3*d)*sqrt(e*x^2 +
 d)*log((c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) + 1)/(c*x)) + 2*(2*a*c^3*e*x^2 +
 b*c^2*e*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) - 4*a*c^3*d)*sqrt(e*x^2 + d))/(c^3
*e^2), -1/24*(8*b*c^3*sqrt(-d)*d*arctan(1/2*((c^3*d + c*e)*x^3 + 2*c*d*x)*s
qrt(e*x^2 + d)*sqrt(-d)*sqrt((c^2*x^2 + 1)/(c^2*x^2))/(c^2*d*e*x^4 + (c^2*d
^2 + d*e)*x^2 + d^2)) - (3*b*c^2*d + b*e)*sqrt(e)*log(8*c^4*e^2*x^4 + c^4*d
^2 + 6*c^2*d*e + 8*(c^4*d*e + c^2*e^2)*x^2 - 4*(2*c^4*e*x^3 + (c^4*d + c^2*
e)*x)*sqrt(e*x^2 + d)*sqrt(e)*sqrt((c^2*x^2 + 1)/(c^2*x^2)) + e^2) - 8*(b*c
^3*e*x^2 - 2*b*c^3*d)*sqrt(e*x^2 + d)*log((c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)
) + 1)/(c*x)) - 4*(2*a*c^3*e*x^2 + b*c^2*e*x*sqrt((c^2*x^2 + 1)/(c^2*x^2))
- 4*a*c^3*d)*sqrt(e*x^2 + d))/(c^3*e^2), -1/12*(4*b*c^3*sqrt(-d)*d*arctan(1
/2*((c^3*d + c*e)*x^3 + 2*c*d*x)*sqrt(e*x^2 + d)*sqrt(-d)*sqrt((c^2*x^2 + 1
)/(c^2*x^2))/(c^2*d*e*x^4 + (c^2*d^2 + d*e)*x^2 + d^2)) - (3*b*c^2*d + b*e)
*sqrt(-e)*arctan(1/2*(2*c^2*e*x^3 + (c^2*d + e)*x)*sqrt(e*x^2 + d)*sqrt(-e)
*sqrt((c^2*x^2 + 1)/(c^2*x^2))/(c^2*e^2*x^4 + (c^2*d*e + e^2)*x^2 + d*e)) -
 4*(b*c^3*e*x^2 - 2*b*c^3*d)*sqrt(e*x^2 + d)*log((c*x*sqrt((c^2*x^2 + 1)/(c
^2*x^2)) + 1)/(c*x)) - 2*(2*a*c^3*e*x^2 + b*c^2*e*x*sqrt((c^2*x^2 + 1)/(c^2
*x^2)) - 4*a*c^3*d)*sqrt(e*x^2 + d))/(c^3*e^2)]
```

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

$$\int \frac{(b \operatorname{arcsch}(cx) + a)x^3}{\sqrt{ex^2 + d}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^3*(a+b*arccsch(c*x))/(e*x^2+d)^(1/2),x, algorithm="giac")
```

```
[Out] integrate((b*arccsch(c*x) + a)*x^3/sqrt(e*x^2 + d), x)
```

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

$$\int \frac{x^3 (a + b \operatorname{arccsch}(cx))}{\sqrt{e x^2 + d}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^3*(a+b*arccsch(c*x))/(e*x^2+d)^(1/2),x)
```

```
[Out] int(x^3*(a+b*arccsch(c*x))/(e*x^2+d)^(1/2),x)
```

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

$$\frac{1}{3}\left(\frac{\sqrt{ex^2+d}\,x^2}{e} - \frac{2\sqrt{ex^2+d}\,d}{e^2}\right)a + \frac{1}{3}b\left(\frac{\left(e^2x^4 - dex^2 - 2d^2\right)\log\left(\sqrt{c^2x^2+1}+1\right)}{\sqrt{ex^2+d}\,e^2} + 3\int \frac{c^2e^2}{3\left(\left(c^2e^2x^2+e^2\right)\sqrt{c^2x^2}\right.}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^3*(a+b*arccsch(c*x))/(e*x^2+d)^(1/2),x, algorithm="maxima")
```

```
[Out] 1/3*(sqrt(e*x^2 + d)*x^2/e - 2*sqrt(e*x^2 + d)*d/e^2)*a + 1/3*b*((e^2*x^4 -
 d*e*x^2 - 2*d^2)*log(sqrt(c^2*x^2 + 1) + 1)/(sqrt(e*x^2 + d)*e^2) + 3*inte
grate(1/3*(c^2*e^2*x^5 - c^2*d*e*x^3 - 2*c^2*d^2*x)/((c^2*e^2*x^2 + e^2)*sq
rt(c^2*x^2 + 1)*sqrt(e*x^2 + d) + (c^2*e^2*x^2 + e^2)*sqrt(e*x^2 + d)), x)
- 3*integrate(1/3*((3*e^2*log(c) + e^2)*c^2*x^5 - 2*c^2*d^2*x - (c^2*d*e -
3*e^2*log(c))*x^3 + 3*(c^2*e^2*x^5 + e^2*x^3)*log(x))/((c^2*e^2*x^2 + e^2)*
sqrt(e*x^2 + d)), x))
```

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

$$\int \frac{x^3 \left(a + b \operatorname{asinh}\left(\frac{1}{c\,x}\right)\right)}{\sqrt{e\,x^2 + d}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((x^3*(a + b*asinh(1/(c*x))))/(d + e*x^2)^(1/2),x)
[Out] int((x^3*(a + b*asinh(1/(c*x))))/(d + e*x^2)^(1/2), x)
```

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

$$\int \frac{x^3 (a + b \operatorname{acsch}(cx))}{\sqrt{d + ex^2}} \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**3*(a+b*acsch(c*x))/(e*x**2+d)**(1/2),x)
[Out] Integral(x**3*(a + b*acsch(c*x))/sqrt(d + e*x**2), x)
```

# 3.140 $\int \frac{x\left(a+b\,\mathbf{csch}^{-1}(cx)\right)}{\sqrt{d+ex^2}}\,dx$

**Optimal**. Leaf size=135

$$\frac{\sqrt{d+ex^2}\,\left(a+b\text{csch}^{-1}(cx)\right)}{e}+\frac{bx\tan^{-1}\left(\frac{\sqrt{e}\,\sqrt{-c^2x^2-1}}{c\sqrt{d+ex^2}}\right)}{\sqrt{e}\,\sqrt{-c^2x^2}}+\frac{bc\sqrt{d}\,x\tan^{-1}\left(\frac{\sqrt{d+ex^2}}{\sqrt{d}\,\sqrt{-c^2x^2-1}}\right)}{e\sqrt{-c^2x^2}}$$

```
[Out] b*c*x*arctan((e*x^2+d)^(1/2)/d^(1/2)/(-c^2*x^2-1)^(1/2))*d^(1/2)/e/(-c^2*x^
2)^(1/2)+b*x*arctan(e^(1/2)*(-c^2*x^2-1)^(1/2)/c/(e*x^2+d)^(1/2))/e^(1/2)/(
-c^2*x^2)^(1/2)+(a+b*arccsch(c*x))*(e*x^2+d)^(1/2)/e
```

**Rubi [A]** time = 0.15, antiderivative size = 135, normalized size of antiderivative = 1.00, number of steps used = 8, number of rules used = 8, integrand size = 21, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.381, Rules used = {6300, 446, 105, 63, 217, 203, 93, 204}

$$\frac{\sqrt{d+ex^2}\,\left(a+b\text{csch}^{-1}(cx)\right)}{e}+\frac{bx\tan^{-1}\left(\frac{\sqrt{e}\,\sqrt{-c^2x^2-1}}{c\sqrt{d+ex^2}}\right)}{\sqrt{e}\,\sqrt{-c^2x^2}}+\frac{bc\sqrt{d}\,x\tan^{-1}\left(\frac{\sqrt{d+ex^2}}{\sqrt{d}\,\sqrt{-c^2x^2-1}}\right)}{e\sqrt{-c^2x^2}}$$

Antiderivative was successfully verified.

```
[In] Int[(x*(a + b*ArcCsch[c*x]))/Sqrt[d + e*x^2],x]
```

```
[Out] (Sqrt[d + e*x^2]*(a + b*ArcCsch[c*x]))/e + (b*x*ArcTan[(Sqrt[e]*Sqrt[-1 - c
^2*x^2])/(c*Sqrt[d + e*x^2])])/(Sqrt[e]*Sqrt[-(c^2*x^2)]) + (b*c*Sqrt[d]*x*
ArcTan[Sqrt[d + e*x^2]/(Sqrt[d]*Sqrt[-1 - c^2*x^2])])/(e*Sqrt[-(c^2*x^2)])
```

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 93

```
Int[(((a_.) + (b_.)*(x_))^(m_)*((c_.) + (d_.)*(x_))^(n_))/((e_.) + (f_.)*(x
_)), x_Symbol] :> With[{q = Denominator[m]}, Dist[q, Subst[Int[x^(q*(m + 1)
 - 1)/(b*e - a*f - (d*e - c*f)*x^q), x], x, (a + b*x)^(1/q)/(c + d*x)^(1/q)
], x]] /; FreeQ[{a, b, c, d, e, f}, x] && EqQ[m + n + 1, 0] && RationalQ[n]
 && LtQ[-1, m, 0] && SimplerQ[a + b*x, c + d*x]
```

Rule 105

```
Int[(((a_.) + (b_.)*(x_))^(m_)*((c_.) + (d_.)*(x_))^(n_))/((e_.) + (f_.)*(x
_)), x_Symbol] :> Dist[b/f, Int[(a + b*x)^(m - 1)*(c + d*x)^n, x], x] - Dis
t[(b*e - a*f)/f, Int[((a + b*x)^(m - 1)*(c + d*x)^n)/(e + f*x), x], x] /; F
reeQ[{a, b, c, d, e, f, m, n}, x] && IGtQ[Simplify[m + n + 1], 0] && (GtQ[m
, 0] || ( !RationalQ[m] && (SumSimplerQ[m, -1] ||  !SumSimplerQ[n, -1])))
```

Rule 203

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

Rule 204

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

Rule 217

```
Int[1/Sqrt[(a_) + (b_.)*(x_)^2], x_Symbol] :> Subst[Int[1/(1 - b*x^2), x],
x, x/Sqrt[a + b*x^2]] /; FreeQ[{a, b}, x] &&  !GtQ[a, 0]
```

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 6300

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))*(x_)*((d_.) + (e_.)*(x_)^2)^(p_.),
x_Symbol] :> Simp[((d + e*x^2)^(p + 1)*(a + b*ArcCsch[c*x]))/(2*e*(p + 1)),
 x] - Dist[(b*c*x)/(2*e*(p + 1)*Sqrt[-(c^2*x^2)]), Int[(d + e*x^2)^(p + 1)/
(x*Sqrt[-1 - c^2*x^2]), x], x] /; FreeQ[{a, b, c, d, e, p}, x] && NeQ[p, -1
]
```

Rubi steps

$$\int \frac{x\left(a+b\text{csch}^{-1}(cx)\right)}{\sqrt{d+ex^2}}\,dx = \frac{\sqrt{d+ex^2}\left(a+b\text{csch}^{-1}(cx)\right)}{e} - \frac{(bcx)\int \frac{\sqrt{d+ex^2}}{x\sqrt{-1-c^2x^2}}\,dx}{e\sqrt{-c^2x^2}}$$

$$= \frac{\sqrt{d+ex^2}\left(a+b\text{csch}^{-1}(cx)\right)}{e} - \frac{(bcx)\,\text{Subst}\left(\int \frac{\sqrt{d+ex}}{x\sqrt{-1-c^2x}}\,dx, x, x^2\right)}{2e\sqrt{-c^2x^2}}$$

$$= \frac{\sqrt{d+ex^2}\left(a+b\text{csch}^{-1}(cx)\right)}{e} - \frac{(bcx)\,\text{Subst}\left(\int \frac{1}{\sqrt{-1-c^2x}\sqrt{d+ex}}\,dx, x, x^2\right)}{2\sqrt{-c^2x^2}} - \frac{(bcdx)\,\text{Sul}}{}$$

$$= \frac{\sqrt{d+ex^2}\left(a+b\text{csch}^{-1}(cx)\right)}{e} + \frac{(bx)\,\text{Subst}\left(\int \frac{1}{\sqrt{d-\frac{e}{c^2}-\frac{ex^2}{c^2}}}\,dx, x, \sqrt{-1-c^2x^2}\right)}{c\sqrt{-c^2x^2}} - \frac{(bcd}{}$$

$$= \frac{\sqrt{d+ex^2}\left(a+b\text{csch}^{-1}(cx)\right)}{e} + \frac{bc\sqrt{d}\,x\tan^{-1}\left(\frac{\sqrt{d+ex^2}}{\sqrt{d}\sqrt{-1-c^2x^2}}\right)}{e\sqrt{-c^2x^2}} + \frac{(bx)\,\text{Subst}\left(\int \frac{1}{1+\frac{ex^2}{c^2}}\,d\right.}{c\sqrt{-c^2x}}$$

$$= \frac{\sqrt{d+ex^2}\left(a+b\text{csch}^{-1}(cx)\right)}{e} + \frac{bx\tan^{-1}\left(\frac{\sqrt{e}\sqrt{-1-c^2x^2}}{c\sqrt{d+ex^2}}\right)}{\sqrt{e}\sqrt{-c^2x^2}} + \frac{bc\sqrt{d}\,x\tan^{-1}\left(\frac{\sqrt{d+ex^2}}{\sqrt{d}\sqrt{-1-c^2x^2}}\right.}{e\sqrt{-c^2x^2}}$$

**Mathematica [A]** time = 0.24, size = 223, normalized size = 1.65

$$\frac{\sqrt{d+ex^2}\left(a+b\text{csch}^{-1}(cx)\right)}{e} - \frac{bx\sqrt{\frac{1}{c^2x^2}+1}\left(c^3\sqrt{d}\sqrt{-d-ex^2}\tan^{-1}\left(\frac{\sqrt{d}\sqrt{c^2x^2+1}}{\sqrt{-d-ex^2}}\right) - \sqrt{c^2}\sqrt{e}\sqrt{c^2d-e}\sqrt{\frac{c^2\left(d+ex^2\right)}{c^2d-e}}\ \text{s}\right.}{c^2e\sqrt{c^2x^2+1}\sqrt{d+ex^2}}$$

Antiderivative was successfully verified.

```
[In] Integrate[(x*(a + b*ArcCsch[c*x]))/Sqrt[d + e*x^2],x]
```

```
[Out] (Sqrt[d + e*x^2]*(a + b*ArcCsch[c*x]))/e - (b*Sqrt[1 + 1/(c^2*x^2)]*x*(-(Sq
rt[c^2]*Sqrt[c^2*d - e]*Sqrt[e]*Sqrt[(c^2*(d + e*x^2))/(c^2*d - e)]*ArcSinh
[(c*Sqrt[e]*Sqrt[1 + c^2*x^2])/(Sqrt[c^2]*Sqrt[c^2*d - e])]) + c^3*Sqrt[d]*
Sqrt[-d - e*x^2]*ArcTan[(Sqrt[d]*Sqrt[1 + c^2*x^2])/Sqrt[-d - e*x^2]]))/(c^
2*e*Sqrt[1 + c^2*x^2]*Sqrt[d + e*x^2])
```

**fricas [B]** time = 0.69, size = 1064, normalized size = 7.88

$$\left[\frac{4\sqrt{ex^2+d}\,bc\log\left(\frac{cx\sqrt{\frac{c^2x^2+1}{c^2x^2}}+1}{cx}\right)+bc\sqrt{d}\,\log\left(\frac{\left(c^4d^2+6c^2de+e^2\right)x^4+8\left(c^2d^2+de\right)x^2-4\left(\left(c^3d+ce\right)x^3+2cdx\right)\sqrt{ex^2+d}\,\sqrt{d}\,\sqrt{\frac{c^2x^2+1}{c^2x^2}}+8d^2}{x^4}\right)}{}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*(a+b*arccsch(c*x))/(e*x^2+d)^(1/2),x, algorithm="fricas")
```

```
[Out] [1/4*(4*sqrt(e*x^2 + d)*b*c*log((c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) + 1)/(c*
x)) + b*c*sqrt(d)*log(((c^4*d^2 + 6*c^2*d*e + e^2)*x^4 + 8*(c^2*d^2 + d*e)*
x^2 - 4*((c^3*d + c*e)*x^3 + 2*c*d*x)*sqrt(e*x^2 + d)*sqrt(d)*sqrt((c^2*x^2
 + 1)/(c^2*x^2)) + 8*d^2)/x^4) + 4*sqrt(e*x^2 + d)*a*c + b*sqrt(e)*log(8*c^
4*e^2*x^4 + c^4*d^2 + 6*c^2*d*e + 8*(c^4*d*e + c^2*e^2)*x^2 + 4*(2*c^4*e*x^
3 + (c^4*d + c^2*e)*x)*sqrt(e*x^2 + d)*sqrt(e)*sqrt((c^2*x^2 + 1)/(c^2*x^2)
) + e^2))/(c*e), 1/4*(4*sqrt(e*x^2 + d)*b*c*log((c*x*sqrt((c^2*x^2 + 1)/(c^
2*x^2)) + 1)/(c*x)) + b*c*sqrt(d)*log(((c^4*d^2 + 6*c^2*d*e + e^2)*x^4 + 8*
(c^2*d^2 + d*e)*x^2 - 4*((c^3*d + c*e)*x^3 + 2*c*d*x)*sqrt(e*x^2 + d)*sqrt(
d)*sqrt((c^2*x^2 + 1)/(c^2*x^2)) + 8*d^2)/x^4) + 4*sqrt(e*x^2 + d)*a*c - 2*
b*sqrt(-e)*arctan(1/2*(2*c^2*e*x^3 + (c^2*d + e)*x)*sqrt(e*x^2 + d)*sqrt(-e
)*sqrt((c^2*x^2 + 1)/(c^2*x^2))/(c^2*e^2*x^4 + (c^2*d*e + e^2)*x^2 + d*e)))
/(c*e), 1/4*(2*b*c*sqrt(-d)*arctan(1/2*((c^3*d + c*e)*x^3 + 2*c*d*x)*sqrt(e
*x^2 + d)*sqrt(-d)*sqrt((c^2*x^2 + 1)/(c^2*x^2))/(c^2*d*e*x^4 + (c^2*d^2 +
d*e)*x^2 + d^2)) + 4*sqrt(e*x^2 + d)*b*c*log((c*x*sqrt((c^2*x^2 + 1)/(c^2*x
^2)) + 1)/(c*x)) + 4*sqrt(e*x^2 + d)*a*c + b*sqrt(e)*log(8*c^4*e^2*x^4 + c^
4*d^2 + 6*c^2*d*e + 8*(c^4*d*e + c^2*e^2)*x^2 + 4*(2*c^4*e*x^3 + (c^4*d + c
^2*e)*x)*sqrt(e*x^2 + d)*sqrt(e)*sqrt((c^2*x^2 + 1)/(c^2*x^2)) + e^2))/(c*e
), 1/2*(b*c*sqrt(-d)*arctan(1/2*((c^3*d + c*e)*x^3 + 2*c*d*x)*sqrt(e*x^2 +
d)*sqrt(-d)*sqrt((c^2*x^2 + 1)/(c^2*x^2))/(c^2*d*e*x^4 + (c^2*d^2 + d*e)*x^
2 + d^2)) + 2*sqrt(e*x^2 + d)*b*c*log((c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) +
1)/(c*x)) + 2*sqrt(e*x^2 + d)*a*c - b*sqrt(-e)*arctan(1/2*(2*c^2*e*x^3 + (c
^2*d + e)*x)*sqrt(e*x^2 + d)*sqrt(-e)*sqrt((c^2*x^2 + 1)/(c^2*x^2))/(c^2*e^
2*x^4 + (c^2*d*e + e^2)*x^2 + d*e)))/(c*e)]
```

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

$$\int \frac{(b\,\mathrm{arcsch}\,(cx)+a)x}{\sqrt{ex^2+d}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*(a+b*arccsch(c*x))/(e*x^2+d)^(1/2),x, algorithm="giac")
```

```
[Out] integrate((b*arccsch(c*x) + a)*x/sqrt(e*x^2 + d), x)
```

**maple [F]** time = 0.43, size = 0, normalized size = 0.00

$$\int \frac{x\left(a+b\,\mathrm{arccsch}\left(cx\right)\right)}{\sqrt{e\,x^{2}+d}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x*(a+b*arccsch(c*x))/(e*x^2+d)^(1/2),x)
```

```
[Out] int(x*(a+b*arccsch(c*x))/(e*x^2+d)^(1/2),x)
```

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

$$b\left(\frac{\sqrt{ex^{2}+d}\,\log\left(\sqrt{c^{2}x^{2}+1}+1\right)}{e}+\int\frac{c^{2}ex^{3}+c^{2}dx}{\left(c^{2}ex^{2}+e\right)\sqrt{c^{2}x^{2}+1}\,\sqrt{ex^{2}+d}+\left(c^{2}ex^{2}+e\right)\sqrt{ex^{2}+d}}\,dx-\int\frac{\left(e\log(c)\right.}{}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*(a+b*arccsch(c*x))/(e*x^2+d)^(1/2),x, algorithm="maxima")
```

```
[Out] b*(sqrt(e*x^2 + d)*log(sqrt(c^2*x^2 + 1) + 1)/e + integrate((c^2*e*x^3 + c^
2*d*x)/((c^2*e*x^2 + e)*sqrt(c^2*x^2 + 1)*sqrt(e*x^2 + d) + (c^2*e*x^2 + e)
*sqrt(e*x^2 + d)), x) - integrate(((e*log(c) + e)*c^2*x^3 + (c^2*d + e*log(
c))*x + (c^2*e*x^3 + e*x)*log(x))/((c^2*e*x^2 + e)*sqrt(e*x^2 + d)), x)) +
sqrt(e*x^2 + d)*a/e
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.01

$$\int \frac{x\,\left(a+b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)\right)}{\sqrt{e\,x^2+d}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((x*(a + b*asinh(1/(c*x))))/(d + e*x^2)^(1/2),x)
```

```
[Out] int((x*(a + b*asinh(1/(c*x))))/(d + e*x^2)^(1/2), x)
```

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

$$\int \frac{x\left(a+b\,\mathrm{acsch}\left(cx\right)\right)}{\sqrt{d+ex^{2}}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*(a+b*acsch(c*x))/(e*x**2+d)**(1/2),x)
```

```
[Out] Integral(x*(a + b*acsch(c*x))/sqrt(d + e*x**2), x)
```

## 3.141 $\int \frac{a+b\text{csch}^{-1}(cx)}{x\sqrt{d+ex^2}}\,dx$

**Optimal**. Leaf size=26

$$\text{Int}\left(\frac{a+b\text{csch}^{-1}(cx)}{x\sqrt{d+ex^2}},x\right)$$

[Out] Unintegrable((a+b*arccsch(c*x))/x/(e*x^2+d)^(1/2),x)

**Rubi** [A] time = 0.10, 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 = {}

$$\int \frac{a+b\text{csch}^{-1}(cx)}{x\sqrt{d+ex^2}}\,dx$$

Verification is Not applicable to the result.

[In] Int[(a + b*ArcCsch[c*x])/(x*Sqrt[d + e*x^2]),x]

[Out] Defer[Int][(a + b*ArcCsch[c*x])/(x*Sqrt[d + e*x^2]), x]

Rubi steps

$$\int \frac{a+b\text{csch}^{-1}(cx)}{x\sqrt{d+ex^2}}\,dx=\int \frac{a+b\text{csch}^{-1}(cx)}{x\sqrt{d+ex^2}}\,dx$$

**Mathematica** [A] time = 1.75, size = 0, normalized size = 0.00

$$\int \frac{a+b\text{csch}^{-1}(cx)}{x\sqrt{d+ex^2}}\,dx$$

Verification is Not applicable to the result.

[In] Integrate[(a + b*ArcCsch[c*x])/(x*Sqrt[d + e*x^2]),x]

[Out] Integrate[(a + b*ArcCsch[c*x])/(x*Sqrt[d + e*x^2]), x]

**fricas** [A] time = 0.67, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{\sqrt{ex^2+d}\,(b\,\text{arcsch}\,(cx)+a)}{ex^3+dx},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))/x/(e*x^2+d)^(1/2),x, algorithm="fricas")
[Out] integral(sqrt(e*x^2 + d)*(b*arccsch(c*x) + a)/(e*x^3 + d*x), x)
```

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

$$\int \frac{b\,\mathrm{arcsch}\,(cx) + a}{\sqrt{ex^2 + d}\,x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))/x/(e*x^2+d)^(1/2),x, algorithm="giac")
[Out] integrate((b*arccsch(c*x) + a)/(sqrt(e*x^2 + d)*x), x)
```

**maple** [A] time = 0.42, size = 0, normalized size = 0.00

$$\int \frac{a + b\,\mathrm{arccsch}\,(cx)}{x\sqrt{e\,x^2 + d}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a+b*arccsch(c*x))/x/(e*x^2+d)^(1/2),x)
[Out] int((a+b*arccsch(c*x))/x/(e*x^2+d)^(1/2),x)
```

**maxima** [A] time = 0.00, size = 0, normalized size = 0.00

$$b\int \frac{\log\left(\sqrt{\frac{1}{c^2x^2} + 1} + \frac{1}{cx}\right)}{\sqrt{ex^2 + d}\,x}\,dx - \frac{a\,\mathrm{arsinh}\left(\frac{d}{\sqrt{de}\,|x|}\right)}{\sqrt{d}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))/x/(e*x^2+d)^(1/2),x, algorithm="maxima")
[Out] b*integrate(log(sqrt(1/(c^2*x^2) + 1) + 1/(c*x))/(sqrt(e*x^2 + d)*x), x) -
a*arcsinh(d/(sqrt(d*e)*abs(x)))/sqrt(d)
```

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

$$\int \frac{a + b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)}{x\,\sqrt{e\,x^2 + d}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a + b*asinh(1/(c*x)))/(x*(d + e*x^2)^(1/2)),x)
```

```
[Out] int((a + b*asinh(1/(c*x)))/(x*(d + e*x^2)^(1/2)), x)
```

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

$$\int \frac{a + b\,\mathrm{acsch}\,(cx)}{x\sqrt{d + ex^2}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*acsch(c*x))/x/(e*x**2+d)**(1/2),x)
```

```
[Out] Integral((a + b*acsch(c*x))/(x*sqrt(d + e*x**2)), x)
```

## 3.142 $\int \frac{a+b\text{csch}^{-1}(cx)}{x^3\sqrt{d+ex^2}}\,dx$

**Optimal**. Leaf size=26

$$\text{Int}\left(\frac{a+b\text{csch}^{-1}(cx)}{x^3\sqrt{d+ex^2}},x\right)$$

```
[Out] Unintegrable((a+b*arccsch(c*x))/x^3/(e*x^2+d)^(1/2),x)
```

**Rubi** [A] time = 0.11, 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 = {}

$$\int \frac{a+b\text{csch}^{-1}(cx)}{x^3\sqrt{d+ex^2}}\,dx$$

Verification is Not applicable to the result.

```
[In] Int[(a + b*ArcCsch[c*x])/(x^3*Sqrt[d + e*x^2]),x]
```

```
[Out] Defer[Int][(a + b*ArcCsch[c*x])/(x^3*Sqrt[d + e*x^2]), x]
```

Rubi steps

$$\int \frac{a+b\text{csch}^{-1}(cx)}{x^3\sqrt{d+ex^2}}\,dx=\int \frac{a+b\text{csch}^{-1}(cx)}{x^3\sqrt{d+ex^2}}\,dx$$

**Mathematica** [A] time = 23.25, size = 0, normalized size = 0.00

$$\int \frac{a+b\text{csch}^{-1}(cx)}{x^3\sqrt{d+ex^2}}\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[(a + b*ArcCsch[c*x])/(x^3*Sqrt[d + e*x^2]),x]
```

```
[Out] Integrate[(a + b*ArcCsch[c*x])/(x^3*Sqrt[d + e*x^2]), x]
```

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

$$\text{integral}\left(\frac{\sqrt{ex^2+d}\,(b\,\text{arcsch}\,(cx)+a)}{ex^5+dx^3},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))/x^3/(e*x^2+d)^(1/2),x, algorithm="fricas")
```

```
[Out] integral(sqrt(e*x^2 + d)*(b*arccsch(c*x) + a)/(e*x^5 + d*x^3), x)
```

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

$$\int \frac{b \operatorname{arcsch}(cx) + a}{\sqrt{ex^2 + d}\, x^3}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))/x^3/(e*x^2+d)^(1/2),x, algorithm="giac")
```

```
[Out] integrate((b*arccsch(c*x) + a)/(sqrt(e*x^2 + d)*x^3), x)
```

**maple** [A] time = 0.46, size = 0, normalized size = 0.00

$$\int \frac{a + b \operatorname{arccsch}(cx)}{x^3 \sqrt{e\, x^2 + d}}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a+b*arccsch(c*x))/x^3/(e*x^2+d)^(1/2),x)
```

```
[Out] int((a+b*arccsch(c*x))/x^3/(e*x^2+d)^(1/2),x)
```

**maxima** [A] time = 0.00, size = 0, normalized size = 0.00

$$\frac{1}{2}\, a \left( \frac{e \operatorname{arsinh}\left( \frac{d}{\sqrt{de}\, |x|} \right)}{d^{\frac{3}{2}}} - \frac{\sqrt{ex^2 + d}}{dx^2} \right) + b \int \frac{\log\left( \sqrt{\frac{1}{c^2 x^2} + 1} + \frac{1}{cx} \right)}{\sqrt{ex^2 + d}\, x^3}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))/x^3/(e*x^2+d)^(1/2),x, algorithm="maxima")
```

```
[Out] 1/2*a*(e*arcsinh(d/(sqrt(d*e)*abs(x)))/d^(3/2) - sqrt(e*x^2 + d)/(d*x^2)) +
 b*integrate(log(sqrt(1/(c^2*x^2) + 1) + 1/(c*x))/(sqrt(e*x^2 + d)*x^3), x)
```

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

$$\int \frac{a + b \operatorname{asinh}\left(\frac{1}{c\, x}\right)}{x^3\, \sqrt{e\, x^2 + d}}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a + b*asinh(1/(c*x)))/(x^3*(d + e*x^2)^(1/2)),x)
```

```
[Out] int((a + b*asinh(1/(c*x)))/(x^3*(d + e*x^2)^(1/2)), x)
```

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

$$\int \frac{a + b \operatorname{acsch}(cx)}{x^3 \sqrt{d + ex^2}}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*acsch(c*x))/x**3/(e*x**2+d)**(1/2),x)
```

```
[Out] Integral((a + b*acsch(c*x))/(x**3*sqrt(d + e*x**2)), x)
```

## 3.143 $\int \frac{x^2\left(a+b\mathbf{csch}^{-1}(cx)\right)}{\sqrt{d+ex^2}}\,dx$

**Optimal**. Leaf size=26

$$\text{Int}\left(\frac{x^2\left(a+b\text{csch}^{-1}(cx)\right)}{\sqrt{d+ex^2}},x\right)$$

```
[Out] Unintegrable(x^2*(a+b*arccsch(c*x))/(e*x^2+d)^(1/2),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 = {}

$$\int \frac{x^2\left(a+b\text{csch}^{-1}(cx)\right)}{\sqrt{d+ex^2}}\,dx$$

Verification is Not applicable to the result.

```
[In] Int[(x^2*(a + b*ArcCsch[c*x]))/Sqrt[d + e*x^2],x]
[Out] Defer[Int][(x^2*(a + b*ArcCsch[c*x]))/Sqrt[d + e*x^2], x]
```

Rubi steps

$$\int \frac{x^2\left(a+b\text{csch}^{-1}(cx)\right)}{\sqrt{d+ex^2}}\,dx=\int \frac{x^2\left(a+b\text{csch}^{-1}(cx)\right)}{\sqrt{d+ex^2}}\,dx$$

**Mathematica [A]** time = 6.33, size = 0, normalized size = 0.00

$$\int \frac{x^2\left(a+b\text{csch}^{-1}(cx)\right)}{\sqrt{d+ex^2}}\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[(x^2*(a + b*ArcCsch[c*x]))/Sqrt[d + e*x^2],x]
[Out] Integrate[(x^2*(a + b*ArcCsch[c*x]))/Sqrt[d + e*x^2], x]
```

**fricas [A]** time = 0.50, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{bx^2\,\text{arcsch}\,(cx)+ax^2}{\sqrt{ex^2+d}},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*(a+b*arccsch(c*x))/(e*x^2+d)^(1/2),x, algorithm="fricas")
```

```
[Out] integral((b*x^2*arccsch(c*x) + a*x^2)/sqrt(e*x^2 + d), x)
```

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

$$\int \frac{(b \operatorname{arcsch}(cx) + a)x^2}{\sqrt{ex^2 + d}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*(a+b*arccsch(c*x))/(e*x^2+d)^(1/2),x, algorithm="giac")
```

```
[Out] integrate((b*arccsch(c*x) + a)*x^2/sqrt(e*x^2 + d), x)
```

**maple [A]** time = 0.44, size = 0, normalized size = 0.00

$$\int \frac{x^2\,(a + b \operatorname{arccsch}(cx))}{\sqrt{e\,x^2 + d}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^2*(a+b*arccsch(c*x))/(e*x^2+d)^(1/2),x)
```

```
[Out] int(x^2*(a+b*arccsch(c*x))/(e*x^2+d)^(1/2),x)
```

**maxima [A]** time = 0.00, size = 0, normalized size = 0.00

$$\frac{1}{2}\,a\left(\frac{\sqrt{ex^2 + d}\,x}{e} - \frac{d \operatorname{arsinh}\left(\frac{ex}{\sqrt{de}}\right)}{e^{\frac{3}{2}}}\right) + b\int \frac{x^2 \log\left(\sqrt{\frac{1}{c^2x^2} + 1} + \frac{1}{cx}\right)}{\sqrt{ex^2 + d}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*(a+b*arccsch(c*x))/(e*x^2+d)^(1/2),x, algorithm="maxima")
```

```
[Out] 1/2*a*(sqrt(e*x^2 + d)*x/e - d*arcsinh(e*x/sqrt(d*e))/e^(3/2)) + b*integrat
e(x^2*log(sqrt(1/(c^2*x^2) + 1) + 1/(c*x))/sqrt(e*x^2 + d), x)
```

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

$$\int \frac{x^2\,\left(a + b \operatorname{asinh}\left(\frac{1}{c\,x}\right)\right)}{\sqrt{e\,x^2 + d}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((x^2*(a + b*asinh(1/(c*x))))/(d + e*x^2)^(1/2),x)
[Out] int((x^2*(a + b*asinh(1/(c*x))))/(d + e*x^2)^(1/2), x)
```

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

$$\int \frac{x^2\,(a + b\,\mathrm{acsch}\,(cx))}{\sqrt{d + ex^2}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**2*(a+b*acsch(c*x))/(e*x**2+d)**(1/2),x)
[Out] Integral(x**2*(a + b*acsch(c*x))/sqrt(d + e*x**2), x)
```

## 3.144 $\int \frac{a+b\text{csch}^{-1}(cx)}{\sqrt{d+ex^2}}\,dx$

**Optimal**. Leaf size=23

$$\text{Int}\left(\frac{a+b\text{csch}^{-1}(cx)}{\sqrt{d+ex^2}},x\right)$$

```
[Out] Unintegrable((a+b*arccsch(c*x))/(e*x^2+d)^(1/2),x)
```

**Rubi** [A] time = 0.03, 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 = {}

$$\int \frac{a+b\text{csch}^{-1}(cx)}{\sqrt{d+ex^2}}\,dx$$

Verification is Not applicable to the result.

```
[In] Int[(a + b*ArcCsch[c*x])/Sqrt[d + e*x^2],x]
[Out] Defer[Int][(a + b*ArcCsch[c*x])/Sqrt[d + e*x^2], x]
```

Rubi steps

$$\int \frac{a+b\text{csch}^{-1}(cx)}{\sqrt{d+ex^2}}\,dx=\int \frac{a+b\text{csch}^{-1}(cx)}{\sqrt{d+ex^2}}\,dx$$

**Mathematica** [A] time = 1.05, size = 0, normalized size = 0.00

$$\int \frac{a+b\text{csch}^{-1}(cx)}{\sqrt{d+ex^2}}\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[(a + b*ArcCsch[c*x])/Sqrt[d + e*x^2],x]
[Out] Integrate[(a + b*ArcCsch[c*x])/Sqrt[d + e*x^2], x]
```

**fricas** [A] time = 0.66, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{b\,\text{arcsch}\,(cx)+a}{\sqrt{ex^2+d}},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))/(e*x^2+d)^(1/2),x, algorithm="fricas")
```

```
[Out] integral((b*arccsch(c*x) + a)/sqrt(e*x^2 + d), x)
```

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

$$\int \frac{b \operatorname{arcsch}(cx) + a}{\sqrt{ex^2 + d}}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))/(e*x^2+d)^(1/2),x, algorithm="giac")
```

```
[Out] integrate((b*arccsch(c*x) + a)/sqrt(e*x^2 + d), x)
```

**maple [A]** time = 0.43, size = 0, normalized size = 0.00

$$\int \frac{a + b \operatorname{arccsch}(cx)}{\sqrt{e\,x^2 + d}}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a+b*arccsch(c*x))/(e*x^2+d)^(1/2),x)
```

```
[Out] int((a+b*arccsch(c*x))/(e*x^2+d)^(1/2),x)
```

**maxima [A]** time = 0.00, size = 0, normalized size = 0.00

$$b \int \frac{\log\left(\sqrt{\frac{1}{c^2x^2} + 1} + \frac{1}{cx}\right)}{\sqrt{ex^2 + d}}\, dx + \frac{a \operatorname{arsinh}\left(\frac{ex}{\sqrt{de}}\right)}{\sqrt{e}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))/(e*x^2+d)^(1/2),x, algorithm="maxima")
```

```
[Out] b*integrate(log(sqrt(1/(c^2*x^2) + 1) + 1/(c*x))/sqrt(e*x^2 + d), x) + a*ar
csinh(e*x/sqrt(d*e))/sqrt(e)
```

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

$$\int \frac{a + b \operatorname{asinh}\left(\frac{1}{c\,x}\right)}{\sqrt{e\,x^2 + d}}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a + b*asinh(1/(c*x)))/(d + e*x^2)^(1/2),x)
```

```
[Out] int((a + b*asinh(1/(c*x)))/(d + e*x^2)^(1/2), x)
```

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

$$\int \frac{a + b\,\mathrm{acsch}\,(cx)}{\sqrt{d + ex^2}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*acsch(c*x))/(e*x**2+d)**(1/2),x)
```

```
[Out] Integral((a + b*acsch(c*x))/sqrt(d + e*x**2), x)
```

# 3.145 $\int \frac{a+b\text{csch}^{-1}(cx)}{x^2\sqrt{d+ex^2}}\,dx$

**Optimal**. Leaf size=294

$$-\frac{\sqrt{d+ex^2}\left(a+b\text{csch}^{-1}(cx)\right)}{dx}+\frac{bex\sqrt{d+ex^2}\,F\left(\tan^{-1}(cx)|1-\frac{e}{c^2d}\right)}{d^2\sqrt{-c^2x^2}\sqrt{-c^2x^2-1}\sqrt{\frac{d+ex^2}{d(c^2x^2+1)}}}+\frac{bc\sqrt{-c^2x^2-1}\sqrt{d+ex^2}}{d\sqrt{-c^2x^2}}-\frac{bc^2x\sqrt{d+ex^2}\,E\left(\text{ta}\right.}{d\sqrt{-c^2x^2}\sqrt{-c^2x^2}}$$

```
[Out] -(a+b*arccsch(c*x))*(e*x^2+d)^(1/2)/d/x+b*c^3*x^2*(e*x^2+d)^(1/2)/d/(-c^2*x
^2)^(1/2)/(-c^2*x^2-1)^(1/2)+b*c*(-c^2*x^2-1)^(1/2)*(e*x^2+d)^(1/2)/d/(-c^2
*x^2)^(1/2)-b*c^2*x*(1/(c^2*x^2+1))^(1/2)*(c^2*x^2+1)^(1/2)*EllipticE(c*x/(
c^2*x^2+1)^(1/2),(1-e/c^2/d)^(1/2))*(e*x^2+d)^(1/2)/d/(-c^2*x^2)^(1/2)/(-c^
2*x^2-1)^(1/2)/((e*x^2+d)/d/(c^2*x^2+1))^(1/2)+b*e*x*(1/(c^2*x^2+1))^(1/2)*
(c^2*x^2+1)^(1/2)*EllipticF(c*x/(c^2*x^2+1)^(1/2),(1-e/c^2/d)^(1/2))*(e*x^2
+d)^(1/2)/d^2/(-c^2*x^2)^(1/2)/(-c^2*x^2-1)^(1/2)/((e*x^2+d)/d/(c^2*x^2+1))
^(1/2)
```

**Rubi [A]** time = 0.25, antiderivative size = 294, normalized size of antiderivative = 1.00, number of steps used = 8, number of rules used = 9, integrand size = 23, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.391, Rules used = {264, 6302, 12, 475, 21, 422, 418, 492, 411}

$$-\frac{\sqrt{d+ex^2}\left(a+b\text{csch}^{-1}(cx)\right)}{dx}+\frac{bex\sqrt{d+ex^2}\,F\left(\tan^{-1}(cx)|1-\frac{e}{c^2d}\right)}{d^2\sqrt{-c^2x^2}\sqrt{-c^2x^2-1}\sqrt{\frac{d+ex^2}{d(c^2x^2+1)}}}+\frac{bc^3x^2\sqrt{d+ex^2}}{d\sqrt{-c^2x^2}\sqrt{-c^2x^2-1}}+\frac{bc\sqrt{-c^2x^2-1}\sqrt{d+e}}{d\sqrt{-c^2x^2}}$$

Antiderivative was successfully verified.

```
[In] Int[(a + b*ArcCsch[c*x])/(x^2*Sqrt[d + e*x^2]),x]
```

```
[Out] (b*c^3*x^2*Sqrt[d + e*x^2])/(d*Sqrt[-(c^2*x^2)]*Sqrt[-1 - c^2*x^2]) + (b*c*
Sqrt[-1 - c^2*x^2]*Sqrt[d + e*x^2])/(d*Sqrt[-(c^2*x^2)]) - (Sqrt[d + e*x^2]
*(a + b*ArcCsch[c*x]))/(d*x) - (b*c^2*x*Sqrt[d + e*x^2]*EllipticE[ArcTan[c*
x], 1 - e/(c^2*d)])/(d*Sqrt[-(c^2*x^2)]*Sqrt[-1 - c^2*x^2]*Sqrt[(d + e*x^2)
/(d*(1 + c^2*x^2))]) + (b*e*x*Sqrt[d + e*x^2]*EllipticF[ArcTan[c*x], 1 - e/
(c^2*d)])/(d^2*Sqrt[-(c^2*x^2)]*Sqrt[-1 - c^2*x^2]*Sqrt[(d + e*x^2)/(d*(1 +
 c^2*x^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 21

```
Int[(u_.)*((a_) + (b_.)*(v_))^(m_.)*((c_) + (d_.)*(v_))^(n_.), x_Symbol] :>
 Dist[(b/d)^m, Int[u*(c + d*v)^(m + n), x], x] /; FreeQ[{a, b, c, d, n}, x]
 && EqQ[b*c - a*d, 0] && IntegerQ[m] && ( !IntegerQ[n] || SimplerQ[c + d*x,
 a + b*x])
```

Rule 264

```
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] /; FreeQ[{a, b, c, m, n,
 p}, x] && EqQ[(m + 1)/n + p + 1, 0] && NeQ[m, -1]
```

Rule 411

```
Int[Sqrt[(a_) + (b_.)*(x_)^2]/((c_) + (d_.)*(x_)^2)^(3/2), x_Symbol] :> Sim
p[(Sqrt[a + b*x^2]*EllipticE[ArcTan[Rt[d/c, 2]*x], 1 - (b*c)/(a*d)])/(c*Rt[
d/c, 2]*Sqrt[c + d*x^2]*Sqrt[(c*(a + b*x^2))/(a*(c + d*x^2))]), x] /; FreeQ
[{a, b, c, d}, x] && PosQ[b/a] && PosQ[d/c]
```

Rule 418

```
Int[1/(Sqrt[(a_) + (b_.)*(x_)^2]*Sqrt[(c_) + (d_.)*(x_)^2]), x_Symbol] :> S
imp[(Sqrt[a + b*x^2]*EllipticF[ArcTan[Rt[d/c, 2]*x], 1 - (b*c)/(a*d)])/(a*R
t[d/c, 2]*Sqrt[c + d*x^2]*Sqrt[(c*(a + b*x^2))/(a*(c + d*x^2))]), x] /; Fre
eQ[{a, b, c, d}, x] && PosQ[d/c] && PosQ[b/a] &&  !SimplerSqrtQ[b/a, d/c]
```

Rule 422

```
Int[Sqrt[(a_) + (b_.)*(x_)^2]/Sqrt[(c_) + (d_.)*(x_)^2], x_Symbol] :> Dist[
a, Int[1/(Sqrt[a + b*x^2]*Sqrt[c + d*x^2]), x], x] + Dist[b, Int[x^2/(Sqrt[
a + b*x^2]*Sqrt[c + d*x^2]), x], x] /; FreeQ[{a, b, c, d}, x] && PosQ[d/c]
&& PosQ[b/a]
```

Rule 475

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

Rule 492

```
Int[(x_)^2/(Sqrt[(a_) + (b_.)*(x_)^2]*Sqrt[(c_) + (d_.)*(x_)^2]), x_Symbol]
 :> Simp[(x*Sqrt[a + b*x^2])/(b*Sqrt[c + d*x^2]), x] - Dist[c/b, Int[Sqrt[a
 + b*x^2]/(c + d*x^2)^(3/2), x], x] /; FreeQ[{a, b, c, d}, x] && NeQ[b*c -
a*d, 0] && PosQ[b/a] && PosQ[d/c] &&  !SimplerSqrtQ[b/a, d/c]
```

Rule 6302

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))*((f_.)*(x_))^(m_.)*((d_.) + (e_.)*(
x_)^2)^(p_.), x_Symbol] :> With[{u = IntHide[(f*x)^m*(d + e*x^2)^p, x]}, Di
st[a + b*ArcCsch[c*x], u, x] - Dist[(b*c*x)/Sqrt[-(c^2*x^2)], Int[SimplifyI
ntegrand[u/(x*Sqrt[-1 - c^2*x^2]), x], x], x]] /; FreeQ[{a, b, c, d, e, f,
m, p}, x] && ((IGtQ[p, 0] &&  !(ILtQ[(m - 1)/2, 0] && GtQ[m + 2*p + 3, 0]))
 || (IGtQ[(m + 1)/2, 0] &&  !(ILtQ[p, 0] && GtQ[m + 2*p + 3, 0])) || (ILtQ[
(m + 2*p + 1)/2, 0] &&  !ILtQ[(m - 1)/2, 0]))
```

Rubi steps

$$\int \frac{a+b\operatorname{csch}^{-1}(cx)}{x^2\sqrt{d+ex^2}}\,dx = -\frac{\sqrt{d+ex^2}\left(a+b\operatorname{csch}^{-1}(cx)\right)}{dx}+\frac{(bcx)\int \frac{\sqrt{d+ex^2}}{dx^2\sqrt{-1-c^2x^2}}\,dx}{\sqrt{-c^2x^2}}$$

$$= -\frac{\sqrt{d+ex^2}\left(a+b\operatorname{csch}^{-1}(cx)\right)}{dx}+\frac{(bcx)\int \frac{\sqrt{d+ex^2}}{x^2\sqrt{-1-c^2x^2}}\,dx}{d\sqrt{-c^2x^2}}$$

$$= \frac{bc\sqrt{-1-c^2x^2}\,\sqrt{d+ex^2}}{d\sqrt{-c^2x^2}}-\frac{\sqrt{d+ex^2}\left(a+b\operatorname{csch}^{-1}(cx)\right)}{dx}-\frac{(bcx)\int \frac{-e-c^2ex^2}{\sqrt{-1-c^2x^2}\,\sqrt{d+ex^2}}\,dx}{d\sqrt{-c^2x^2}}$$

$$= \frac{bc\sqrt{-1-c^2x^2}\,\sqrt{d+ex^2}}{d\sqrt{-c^2x^2}}-\frac{\sqrt{d+ex^2}\left(a+b\operatorname{csch}^{-1}(cx)\right)}{dx}-\frac{(bcex)\int \frac{\sqrt{-1-c^2x^2}}{\sqrt{d+ex^2}}\,dx}{d\sqrt{-c^2x^2}}$$

$$= \frac{bc\sqrt{-1-c^2x^2}\,\sqrt{d+ex^2}}{d\sqrt{-c^2x^2}}-\frac{\sqrt{d+ex^2}\left(a+b\operatorname{csch}^{-1}(cx)\right)}{dx}+\frac{(bcex)\int \frac{1}{\sqrt{-1-c^2x^2}\,\sqrt{d+ex^2}}\,dx}{d\sqrt{-c^2x^2}}$$

$$= \frac{bc^3x^2\sqrt{d+ex^2}}{d\sqrt{-c^2x^2}\,\sqrt{-1-c^2x^2}}+\frac{bc\sqrt{-1-c^2x^2}\,\sqrt{d+ex^2}}{d\sqrt{-c^2x^2}}-\frac{\sqrt{d+ex^2}\left(a+b\operatorname{csch}^{-1}(cx)\right)}{dx}+\frac{bex}{d^2}$$

$$= \frac{bc^3x^2\sqrt{d+ex^2}}{d\sqrt{-c^2x^2}\,\sqrt{-1-c^2x^2}}+\frac{bc\sqrt{-1-c^2x^2}\,\sqrt{d+ex^2}}{d\sqrt{-c^2x^2}}-\frac{\sqrt{d+ex^2}\left(a+b\operatorname{csch}^{-1}(cx)\right)}{dx}-\frac{bc^2}{d}$$

**Mathematica [A]** time = 0.21, size = 139, normalized size = 0.47

$$\frac{\sqrt{d+ex^2}\left(-a+bcx\sqrt{\frac{1}{c^2x^2}+1}-b\operatorname{csch}^{-1}(cx)\right)}{dx}-\frac{bcex\sqrt{\frac{1}{c^2x^2}+1}\sqrt{\frac{ex^2}{d}+1}\,E\left(\sin^{-1}\left(\sqrt{-\frac{e}{d}}\,x\right)|\frac{c^2d}{e}\right)}{d\sqrt{c^2x^2+1}\sqrt{-\frac{e}{d}}\sqrt{d+ex^2}}$$

Antiderivative was successfully verified.

```
[In] Integrate[(a + b*ArcCsch[c*x])/(x^2*Sqrt[d + e*x^2]),x]
```

```
[Out] (Sqrt[d + e*x^2]*(-a + b*c*Sqrt[1 + 1/(c^2*x^2)]*x - b*ArcCsch[c*x]))/(d*x)
 - (b*c*e*Sqrt[1 + 1/(c^2*x^2)]*x*Sqrt[1 + (e*x^2)/d]*EllipticE[ArcSin[Sqrt
[-(e/d)]*x], (c^2*d)/e])/(d*Sqrt[-(e/d)]*Sqrt[1 + c^2*x^2]*Sqrt[d + e*x^2])
```

**fricas [F]** time = 0.61, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{\sqrt{ex^2+d}\,(b\operatorname{arcsch}(cx)+a)}{ex^4+dx^2},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))/x^2/(e*x^2+d)^(1/2),x, algorithm="fricas")
```

```
[Out] integral(sqrt(e*x^2 + d)*(b*arccsch(c*x) + a)/(e*x^4 + d*x^2), x)
```

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

$$\int \frac{b\operatorname{arcsch}(cx)+a}{\sqrt{ex^2+d}\,x^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))/x^2/(e*x^2+d)^(1/2),x, algorithm="giac")
```

```
[Out] integrate((b*arccsch(c*x) + a)/(sqrt(e*x^2 + d)*x^2), x)
```

**maple [F]** time = 0.51, size = 0, normalized size = 0.00

$$\int \frac{a+b\,\mathrm{arccsch}(cx)}{x^2\sqrt{e\,x^2+d}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a+b*arccsch(c*x))/x^2/(e*x^2+d)^(1/2),x)
```

```
[Out] int((a+b*arccsch(c*x))/x^2/(e*x^2+d)^(1/2),x)
```

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

$$-b\left(\frac{\sqrt{ex^2+d}\log\left(\sqrt{c^2x^2+1}+1\right)}{dx}+\int\frac{c^2ex^2+c^2d}{\left(c^2dx^2+d\right)\sqrt{c^2x^2+1}\sqrt{ex^2+d}+\left(c^2dx^2+d\right)\sqrt{ex^2+d}}\,dx+\int-\frac{c^2ex^4}{\phantom{x}}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))/x^2/(e*x^2+d)^(1/2),x, algorithm="maxima")
```

```
[Out] -b*(sqrt(e*x^2 + d)*log(sqrt(c^2*x^2 + 1) + 1)/(d*x) + integrate((c^2*e*x^2
 + c^2*d)/((c^2*d*x^2 + d)*sqrt(c^2*x^2 + 1)*sqrt(e*x^2 + d) + (c^2*d*x^2 +
 d)*sqrt(e*x^2 + d)), x) + integrate(-(c^2*e*x^4 - (d*log(c) - d)*c^2*x^2 -
 d*log(c) - (c^2*d*x^2 + d)*log(x))/((c^2*d*x^4 + d*x^2)*sqrt(e*x^2 + d)),
x)) - sqrt(e*x^2 + d)*a/(d*x)
```

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

$$\int\frac{a+b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)}{x^2\,\sqrt{e\,x^2+d}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a + b*asinh(1/(c*x)))/(x^2*(d + e*x^2)^(1/2)),x)
```

```
[Out] int((a + b*asinh(1/(c*x)))/(x^2*(d + e*x^2)^(1/2)), x)
```

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

$$\int\frac{a+b\,\mathrm{acsch}\,(cx)}{x^2\sqrt{d+ex^2}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*acsch(c*x))/x**2/(e*x**2+d)**(1/2),x)
```

```
[Out] Integral((a + b*acsch(c*x))/(x**2*sqrt(d + e*x**2)), x)
```

# 3.146 $\int \frac{a+b\,\mathrm{csch}^{-1}(cx)}{x^4\sqrt{d+ex^2}}\,dx$

**Optimal**. Leaf size=425

$$\frac{2e\sqrt{d+ex^2}\left(a+b\,\mathrm{csch}^{-1}(cx)\right)}{3d^2x}-\frac{\sqrt{d+ex^2}\left(a+b\,\mathrm{csch}^{-1}(cx)\right)}{3dx^3}-\frac{bex\left(c^2d+6e\right)\sqrt{d+ex^2}\,F\left(\tan^{-1}(cx)|1-\frac{e}{c^2d}\right)}{9d^3\sqrt{-c^2x^2}\sqrt{-c^2x^2-1}\sqrt{\frac{d+ex^2}{d\left(c^2x^2+1\right)}}}-\frac{bc\sqrt{}}{}$$

```
[Out] -1/3*(a+b*arccsch(c*x))*(e*x^2+d)^(1/2)/d/x^3+2/3*e*(a+b*arccsch(c*x))*(e*x
^2+d)^(1/2)/d^2/x-1/9*b*c^3*(2*c^2*d+5*e)*x^2*(e*x^2+d)^(1/2)/d^2/(-c^2*x^2
)^(1/2)/(-c^2*x^2-1)^(1/2)-1/9*b*c*(2*c^2*d+5*e)*(-c^2*x^2-1)^(1/2)*(e*x^2+
d)^(1/2)/d^2/(-c^2*x^2)^(1/2)+1/9*b*c*(-c^2*x^2-1)^(1/2)*(e*x^2+d)^(1/2)/d/
x^2/(-c^2*x^2)^(1/2)+1/9*b*c^2*(2*c^2*d+5*e)*x*(1/(c^2*x^2+1))^(1/2)*(c^2*x
^2+1)^(1/2)*EllipticE(c*x/(c^2*x^2+1)^(1/2),(1-e/c^2/d)^(1/2))*(e*x^2+d)^(1
/2)/d^2/(-c^2*x^2)^(1/2)/(-c^2*x^2-1)^(1/2)/((e*x^2+d)/d/(c^2*x^2+1))^(1/2)
-1/9*b*e*(c^2*d+6*e)*x*(1/(c^2*x^2+1))^(1/2)*(c^2*x^2+1)^(1/2)*EllipticF(c*
x/(c^2*x^2+1)^(1/2),(1-e/c^2/d)^(1/2))*(e*x^2+d)^(1/2)/d^3/(-c^2*x^2)^(1/2)
/(-c^2*x^2-1)^(1/2)/((e*x^2+d)/d/(c^2*x^2+1))^(1/2)
```

**Rubi [A]** time = 0.49, antiderivative size = 425, normalized size of antiderivative = 1.00, number of steps used = 8, number of rules used = 10, integrand size = 23, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.435, Rules used = {271, 264, 6302, 12, 580, 583, 531, 418, 492, 411}

$$\frac{2e\sqrt{d+ex^2}\left(a+b\,\mathrm{csch}^{-1}(cx)\right)}{3d^2x}-\frac{\sqrt{d+ex^2}\left(a+b\,\mathrm{csch}^{-1}(cx)\right)}{3dx^3}-\frac{bc^3x^2\left(2c^2d+5e\right)\sqrt{d+ex^2}}{9d^2\sqrt{-c^2x^2}\sqrt{-c^2x^2-1}}-\frac{bc\sqrt{-c^2x^2-1}\left(2c^2d\right.}{9d^2\sqrt{-c^2}}$$

Antiderivative was successfully verified.

```
[In] Int[(a + b*ArcCsch[c*x])/(x^4*Sqrt[d + e*x^2]),x]
```

```
[Out] -(b*c^3*(2*c^2*d + 5*e)*x^2*Sqrt[d + e*x^2])/(9*d^2*Sqrt[-(c^2*x^2)]*Sqrt[-
1 - c^2*x^2]) - (b*c*(2*c^2*d + 5*e)*Sqrt[-1 - c^2*x^2]*Sqrt[d + e*x^2])/(9
*d^2*Sqrt[-(c^2*x^2)]) + (b*c*Sqrt[-1 - c^2*x^2]*Sqrt[d + e*x^2])/(9*d*x^2*
Sqrt[-(c^2*x^2)]) - (Sqrt[d + e*x^2]*(a + b*ArcCsch[c*x]))/(3*d*x^3) + (2*e
*Sqrt[d + e*x^2]*(a + b*ArcCsch[c*x]))/(3*d^2*x) + (b*c^2*(2*c^2*d + 5*e)*x
*Sqrt[d + e*x^2]*EllipticE[ArcTan[c*x], 1 - e/(c^2*d)])/(9*d^2*Sqrt[-(c^2*x
^2)]*Sqrt[-1 - c^2*x^2]*Sqrt[(d + e*x^2)/(d*(1 + c^2*x^2))]) - (b*e*(c^2*d
+ 6*e)*x*Sqrt[d + e*x^2]*EllipticF[ArcTan[c*x], 1 - e/(c^2*d)])/(9*d^3*Sqrt
[-(c^2*x^2)]*Sqrt[-1 - c^2*x^2]*Sqrt[(d + e*x^2)/(d*(1 + c^2*x^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 264

```
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] /; FreeQ[{a, b, c, m, n,
 p}, x] && EqQ[(m + 1)/n + p + 1, 0] && NeQ[m, -1]
```

Rule 271

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

Rule 411

```
Int[Sqrt[(a_) + (b_.)*(x_)^2]/((c_) + (d_.)*(x_)^2)^(3/2), x_Symbol] :> Sim
p[(Sqrt[a + b*x^2]*EllipticE[ArcTan[Rt[d/c, 2]*x], 1 - (b*c)/(a*d)])/(c*Rt[
d/c, 2]*Sqrt[c + d*x^2]*Sqrt[(c*(a + b*x^2))/(a*(c + d*x^2))]), x] /; FreeQ
[{a, b, c, d}, x] && PosQ[b/a] && PosQ[d/c]
```

Rule 418

```
Int[1/(Sqrt[(a_) + (b_.)*(x_)^2]*Sqrt[(c_) + (d_.)*(x_)^2]), x_Symbol] :> S
imp[(Sqrt[a + b*x^2]*EllipticF[ArcTan[Rt[d/c, 2]*x], 1 - (b*c)/(a*d)])/(a*R
t[d/c, 2]*Sqrt[c + d*x^2]*Sqrt[(c*(a + b*x^2))/(a*(c + d*x^2))]), x] /; Fre
eQ[{a, b, c, d}, x] && PosQ[d/c] && PosQ[b/a] &&  !SimplerSqrtQ[b/a, d/c]
```

Rule 492

```
Int[(x_)^2/(Sqrt[(a_) + (b_.)*(x_)^2]*Sqrt[(c_) + (d_.)*(x_)^2]), x_Symbol]
 :> Simp[(x*Sqrt[a + b*x^2])/(b*Sqrt[c + d*x^2]), x] - Dist[c/b, Int[Sqrt[a
 + b*x^2]/(c + d*x^2)^(3/2), x], x] /; FreeQ[{a, b, c, d}, x] && NeQ[b*c -
a*d, 0] && PosQ[b/a] && PosQ[d/c] &&  !SimplerSqrtQ[b/a, d/c]
```

Rule 531

```
Int[((a_) + (b_.)*(x_)^(n_))^(p_.)*((c_) + (d_.)*(x_)^(n_))^(q_.)*((e_) + (
f_.)*(x_)^(n_)), x_Symbol] :> Dist[e, Int[(a + b*x^n)^p*(c + d*x^n)^q, x],
x] + Dist[f, Int[x^n*(a + b*x^n)^p*(c + d*x^n)^q, x], x] /; FreeQ[{a, b, c,
 d, e, f, n, p, q}, x]
```

Rule 580

```
Int[((g_.)*(x_))^(m_)*((a_) + (b_.)*(x_)^(n_))^(p_.)*((c_) + (d_.)*(x_)^(n_
))^(q_.)*((e_) + (f_.)*(x_)^(n_)), x_Symbol] :> Simp[(e*(g*x)^(m + 1)*(a +
b*x^n)^(p + 1)*(c + d*x^n)^q)/(a*g*(m + 1)), x] - Dist[1/(a*g^n*(m + 1)), I
nt[(g*x)^(m + n)*(a + b*x^n)^p*(c + d*x^n)^(q - 1)*Simp[c*(b*e - a*f)*(m +
1) + e*n*(b*c*(p + 1) + a*d*q) + d*((b*e - a*f)*(m + 1) + b*e*n*(p + q + 1)
)*x^n, x], x], x] /; FreeQ[{a, b, c, d, e, f, g, p}, x] && IGtQ[n, 0] && Gt
Q[q, 0] && LtQ[m, -1] &&  !(EqQ[q, 1] && SimplerQ[e + f*x^n, c + d*x^n])
```

Rule 583

```
Int[((g_.)*(x_))^(m_)*((a_) + (b_.)*(x_)^(n_))^(p_.)*((c_) + (d_.)*(x_)^(n_
))^(q_.)*((e_) + (f_.)*(x_)^(n_)), x_Symbol] :> Simp[(e*(g*x)^(m + 1)*(a +
b*x^n)^(p + 1)*(c + d*x^n)^(q + 1))/(a*c*g*(m + 1)), x] + Dist[1/(a*c*g^n*(
m + 1)), Int[(g*x)^(m + n)*(a + b*x^n)^p*(c + d*x^n)^q*Simp[a*f*c*(m + 1) -
 e*(b*c + a*d)*(m + n + 1) - e*n*(b*c*p + a*d*q) - b*e*d*(m + n*(p + q + 2)
 + 1)*x^n, x], x], x] /; FreeQ[{a, b, c, d, e, f, g, p, q}, x] && IGtQ[n, 0
] && LtQ[m, -1]
```

Rule 6302

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))*((f_.)*(x_))^(m_.)*((d_.) + (e_.)*(
x_)^2)^(p_.), x_Symbol] :> With[{u = IntHide[(f*x)^m*(d + e*x^2)^p, x]}, Di
st[a + b*ArcCsch[c*x], u, x] - Dist[(b*c*x)/Sqrt[-(c^2*x^2)], Int[SimplifyI
ntegrand[u/(x*Sqrt[-1 - c^2*x^2]), x], x], x]] /; FreeQ[{a, b, c, d, e, f,
m, p}, x] && ((IGtQ[p, 0] &&  !(ILtQ[(m - 1)/2, 0] && GtQ[m + 2*p + 3, 0]))
 || (IGtQ[(m + 1)/2, 0] &&  !(ILtQ[p, 0] && GtQ[m + 2*p + 3, 0])) || (ILtQ[
(m + 2*p + 1)/2, 0] &&  !ILtQ[(m - 1)/2, 0]))
```

Rubi steps

$$\int \frac{a+b\text{csch}^{-1}(cx)}{x^4\sqrt{d+ex^2}}\,dx = -\frac{\sqrt{d+ex^2}\left(a+b\text{csch}^{-1}(cx)\right)}{3dx^3} + \frac{2e\sqrt{d+ex^2}\left(a+b\text{csch}^{-1}(cx)\right)}{3d^2x} - \frac{(bcx)\int \frac{\sqrt{d+ex^2}\left(-d+2e\ldots\right.}{3d^2x^4\sqrt{-1-c^2x\ldots}}}{\sqrt{-c^2x^2}}$$

$$= -\frac{\sqrt{d+ex^2}\left(a+b\text{csch}^{-1}(cx)\right)}{3dx^3} + \frac{2e\sqrt{d+ex^2}\left(a+b\text{csch}^{-1}(cx)\right)}{3d^2x} - \frac{(bcx)\int \frac{\sqrt{d+ex^2}\left(-d+2e\ldots\right.}{x^4\sqrt{-1-c^2x^2}}}{3d^2\sqrt{-c^2x^2}}$$

$$= \frac{bc\sqrt{-1-c^2x^2}\sqrt{d+ex^2}}{9dx^2\sqrt{-c^2x^2}} - \frac{\sqrt{d+ex^2}\left(a+b\text{csch}^{-1}(cx)\right)}{3dx^3} + \frac{2e\sqrt{d+ex^2}\left(a+b\text{csch}^{-1}(cx\ldots\right.}{3d^2x}$$

$$= -\frac{bc\left(2c^2d+5e\right)\sqrt{-1-c^2x^2}\sqrt{d+ex^2}}{9d^2\sqrt{-c^2x^2}} + \frac{bc\sqrt{-1-c^2x^2}\sqrt{d+ex^2}}{9dx^2\sqrt{-c^2x^2}} - \frac{\sqrt{d+ex^2}\left(a+bcs\ldots\right.}{3dx^3}$$

$$= -\frac{bc\left(2c^2d+5e\right)\sqrt{-1-c^2x^2}\sqrt{d+ex^2}}{9d^2\sqrt{-c^2x^2}} + \frac{bc\sqrt{-1-c^2x^2}\sqrt{d+ex^2}}{9dx^2\sqrt{-c^2x^2}} - \frac{\sqrt{d+ex^2}\left(a+bcs\ldots\right.}{3dx^3}$$

$$= -\frac{bc^3\left(2c^2d+5e\right)x^2\sqrt{d+ex^2}}{9d^2\sqrt{-c^2x^2}\sqrt{-1-c^2x^2}} - \frac{bc\left(2c^2d+5e\right)\sqrt{-1-c^2x^2}\sqrt{d+ex^2}}{9d^2\sqrt{-c^2x^2}} + \frac{bc\sqrt{-1-c^2x^2}\ldots}{9dx^2\sqrt{-c\ldots}}$$

$$= -\frac{bc^3\left(2c^2d+5e\right)x^2\sqrt{d+ex^2}}{9d^2\sqrt{-c^2x^2}\sqrt{-1-c^2x^2}} - \frac{bc\left(2c^2d+5e\right)\sqrt{-1-c^2x^2}\sqrt{d+ex^2}}{9d^2\sqrt{-c^2x^2}} + \frac{bc\sqrt{-1-c^2x^2}\ldots}{9dx^2\sqrt{-c\ldots}}$$

**Mathematica [C]** time = 0.64, size = 239, normalized size = 0.56

$$-\frac{\sqrt{d+ex^2}\left(3a\left(d-2ex^2\right)+bcx\sqrt{\frac{1}{c^2x^2}+1}\left(2c^2dx^2-d+5ex^2\right)+3b\text{csch}^{-1}(cx)\left(d-2ex^2\right)\right)}{9d^2x^3} - \frac{ibcx\sqrt{\frac{1}{c^2x^2}+1}\sqrt{\frac{ex^2}{d}\ldots}}{\ldots}$$

Antiderivative was successfully verified.

```
[In] Integrate[(a + b*ArcCsch[c*x])/(x^4*Sqrt[d + e*x^2]),x]
```

```
[Out] -1/9*(Sqrt[d + e*x^2]*(3*a*(d - 2*e*x^2) + b*c*Sqrt[1 + 1/(c^2*x^2)]*x*(-d
+ 2*c^2*d*x^2 + 5*e*x^2) + 3*b*(d - 2*e*x^2)*ArcCsch[c*x]))/(d^2*x^3) - ((I
/9)*b*c*Sqrt[1 + 1/(c^2*x^2)]*x*Sqrt[1 + (e*x^2)/d]*(c^2*d*(2*c^2*d + 5*e)*
EllipticE[I*ArcSinh[Sqrt[c^2]*x], e/(c^2*d)] - 2*(c^4*d^2 + 2*c^2*d*e - 3*e
^2)*EllipticF[I*ArcSinh[Sqrt[c^2]*x], e/(c^2*d)]))/(Sqrt[c^2]*d^2*Sqrt[1 +
c^2*x^2]*Sqrt[d + e*x^2])
```

**fricas [F]** time = 0.90, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{\sqrt{ex^2+d}\,(b\,\text{arcsch}\,(cx)+a)}{ex^6+dx^4},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))/x^4/(e*x^2+d)^(1/2),x, algorithm="fricas")
[Out] integral(sqrt(e*x^2 + d)*(b*arccsch(c*x) + a)/(e*x^6 + d*x^4), x)
```

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

$$\int \frac{b\,\text{arcsch}\,(cx)+a}{\sqrt{ex^2+d}\,x^4}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))/x^4/(e*x^2+d)^(1/2),x, algorithm="giac")
[Out] integrate((b*arccsch(c*x) + a)/(sqrt(e*x^2 + d)*x^4), x)
```

**maple [F]** time = 0.49, size = 0, normalized size = 0.00

$$\int \frac{a+b\,\text{arccsch}\,(cx)}{x^4\sqrt{e\,x^2+d}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a+b*arccsch(c*x))/x^4/(e*x^2+d)^(1/2),x)
[Out] int((a+b*arccsch(c*x))/x^4/(e*x^2+d)^(1/2),x)
```

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

$$\frac{1}{3}\,a\left(\frac{2\,\sqrt{ex^2+d}\,e}{d^2x}-\frac{\sqrt{ex^2+d}}{dx^3}\right)+\frac{1}{3}\,b\left(\frac{\left(2\,e^2x^4+dex^2-d^2\right)\log\left(\sqrt{c^2x^2+1}\,+1\right)}{\sqrt{ex^2+d}\,d^2x^3}+3\int\frac{2\,c^2e}{3\left(\left(c^2d^2x^4+d^2x^2\right)\sqrt{c^2x^2+\right.\right.}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))/x^4/(e*x^2+d)^(1/2),x, algorithm="maxima")
[Out] 1/3*a*(2*sqrt(e*x^2 + d)*e/(d^2*x) - sqrt(e*x^2 + d)/(d*x^3)) + 1/3*b*((2*e
^2*x^4 + d*e*x^2 - d^2)*log(sqrt(c^2*x^2 + 1) + 1)/(sqrt(e*x^2 + d)*d^2*x^3
) + 3*integrate(1/3*(2*c^2*e^2*x^4 + c^2*d*e*x^2 - c^2*d^2)/((c^2*d^2*x^4 +
```

```
d^2*x^2)*sqrt(c^2*x^2 + 1)*sqrt(e*x^2 + d) + (c^2*d^2*x^4 + d^2*x^2)*sqrt(
e*x^2 + d)), x) - 3*integrate(1/3*(2*c^2*e^2*x^6 + c^2*d*e*x^4 + (3*d^2*log
(c) - d^2)*c^2*x^2 + 3*d^2*log(c) + 3*(c^2*d^2*x^2 + d^2)*log(x))/((c^2*d^2
*x^6 + d^2*x^4)*sqrt(e*x^2 + d)), x))
```

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

$$\int \frac{a+b\operatorname{asinh}\left(\frac{1}{c\,x}\right)}{x^4\,\sqrt{e\,x^2+d}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a + b*asinh(1/(c*x)))/(x^4*(d + e*x^2)^(1/2)),x)
[Out] int((a + b*asinh(1/(c*x)))/(x^4*(d + e*x^2)^(1/2)), x)
```

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

$$\int \frac{a+b\operatorname{acsch}(cx)}{x^4\sqrt{d+ex^2}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*acsch(c*x))/x**4/(e*x**2+d)**(1/2),x)
[Out] Integral((a + b*acsch(c*x))/(x**4*sqrt(d + e*x**2)), x)
```

# 3.147 $\int \frac{x^5\left(a+b\mathbf{csch}^{-1}(cx)\right)}{\left(d+ex^2\right)^{3/2}}\,dx$

**Optimal**. Leaf size=256

$$-\frac{d^2\left(a+b\text{csch}^{-1}(cx)\right)}{e^3\sqrt{d+ex^2}}-\frac{2d\sqrt{d+ex^2}\left(a+b\text{csch}^{-1}(cx)\right)}{e^3}+\frac{\left(d+ex^2\right)^{3/2}\left(a+b\text{csch}^{-1}(cx)\right)}{3e^3}-\frac{8bcd^{3/2}x\tan^{-1}\left(\frac{\sqrt{d+ex^2}}{\sqrt{d}\sqrt{-c^2x}}\right.}{3e^3\sqrt{-c^2x^2}}$$

```
[Out] 1/3*(e*x^2+d)^(3/2)*(a+b*arccsch(c*x))/e^3-1/6*b*(9*c^2*d+e)*x*arctan(e^(1/
2)*(-c^2*x^2-1)^(1/2)/c/(e*x^2+d)^(1/2))/c^2/e^(5/2)/(-c^2*x^2)^(1/2)-8/3*b
*c*d^(3/2)*x*arctan((e*x^2+d)^(1/2)/d^(1/2)/(-c^2*x^2-1)^(1/2))/e^3/(-c^2*x
^2)^(1/2)-d^2*(a+b*arccsch(c*x))/e^3/(e*x^2+d)^(1/2)-2*d*(a+b*arccsch(c*x))
*(e*x^2+d)^(1/2)/e^3+1/6*b*x*(-c^2*x^2-1)^(1/2)*(e*x^2+d)^(1/2)/c/e^2/(-c^2
*x^2)^(1/2)
```

**Rubi [A]** time = 1.13, antiderivative size = 256, normalized size of antiderivative = 1.00, number of steps used = 10, number of rules used = 11, integrand size = 23, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.478, Rules used = {266, 43, 6302, 12, 1615, 157, 63, 217, 203, 93, 204}

$$-\frac{d^2\left(a+b\text{csch}^{-1}(cx)\right)}{e^3\sqrt{d+ex^2}}-\frac{2d\sqrt{d+ex^2}\left(a+b\text{csch}^{-1}(cx)\right)}{e^3}+\frac{\left(d+ex^2\right)^{3/2}\left(a+b\text{csch}^{-1}(cx)\right)}{3e^3}-\frac{8bcd^{3/2}x\tan^{-1}\left(\frac{\sqrt{d+ex^2}}{\sqrt{d}\sqrt{-c^2x}}\right.}{3e^3\sqrt{-c^2x^2}}$$

Antiderivative was successfully verified.

```
[In] Int[(x^5*(a + b*ArcCsch[c*x]))/(d + e*x^2)^(3/2),x]
```

```
[Out] (b*x*Sqrt[-1 - c^2*x^2]*Sqrt[d + e*x^2])/(6*c*e^2*Sqrt[-(c^2*x^2)]) - (d^2*
(a + b*ArcCsch[c*x]))/(e^3*Sqrt[d + e*x^2]) - (2*d*Sqrt[d + e*x^2]*(a + b*A
rcCsch[c*x]))/e^3 + ((d + e*x^2)^(3/2)*(a + b*ArcCsch[c*x]))/(3*e^3) - (b*(
9*c^2*d + e)*x*ArcTan[(Sqrt[e]*Sqrt[-1 - c^2*x^2])/(c*Sqrt[d + e*x^2])])/(6
*c^2*e^(5/2)*Sqrt[-(c^2*x^2)]) - (8*b*c*d^(3/2)*x*ArcTan[Sqrt[d + e*x^2]/(S
qrt[d]*Sqrt[-1 - c^2*x^2])])/(3*e^3*Sqrt[-(c^2*x^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 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 93

```
Int[(((a_.) + (b_.)*(x_))^(m_)*((c_.) + (d_.)*(x_))^(n_))/((e_.) + (f_.)*(x
_)), x_Symbol] :> With[{q = Denominator[m]}, Dist[q, Subst[Int[x^(q*(m + 1)
 - 1)/(b*e - a*f - (d*e - c*f)*x^q), x], x, (a + b*x)^(1/q)/(c + d*x)^(1/q)
], x]] /; FreeQ[{a, b, c, d, e, f}, x] && EqQ[m + n + 1, 0] && RationalQ[n]
 && LtQ[-1, m, 0] && SimplerQ[a + b*x, c + d*x]
```

Rule 157

```
Int[(((c_.) + (d_.)*(x_))^(n_)*((e_.) + (f_.)*(x_))^(p_)*((g_.) + (h_.)*(x_
)))/((a_.) + (b_.)*(x_)), x_Symbol] :> Dist[h/b, Int[(c + d*x)^n*(e + f*x)^
p, x], x] + Dist[(b*g - a*h)/b, Int[((c + d*x)^n*(e + f*x)^p)/(a + b*x), x]
, x] /; FreeQ[{a, b, c, d, e, f, g, h, n, p}, x]
```

Rule 203

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

Rule 204

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

Rule 217

```
Int[1/Sqrt[(a_) + (b_.)*(x_)^2], x_Symbol] :> Subst[Int[1/(1 - b*x^2), x],
x, x/Sqrt[a + b*x^2]] /; FreeQ[{a, b}, x] &&  !GtQ[a, 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 1615

```
Int[(Px_)*((a_.) + (b_.)*(x_))^(m_.)*((c_.) + (d_.)*(x_))^(n_.)*((e_.) + (f
_.)*(x_))^(p_.), x_Symbol] :> With[{q = Expon[Px, x], k = Coeff[Px, x, Expo
n[Px, x]]}, Simp[(k*(a + b*x)^(m + q - 1)*(c + d*x)^(n + 1)*(e + f*x)^(p +
1))/(d*f*b^(q - 1)*(m + n + p + q + 1)), x] + Dist[1/(d*f*b^q*(m + n + p +
q + 1)), Int[(a + b*x)^m*(c + d*x)^n*(e + f*x)^p*ExpandToSum[d*f*b^q*(m + n
 + p + q + 1)*Px - d*f*k*(m + n + p + q + 1)*(a + b*x)^q + k*(a + b*x)^(q -
 2)*(a^2*d*f*(m + n + p + q + 1) - b*(b*c*e*(m + q - 1) + a*(d*e*(n + 1) +
c*f*(p + 1))) + b*(a*d*f*(2*(m + q) + n + p) - b*(d*e*(m + q + n) + c*f*(m
+ q + p)))*x), x], x], x] /; NeQ[m + n + p + q + 1, 0]] /; FreeQ[{a, b, c,
d, e, f, m, n, p}, x] && PolyQ[Px, x] && IntegersQ[2*m, 2*n, 2*p]
```

Rule 6302

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))*((f_.)*(x_))^(m_.)*((d_.) + (e_.)*(
x_)^2)^(p_.), x_Symbol] :> With[{u = IntHide[(f*x)^m*(d + e*x^2)^p, x]}, Di
st[a + b*ArcCsch[c*x], u, x] - Dist[(b*c*x)/Sqrt[-(c^2*x^2)], Int[SimplifyI
ntegrand[u/(x*Sqrt[-1 - c^2*x^2]), x], x], x]] /; FreeQ[{a, b, c, d, e, f,
m, p}, x] && ((IGtQ[p, 0] &&  !(ILtQ[(m - 1)/2, 0] && GtQ[m + 2*p + 3, 0]))
 || (IGtQ[(m + 1)/2, 0] &&  !(ILtQ[p, 0] && GtQ[m + 2*p + 3, 0])) || (ILtQ[
(m + 2*p + 1)/2, 0] &&  !ILtQ[(m - 1)/2, 0]))
```

Rubi steps

$$\int \frac{x^5 \left(a+b\operatorname{csch}^{-1}(cx)\right)}{\left(d+ex^2\right)^{3/2}}\,dx = -\frac{d^2\left(a+b\operatorname{csch}^{-1}(cx)\right)}{e^3\sqrt{d+ex^2}} - \frac{2d\sqrt{d+ex^2}\left(a+b\operatorname{csch}^{-1}(cx)\right)}{e^3} + \frac{\left(d+ex^2\right)^{3/2}\left(a+b\operatorname{csch}\right.}{3e^3}$$

$$= -\frac{d^2\left(a+b\operatorname{csch}^{-1}(cx)\right)}{e^3\sqrt{d+ex^2}} - \frac{2d\sqrt{d+ex^2}\left(a+b\operatorname{csch}^{-1}(cx)\right)}{e^3} + \frac{\left(d+ex^2\right)^{3/2}\left(a+b\operatorname{csch}\right.}{3e^3}$$

$$= -\frac{d^2\left(a+b\operatorname{csch}^{-1}(cx)\right)}{e^3\sqrt{d+ex^2}} - \frac{2d\sqrt{d+ex^2}\left(a+b\operatorname{csch}^{-1}(cx)\right)}{e^3} + \frac{\left(d+ex^2\right)^{3/2}\left(a+b\operatorname{csch}\right.}{3e^3}$$

$$= \frac{bx\sqrt{-1-c^2x^2}\sqrt{d+ex^2}}{6ce^2\sqrt{-c^2x^2}} - \frac{d^2\left(a+b\operatorname{csch}^{-1}(cx)\right)}{e^3\sqrt{d+ex^2}} - \frac{2d\sqrt{d+ex^2}\left(a+b\operatorname{csch}^{-1}(cx)\right)}{e^3}$$

$$= \frac{bx\sqrt{-1-c^2x^2}\sqrt{d+ex^2}}{6ce^2\sqrt{-c^2x^2}} - \frac{d^2\left(a+b\operatorname{csch}^{-1}(cx)\right)}{e^3\sqrt{d+ex^2}} - \frac{2d\sqrt{d+ex^2}\left(a+b\operatorname{csch}^{-1}(cx)\right)}{e^3}$$

$$= \frac{bx\sqrt{-1-c^2x^2}\sqrt{d+ex^2}}{6ce^2\sqrt{-c^2x^2}} - \frac{d^2\left(a+b\operatorname{csch}^{-1}(cx)\right)}{e^3\sqrt{d+ex^2}} - \frac{2d\sqrt{d+ex^2}\left(a+b\operatorname{csch}^{-1}(cx)\right)}{e^3}$$

$$= \frac{bx\sqrt{-1-c^2x^2}\sqrt{d+ex^2}}{6ce^2\sqrt{-c^2x^2}} - \frac{d^2\left(a+b\operatorname{csch}^{-1}(cx)\right)}{e^3\sqrt{d+ex^2}} - \frac{2d\sqrt{d+ex^2}\left(a+b\operatorname{csch}^{-1}(cx)\right)}{e^3}$$

$$= \frac{bx\sqrt{-1-c^2x^2}\sqrt{d+ex^2}}{6ce^2\sqrt{-c^2x^2}} - \frac{d^2\left(a+b\operatorname{csch}^{-1}(cx)\right)}{e^3\sqrt{d+ex^2}} - \frac{2d\sqrt{d+ex^2}\left(a+b\operatorname{csch}^{-1}(cx)\right)}{e^3}$$

**Mathematica [A]** time = 0.64, size = 311, normalized size = 1.21

$$\frac{-2ac\left(8d^2+4dex^2-e^2x^4\right)+bex\sqrt{\frac{1}{c^2x^2}+1}\left(d+ex^2\right)-2bc\operatorname{csch}^{-1}(cx)\left(8d^2+4dex^2-e^2x^4\right)}{6ce^3\sqrt{d+ex^2}}+\frac{bx\sqrt{\frac{1}{c^2x^2}+1}\left(16c^5\right.}{}$$

Antiderivative was successfully verified.

```
[In] Integrate[(x^5*(a + b*ArcCsch[c*x]))/(d + e*x^2)^(3/2),x]

[Out] (b*e*Sqrt[1 + 1/(c^2*x^2)]*x*(d + e*x^2) - 2*a*c*(8*d^2 + 4*d*e*x^2 - e^2*x
^4) - 2*b*c*(8*d^2 + 4*d*e*x^2 - e^2*x^4)*ArcCsch[c*x])/(6*c*e^3*Sqrt[d + e
```

```
*x^2]) + (b*Sqrt[1 + 1/(c^2*x^2)]*x*(-(Sqrt[c^2]*Sqrt[c^2*d - e]*Sqrt[e]*(9
*c^2*d + e)*Sqrt[(c^2*(d + e*x^2))/(c^2*d - e)]*ArcSinh[(c*Sqrt[e]*Sqrt[1 +
 c^2*x^2])/(Sqrt[c^2]*Sqrt[c^2*d - e])]) + 16*c^5*d^(3/2)*Sqrt[-d - e*x^2]*
ArcTan[(Sqrt[d]*Sqrt[1 + c^2*x^2])/Sqrt[-d - e*x^2]]))/(6*c^4*e^3*Sqrt[1 +
c^2*x^2]*Sqrt[d + e*x^2])
```

**fricas [A]** time = 1.03, size = 1719, normalized size = 6.71

result too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^5*(a+b*arccsch(c*x))/(e*x^2+d)^(3/2),x, algorithm="fricas")
```

```
[Out] [1/24*((9*b*c^2*d^2 + b*d*e + (9*b*c^2*d*e + b*e^2)*x^2)*sqrt(e)*log(8*c^4*
e^2*x^4 + c^4*d^2 + 6*c^2*d*e + 8*(c^4*d*e + c^2*e^2)*x^2 - 4*(2*c^4*e*x^3
+ (c^4*d + c^2*e)*x)*sqrt(e*x^2 + d)*sqrt(e)*sqrt((c^2*x^2 + 1)/(c^2*x^2))
+ e^2) + 8*(b*c^3*e^2*x^4 - 4*b*c^3*d*e*x^2 - 8*b*c^3*d^2)*sqrt(e*x^2 + d)*
log((c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) + 1)/(c*x)) + 16*(b*c^3*d*e*x^2 + b*
c^3*d^2)*sqrt(d)*log(((c^4*d^2 + 6*c^2*d*e + e^2)*x^4 + 8*(c^2*d^2 + d*e)*x
^2 + 4*((c^3*d + c*e)*x^3 + 2*c*d*x)*sqrt(e*x^2 + d)*sqrt(d)*sqrt((c^2*x^2
+ 1)/(c^2*x^2)) + 8*d^2)/x^4) + 4*(2*a*c^3*e^2*x^4 - 8*a*c^3*d*e*x^2 - 16*a
*c^3*d^2 + (b*c^2*e^2*x^3 + b*c^2*d*e*x)*sqrt((c^2*x^2 + 1)/(c^2*x^2)))*sqr
t(e*x^2 + d))/(c^3*e^4*x^2 + c^3*d*e^3), 1/12*((9*b*c^2*d^2 + b*d*e + (9*b*
c^2*d*e + b*e^2)*x^2)*sqrt(-e)*arctan(1/2*(2*c^2*e*x^3 + (c^2*d + e)*x)*sqr
t(e*x^2 + d)*sqrt(-e)*sqrt((c^2*x^2 + 1)/(c^2*x^2))/(c^2*e^2*x^4 + (c^2*d*e
 + e^2)*x^2 + d*e)) + 4*(b*c^3*e^2*x^4 - 4*b*c^3*d*e*x^2 - 8*b*c^3*d^2)*sqr
t(e*x^2 + d)*log((c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) + 1)/(c*x)) + 8*(b*c^3*
d*e*x^2 + b*c^3*d^2)*sqrt(d)*log(((c^4*d^2 + 6*c^2*d*e + e^2)*x^4 + 8*(c^2*
d^2 + d*e)*x^2 + 4*((c^3*d + c*e)*x^3 + 2*c*d*x)*sqrt(e*x^2 + d)*sqrt(d)*sq
rt((c^2*x^2 + 1)/(c^2*x^2)) + 8*d^2)/x^4) + 2*(2*a*c^3*e^2*x^4 - 8*a*c^3*d*
e*x^2 - 16*a*c^3*d^2 + (b*c^2*e^2*x^3 + b*c^2*d*e*x)*sqrt((c^2*x^2 + 1)/(c^
2*x^2)))*sqrt(e*x^2 + d))/(c^3*e^4*x^2 + c^3*d*e^3), -1/24*(32*(b*c^3*d*e*x
^2 + b*c^3*d^2)*sqrt(-d)*arctan(1/2*((c^3*d + c*e)*x^3 + 2*c*d*x)*sqrt(e*x^
2 + d)*sqrt(-d)*sqrt((c^2*x^2 + 1)/(c^2*x^2))/(c^2*d*e*x^4 + (c^2*d^2 + d*e
)*x^2 + d^2)) - (9*b*c^2*d^2 + b*d*e + (9*b*c^2*d*e + b*e^2)*x^2)*sqrt(e)*l
og(8*c^4*e^2*x^4 + c^4*d^2 + 6*c^2*d*e + 8*(c^4*d*e + c^2*e^2)*x^2 - 4*(2*c
^4*e*x^3 + (c^4*d + c^2*e)*x)*sqrt(e*x^2 + d)*sqrt(e)*sqrt((c^2*x^2 + 1)/(c
^2*x^2)) + e^2) - 8*(b*c^3*e^2*x^4 - 4*b*c^3*d*e*x^2 - 8*b*c^3*d^2)*sqrt(e*
x^2 + d)*log((c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) + 1)/(c*x)) - 4*(2*a*c^3*e^
2*x^4 - 8*a*c^3*d*e*x^2 - 16*a*c^3*d^2 + (b*c^2*e^2*x^3 + b*c^2*d*e*x)*sqrt
((c^2*x^2 + 1)/(c^2*x^2)))*sqrt(e*x^2 + d))/(c^3*e^4*x^2 + c^3*d*e^3), -1/1
2*(16*(b*c^3*d*e*x^2 + b*c^3*d^2)*sqrt(-d)*arctan(1/2*((c^3*d + c*e)*x^3 +
2*c*d*x)*sqrt(e*x^2 + d)*sqrt(-d)*sqrt((c^2*x^2 + 1)/(c^2*x^2))/(c^2*d*e*x^
4 + (c^2*d^2 + d*e)*x^2 + d^2)) - (9*b*c^2*d^2 + b*d*e + (9*b*c^2*d*e + b*e
^2)*x^2)*sqrt(-e)*arctan(1/2*(2*c^2*e*x^3 + (c^2*d + e)*x)*sqrt(e*x^2 + d)*
```

```
sqrt(-e)*sqrt((c^2*x^2 + 1)/(c^2*x^2))/(c^2*e^2*x^4 + (c^2*d*e + e^2)*x^2 +
 d*e)) - 4*(b*c^3*e^2*x^4 - 4*b*c^3*d*e*x^2 - 8*b*c^3*d^2)*sqrt(e*x^2 + d)*
log((c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) + 1)/(c*x)) - 2*(2*a*c^3*e^2*x^4 - 8
*a*c^3*d*e*x^2 - 16*a*c^3*d^2 + (b*c^2*e^2*x^3 + b*c^2*d*e*x)*sqrt((c^2*x^2
 + 1)/(c^2*x^2)))*sqrt(e*x^2 + d))/(c^3*e^4*x^2 + c^3*d*e^3)]
```

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

$$\int \frac{(b \operatorname{arcsch}(cx) + a)x^5}{\left(ex^2 + d\right)^{\frac{3}{2}}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^5*(a+b*arccsch(c*x))/(e*x^2+d)^(3/2),x, algorithm="giac")
```

```
[Out] integrate((b*arccsch(c*x) + a)*x^5/(e*x^2 + d)^(3/2), x)
```

**maple [F]** time = 0.47, size = 0, normalized size = 0.00

$$\int \frac{x^5 \left(a + b \operatorname{arccsch}(cx)\right)}{\left(e\,x^2 + d\right)^{\frac{3}{2}}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^5*(a+b*arccsch(c*x))/(e*x^2+d)^(3/2),x)
```

```
[Out] int(x^5*(a+b*arccsch(c*x))/(e*x^2+d)^(3/2),x)
```

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

$$\frac{1}{3}\left(\frac{x^4}{\sqrt{ex^2+d}\,e} - \frac{4\,dx^2}{\sqrt{ex^2+d}\,e^2} - \frac{8\,d^2}{\sqrt{ex^2+d}\,e^3}\right)a+\frac{1}{3}\,b\left(\frac{\left(e^2x^4 - 4\,dex^2 - 8\,d^2\right)\log\left(\sqrt{c^2x^2+1}\,+1\right)}{\sqrt{ex^2+d}\,e^3} + 3\int \frac{}{3\left(\left(c^2e^3x\right.\right.}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^5*(a+b*arccsch(c*x))/(e*x^2+d)^(3/2),x, algorithm="maxima")
```

```
[Out] 1/3*(x^4/(sqrt(e*x^2 + d)*e) - 4*d*x^2/(sqrt(e*x^2 + d)*e^2) - 8*d^2/(sqrt(
e*x^2 + d)*e^3))*a + 1/3*b*((e^2*x^4 - 4*d*e*x^2 - 8*d^2)*log(sqrt(c^2*x^2
+ 1) + 1)/(sqrt(e*x^2 + d)*e^3) + 3*integrate(1/3*(c^2*e^2*x^5 - 4*c^2*d*e*
x^3 - 8*c^2*d^2*x)/((c^2*e^3*x^2 + e^3)*sqrt(c^2*x^2 + 1)*sqrt(e*x^2 + d) +
 (c^2*e^3*x^2 + e^3)*sqrt(e*x^2 + d)), x) - 3*integrate(1/3*((3*e^3*log(c)
+ e^3)*c^2*x^7 - 12*c^2*d^2*e*x^3 - 8*c^2*d^3*x - 3*(c^2*d*e^2 - e^3*log(c)
```

```
)*x^5 + 3*(c^2*e^3*x^7 + e^3*x^5)*log(x))/((c^2*e^4*x^4 + d*e^3 + (c^2*d*e^
3 + e^4)*x^2)*sqrt(e*x^2 + d)), x))
```

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

$$\int \frac{x^5 \left(a + b \operatorname{asinh}\left(\frac{1}{c\,x}\right)\right)}{\left(e\,x^2 + d\right)^{3/2}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((x^5*(a + b*asinh(1/(c*x))))/(d + e*x^2)^(3/2),x)
[Out] int((x^5*(a + b*asinh(1/(c*x))))/(d + e*x^2)^(3/2), 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**5*(a+b*acsch(c*x))/(e*x**2+d)**(3/2),x)
[Out] Timed out
```

## 3.148 $\int \frac{x^3\left(a+b\,\mathrm{csch}^{-1}(cx)\right)}{\left(d+ex^2\right)^{3/2}}\,dx$

**Optimal**. Leaf size=160

$$\frac{\sqrt{d+ex^2}\left(a+b\,\mathrm{csch}^{-1}(cx)\right)}{e^2}+\frac{d\left(a+b\,\mathrm{csch}^{-1}(cx)\right)}{e^2\sqrt{d+ex^2}}+\frac{bx\tan^{-1}\left(\frac{\sqrt{e}\sqrt{-c^2x^2-1}}{c\sqrt{d+ex^2}}\right)}{e^{3/2}\sqrt{-c^2x^2}}+\frac{2bc\sqrt{d}\,x\tan^{-1}\left(\frac{\sqrt{d+ex^2}}{\sqrt{d}\sqrt{-c^2x^2-1}}\right)}{e^2\sqrt{-c^2x^2}}$$

```
[Out] b*x*arctan(e^(1/2)*(-c^2*x^2-1)^(1/2)/c/(e*x^2+d)^(1/2))/e^(3/2)/(-c^2*x^2)
^(1/2)+2*b*c*x*arctan((e*x^2+d)^(1/2)/d^(1/2)/(-c^2*x^2-1)^(1/2))*d^(1/2)/e
^2/(-c^2*x^2)^(1/2)+d*(a+b*arccsch(c*x))/e^2/(e*x^2+d)^(1/2)+(a+b*arccsch(c
*x))*(e*x^2+d)^(1/2)/e^2
```

**Rubi [A]** time = 0.28, antiderivative size = 160, normalized size of antiderivative = 1.00, number of steps used = 9, number of rules used = 11, integrand size = 23, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.478, Rules used = {266, 43, 6302, 12, 573, 157, 63, 217, 203, 93, 204}

$$\frac{\sqrt{d+ex^2}\left(a+b\,\mathrm{csch}^{-1}(cx)\right)}{e^2}+\frac{d\left(a+b\,\mathrm{csch}^{-1}(cx)\right)}{e^2\sqrt{d+ex^2}}+\frac{bx\tan^{-1}\left(\frac{\sqrt{e}\sqrt{-c^2x^2-1}}{c\sqrt{d+ex^2}}\right)}{e^{3/2}\sqrt{-c^2x^2}}+\frac{2bc\sqrt{d}\,x\tan^{-1}\left(\frac{\sqrt{d+ex^2}}{\sqrt{d}\sqrt{-c^2x^2-1}}\right)}{e^2\sqrt{-c^2x^2}}$$

Antiderivative was successfully verified.

```
[In] Int[(x^3*(a + b*ArcCsch[c*x]))/(d + e*x^2)^(3/2),x]
```

```
[Out] (d*(a + b*ArcCsch[c*x]))/(e^2*Sqrt[d + e*x^2]) + (Sqrt[d + e*x^2]*(a + b*Ar
cCsch[c*x]))/e^2 + (b*x*ArcTan[(Sqrt[e]*Sqrt[-1 - c^2*x^2])/(c*Sqrt[d + e*x
^2])])/(e^(3/2)*Sqrt[-(c^2*x^2)]) + (2*b*c*Sqrt[d]*x*ArcTan[Sqrt[d + e*x^2]
/(Sqrt[d]*Sqrt[-1 - c^2*x^2])])/(e^2*Sqrt[-(c^2*x^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 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 93

```
Int[(((a_.) + (b_.)*(x_))^(m_)*((c_.) + (d_.)*(x_))^(n_))/((e_.) + (f_.)*(x
_)), x_Symbol] :> With[{q = Denominator[m]}, Dist[q, Subst[Int[x^(q*(m + 1)
 - 1)/(b*e - a*f - (d*e - c*f)*x^q), x], x, (a + b*x)^(1/q)/(c + d*x)^(1/q)
], x]] /; FreeQ[{a, b, c, d, e, f}, x] && EqQ[m + n + 1, 0] && RationalQ[n]
 && LtQ[-1, m, 0] && SimplerQ[a + b*x, c + d*x]
```

Rule 157

```
Int[(((c_.) + (d_.)*(x_))^(n_)*((e_.) + (f_.)*(x_))^(p_)*((g_.) + (h_.)*(x_
)))/((a_.) + (b_.)*(x_)), x_Symbol] :> Dist[h/b, Int[(c + d*x)^n*(e + f*x)^
p, x], x] + Dist[(b*g - a*h)/b, Int[((c + d*x)^n*(e + f*x)^p)/(a + b*x), x]
, x] /; FreeQ[{a, b, c, d, e, f, g, h, n, p}, x]
```

Rule 203

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

Rule 204

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

Rule 217

```
Int[1/Sqrt[(a_) + (b_.)*(x_)^2], x_Symbol] :> Subst[Int[1/(1 - b*x^2), x],
x, x/Sqrt[a + b*x^2]] /; FreeQ[{a, b}, x] &&  !GtQ[a, 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 573

```
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[x^(Simpl
ify[(m + 1)/n] - 1)*(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] && IntegerQ[Simplify[(m + 1)/n
]]
```

Rule 6302

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))*((f_.)*(x_))^(m_.)*((d_.) + (e_.)*(
x_)^2)^(p_.), x_Symbol] :> With[{u = IntHide[(f*x)^m*(d + e*x^2)^p, x]}, Di
st[a + b*ArcCsch[c*x], u, x] - Dist[(b*c*x)/Sqrt[-(c^2*x^2)], Int[SimplifyI
ntegrand[u/(x*Sqrt[-1 - c^2*x^2]), x], x], x]] /; FreeQ[{a, b, c, d, e, f,
m, p}, x] && ((IGtQ[p, 0] &&  !(ILtQ[(m - 1)/2, 0] && GtQ[m + 2*p + 3, 0]))
 || (IGtQ[(m + 1)/2, 0] &&  !(ILtQ[p, 0] && GtQ[m + 2*p + 3, 0])) || (ILtQ[
(m + 2*p + 1)/2, 0] &&  !ILtQ[(m - 1)/2, 0]))
```

Rubi steps

$$\int \frac{x^3\left(a+b\operatorname{csch}^{-1}(cx)\right)}{\left(d+ex^2\right)^{3/2}}\,dx = \frac{d\left(a+b\operatorname{csch}^{-1}(cx)\right)}{e^2\sqrt{d+ex^2}} + \frac{\sqrt{d+ex^2}\left(a+b\operatorname{csch}^{-1}(cx)\right)}{e^2} - \frac{(bcx)\int \frac{2d+ex^2}{e^2x\sqrt{-1-c^2x^2}\sqrt{d+ex^2}}\,dx}{\sqrt{-c^2x^2}}$$

$$= \frac{d\left(a+b\operatorname{csch}^{-1}(cx)\right)}{e^2\sqrt{d+ex^2}} + \frac{\sqrt{d+ex^2}\left(a+b\operatorname{csch}^{-1}(cx)\right)}{e^2} - \frac{(bcx)\int \frac{2d+ex^2}{x\sqrt{-1-c^2x^2}\sqrt{d+ex^2}}\,dx}{e^2\sqrt{-c^2x^2}}$$

$$= \frac{d\left(a+b\operatorname{csch}^{-1}(cx)\right)}{e^2\sqrt{d+ex^2}} + \frac{\sqrt{d+ex^2}\left(a+b\operatorname{csch}^{-1}(cx)\right)}{e^2} - \frac{(bcx)\operatorname{Subst}\left(\int \frac{2d+ex}{x\sqrt{-1-c^2x}\sqrt{d+ex}}\right.}{2e^2\sqrt{-c^2x^2}}$$

$$= \frac{d\left(a+b\operatorname{csch}^{-1}(cx)\right)}{e^2\sqrt{d+ex^2}} + \frac{\sqrt{d+ex^2}\left(a+b\operatorname{csch}^{-1}(cx)\right)}{e^2} - \frac{(bcdx)\operatorname{Subst}\left(\int \frac{1}{x\sqrt{-1-c^2x}\sqrt{d+e}}\right.}{e^2\sqrt{-c^2x^2}}$$

$$= \frac{d\left(a+b\operatorname{csch}^{-1}(cx)\right)}{e^2\sqrt{d+ex^2}} + \frac{\sqrt{d+ex^2}\left(a+b\operatorname{csch}^{-1}(cx)\right)}{e^2} - \frac{(2bcdx)\operatorname{Subst}\left(\int \frac{1}{-d-x^2}\,dx, x,\right.}{e^2\sqrt{-c^2x^2}}$$

$$= \frac{d\left(a+b\operatorname{csch}^{-1}(cx)\right)}{e^2\sqrt{d+ex^2}} + \frac{\sqrt{d+ex^2}\left(a+b\operatorname{csch}^{-1}(cx)\right)}{e^2} + \frac{2bc\sqrt{d}\,x\tan^{-1}\left(\frac{\sqrt{d+ex^2}}{\sqrt{d}\sqrt{-1-c^2x^2}}\right)}{e^2\sqrt{-c^2x^2}}$$

$$= \frac{d\left(a+b\operatorname{csch}^{-1}(cx)\right)}{e^2\sqrt{d+ex^2}} + \frac{\sqrt{d+ex^2}\left(a+b\operatorname{csch}^{-1}(cx)\right)}{e^2} + \frac{bx\tan^{-1}\left(\frac{\sqrt{e}\sqrt{-1-c^2x^2}}{c\sqrt{d+ex^2}}\right)}{e^{3/2}\sqrt{-c^2x^2}} + \frac{2bc}{}$$

**Mathematica [A]** time = 0.37, size = 233, normalized size = 1.46

$$\frac{\left(2d+ex^2\right)\left(a+b\operatorname{csch}^{-1}(cx)\right)}{e^2\sqrt{d+ex^2}} - \frac{bx\sqrt{\frac{1}{c^2x^2}+1}\left(2c^3\sqrt{d}\sqrt{-d-ex^2}\tan^{-1}\left(\frac{\sqrt{d}\sqrt{c^2x^2+1}}{\sqrt{-d-ex^2}}\right) - \sqrt{c^2}\sqrt{e}\sqrt{c^2d-e}\sqrt{\frac{c^2\left(d+ex^2\right)}{c^2d-e}}\right.}{c^2e^2\sqrt{c^2x^2+1}\sqrt{d+ex^2}}$$

Antiderivative was successfully verified.

```
[In] Integrate[(x^3*(a + b*ArcCsch[c*x]))/(d + e*x^2)^(3/2),x]
```

```
[Out] ((2*d + e*x^2)*(a + b*ArcCsch[c*x]))/(e^2*Sqrt[d + e*x^2]) - (b*Sqrt[1 + 1/
(c^2*x^2)]*x*(-(Sqrt[c^2]*Sqrt[c^2*d - e]*Sqrt[e]*Sqrt[(c^2*(d + e*x^2))/(c
^2*d - e)]*ArcSinh[(c*Sqrt[e]*Sqrt[1 + c^2*x^2])/(Sqrt[c^2]*Sqrt[c^2*d - e]
)]) + 2*c^3*Sqrt[d]*Sqrt[-d - e*x^2]*ArcTan[(Sqrt[d]*Sqrt[1 + c^2*x^2])/Sqr
t[-d - e*x^2]]))/(c^2*e^2*Sqrt[1 + c^2*x^2]*Sqrt[d + e*x^2])
```

**fricas [B]** time = 0.84, size = 1274, normalized size = 7.96

result too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^3*(a+b*arccsch(c*x))/(e*x^2+d)^(3/2),x, algorithm="fricas")
```

```
[Out] [1/4*((b*e*x^2 + b*d)*sqrt(e)*log(8*c^4*e^2*x^4 + c^4*d^2 + 6*c^2*d*e + 8*(
c^4*d*e + c^2*e^2)*x^2 + 4*(2*c^4*e*x^3 + (c^4*d + c^2*e)*x)*sqrt(e*x^2 + d
)*sqrt(e)*sqrt((c^2*x^2 + 1)/(c^2*x^2)) + e^2) + 4*(b*c*e*x^2 + 2*b*c*d)*sq
rt(e*x^2 + d)*log((c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) + 1)/(c*x)) + 2*(b*c*e
*x^2 + b*c*d)*sqrt(d)*log(((c^4*d^2 + 6*c^2*d*e + e^2)*x^4 + 8*(c^2*d^2 + d
*e)*x^2 - 4*((c^3*d + c*e)*x^3 + 2*c*d*x)*sqrt(e*x^2 + d)*sqrt(d)*sqrt((c^2
*x^2 + 1)/(c^2*x^2)) + 8*d^2)/x^4) + 4*(a*c*e*x^2 + 2*a*c*d)*sqrt(e*x^2 + d
))/(c*e^3*x^2 + c*d*e^2), -1/2*((b*e*x^2 + b*d)*sqrt(-e)*arctan(1/2*(2*c^2*
e*x^3 + (c^2*d + e)*x)*sqrt(e*x^2 + d)*sqrt(-e)*sqrt((c^2*x^2 + 1)/(c^2*x^2
))/(c^2*e^2*x^4 + (c^2*d*e + e^2)*x^2 + d*e)) - 2*(b*c*e*x^2 + 2*b*c*d)*sqr
t(e*x^2 + d)*log((c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) + 1)/(c*x)) - (b*c*e*x^
2 + b*c*d)*sqrt(d)*log(((c^4*d^2 + 6*c^2*d*e + e^2)*x^4 + 8*(c^2*d^2 + d*e)
*x^2 - 4*((c^3*d + c*e)*x^3 + 2*c*d*x)*sqrt(e*x^2 + d)*sqrt(d)*sqrt((c^2*x^
2 + 1)/(c^2*x^2)) + 8*d^2)/x^4) - 2*(a*c*e*x^2 + 2*a*c*d)*sqrt(e*x^2 + d))/
(c*e^3*x^2 + c*d*e^2), 1/4*(4*(b*c*e*x^2 + b*c*d)*sqrt(-d)*arctan(1/2*((c^3
*d + c*e)*x^3 + 2*c*d*x)*sqrt(e*x^2 + d)*sqrt(-d)*sqrt((c^2*x^2 + 1)/(c^2*x
^2))/(c^2*d*e*x^4 + (c^2*d^2 + d*e)*x^2 + d^2)) + (b*e*x^2 + b*d)*sqrt(e)*l
og(8*c^4*e^2*x^4 + c^4*d^2 + 6*c^2*d*e + 8*(c^4*d*e + c^2*e^2)*x^2 + 4*(2*c
^4*e*x^3 + (c^4*d + c^2*e)*x)*sqrt(e*x^2 + d)*sqrt(e)*sqrt((c^2*x^2 + 1)/(c
^2*x^2)) + e^2) + 4*(b*c*e*x^2 + 2*b*c*d)*sqrt(e*x^2 + d)*log((c*x*sqrt((c^
2*x^2 + 1)/(c^2*x^2)) + 1)/(c*x)) + 4*(a*c*e*x^2 + 2*a*c*d)*sqrt(e*x^2 + d)
)/(c*e^3*x^2 + c*d*e^2), 1/2*(2*(b*c*e*x^2 + b*c*d)*sqrt(-d)*arctan(1/2*((c
^3*d + c*e)*x^3 + 2*c*d*x)*sqrt(e*x^2 + d)*sqrt(-d)*sqrt((c^2*x^2 + 1)/(c^2
*x^2))/(c^2*d*e*x^4 + (c^2*d^2 + d*e)*x^2 + d^2)) - (b*e*x^2 + b*d)*sqrt(-e
)*arctan(1/2*(2*c^2*e*x^3 + (c^2*d + e)*x)*sqrt(e*x^2 + d)*sqrt(-e)*sqrt((c
^2*x^2 + 1)/(c^2*x^2))/(c^2*e^2*x^4 + (c^2*d*e + e^2)*x^2 + d*e)) + 2*(b*c*
e*x^2 + 2*b*c*d)*sqrt(e*x^2 + d)*log((c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) + 1
)/(c*x)) + 2*(a*c*e*x^2 + 2*a*c*d)*sqrt(e*x^2 + d))/(c*e^3*x^2 + c*d*e^2)]
```

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

$$\int \frac{(b\,\mathrm{arcsch}\,(cx) + a)x^3}{\left(ex^2 + d\right)^{\frac{3}{2}}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^3*(a+b*arccsch(c*x))/(e*x^2+d)^(3/2),x, algorithm="giac")
```

```
[Out] integrate((b*arccsch(c*x) + a)*x^3/(e*x^2 + d)^(3/2), x)
```

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

$$\int \frac{x^3 (a + b \operatorname{arccsch}(cx))}{\left(e x^2 + d\right)^{\frac{3}{2}}} dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^3*(a+b*arccsch(c*x))/(e*x^2+d)^(3/2),x)
[Out] int(x^3*(a+b*arccsch(c*x))/(e*x^2+d)^(3/2),x)
```

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

$$a\left(\frac{x^2}{\sqrt{ex^2+d}\,e} + \frac{2\,d}{\sqrt{ex^2+d}\,e^2}\right)+b\left(\frac{\left(ex^2+2\,d\right)\log\left(\sqrt{c^2x^2+1}+1\right)}{\sqrt{ex^2+d}\,e^2} + \int \frac{c^2ex^3+2\,c^2dx}{\left(c^2e^2x^2+e^2\right)\sqrt{c^2x^2+1}\,\sqrt{ex^2+d} + \left(c^2e^2x\right.}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^3*(a+b*arccsch(c*x))/(e*x^2+d)^(3/2),x, algorithm="maxima")
[Out] a*(x^2/(sqrt(e*x^2 + d)*e) + 2*d/(sqrt(e*x^2 + d)*e^2)) + b*((e*x^2 + 2*d)*
log(sqrt(c^2*x^2 + 1) + 1)/(sqrt(e*x^2 + d)*e^2) + integrate((c^2*e*x^3 + 2
*c^2*d*x)/((c^2*e^2*x^2 + e^2)*sqrt(c^2*x^2 + 1)*sqrt(e*x^2 + d) + (c^2*e^2
*x^2 + e^2)*sqrt(e*x^2 + d)), x) - integrate(((e^2*log(c) + e^2)*c^2*x^5 +
2*c^2*d^2*x + (3*c^2*d*e + e^2*log(c))*x^3 + (c^2*e^2*x^5 + e^2*x^3)*log(x)
)/((c^2*e^3*x^4 + d*e^2 + (c^2*d*e^2 + e^3)*x^2)*sqrt(e*x^2 + d)), x))
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.01

$$\int \frac{x^3 \left(a + b \operatorname{asinh}\left(\frac{1}{c\,x}\right)\right)}{\left(e\,x^2 + d\right)^{3/2}} dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((x^3*(a + b*asinh(1/(c*x))))/(d + e*x^2)^(3/2),x)
[Out] int((x^3*(a + b*asinh(1/(c*x))))/(d + e*x^2)^(3/2), 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**3*(a+b*acsch(c*x))/(e*x**2+d)**(3/2),x)
```

```
[Out] Timed out
```

# 3.149 $\int \frac{x\left(a+b\text{csch}^{-1}(cx)\right)}{\left(d+ex^2\right)^{3/2}}\,dx$

**Optimal**. Leaf size=82

$$-\frac{a+b\text{csch}^{-1}(cx)}{e\sqrt{d+ex^2}}-\frac{bcx\tan^{-1}\left(\frac{\sqrt{d+ex^2}}{\sqrt{d}\sqrt{-c^2x^2-1}}\right)}{\sqrt{d}\,e\sqrt{-c^2x^2}}$$

```
[Out] -b*c*x*arctan((e*x^2+d)^(1/2)/d^(1/2)/(-c^2*x^2-1)^(1/2))/e/d^(1/2)/(-c^2*x
^2)^(1/2)+(-a-b*arccsch(c*x))/e/(e*x^2+d)^(1/2)
```

**Rubi [A]** time = 0.11, antiderivative size = 82, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 4, integrand size = 21, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.190, Rules used = {6300, 446, 93, 204}

$$-\frac{a+b\text{csch}^{-1}(cx)}{e\sqrt{d+ex^2}}-\frac{bcx\tan^{-1}\left(\frac{\sqrt{d+ex^2}}{\sqrt{d}\sqrt{-c^2x^2-1}}\right)}{\sqrt{d}\,e\sqrt{-c^2x^2}}$$

Antiderivative was successfully verified.

```
[In] Int[(x*(a + b*ArcCsch[c*x]))/(d + e*x^2)^(3/2),x]
```

```
[Out] -((a + b*ArcCsch[c*x])/(e*Sqrt[d + e*x^2])) - (b*c*x*ArcTan[Sqrt[d + e*x^2]
/(Sqrt[d]*Sqrt[-1 - c^2*x^2])])/(Sqrt[d]*e*Sqrt[-(c^2*x^2)])
```

Rule 93

```
Int[(((a_.) + (b_.)*(x_))^(m_)*((c_.) + (d_.)*(x_))^(n_))/((e_.) + (f_.)*(x
_)), x_Symbol] :> With[{q = Denominator[m]}, Dist[q, Subst[Int[x^(q*(m + 1)
 - 1)/(b*e - a*f - (d*e - c*f)*x^q), x], x, (a + b*x)^(1/q)/(c + d*x)^(1/q)
], x]] /; FreeQ[{a, b, c, d, e, f}, x] && EqQ[m + n + 1, 0] && RationalQ[n]
 && LtQ[-1, m, 0] && SimplerQ[a + b*x, c + d*x]
```

Rule 204

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

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 6300

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))*(x_)*((d_.) + (e_.)*(x_)^2)^(p_.),
x_Symbol] :> Simp[((d + e*x^2)^(p + 1)*(a + b*ArcCsch[c*x]))/(2*e*(p + 1)),
 x] - Dist[(b*c*x)/(2*e*(p + 1)*Sqrt[-(c^2*x^2)]), Int[(d + e*x^2)^(p + 1)/
(x*Sqrt[-1 - c^2*x^2]), x], x] /; FreeQ[{a, b, c, d, e, p}, x] && NeQ[p, -1
]
```

Rubi steps

$$\begin{aligned}
\int \frac{x\left(a+b\operatorname{csch}^{-1}(cx)\right)}{\left(d+ex^2\right)^{3/2}}\,dx &= -\frac{a+b\operatorname{csch}^{-1}(cx)}{e\sqrt{d+ex^2}}+\frac{(bcx)\int \frac{1}{x\sqrt{-1-c^2x^2}\,\sqrt{d+ex^2}}\,dx}{e\sqrt{-c^2x^2}}\\
&= -\frac{a+b\operatorname{csch}^{-1}(cx)}{e\sqrt{d+ex^2}}+\frac{(bcx)\operatorname{Subst}\left(\int \frac{1}{x\sqrt{-1-c^2x}\,\sqrt{d+ex}}\,dx,x,x^2\right)}{2e\sqrt{-c^2x^2}}\\
&= -\frac{a+b\operatorname{csch}^{-1}(cx)}{e\sqrt{d+ex^2}}+\frac{(bcx)\operatorname{Subst}\left(\int \frac{1}{-d-x^2}\,dx,x,\frac{\sqrt{d+ex^2}}{\sqrt{-1-c^2x^2}}\right)}{e\sqrt{-c^2x^2}}\\
&= -\frac{a+b\operatorname{csch}^{-1}(cx)}{e\sqrt{d+ex^2}}-\frac{bcx\tan^{-1}\left(\frac{\sqrt{d+ex^2}}{\sqrt{d}\,\sqrt{-1-c^2x^2}}\right)}{\sqrt{d}\,e\sqrt{-c^2x^2}}
\end{aligned}$$

**Mathematica [A]** time = 0.16, size = 122, normalized size = 1.49

$$\frac{bcx\sqrt{\frac{1}{c^2x^2}+1}\,\sqrt{-d-ex^2}\,\tan^{-1}\left(\frac{\sqrt{d}\,\sqrt{c^2x^2+1}}{\sqrt{-d-ex^2}}\right)}{\sqrt{d}\,e\sqrt{c^2x^2+1}\,\sqrt{d+ex^2}}-\frac{a+b\operatorname{csch}^{-1}(cx)}{e\sqrt{d+ex^2}}$$

Antiderivative was successfully verified.

```
[In] Integrate[(x*(a + b*ArcCsch[c*x]))/(d + e*x^2)^(3/2),x]
```

```
[Out] -((a + b*ArcCsch[c*x])/(e*Sqrt[d + e*x^2])) + (b*c*Sqrt[1 + 1/(c^2*x^2)]*x*
Sqrt[-d - e*x^2]*ArcTan[(Sqrt[d]*Sqrt[1 + c^2*x^2])/Sqrt[-d - e*x^2]])/(Sqr
t[d]*e*Sqrt[1 + c^2*x^2]*Sqrt[d + e*x^2])
```

**fricas [B]** time = 0.69, size = 368, normalized size = 4.49

$$\left[-\frac{4\sqrt{ex^2+d}\,bd\log\left(\frac{cx\sqrt{\frac{c^2x^2+1}{c^2x^2}}+1}{cx}\right)+4\sqrt{ex^2+d}\,ad-\left(bex^2+bd\right)\sqrt{d}\,\log\left(\frac{\left(c^4d^2+6\,c^2de+e^2\right)x^4+8\left(c^2d^2+de\right)x^2+4\left(\left(c^3d+ce\right)x^3\cdots\right.}{x^4}\right.}{4\left(de^2x^2+d^2e\right)}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*(a+b*arccsch(c*x))/(e*x^2+d)^(3/2),x, algorithm="fricas")
```

```
[Out] [-1/4*(4*sqrt(e*x^2 + d)*b*d*log((c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) + 1)/(c
*x)) + 4*sqrt(e*x^2 + d)*a*d - (b*e*x^2 + b*d)*sqrt(d)*log(((c^4*d^2 + 6*c^
2*d*e + e^2)*x^4 + 8*(c^2*d^2 + d*e)*x^2 + 4*((c^3*d + c*e)*x^3 + 2*c*d*x)*
sqrt(e*x^2 + d)*sqrt(d)*sqrt((c^2*x^2 + 1)/(c^2*x^2)) + 8*d^2)/x^4))/(d*e^2
*x^2 + d^2*e), -1/2*(2*sqrt(e*x^2 + d)*b*d*log((c*x*sqrt((c^2*x^2 + 1)/(c^2
*x^2)) + 1)/(c*x)) + 2*sqrt(e*x^2 + d)*a*d + (b*e*x^2 + b*d)*sqrt(-d)*arcta
n(1/2*((c^3*d + c*e)*x^3 + 2*c*d*x)*sqrt(e*x^2 + d)*sqrt(-d)*sqrt((c^2*x^2
+ 1)/(c^2*x^2))/(c^2*d*e*x^4 + (c^2*d^2 + d*e)*x^2 + d^2)))/(d*e^2*x^2 + d^
2*e)]
```

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

$$\int \frac{\left(b\,\mathrm{arcsch}\left(cx\right)+a\right)x}{\left(ex^2+d\right)^{\frac{3}{2}}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*(a+b*arccsch(c*x))/(e*x^2+d)^(3/2),x, algorithm="giac")
```

```
[Out] integrate((b*arccsch(c*x) + a)*x/(e*x^2 + d)^(3/2), x)
```

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

$$\int \frac{x\left(a+b\,\mathrm{arccsch}\left(cx\right)\right)}{\left(e\,x^2+d\right)^{\frac{3}{2}}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x*(a+b*arccsch(c*x))/(e*x^2+d)^(3/2),x)
```

```
[Out] int(x*(a+b*arccsch(c*x))/(e*x^2+d)^(3/2),x)
```

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

$$-\left(c^2 \int \frac{x}{\left(c^2ex^2+e\right)\sqrt{c^2x^2+1}\,\sqrt{ex^2+d}+\left(c^2ex^2+e\right)\sqrt{ex^2+d}}\,dx+\frac{\log\left(\sqrt{c^2x^2+1}+1\right)}{\sqrt{ex^2+d}\,e}+\int \frac{\left(e\log(c)-e\right)c^2x}{\left(c^2e^2x\right.}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*(a+b*arccsch(c*x))/(e*x^2+d)^(3/2),x, algorithm="maxima")
```

```
[Out] -(c^2*integrate(x/((c^2*e*x^2 + e)*sqrt(c^2*x^2 + 1)*sqrt(e*x^2 + d) + (c^2
*e*x^2 + e)*sqrt(e*x^2 + d)), x) + log(sqrt(c^2*x^2 + 1) + 1)/(sqrt(e*x^2 +
 d)*e) + integrate(((e*log(c) - e)*c^2*x^3 - (c^2*d - e*log(c))*x + (c^2*e*
x^3 + e*x)*log(x))/((c^2*e^2*x^4 + (c^2*d*e + e^2)*x^2 + d*e)*sqrt(e*x^2 +
d)), x))*b - a/(sqrt(e*x^2 + d)*e)
```

**mupad** [F] time = 0.00, size = -1, normalized size = -0.01

$$\int \frac{x\,\left(a+b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)\right)}{{\left(e\,x^2+d\right)}^{3/2}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((x*(a + b*asinh(1/(c*x))))/(d + e*x^2)^(3/2),x)
```

```
[Out] int((x*(a + b*asinh(1/(c*x))))/(d + e*x^2)^(3/2), x)
```

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

$$\int \frac{x\left(a+b\operatorname{acsch}\left(cx\right)\right)}{\left(d+ex^2\right)^{\frac{3}{2}}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*(a+b*acsch(c*x))/(e*x**2+d)**(3/2),x)
```

```
[Out] Integral(x*(a + b*acsch(c*x))/(d + e*x**2)**(3/2), x)
```

# 3.150 $\int \frac{a+b\text{csch}^{-1}(cx)}{x(d+ex^2)^{3/2}}\,dx$

**Optimal**. Leaf size=26

$$\text{Int}\left(\frac{a+b\text{csch}^{-1}(cx)}{x\left(d+ex^2\right)^{3/2}},x\right)$$

```
[Out] Unintegrable((a+b*arccsch(c*x))/x/(e*x^2+d)^(3/2),x)
```

**Rubi** [A] time = 0.12, 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 = {}

$$\int \frac{a+b\text{csch}^{-1}(cx)}{x\left(d+ex^2\right)^{3/2}}\,dx$$

Verification is Not applicable to the result.

```
[In] Int[(a + b*ArcCsch[c*x])/(x*(d + e*x^2)^(3/2)),x]
```

```
[Out] Defer[Int][(a + b*ArcCsch[c*x])/(x*(d + e*x^2)^(3/2)), x]
```

Rubi steps

$$\int \frac{a+b\text{csch}^{-1}(cx)}{x\left(d+ex^2\right)^{3/2}}\,dx=\int \frac{a+b\text{csch}^{-1}(cx)}{x\left(d+ex^2\right)^{3/2}}\,dx$$

**Mathematica** [A] time = 32.96, size = 0, normalized size = 0.00

$$\int \frac{a+b\text{csch}^{-1}(cx)}{x\left(d+ex^2\right)^{3/2}}\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[(a + b*ArcCsch[c*x])/(x*(d + e*x^2)^(3/2)),x]
```

```
[Out] Integrate[(a + b*ArcCsch[c*x])/(x*(d + e*x^2)^(3/2)), x]
```

**fricas** [A] time = 0.68, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{\sqrt{ex^2+d}\,(b\,\text{arcsch}\,(cx)+a)}{e^2x^5+2\,dex^3+d^2x},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))/x/(e*x^2+d)^(3/2),x, algorithm="fricas")
```

```
[Out] integral(sqrt(e*x^2 + d)*(b*arccsch(c*x) + a)/(e^2*x^5 + 2*d*e*x^3 + d^2*x)
, x)
```

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

$$\int \frac{b\operatorname{arcsch}(cx)+a}{(ex^2+d)^{\frac{3}{2}}x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))/x/(e*x^2+d)^(3/2),x, algorithm="giac")
```

```
[Out] integrate((b*arccsch(c*x) + a)/((e*x^2 + d)^(3/2)*x), x)
```

**maple [A]** time = 0.44, size = 0, normalized size = 0.00

$$\int \frac{a+b\operatorname{arccsch}(cx)}{x\left(e\,x^2+d\right)^{\frac{3}{2}}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a+b*arccsch(c*x))/x/(e*x^2+d)^(3/2),x)
```

```
[Out] int((a+b*arccsch(c*x))/x/(e*x^2+d)^(3/2),x)
```

**maxima [A]** time = 0.00, size = 0, normalized size = 0.00

$$-a\left(\frac{\operatorname{arsinh}\left(\frac{d}{\sqrt{de}\,|x|}\right)}{d^{\frac{3}{2}}}-\frac{1}{\sqrt{ex^2+d}\,d}\right)+b\int \frac{\log\left(\sqrt{\frac{1}{c^2x^2}+1}+\frac{1}{cx}\right)}{(ex^2+d)^{\frac{3}{2}}x}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))/x/(e*x^2+d)^(3/2),x, algorithm="maxima")
```

```
[Out] -a*(arcsinh(d/(sqrt(d*e)*abs(x)))/d^(3/2) - 1/(sqrt(e*x^2 + d)*d)) + b*inte
grate(log(sqrt(1/(c^2*x^2) + 1) + 1/(c*x))/((e*x^2 + d)^(3/2)*x), x)
```

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

$$\int \frac{a+b\operatorname{asinh}\left(\frac{1}{c\,x}\right)}{x\left(e\,x^2+d\right)^{3/2}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a + b*asinh(1/(c*x)))/(x*(d + e*x^2)^(3/2)),x)
```

```
[Out] int((a + b*asinh(1/(c*x)))/(x*(d + e*x^2)^(3/2)), 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*acsch(c*x))/x/(e*x**2+d)**(3/2),x)
```

```
[Out] Timed out
```

## 3.151 $\int \frac{a+b\,\mathrm{csch}^{-1}(cx)}{x^3\left(d+ex^2\right)^{3/2}}\,dx$

**Optimal**. Leaf size=26

$$\mathrm{Int}\left(\frac{a+b\,\mathrm{csch}^{-1}(cx)}{x^3\left(d+ex^2\right)^{3/2}},x\right)$$

```
[Out] Unintegrable((a+b*arccsch(c*x))/x^3/(e*x^2+d)^(3/2),x)
```

**Rubi [A]** time = 0.13, 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 = {}

$$\int \frac{a+b\,\mathrm{csch}^{-1}(cx)}{x^3\left(d+ex^2\right)^{3/2}}\,dx$$

Verification is Not applicable to the result.

```
[In] Int[(a + b*ArcCsch[c*x])/(x^3*(d + e*x^2)^(3/2)),x]
```

```
[Out] Defer[Int][(a + b*ArcCsch[c*x])/(x^3*(d + e*x^2)^(3/2)), x]
```

Rubi steps

$$\int \frac{a+b\,\mathrm{csch}^{-1}(cx)}{x^3\left(d+ex^2\right)^{3/2}}\,dx=\int \frac{a+b\,\mathrm{csch}^{-1}(cx)}{x^3\left(d+ex^2\right)^{3/2}}\,dx$$

**Mathematica [A]** time = 38.59, size = 0, normalized size = 0.00

$$\int \frac{a+b\,\mathrm{csch}^{-1}(cx)}{x^3\left(d+ex^2\right)^{3/2}}\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[(a + b*ArcCsch[c*x])/(x^3*(d + e*x^2)^(3/2)),x]
```

```
[Out] Integrate[(a + b*ArcCsch[c*x])/(x^3*(d + e*x^2)^(3/2)), x]
```

**fricas [A]** time = 0.56, size = 0, normalized size = 0.00

$$\mathrm{integral}\left(\frac{\sqrt{ex^2+d}\,(b\,\mathrm{arcsch}\,(cx)+a)}{e^2x^7+2\,dex^5+d^2x^3},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))/x^3/(e*x^2+d)^(3/2),x, algorithm="fricas")
```

```
[Out] integral(sqrt(e*x^2 + d)*(b*arccsch(c*x) + a)/(e^2*x^7 + 2*d*e*x^5 + d^2*x^
3), x)
```

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

$$\int \frac{b\,\mathrm{arcsch}\,(cx) + a}{\left(ex^2 + d\right)^{\frac{3}{2}} x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))/x^3/(e*x^2+d)^(3/2),x, algorithm="giac")
```

```
[Out] integrate((b*arccsch(c*x) + a)/((e*x^2 + d)^(3/2)*x^3), x)
```

**maple** [A] time = 0.46, size = 0, normalized size = 0.00

$$\int \frac{a + b\,\mathrm{arccsch}\,(cx)}{x^3 \left(e\,x^2 + d\right)^{\frac{3}{2}}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a+b*arccsch(c*x))/x^3/(e*x^2+d)^(3/2),x)
```

```
[Out] int((a+b*arccsch(c*x))/x^3/(e*x^2+d)^(3/2),x)
```

**maxima** [A] time = 0.00, size = 0, normalized size = 0.00

$$\frac{1}{2}\,a\left(\frac{3\,e\,\mathrm{arsinh}\left(\frac{d}{\sqrt{de}\,|x|}\right)}{d^{\frac{5}{2}}} - \frac{3\,e}{\sqrt{ex^2 + d}\,d^2} - \frac{1}{\sqrt{ex^2 + d}\,dx^2}\right) + b\int \frac{\log\left(\sqrt{\frac{1}{c^2x^2} + 1} + \frac{1}{cx}\right)}{\left(ex^2 + d\right)^{\frac{3}{2}} x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))/x^3/(e*x^2+d)^(3/2),x, algorithm="maxima")
```

```
[Out] 1/2*a*(3*e*arcsinh(d/(sqrt(d*e)*abs(x)))/d^(5/2) - 3*e/(sqrt(e*x^2 + d)*d^2
) - 1/(sqrt(e*x^2 + d)*d*x^2)) + b*integrate(log(sqrt(1/(c^2*x^2) + 1) + 1/
(c*x))/((e*x^2 + d)^(3/2)*x^3), x)
```

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

$$\int \frac{a + b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)}{x^3 \left(e\,x^2 + d\right)^{3/2}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a + b*asinh(1/(c*x)))/(x^3*(d + e*x^2)^(3/2)),x)
```

```
[Out] int((a + b*asinh(1/(c*x)))/(x^3*(d + e*x^2)^(3/2)), 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*acsch(c*x))/x**3/(e*x**2+d)**(3/2),x)
```

```
[Out] Timed out
```

# 3.152 $\int \frac{x^4(a+b\,\mathbf{csch}^{-1}(cx))}{(d+ex^2)^{3/2}}\,dx$

**Optimal**. Leaf size=26

$$\mathrm{Int}\left(\frac{x^4\left(a+b\,\mathrm{csch}^{-1}(cx)\right)}{\left(d+ex^2\right)^{3/2}},x\right)$$

```
[Out] Unintegrable(x^4*(a+b*arccsch(c*x))/(e*x^2+d)^(3/2),x)
```

**Rubi** [A] time = 0.11, 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 = {}

$$\int \frac{x^4\left(a+b\,\mathrm{csch}^{-1}(cx)\right)}{\left(d+ex^2\right)^{3/2}}\,dx$$

Verification is Not applicable to the result.

```
[In] Int[(x^4*(a + b*ArcCsch[c*x]))/(d + e*x^2)^(3/2),x]
```

```
[Out] Defer[Int][(x^4*(a + b*ArcCsch[c*x]))/(d + e*x^2)^(3/2), x]
```

Rubi steps

$$\int \frac{x^4\left(a+b\,\mathrm{csch}^{-1}(cx)\right)}{\left(d+ex^2\right)^{3/2}}\,dx=\int \frac{x^4\left(a+b\,\mathrm{csch}^{-1}(cx)\right)}{\left(d+ex^2\right)^{3/2}}\,dx$$

**Mathematica** [A] time = 8.80, size = 0, normalized size = 0.00

$$\int \frac{x^4\left(a+b\,\mathrm{csch}^{-1}(cx)\right)}{\left(d+ex^2\right)^{3/2}}\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[(x^4*(a + b*ArcCsch[c*x]))/(d + e*x^2)^(3/2),x]
```

```
[Out] Integrate[(x^4*(a + b*ArcCsch[c*x]))/(d + e*x^2)^(3/2), x]
```

**fricas** [A] time = 0.61, size = 0, normalized size = 0.00

$$\mathrm{integral}\left(\frac{\left(bx^4\,\mathrm{arcsch}\,(cx)+ax^4\right)\sqrt{ex^2+d}}{e^2x^4+2\,dex^2+d^2},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^4*(a+b*arccsch(c*x))/(e*x^2+d)^(3/2),x, algorithm="fricas")
```

```
[Out] integral((b*x^4*arccsch(c*x) + a*x^4)*sqrt(e*x^2 + d)/(e^2*x^4 + 2*d*e*x^2
+ d^2), x)
```

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

$$\int \frac{(b \operatorname{arcsch}(cx) + a)x^4}{\left(ex^2 + d\right)^{\frac{3}{2}}}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^4*(a+b*arccsch(c*x))/(e*x^2+d)^(3/2),x, algorithm="giac")
```

```
[Out] integrate((b*arccsch(c*x) + a)*x^4/(e*x^2 + d)^(3/2), x)
```

**maple** [A] time = 0.44, size = 0, normalized size = 0.00

$$\int \frac{x^4 \left(a + b \operatorname{arccsch}(cx)\right)}{\left(e\, x^2 + d\right)^{\frac{3}{2}}}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^4*(a+b*arccsch(c*x))/(e*x^2+d)^(3/2),x)
```

```
[Out] int(x^4*(a+b*arccsch(c*x))/(e*x^2+d)^(3/2),x)
```

**maxima** [A] time = 0.00, size = 0, normalized size = 0.00

$$\frac{1}{2}\left(\frac{x^3}{\sqrt{ex^2 + d}\, e} + \frac{3\, dx}{\sqrt{ex^2 + d}\, e^2} - \frac{3\, d \operatorname{arsinh}\left(\frac{ex}{\sqrt{de}}\right)}{e^{\frac{5}{2}}}\right)a + b\int \frac{x^4 \log\left(\sqrt{\frac{1}{c^2x^2} + 1} + \frac{1}{cx}\right)}{\left(ex^2 + d\right)^{\frac{3}{2}}}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^4*(a+b*arccsch(c*x))/(e*x^2+d)^(3/2),x, algorithm="maxima")
```

```
[Out] 1/2*(x^3/(sqrt(e*x^2 + d)*e) + 3*d*x/(sqrt(e*x^2 + d)*e^2) - 3*d*arcsinh(e*
x/sqrt(d*e))/e^(5/2))*a + b*integrate(x^4*log(sqrt(1/(c^2*x^2) + 1) + 1/(c*
x))/(e*x^2 + d)^(3/2), x)
```

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

$$\int \frac{x^4 \left(a + b \operatorname{asinh}\left(\frac{1}{c\, x}\right)\right)}{\left(e\, x^2 + d\right)^{3/2}}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((x^4*(a + b*asinh(1/(c*x))))/(d + e*x^2)^(3/2),x)
```

```
[Out] int((x^4*(a + b*asinh(1/(c*x))))/(d + e*x^2)^(3/2), 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**4*(a+b*acsch(c*x))/(e*x**2+d)**(3/2),x)
```

```
[Out] Timed out
```

## 3.153 $\int \frac{x^2\left(a+b\operatorname{csch}^{-1}(cx)\right)}{\left(d+ex^2\right)^{3/2}}\,dx$

**Optimal**. Leaf size=26

$$\text{Int}\left(\frac{x^2\left(a+b\text{csch}^{-1}(cx)\right)}{\left(d+ex^2\right)^{3/2}},x\right)$$

```
[Out] Unintegrable(x^2*(a+b*arccsch(c*x))/(e*x^2+d)^(3/2),x)
```

**Rubi [A]** time = 0.11, 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 = {}

$$\int \frac{x^2\left(a+b\text{csch}^{-1}(cx)\right)}{\left(d+ex^2\right)^{3/2}}\,dx$$

Verification is Not applicable to the result.

```
[In] Int[(x^2*(a + b*ArcCsch[c*x]))/(d + e*x^2)^(3/2),x]
[Out] Defer[Int][(x^2*(a + b*ArcCsch[c*x]))/(d + e*x^2)^(3/2), x]
```

Rubi steps

$$\int \frac{x^2\left(a+b\text{csch}^{-1}(cx)\right)}{\left(d+ex^2\right)^{3/2}}\,dx=\int \frac{x^2\left(a+b\text{csch}^{-1}(cx)\right)}{\left(d+ex^2\right)^{3/2}}\,dx$$

**Mathematica [A]** time = 5.02, size = 0, normalized size = 0.00

$$\int \frac{x^2\left(a+b\text{csch}^{-1}(cx)\right)}{\left(d+ex^2\right)^{3/2}}\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[(x^2*(a + b*ArcCsch[c*x]))/(d + e*x^2)^(3/2),x]
[Out] Integrate[(x^2*(a + b*ArcCsch[c*x]))/(d + e*x^2)^(3/2), x]
```

**fricas [A]** time = 0.50, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{\left(bx^2\,\text{arcsch}\,(cx)+ax^2\right)\sqrt{ex^2+d}}{e^2x^4+2\,dex^2+d^2},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*(a+b*arccsch(c*x))/(e*x^2+d)^(3/2),x, algorithm="fricas")
```

```
[Out] integral((b*x^2*arccsch(c*x) + a*x^2)*sqrt(e*x^2 + d)/(e^2*x^4 + 2*d*e*x^2
+ d^2), x)
```

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

$$\int \frac{(b\operatorname{arcsch}(cx) + a)x^2}{\left(ex^2 + d\right)^{\frac{3}{2}}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*(a+b*arccsch(c*x))/(e*x^2+d)^(3/2),x, algorithm="giac")
```

```
[Out] integrate((b*arccsch(c*x) + a)*x^2/(e*x^2 + d)^(3/2), x)
```

**maple [A]** time = 0.43, size = 0, normalized size = 0.00

$$\int \frac{x^2\left(a + b\operatorname{arccsch}(cx)\right)}{\left(e\,x^2 + d\right)^{\frac{3}{2}}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^2*(a+b*arccsch(c*x))/(e*x^2+d)^(3/2),x)
```

```
[Out] int(x^2*(a+b*arccsch(c*x))/(e*x^2+d)^(3/2),x)
```

**maxima [A]** time = 0.00, size = 0, normalized size = 0.00

$$-a\left(\frac{x}{\sqrt{ex^2 + d}\,e} - \frac{\operatorname{arsinh}\left(\frac{ex}{\sqrt{de}}\right)}{e^{\frac{3}{2}}}\right) + b\int \frac{x^2\log\left(\sqrt{\frac{1}{c^2x^2} + 1} + \frac{1}{cx}\right)}{\left(ex^2 + d\right)^{\frac{3}{2}}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*(a+b*arccsch(c*x))/(e*x^2+d)^(3/2),x, algorithm="maxima")
```

```
[Out] -a*(x/(sqrt(e*x^2 + d)*e) - arcsinh(e*x/sqrt(d*e))/e^(3/2)) + b*integrate(x
^2*log(sqrt(1/(c^2*x^2) + 1) + 1/(c*x))/(e*x^2 + d)^(3/2), x)
```

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

$$\int \frac{x^2\left(a + b\operatorname{asinh}\left(\frac{1}{c\,x}\right)\right)}{\left(e\,x^2 + d\right)^{3/2}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((x^2*(a + b*asinh(1/(c*x))))/(d + e*x^2)^(3/2),x)
[Out] int((x^2*(a + b*asinh(1/(c*x))))/(d + e*x^2)^(3/2), x)
```

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

$$\int \frac{x^2 (a + b \operatorname{acsch}(cx))}{(d + ex^2)^{\frac{3}{2}}} \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**2*(a+b*acsch(c*x))/(e*x**2+d)**(3/2),x)
[Out] Integral(x**2*(a + b*acsch(c*x))/(d + e*x**2)**(3/2), x)
```

# 3.154 $\int \frac{a+b\text{csch}^{-1}(cx)}{\left(d+ex^2\right)^{3/2}} \, dx$

**Optimal**. Leaf size=111

$$\frac{x\left(a+b\text{csch}^{-1}(cx)\right)}{d\sqrt{d+ex^2}}-\frac{bx\sqrt{d+ex^2}\,F\left(\tan^{-1}(cx)|1-\frac{e}{c^2d}\right)}{d^2\sqrt{-c^2x^2}\,\sqrt{-c^2x^2-1}\,\sqrt{\frac{d+ex^2}{d\left(c^2x^2+1\right)}}}$$

```
[Out] x*(a+b*arccsch(c*x))/d/(e*x^2+d)^(1/2)-b*x*(1/(c^2*x^2+1))^(1/2)*(c^2*x^2+1
)^(1/2)*EllipticF(c*x/(c^2*x^2+1)^(1/2),(1-e/c^2/d)^(1/2))*(e*x^2+d)^(1/2)/
d^2/(-c^2*x^2)^(1/2)/(-c^2*x^2-1)^(1/2)/((e*x^2+d)/d/(c^2*x^2+1))^(1/2)
```

**Rubi [A]** time = 0.08, antiderivative size = 111, normalized size of antiderivative = 1.00, number of steps used = 3, number of rules used = 4, integrand size = 20, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.200, Rules used = {191, 6292, 12, 418}

$$\frac{x\left(a+b\text{csch}^{-1}(cx)\right)}{d\sqrt{d+ex^2}}-\frac{bx\sqrt{d+ex^2}\,F\left(\tan^{-1}(cx)|1-\frac{e}{c^2d}\right)}{d^2\sqrt{-c^2x^2}\,\sqrt{-c^2x^2-1}\,\sqrt{\frac{d+ex^2}{d\left(c^2x^2+1\right)}}}$$

Antiderivative was successfully verified.

```
[In] Int[(a + b*ArcCsch[c*x])/(d + e*x^2)^(3/2),x]
```

```
[Out] (x*(a + b*ArcCsch[c*x]))/(d*Sqrt[d + e*x^2]) - (b*x*Sqrt[d + e*x^2]*Ellipti
cF[ArcTan[c*x], 1 - e/(c^2*d)])/(d^2*Sqrt[-(c^2*x^2)]*Sqrt[-1 - c^2*x^2]*Sq
rt[(d + e*x^2)/(d*(1 + c^2*x^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 418

```
Int[1/(Sqrt[(a_) + (b_.)*(x_)^2]*Sqrt[(c_) + (d_.)*(x_)^2]), x_Symbol] :> S
imp[(Sqrt[a + b*x^2]*EllipticF[ArcTan[Rt[d/c, 2]*x], 1 - (b*c)/(a*d)])/(a*R
t[d/c, 2]*Sqrt[c + d*x^2]*Sqrt[(c*(a + b*x^2))/(a*(c + d*x^2))]), x] /; Fre
```

```
eQ[{a, b, c, d}, x] && PosQ[d/c] && PosQ[b/a] &&  !SimplerSqrtQ[b/a, d/c]
```

Rule 6292

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))*((d_.) + (e_.)*(x_)^2)^(p_.), x_Sym
bol] :> With[{u = IntHide[(d + e*x^2)^p, x]}, Dist[a + b*ArcCsch[c*x], u, x
] - Dist[(b*c*x)/Sqrt[-(c^2*x^2)], Int[SimplifyIntegrand[u/(x*Sqrt[-1 - c^2
*x^2]), x], x], x]] /; FreeQ[{a, b, c, d, e}, x] && (IGtQ[p, 0] || ILtQ[p +
 1/2, 0])
```

Rubi steps

$$
\begin{aligned}
\int \frac{a+b\operatorname{csch}^{-1}(cx)}{\left(d+ex^2\right)^{3/2}}\,dx &= \frac{x\left(a+b\operatorname{csch}^{-1}(cx)\right)}{d\sqrt{d+ex^2}} - \frac{(bcx)\int \frac{1}{d\sqrt{-1-c^2x^2}\sqrt{d+ex^2}}\,dx}{\sqrt{-c^2x^2}} \\
&= \frac{x\left(a+b\operatorname{csch}^{-1}(cx)\right)}{d\sqrt{d+ex^2}} - \frac{(bcx)\int \frac{1}{\sqrt{-1-c^2x^2}\sqrt{d+ex^2}}\,dx}{d\sqrt{-c^2x^2}} \\
&= \frac{x\left(a+b\operatorname{csch}^{-1}(cx)\right)}{d\sqrt{d+ex^2}} - \frac{bx\sqrt{d+ex^2}\,F\left(\tan^{-1}(cx)|1-\frac{e}{c^2d}\right)}{d^2\sqrt{-c^2x^2}\sqrt{-1-c^2x^2}\sqrt{\frac{d+ex^2}{d(1+c^2x^2)}}}
\end{aligned}
$$

**Mathematica [A]** time = 0.20, size = 113, normalized size = 1.02

$$
\frac{x\left(a+b\operatorname{csch}^{-1}(cx)\right)}{d\sqrt{d+ex^2}} + \frac{bcx\sqrt{\frac{1}{c^2x^2}+1}\sqrt{\frac{ex^2}{d}+1}\,F\left(\sin^{-1}\left(\sqrt{-c^2}\,x\right)|\frac{e}{c^2d}\right)}{\sqrt{-c^2}\,d\sqrt{c^2x^2+1}\sqrt{d+ex^2}}
$$

Antiderivative was successfully verified.

```
[In] Integrate[(a + b*ArcCsch[c*x])/(d + e*x^2)^(3/2),x]
```

```
[Out] (x*(a + b*ArcCsch[c*x]))/(d*Sqrt[d + e*x^2]) + (b*c*Sqrt[1 + 1/(c^2*x^2)]*x
*Sqrt[1 + (e*x^2)/d]*EllipticF[ArcSin[Sqrt[-c^2]*x], e/(c^2*d)])/(Sqrt[-c^2
]*d*Sqrt[1 + c^2*x^2]*Sqrt[d + e*x^2])
```

**fricas [F]** time = 0.99, size = 0, normalized size = 0.00

$$
\text{integral}\left(\frac{\sqrt{ex^2+d}\,(b\operatorname{arcsch}(cx)+a)}{e^2x^4+2\,dex^2+d^2}, x\right)
$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))/(e*x^2+d)^(3/2),x, algorithm="fricas")
```

```
[Out] integral(sqrt(e*x^2 + d)*(b*arccsch(c*x) + a)/(e^2*x^4 + 2*d*e*x^2 + d^2),
x)
```

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

$$\int \frac{b \operatorname{arcsch}(cx) + a}{\left(ex^2 + d\right)^{\frac{3}{2}}}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))/(e*x^2+d)^(3/2),x, algorithm="giac")
```

```
[Out] integrate((b*arccsch(c*x) + a)/(e*x^2 + d)^(3/2), x)
```

**maple [F]** time = 0.46, size = 0, normalized size = 0.00

$$\int \frac{a + b \operatorname{arccsch}(cx)}{\left(e\,x^2 + d\right)^{\frac{3}{2}}}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a+b*arccsch(c*x))/(e*x^2+d)^(3/2),x)
```

```
[Out] int((a+b*arccsch(c*x))/(e*x^2+d)^(3/2),x)
```

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

$$b \int \frac{\log\left(\sqrt{\frac{1}{c^2x^2} + 1} + \frac{1}{cx}\right)}{\left(ex^2 + d\right)^{\frac{3}{2}}}\, dx + \frac{ax}{\sqrt{ex^2 + d}\, d}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))/(e*x^2+d)^(3/2),x, algorithm="maxima")
```

```
[Out] b*integrate(log(sqrt(1/(c^2*x^2) + 1) + 1/(c*x))/(e*x^2 + d)^(3/2), x) + a*
x/(sqrt(e*x^2 + d)*d)
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.01

$$\int \frac{a + b \operatorname{asinh}\left(\frac{1}{c\,x}\right)}{\left(e\,x^2 + d\right)^{3/2}}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a + b*asinh(1/(c*x)))/(d + e*x^2)^(3/2),x)
```

```
[Out] int((a + b*asinh(1/(c*x)))/(d + e*x^2)^(3/2), x)
```

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

$$\int \frac{a + b\operatorname{acsch}(cx)}{\left(d + ex^2\right)^{\frac{3}{2}}}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*acsch(c*x))/(e*x**2+d)**(3/2),x)
```

```
[Out] Integral((a + b*acsch(c*x))/(d + e*x**2)**(3/2), x)
```

# 3.155 $\int \frac{a+b\operatorname{csch}^{-1}(cx)}{x^2\left(d+ex^2\right)^{3/2}}\,dx$

**Optimal**. Leaf size=321

$$-\frac{2ex\left(a+b\operatorname{csch}^{-1}(cx)\right)}{d^2\sqrt{d+ex^2}}-\frac{a+b\operatorname{csch}^{-1}(cx)}{dx\sqrt{d+ex^2}}+\frac{2bex\sqrt{d+ex^2}\,F\left(\tan^{-1}(cx)|1-\frac{e}{c^2d}\right)}{d^3\sqrt{-c^2x^2}\,\sqrt{-c^2x^2-1}\,\sqrt{\frac{d+ex^2}{d\left(c^2x^2+1\right)}}}+\frac{bc\sqrt{-c^2x^2-1}\,\sqrt{d+ex^2}}{d^2\sqrt{-c^2x^2}}-\frac{bc^2x\sqrt{\ldots}}{d^2\sqrt{-\ldots}}$$

```
[Out] (-a-b*arccsch(c*x))/d/x/(e*x^2+d)^(1/2)-2*e*x*(a+b*arccsch(c*x))/d^2/(e*x^2
+d)^(1/2)+b*c^3*x^2*(e*x^2+d)^(1/2)/d^2/(-c^2*x^2)^(1/2)/(-c^2*x^2-1)^(1/2)
+b*c*(-c^2*x^2-1)^(1/2)*(e*x^2+d)^(1/2)/d^2/(-c^2*x^2)^(1/2)-b*c^2*x*(1/(c^
2*x^2+1))^(1/2)*(c^2*x^2+1)^(1/2)*EllipticE(c*x/(c^2*x^2+1)^(1/2),(1-e/c^2/
d)^(1/2))*(e*x^2+d)^(1/2)/d^2/(-c^2*x^2)^(1/2)/(-c^2*x^2-1)^(1/2)/((e*x^2+d
)/d/(c^2*x^2+1))^(1/2)+2*b*e*x*(1/(c^2*x^2+1))^(1/2)*(c^2*x^2+1)^(1/2)*Elli
pticF(c*x/(c^2*x^2+1)^(1/2),(1-e/c^2/d)^(1/2))*(e*x^2+d)^(1/2)/d^3/(-c^2*x^
2)^(1/2)/(-c^2*x^2-1)^(1/2)/((e*x^2+d)/d/(c^2*x^2+1))^(1/2)
```

**Rubi [A]** time = 0.32, antiderivative size = 321, normalized size of antiderivative = 1.00, number of steps used = 7, number of rules used = 9, integrand size = 23, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.391, Rules used = {271, 191, 6302, 12, 583, 531, 418, 492, 411}

$$-\frac{2ex\left(a+b\operatorname{csch}^{-1}(cx)\right)}{d^2\sqrt{d+ex^2}}-\frac{a+b\operatorname{csch}^{-1}(cx)}{dx\sqrt{d+ex^2}}+\frac{bc^3x^2\sqrt{d+ex^2}}{d^2\sqrt{-c^2x^2}\,\sqrt{-c^2x^2-1}}+\frac{bc\sqrt{-c^2x^2-1}\,\sqrt{d+ex^2}}{d^2\sqrt{-c^2x^2}}+\frac{2bex\sqrt{d+ex^2}\,F\left(\tan\ldots\right.}{d^3\sqrt{-c^2x^2}\,\sqrt{-c^2x^2\ldots}}$$

Antiderivative was successfully verified.

```
[In] Int[(a + b*ArcCsch[c*x])/(x^2*(d + e*x^2)^(3/2)),x]
```

```
[Out] (b*c^3*x^2*Sqrt[d + e*x^2])/(d^2*Sqrt[-(c^2*x^2)]*Sqrt[-1 - c^2*x^2]) + (b*
c*Sqrt[-1 - c^2*x^2]*Sqrt[d + e*x^2])/(d^2*Sqrt[-(c^2*x^2)]) - (a + b*ArcCs
ch[c*x])/(d*x*Sqrt[d + e*x^2]) - (2*e*x*(a + b*ArcCsch[c*x]))/(d^2*Sqrt[d +
 e*x^2]) - (b*c^2*x*Sqrt[d + e*x^2]*EllipticE[ArcTan[c*x], 1 - e/(c^2*d)])/
(d^2*Sqrt[-(c^2*x^2)]*Sqrt[-1 - c^2*x^2]*Sqrt[(d + e*x^2)/(d*(1 + c^2*x^2))
]) + (2*b*e*x*Sqrt[d + e*x^2]*EllipticF[ArcTan[c*x], 1 - e/(c^2*d)])/(d^3*S
qrt[-(c^2*x^2)]*Sqrt[-1 - c^2*x^2]*Sqrt[(d + e*x^2)/(d*(1 + c^2*x^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 271

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

Rule 411

```
Int[Sqrt[(a_) + (b_.)*(x_)^2]/((c_) + (d_.)*(x_)^2)^(3/2), x_Symbol] :> Sim
p[(Sqrt[a + b*x^2]*EllipticE[ArcTan[Rt[d/c, 2]*x], 1 - (b*c)/(a*d)])/(c*Rt[
d/c, 2]*Sqrt[c + d*x^2]*Sqrt[(c*(a + b*x^2))/(a*(c + d*x^2))]), x] /; FreeQ
[{a, b, c, d}, x] && PosQ[b/a] && PosQ[d/c]
```

Rule 418

```
Int[1/(Sqrt[(a_) + (b_.)*(x_)^2]*Sqrt[(c_) + (d_.)*(x_)^2]), x_Symbol] :> S
imp[(Sqrt[a + b*x^2]*EllipticF[ArcTan[Rt[d/c, 2]*x], 1 - (b*c)/(a*d)])/(a*R
t[d/c, 2]*Sqrt[c + d*x^2]*Sqrt[(c*(a + b*x^2))/(a*(c + d*x^2))]), x] /; Fre
eQ[{a, b, c, d}, x] && PosQ[d/c] && PosQ[b/a] &&  !SimplerSqrtQ[b/a, d/c]
```

Rule 492

```
Int[(x_)^2/(Sqrt[(a_) + (b_.)*(x_)^2]*Sqrt[(c_) + (d_.)*(x_)^2]), x_Symbol]
 :> Simp[(x*Sqrt[a + b*x^2])/(b*Sqrt[c + d*x^2]), x] - Dist[c/b, Int[Sqrt[a
 + b*x^2]/(c + d*x^2)^(3/2), x], x] /; FreeQ[{a, b, c, d}, x] && NeQ[b*c -
a*d, 0] && PosQ[b/a] && PosQ[d/c] &&  !SimplerSqrtQ[b/a, d/c]
```

Rule 531

```
Int[((a_) + (b_.)*(x_)^(n_))^(p_.)*((c_) + (d_.)*(x_)^(n_))^(q_.)*((e_) + (
f_.)*(x_)^(n_)), x_Symbol] :> Dist[e, Int[(a + b*x^n)^p*(c + d*x^n)^q, x],
x] + Dist[f, Int[x^n*(a + b*x^n)^p*(c + d*x^n)^q, x], x] /; FreeQ[{a, b, c,
 d, e, f, n, p, q}, x]
```

Rule 583

```
Int[((g_.)*(x_))^(m_)*((a_) + (b_.)*(x_)^(n_))^(p_.)*((c_) + (d_.)*(x_)^(n_
))^(q_.)*((e_) + (f_.)*(x_)^(n_)), x_Symbol] :> Simp[(e*(g*x)^(m + 1)*(a +
b*x^n)^(p + 1)*(c + d*x^n)^(q + 1))/(a*c*g*(m + 1)), x] + Dist[1/(a*c*g^n*(
m + 1)), Int[(g*x)^(m + n)*(a + b*x^n)^p*(c + d*x^n)^q*Simp[a*f*c*(m + 1) -
 e*(b*c + a*d)*(m + n + 1) - e*n*(b*c*p + a*d*q) - b*e*d*(m + n*(p + q + 2)
```

```
 + 1)*x^n, x], x], x] /; FreeQ[{a, b, c, d, e, f, g, p, q}, x] && IGtQ[n, 0
] && LtQ[m, -1]
```

Rule 6302

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))*((f_.)*(x_))^(m_.)*((d_.) + (e_.)*(
x_)^2)^(p_.), x_Symbol] :> With[{u = IntHide[(f*x)^m*(d + e*x^2)^p, x]}, Di
st[a + b*ArcCsch[c*x], u, x] - Dist[(b*c*x)/Sqrt[-(c^2*x^2)], Int[SimplifyI
ntegrand[u/(x*Sqrt[-1 - c^2*x^2]), x], x], x]] /; FreeQ[{a, b, c, d, e, f,
m, p}, x] && ((IGtQ[p, 0] &&  !(ILtQ[(m - 1)/2, 0] && GtQ[m + 2*p + 3, 0]))
 || (IGtQ[(m + 1)/2, 0] &&  !(ILtQ[p, 0] && GtQ[m + 2*p + 3, 0])) || (ILtQ[
(m + 2*p + 1)/2, 0] &&  !ILtQ[(m - 1)/2, 0]))
```

Rubi steps

$$\int \frac{a+b\text{csch}^{-1}(cx)}{x^2\left(d+ex^2\right)^{3/2}}\,dx = -\frac{a+b\text{csch}^{-1}(cx)}{dx\sqrt{d+ex^2}}-\frac{2ex\left(a+b\text{csch}^{-1}(cx)\right)}{d^2\sqrt{d+ex^2}}-\frac{(bcx)\int\frac{-d-2ex^2}{d^2x^2\sqrt{-1-c^2x^2}\sqrt{d+ex^2}}\,dx}{\sqrt{-c^2x^2}}$$

$$= -\frac{a+b\text{csch}^{-1}(cx)}{dx\sqrt{d+ex^2}}-\frac{2ex\left(a+b\text{csch}^{-1}(cx)\right)}{d^2\sqrt{d+ex^2}}-\frac{(bcx)\int\frac{-d-2ex^2}{x^2\sqrt{-1-c^2x^2}\sqrt{d+ex^2}}\,dx}{d^2\sqrt{-c^2x^2}}$$

$$= \frac{bc\sqrt{-1-c^2x^2}\sqrt{d+ex^2}}{d^2\sqrt{-c^2x^2}}-\frac{a+b\text{csch}^{-1}(cx)}{dx\sqrt{d+ex^2}}-\frac{2ex\left(a+b\text{csch}^{-1}(cx)\right)}{d^2\sqrt{d+ex^2}}-\frac{(bcx)\int\frac{-2de-c^2}{\sqrt{-1-c^2x^2}}}{d^3\sqrt{-c^2x}}$$

$$= \frac{bc\sqrt{-1-c^2x^2}\sqrt{d+ex^2}}{d^2\sqrt{-c^2x^2}}-\frac{a+b\text{csch}^{-1}(cx)}{dx\sqrt{d+ex^2}}-\frac{2ex\left(a+b\text{csch}^{-1}(cx)\right)}{d^2\sqrt{d+ex^2}}+\frac{(2bcex)\int\frac{}{\sqrt{-1-c^2}}}{d^2\sqrt{-c^2}}$$

$$= \frac{bc^3x^2\sqrt{d+ex^2}}{d^2\sqrt{-c^2x^2}\sqrt{-1-c^2x^2}}+\frac{bc\sqrt{-1-c^2x^2}\sqrt{d+ex^2}}{d^2\sqrt{-c^2x^2}}-\frac{a+b\text{csch}^{-1}(cx)}{dx\sqrt{d+ex^2}}-\frac{2ex\left(a+b\text{csch}^{-1}\right.}{d^2\sqrt{d+ex^2}}$$

$$= \frac{bc^3x^2\sqrt{d+ex^2}}{d^2\sqrt{-c^2x^2}\sqrt{-1-c^2x^2}}+\frac{bc\sqrt{-1-c^2x^2}\sqrt{d+ex^2}}{d^2\sqrt{-c^2x^2}}-\frac{a+b\text{csch}^{-1}(cx)}{dx\sqrt{d+ex^2}}-\frac{2ex\left(a+b\text{csch}^{-1}\right.}{d^2\sqrt{d+ex^2}}$$

**Mathematica [C]** time = 0.46, size = 201, normalized size = 0.63

$$\frac{-a\left(d+2ex^2\right)+bcx\sqrt{\frac{1}{c^2x^2}+1}\left(d+ex^2\right)-b\text{csch}^{-1}(cx)\left(d+2ex^2\right)}{d^2x\sqrt{d+ex^2}}+\frac{ibcx\sqrt{\frac{1}{c^2x^2}+1}\sqrt{\frac{ex^2}{d}+1}\left(\left(2e-c^2d\right)F\left(i\sinh^{-}\right.\right.}{\sqrt{c^2}\,d^2\sqrt{c^2x^2}}$$

Antiderivative was successfully verified.

```
[In] Integrate[(a + b*ArcCsch[c*x])/(x^2*(d + e*x^2)^(3/2)),x]
```

```
[Out] (b*c*Sqrt[1 + 1/(c^2*x^2)]*x*(d + e*x^2) - a*(d + 2*e*x^2) - b*(d + 2*e*x^2
)*ArcCsch[c*x])/(d^2*x*Sqrt[d + e*x^2]) + (I*b*c*Sqrt[1 + 1/(c^2*x^2)]*x*Sq
rt[1 + (e*x^2)/d]*(c^2*d*EllipticE[I*ArcSinh[Sqrt[c^2]*x], e/(c^2*d)] + (-(
c^2*d) + 2*e)*EllipticF[I*ArcSinh[Sqrt[c^2]*x], e/(c^2*d)]))/(Sqrt[c^2]*d^2
*Sqrt[1 + c^2*x^2]*Sqrt[d + e*x^2])
```

**fricas [F]** time = 0.61, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{\sqrt{ex^2+d}\,(b\,\text{arcsch}\,(cx)+a)}{e^2x^6+2\,dex^4+d^2x^2},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))/x^2/(e*x^2+d)^(3/2),x, algorithm="fricas")
```

```
[Out] integral(sqrt(e*x^2 + d)*(b*arccsch(c*x) + a)/(e^2*x^6 + 2*d*e*x^4 + d^2*x^
2), x)
```

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

$$\int \frac{b\,\text{arcsch}\,(cx)+a}{\left(ex^2+d\right)^{\frac{3}{2}}x^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))/x^2/(e*x^2+d)^(3/2),x, algorithm="giac")
```

```
[Out] integrate((b*arccsch(c*x) + a)/((e*x^2 + d)^(3/2)*x^2), x)
```

**maple [F]** time = 0.45, size = 0, normalized size = 0.00

$$\int \frac{a+b\,\text{arccsch}\,(cx)}{x^2\left(e\,x^2+d\right)^{\frac{3}{2}}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a+b*arccsch(c*x))/x^2/(e*x^2+d)^(3/2),x)
```

```
[Out] int((a+b*arccsch(c*x))/x^2/(e*x^2+d)^(3/2),x)
```

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

$$-a\left(\frac{2\,ex}{\sqrt{ex^2+d}\,d^2}+\frac{1}{\sqrt{ex^2+d}\,dx}\right)-b\left(\frac{\left(2\,ex^2+d\right)\log\left(\sqrt{c^2x^2+1}\,+1\right)}{\sqrt{ex^2+d}\,d^2x}+\int\frac{2\,c^2ex^2+c^2d}{\left(c^2d^2x^2+d^2\right)\sqrt{c^2x^2+1}\,\sqrt{ex^2+d}\,+\left(c\right.}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))/x^2/(e*x^2+d)^(3/2),x, algorithm="maxima")
```

```
[Out] -a*(2*e*x/(sqrt(e*x^2 + d)*d^2) + 1/(sqrt(e*x^2 + d)*d*x)) - b*((2*e*x^2 +
d)*log(sqrt(c^2*x^2 + 1) + 1)/(sqrt(e*x^2 + d)*d^2*x) + integrate((2*c^2*e*
x^2 + c^2*d)/((c^2*d^2*x^2 + d^2)*sqrt(c^2*x^2 + 1)*sqrt(e*x^2 + d) + (c^2*
d^2*x^2 + d^2)*sqrt(e*x^2 + d)), x) + integrate(-(2*c^2*e^2*x^6 + 3*c^2*d*e
*x^4 - (d^2*log(c) - d^2)*c^2*x^2 - d^2*log(c) - (c^2*d^2*x^2 + d^2)*log(x)
)/((c^2*d^2*e*x^6 + d^3*x^2 + (c^2*d^3 + d^2*e)*x^4)*sqrt(e*x^2 + d)), x))
```

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

$$\int\frac{a+b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)}{x^2\,{\left(e\,x^2+d\right)}^{3/2}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a + b*asinh(1/(c*x)))/(x^2*(d + e*x^2)^(3/2)),x)
```

```
[Out] int((a + b*asinh(1/(c*x)))/(x^2*(d + e*x^2)^(3/2)), 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*acsch(c*x))/x**2/(e*x**2+d)**(3/2),x)
```

```
[Out] Timed out
```

# 3.156 $\int \frac{x^5\left(a+b\textbf{csch}^{-1}(cx)\right)}{\left(d+ex^2\right)^{5/2}}\,dx$

**Optimal**. Leaf size=251

$$-\frac{d^2\left(a+b\text{csch}^{-1}(cx)\right)}{3e^3\left(d+ex^2\right)^{3/2}}+\frac{2d\left(a+b\text{csch}^{-1}(cx)\right)}{e^3\sqrt{d+ex^2}}+\frac{\sqrt{d+ex^2}\left(a+b\text{csch}^{-1}(cx)\right)}{e^3}+\frac{bx\tan^{-1}\left(\frac{\sqrt{e}\sqrt{-c^2x^2-1}}{c\sqrt{d+ex^2}}\right)}{e^{5/2}\sqrt{-c^2x^2}}+\frac{8bc\sqrt{d}\,x\,t}{3}$$

```
[Out] -1/3*d^2*(a+b*arccsch(c*x))/e^3/(e*x^2+d)^(3/2)+b*x*arctan(e^(1/2)*(-c^2*x^
2-1)^(1/2)/c/(e*x^2+d)^(1/2))/e^(5/2)/(-c^2*x^2)^(1/2)+8/3*b*c*x*arctan((e*
x^2+d)^(1/2)/d^(1/2)/(-c^2*x^2-1)^(1/2))*d^(1/2)/e^3/(-c^2*x^2)^(1/2)+2*d*(
a+b*arccsch(c*x))/e^3/(e*x^2+d)^(1/2)+1/3*b*c*d*x*(-c^2*x^2-1)^(1/2)/(c^2*d
-e)/e^2/(-c^2*x^2)^(1/2)/(e*x^2+d)^(1/2)+(a+b*arccsch(c*x))*(e*x^2+d)^(1/2)
/e^3
```

**Rubi [A]** time = 1.23, antiderivative size = 251, normalized size of antiderivative = 1.00, number of steps used = 10, number of rules used = 11, integrand size = 23, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.478, Rules used = {266, 43, 6302, 12, 1614, 157, 63, 217, 203, 93, 204}

$$-\frac{d^2\left(a+b\text{csch}^{-1}(cx)\right)}{3e^3\left(d+ex^2\right)^{3/2}}+\frac{2d\left(a+b\text{csch}^{-1}(cx)\right)}{e^3\sqrt{d+ex^2}}+\frac{\sqrt{d+ex^2}\left(a+b\text{csch}^{-1}(cx)\right)}{e^3}+\frac{bcdx\sqrt{-c^2x^2-1}}{3e^2\sqrt{-c^2x^2}\left(c^2d-e\right)\sqrt{d+ex^2}}+\frac{8}{}$$

Antiderivative was successfully verified.

```
[In] Int[(x^5*(a + b*ArcCsch[c*x]))/(d + e*x^2)^(5/2),x]
```

```
[Out] (b*c*d*x*Sqrt[-1 - c^2*x^2])/(3*(c^2*d - e)*e^2*Sqrt[-(c^2*x^2)]*Sqrt[d + e
*x^2]) - (d^2*(a + b*ArcCsch[c*x]))/(3*e^3*(d + e*x^2)^(3/2)) + (2*d*(a + b
*ArcCsch[c*x]))/(e^3*Sqrt[d + e*x^2]) + (Sqrt[d + e*x^2]*(a + b*ArcCsch[c*x
]))/e^3 + (b*x*ArcTan[(Sqrt[e]*Sqrt[-1 - c^2*x^2])/(c*Sqrt[d + e*x^2])])/(e
^(5/2)*Sqrt[-(c^2*x^2)]) + (8*b*c*Sqrt[d]*x*ArcTan[Sqrt[d + e*x^2]/(Sqrt[d]
*Sqrt[-1 - c^2*x^2])])/(3*e^3*Sqrt[-(c^2*x^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 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 93

```
Int[(((a_.) + (b_.)*(x_))^(m_)*((c_.) + (d_.)*(x_))^(n_))/((e_.) + (f_.)*(x
_)), x_Symbol] :> With[{q = Denominator[m]}, Dist[q, Subst[Int[x^(q*(m + 1)
 - 1)/(b*e - a*f - (d*e - c*f)*x^q), x], x, (a + b*x)^(1/q)/(c + d*x)^(1/q)
], x]] /; FreeQ[{a, b, c, d, e, f}, x] && EqQ[m + n + 1, 0] && RationalQ[n]
 && LtQ[-1, m, 0] && SimplerQ[a + b*x, c + d*x]
```

Rule 157

```
Int[(((c_.) + (d_.)*(x_))^(n_)*((e_.) + (f_.)*(x_))^(p_)*((g_.) + (h_.)*(x_
)))/((a_.) + (b_.)*(x_)), x_Symbol] :> Dist[h/b, Int[(c + d*x)^n*(e + f*x)^
p, x], x] + Dist[(b*g - a*h)/b, Int[((c + d*x)^n*(e + f*x)^p)/(a + b*x), x]
, x] /; FreeQ[{a, b, c, d, e, f, g, h, n, p}, x]
```

Rule 203

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

Rule 204

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

Rule 217

```
Int[1/Sqrt[(a_) + (b_.)*(x_)^2], x_Symbol] :> Subst[Int[1/(1 - b*x^2), x],
x, x/Sqrt[a + b*x^2]] /; FreeQ[{a, b}, x] &&  !GtQ[a, 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 1614

```
Int[(Px_)*((a_.) + (b_.)*(x_))^(m_)*((c_.) + (d_.)*(x_))^(n_.)*((e_.) + (f_
.)*(x_))^(p_.), x_Symbol] :> With[{Qx = PolynomialQuotient[Px, a + b*x, x],
 R = PolynomialRemainder[Px, a + b*x, x]}, Simp[(b*R*(a + b*x)^(m + 1)*(c +
 d*x)^(n + 1)*(e + f*x)^(p + 1))/((m + 1)*(b*c - a*d)*(b*e - a*f)), x] + Di
st[1/((m + 1)*(b*c - a*d)*(b*e - a*f)), Int[(a + b*x)^(m + 1)*(c + d*x)^n*(
e + f*x)^p*ExpandToSum[(m + 1)*(b*c - a*d)*(b*e - a*f)*Qx + a*d*f*R*(m + 1)
 - b*R*(d*e*(m + n + 2) + c*f*(m + p + 2)) - b*d*f*R*(m + n + p + 3)*x, x],
 x], x]] /; FreeQ[{a, b, c, d, e, f, n, p}, x] && PolyQ[Px, x] && LtQ[m, -1
] && IntegersQ[2*m, 2*n, 2*p]
```

Rule 6302

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))*((f_.)*(x_))^(m_.)*((d_.) + (e_.)*(
x_)^2)^(p_.), x_Symbol] :> With[{u = IntHide[(f*x)^m*(d + e*x^2)^p, x]}, Di
st[a + b*ArcCsch[c*x], u, x] - Dist[(b*c*x)/Sqrt[-(c^2*x^2)], Int[SimplifyI
ntegrand[u/(x*Sqrt[-1 - c^2*x^2]), x], x], x]] /; FreeQ[{a, b, c, d, e, f,
m, p}, x] && ((IGtQ[p, 0] &&  !(ILtQ[(m - 1)/2, 0] && GtQ[m + 2*p + 3, 0]))
 || (IGtQ[(m + 1)/2, 0] &&  !(ILtQ[p, 0] && GtQ[m + 2*p + 3, 0])) || (ILtQ[
(m + 2*p + 1)/2, 0] &&  !ILtQ[(m - 1)/2, 0]))
```

Rubi steps

$$\int \frac{x^5\left(a+b\operatorname{csch}^{-1}(cx)\right)}{\left(d+ex^2\right)^{5/2}}\,dx = -\frac{d^2\left(a+b\operatorname{csch}^{-1}(cx)\right)}{3e^3\left(d+ex^2\right)^{3/2}} + \frac{2d\left(a+b\operatorname{csch}^{-1}(cx)\right)}{e^3\sqrt{d+ex^2}} + \frac{\sqrt{d+ex^2}\left(a+b\operatorname{csch}^{-1}(cx)\right)}{e^3} - \frac{(bc}{}$$

$$= -\frac{d^2\left(a+b\operatorname{csch}^{-1}(cx)\right)}{3e^3\left(d+ex^2\right)^{3/2}} + \frac{2d\left(a+b\operatorname{csch}^{-1}(cx)\right)}{e^3\sqrt{d+ex^2}} + \frac{\sqrt{d+ex^2}\left(a+b\operatorname{csch}^{-1}(cx)\right)}{e^3} - \frac{(bc}{}$$

$$= -\frac{d^2\left(a+b\operatorname{csch}^{-1}(cx)\right)}{3e^3\left(d+ex^2\right)^{3/2}} + \frac{2d\left(a+b\operatorname{csch}^{-1}(cx)\right)}{e^3\sqrt{d+ex^2}} + \frac{\sqrt{d+ex^2}\left(a+b\operatorname{csch}^{-1}(cx)\right)}{e^3} - \frac{(bc}{}$$

$$= \frac{bcdx\sqrt{-1-c^2x^2}}{3\left(c^2d-e\right)e^2\sqrt{-c^2x^2}\sqrt{d+ex^2}} - \frac{d^2\left(a+b\operatorname{csch}^{-1}(cx)\right)}{3e^3\left(d+ex^2\right)^{3/2}} + \frac{2d\left(a+b\operatorname{csch}^{-1}(cx)\right)}{e^3\sqrt{d+ex^2}} + -$$

$$= \frac{bcdx\sqrt{-1-c^2x^2}}{3\left(c^2d-e\right)e^2\sqrt{-c^2x^2}\sqrt{d+ex^2}} - \frac{d^2\left(a+b\operatorname{csch}^{-1}(cx)\right)}{3e^3\left(d+ex^2\right)^{3/2}} + \frac{2d\left(a+b\operatorname{csch}^{-1}(cx)\right)}{e^3\sqrt{d+ex^2}} + -$$

$$= \frac{bcdx\sqrt{-1-c^2x^2}}{3\left(c^2d-e\right)e^2\sqrt{-c^2x^2}\sqrt{d+ex^2}} - \frac{d^2\left(a+b\operatorname{csch}^{-1}(cx)\right)}{3e^3\left(d+ex^2\right)^{3/2}} + \frac{2d\left(a+b\operatorname{csch}^{-1}(cx)\right)}{e^3\sqrt{d+ex^2}} + -$$

$$= \frac{bcdx\sqrt{-1-c^2x^2}}{3\left(c^2d-e\right)e^2\sqrt{-c^2x^2}\sqrt{d+ex^2}} - \frac{d^2\left(a+b\operatorname{csch}^{-1}(cx)\right)}{3e^3\left(d+ex^2\right)^{3/2}} + \frac{2d\left(a+b\operatorname{csch}^{-1}(cx)\right)}{e^3\sqrt{d+ex^2}} + -$$

$$= \frac{bcdx\sqrt{-1-c^2x^2}}{3\left(c^2d-e\right)e^2\sqrt{-c^2x^2}\sqrt{d+ex^2}} - \frac{d^2\left(a+b\operatorname{csch}^{-1}(cx)\right)}{3e^3\left(d+ex^2\right)^{3/2}} + \frac{2d\left(a+b\operatorname{csch}^{-1}(cx)\right)}{e^3\sqrt{d+ex^2}} + -$$

<u>**Mathematica**</u> **[A]** time = 0.56, size = 327, normalized size = 1.30

$$\frac{a\left(c^2d-e\right)\left(8d^2+12dex^2+3e^2x^4\right)+b\left(c^2d-e\right)\operatorname{csch}^{-1}(cx)\left(8d^2+12dex^2+3e^2x^4\right)+bcdex\sqrt{\frac{1}{c^2x^2}+1}\left(d+ex^2\right)}{3e^3\left(c^2d-e\right)\left(d+ex^2\right)^{3/2}} -$$

Antiderivative was successfully verified.

```
[In] Integrate[(x^5*(a + b*ArcCsch[c*x]))/(d + e*x^2)^(5/2),x]
```

```
[Out] (b*c*d*e*Sqrt[1 + 1/(c^2*x^2)]*x*(d + e*x^2) + a*(c^2*d - e)*(8*d^2 + 12*d*
e*x^2 + 3*e^2*x^4) + b*(c^2*d - e)*(8*d^2 + 12*d*e*x^2 + 3*e^2*x^4)*ArcCsch
[c*x])/(3*(c^2*d - e)*e^3*(d + e*x^2)^(3/2)) - (b*Sqrt[1 + 1/(c^2*x^2)]*x*(
-3*Sqrt[c^2]*Sqrt[c^2*d - e]*Sqrt[e]*Sqrt[(c^2*(d + e*x^2))/(c^2*d - e)]*Ar
cSinh[(c*Sqrt[e]*Sqrt[1 + c^2*x^2])/(Sqrt[c^2]*Sqrt[c^2*d - e])] + 8*c^3*Sq
rt[d]*Sqrt[-d - e*x^2]*ArcTan[(Sqrt[d]*Sqrt[1 + c^2*x^2])/Sqrt[-d - e*x^2]]
))/(3*c^2*e^3*Sqrt[1 + c^2*x^2]*Sqrt[d + e*x^2])
```

**<u>fricas</u> [B]** time = 1.11, size = 2421, normalized size = 9.65

result too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^5*(a+b*arccsch(c*x))/(e*x^2+d)^(5/2),x, algorithm="fricas")
```

```
[Out] [1/12*(3*(b*c^2*d^3 + (b*c^2*d*e^2 - b*e^3)*x^4 - b*d^2*e + 2*(b*c^2*d^2*e
- b*d*e^2)*x^2)*sqrt(e)*log(8*c^4*e^2*x^4 + c^4*d^2 + 6*c^2*d*e + 8*(c^4*d*
e + c^2*e^2)*x^2 + 4*(2*c^4*e*x^3 + (c^4*d + c^2*e)*x)*sqrt(e*x^2 + d)*sqrt
(e)*sqrt((c^2*x^2 + 1)/(c^2*x^2)) + e^2) + 4*(8*b*c^3*d^3 - 8*b*c*d^2*e + 3
*(b*c^3*d*e^2 - b*c*e^3)*x^4 + 12*(b*c^3*d^2*e - b*c*d*e^2)*x^2)*sqrt(e*x^2
 + d)*log((c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) + 1)/(c*x)) + 8*(b*c^3*d^3 - b
*c*d^2*e + (b*c^3*d*e^2 - b*c*e^3)*x^4 + 2*(b*c^3*d^2*e - b*c*d*e^2)*x^2)*s
qrt(d)*log((((c^4*d^2 + 6*c^2*d*e + e^2)*x^4 + 8*(c^2*d^2 + d*e)*x^2 - 4*((c
^3*d + c*e)*x^3 + 2*c*d*x)*sqrt(e*x^2 + d)*sqrt(d)*sqrt((c^2*x^2 + 1)/(c^2*
x^2)) + 8*d^2)/x^4) + 4*(8*a*c^3*d^3 - 8*a*c*d^2*e + 3*(a*c^3*d*e^2 - a*c*e
^3)*x^4 + 12*(a*c^3*d^2*e - a*c*d*e^2)*x^2 + (b*c^2*d*e^2*x^3 + b*c^2*d^2*e
*x)*sqrt((c^2*x^2 + 1)/(c^2*x^2)))*sqrt(e*x^2 + d))/(c^3*d^3*e^3 - c*d^2*e^
4 + (c^3*d*e^5 - c*e^6)*x^4 + 2*(c^3*d^2*e^4 - c*d*e^5)*x^2), -1/6*(3*(b*c^
2*d^3 + (b*c^2*d*e^2 - b*e^3)*x^4 - b*d^2*e + 2*(b*c^2*d^2*e - b*d*e^2)*x^2
)*sqrt(-e)*arctan(1/2*(2*c^2*e*x^3 + (c^2*d + e)*x)*sqrt(e*x^2 + d)*sqrt(-e
)*sqrt((c^2*x^2 + 1)/(c^2*x^2))/(c^2*e^2*x^4 + (c^2*d*e + e^2)*x^2 + d*e))
- 2*(8*b*c^3*d^3 - 8*b*c*d^2*e + 3*(b*c^3*d*e^2 - b*c*e^3)*x^4 + 12*(b*c^3*
d^2*e - b*c*d*e^2)*x^2)*sqrt(e*x^2 + d)*log((c*x*sqrt((c^2*x^2 + 1)/(c^2*x^
2)) + 1)/(c*x)) - 4*(b*c^3*d^3 - b*c*d^2*e + (b*c^3*d*e^2 - b*c*e^3)*x^4 +
2*(b*c^3*d^2*e - b*c*d*e^2)*x^2)*sqrt(d)*log((((c^4*d^2 + 6*c^2*d*e + e^2)*x
^4 + 8*(c^2*d^2 + d*e)*x^2 - 4*((c^3*d + c*e)*x^3 + 2*c*d*x)*sqrt(e*x^2 + d
)*sqrt(d)*sqrt((c^2*x^2 + 1)/(c^2*x^2)) + 8*d^2)/x^4) - 2*(8*a*c^3*d^3 - 8*
a*c*d^2*e + 3*(a*c^3*d*e^2 - a*c*e^3)*x^4 + 12*(a*c^3*d^2*e - a*c*d*e^2)*x^
2 + (b*c^2*d*e^2*x^3 + b*c^2*d^2*e*x)*sqrt((c^2*x^2 + 1)/(c^2*x^2)))*sqrt(e
*x^2 + d))/(c^3*d^3*e^3 - c*d^2*e^4 + (c^3*d*e^5 - c*e^6)*x^4 + 2*(c^3*d^2*
e^4 - c*d*e^5)*x^2), 1/12*(16*(b*c^3*d^3 - b*c*d^2*e + (b*c^3*d*e^2 - b*c*e
^3)*x^4 + 2*(b*c^3*d^2*e - b*c*d*e^2)*x^2)*sqrt(-d)*arctan(1/2*((c^3*d + c*
e)*x^3 + 2*c*d*x)*sqrt(e*x^2 + d)*sqrt(-d)*sqrt((c^2*x^2 + 1)/(c^2*x^2))/(c
```

```
^2*d*e*x^4 + (c^2*d^2 + d*e)*x^2 + d^2)) + 3*(b*c^2*d^3 + (b*c^2*d*e^2 - b*
e^3)*x^4 - b*d^2*e + 2*(b*c^2*d^2*e - b*d*e^2)*x^2)*sqrt(e)*log(8*c^4*e^2*x
^4 + c^4*d^2 + 6*c^2*d*e + 8*(c^4*d*e + c^2*e^2)*x^2 + 4*(2*c^4*e*x^3 + (c^
4*d + c^2*e)*x)*sqrt(e*x^2 + d)*sqrt(e)*sqrt((c^2*x^2 + 1)/(c^2*x^2)) + e^2
) + 4*(8*b*c^3*d^3 - 8*b*c*d^2*e + 3*(b*c^3*d*e^2 - b*c*e^3)*x^4 + 12*(b*c^
3*d^2*e - b*c*d*e^2)*x^2)*sqrt(e*x^2 + d)*log((c*x*sqrt((c^2*x^2 + 1)/(c^2*
x^2)) + 1)/(c*x)) + 4*(8*a*c^3*d^3 - 8*a*c*d^2*e + 3*(a*c^3*d*e^2 - a*c*e^3
)*x^4 + 12*(a*c^3*d^2*e - a*c*d*e^2)*x^2 + (b*c^2*d*e^2*x^3 + b*c^2*d^2*e*x
)*sqrt((c^2*x^2 + 1)/(c^2*x^2)))*sqrt(e*x^2 + d))/(c^3*d^3*e^3 - c*d^2*e^4
+ (c^3*d*e^5 - c*e^6)*x^4 + 2*(c^3*d^2*e^4 - c*d*e^5)*x^2), 1/6*(8*(b*c^3*d
^3 - b*c*d^2*e + (b*c^3*d*e^2 - b*c*e^3)*x^4 + 2*(b*c^3*d^2*e - b*c*d*e^2)*
x^2)*sqrt(-d)*arctan(1/2*((c^3*d + c*e)*x^3 + 2*c*d*x)*sqrt(e*x^2 + d)*sqrt
(-d)*sqrt((c^2*x^2 + 1)/(c^2*x^2))/(c^2*d*e*x^4 + (c^2*d^2 + d*e)*x^2 + d^2
)) - 3*(b*c^2*d^3 + (b*c^2*d*e^2 - b*e^3)*x^4 - b*d^2*e + 2*(b*c^2*d^2*e -
b*d*e^2)*x^2)*sqrt(-e)*arctan(1/2*(2*c^2*e*x^3 + (c^2*d + e)*x)*sqrt(e*x^2
+ d)*sqrt(-e)*sqrt((c^2*x^2 + 1)/(c^2*x^2))/(c^2*e^2*x^4 + (c^2*d*e + e^2)*
x^2 + d*e)) + 2*(8*b*c^3*d^3 - 8*b*c*d^2*e + 3*(b*c^3*d*e^2 - b*c*e^3)*x^4
+ 12*(b*c^3*d^2*e - b*c*d*e^2)*x^2)*sqrt(e*x^2 + d)*log((c*x*sqrt((c^2*x^2
+ 1)/(c^2*x^2)) + 1)/(c*x)) + 2*(8*a*c^3*d^3 - 8*a*c*d^2*e + 3*(a*c^3*d*e^2
 - a*c*e^3)*x^4 + 12*(a*c^3*d^2*e - a*c*d*e^2)*x^2 + (b*c^2*d*e^2*x^3 + b*c
^2*d^2*e*x)*sqrt((c^2*x^2 + 1)/(c^2*x^2)))*sqrt(e*x^2 + d))/(c^3*d^3*e^3 -
c*d^2*e^4 + (c^3*d*e^5 - c*e^6)*x^4 + 2*(c^3*d^2*e^4 - c*d*e^5)*x^2)]
```

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

$$\int \frac{(b\,\mathrm{arcsch}\,(cx) + a)x^5}{\left(ex^2 + d\right)^{\frac{5}{2}}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^5*(a+b*arccsch(c*x))/(e*x^2+d)^(5/2),x, algorithm="giac")
```

```
[Out] integrate((b*arccsch(c*x) + a)*x^5/(e*x^2 + d)^(5/2), x)
```

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

$$\int \frac{x^5\,(a + b\,\mathrm{arccsch}\,(cx))}{\left(e\,x^2 + d\right)^{\frac{5}{2}}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^5*(a+b*arccsch(c*x))/(e*x^2+d)^(5/2),x)
```

```
[Out] int(x^5*(a+b*arccsch(c*x))/(e*x^2+d)^(5/2),x)
```

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

$$\frac{1}{3}\left(\frac{3\,x^4}{\left(ex^2+d\right)^{\frac{3}{2}}e}+\frac{12\,dx^2}{\left(ex^2+d\right)^{\frac{3}{2}}e^2}+\frac{8\,d^2}{\left(ex^2+d\right)^{\frac{3}{2}}e^3}\right)a+\frac{1}{3}\,b\left(\frac{\left(3\,e^2x^4+12\,dex^2+8\,d^2\right)\log\left(\sqrt{c^2x^2+1}+1\right)}{\left(e^4x^2+de^3\right)\sqrt{ex^2+d}}+3\int\frac{}{3(}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^5*(a+b*arccsch(c*x))/(e*x^2+d)^(5/2),x, algorithm="maxima")
```

```
[Out] 1/3*(3*x^4/((e*x^2 + d)^(3/2)*e) + 12*d*x^2/((e*x^2 + d)^(3/2)*e^2) + 8*d^2
/((e*x^2 + d)^(3/2)*e^3))*a + 1/3*b*((3*e^2*x^4 + 12*d*e*x^2 + 8*d^2)*log(s
qrt(c^2*x^2 + 1) + 1)/((e^4*x^2 + d*e^3)*sqrt(e*x^2 + d)) + 3*integrate(1/3
*(3*c^2*e^2*x^5 + 12*c^2*d*e*x^3 + 8*c^2*d^2*x)/((c^2*e^4*x^4 + d*e^3 + (c^
2*d*e^3 + e^4)*x^2)*sqrt(c^2*x^2 + 1)*sqrt(e*x^2 + d) + (c^2*e^4*x^4 + d*e^
3 + (c^2*d*e^3 + e^4)*x^2)*sqrt(e*x^2 + d)), x) - 3*integrate(1/3*(3*(e^3*l
og(c) + e^3)*c^2*x^7 + 20*c^2*d^2*e*x^3 + 8*c^2*d^3*x + 3*(5*c^2*d*e^2 + e^
3*log(c))*x^5 + 3*(c^2*e^3*x^7 + e^3*x^5)*log(x))/((c^2*e^5*x^6 + d^2*e^3 +
 (2*c^2*d*e^4 + e^5)*x^4 + (c^2*d^2*e^3 + 2*d*e^4)*x^2)*sqrt(e*x^2 + d)), x
))
```

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

$$\int \frac{x^5\,\left(a+b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)\right)}{{\left(e\,x^2+d\right)}^{5/2}} \,d x$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((x^5*(a + b*asinh(1/(c*x))))/(d + e*x^2)^(5/2),x)
```

```
[Out] int((x^5*(a + b*asinh(1/(c*x))))/(d + e*x^2)^(5/2), 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**5*(a+b*acsch(c*x))/(e*x**2+d)**(5/2),x)
```

```
[Out] Timed out
```

# 3.157 $\int \frac{x^3\left(a+b\,\text{csch}^{-1}(cx)\right)}{\left(d+ex^2\right)^{5/2}}\,dx$

**Optimal**. Leaf size=169

$$-\frac{a+b\text{csch}^{-1}(cx)}{e^2\sqrt{d+ex^2}}+\frac{d\left(a+b\text{csch}^{-1}(cx)\right)}{3e^2\left(d+ex^2\right)^{3/2}}-\frac{2bcx\tan^{-1}\left(\frac{\sqrt{d+ex^2}}{\sqrt{d}\sqrt{-c^2x^2-1}}\right)}{3\sqrt{d}\,e^2\sqrt{-c^2x^2}}-\frac{bcx\sqrt{-c^2x^2-1}}{3e\sqrt{-c^2x^2}\left(c^2d-e\right)\sqrt{d+ex^2}}$$

```
[Out] 1/3*d*(a+b*arccsch(c*x))/e^2/(e*x^2+d)^(3/2)-2/3*b*c*x*arctan((e*x^2+d)^(1/
2)/d^(1/2)/(-c^2*x^2-1)^(1/2))/e^2/d^(1/2)/(-c^2*x^2)^(1/2)+(-a-b*arccsch(c
*x))/e^2/(e*x^2+d)^(1/2)-1/3*b*c*x*(-c^2*x^2-1)^(1/2)/(c^2*d-e)/e/(-c^2*x^2
)^(1/2)/(e*x^2+d)^(1/2)
```

**Rubi [A]** time = 0.27, antiderivative size = 169, normalized size of antiderivative = 1.00, number of steps used = 7, number of rules used = 8, integrand size = 23, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.348, Rules used = {266, 43, 6302, 12, 573, 152, 93, 204}

$$-\frac{a+b\text{csch}^{-1}(cx)}{e^2\sqrt{d+ex^2}}+\frac{d\left(a+b\text{csch}^{-1}(cx)\right)}{3e^2\left(d+ex^2\right)^{3/2}}-\frac{2bcx\tan^{-1}\left(\frac{\sqrt{d+ex^2}}{\sqrt{d}\sqrt{-c^2x^2-1}}\right)}{3\sqrt{d}\,e^2\sqrt{-c^2x^2}}-\frac{bcx\sqrt{-c^2x^2-1}}{3e\sqrt{-c^2x^2}\left(c^2d-e\right)\sqrt{d+ex^2}}$$

Antiderivative was successfully verified.

```
[In] Int[(x^3*(a + b*ArcCsch[c*x]))/(d + e*x^2)^(5/2),x]
```

```
[Out] -(b*c*x*Sqrt[-1 - c^2*x^2])/(3*(c^2*d - e)*e*Sqrt[-(c^2*x^2)]*Sqrt[d + e*x^
2]) + (d*(a + b*ArcCsch[c*x]))/(3*e^2*(d + e*x^2)^(3/2)) - (a + b*ArcCsch[c
*x])/(e^2*Sqrt[d + e*x^2]) - (2*b*c*x*ArcTan[Sqrt[d + e*x^2]/(Sqrt[d]*Sqrt[
-1 - c^2*x^2])])/(3*Sqrt[d]*e^2*Sqrt[-(c^2*x^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 93

```
Int[(((a_.) + (b_.)*(x_))^(m_)*((c_.) + (d_.)*(x_))^(n_))/((e_.) + (f_.)*(x
_)), x_Symbol] :> With[{q = Denominator[m]}, Dist[q, Subst[Int[x^(q*(m + 1)
 - 1)/(b*e - a*f - (d*e - c*f)*x^q), x], x, (a + b*x)^(1/q)/(c + d*x)^(1/q)
], x]] /; FreeQ[{a, b, c, d, e, f}, x] && EqQ[m + n + 1, 0] && RationalQ[n]
 && LtQ[-1, m, 0] && SimplerQ[a + b*x, c + d*x]
```

Rule 152

```
Int[((a_.) + (b_.)*(x_))^(m_)*((c_.) + (d_.)*(x_))^(n_)*((e_.) + (f_.)*(x_)
)^(p_)*((g_.) + (h_.)*(x_)), x_Symbol] :> Simp[((b*g - a*h)*(a + b*x)^(m +
1)*(c + d*x)^(n + 1)*(e + f*x)^(p + 1))/((m + 1)*(b*c - a*d)*(b*e - a*f)),
x] + Dist[1/((m + 1)*(b*c - a*d)*(b*e - a*f)), Int[(a + b*x)^(m + 1)*(c + d
*x)^n*(e + f*x)^p*Simp[(a*d*f*g - b*(d*e + c*f)*g + b*c*e*h)*(m + 1) - (b*g
 - a*h)*(d*e*(n + 1) + c*f*(p + 1)) - d*f*(b*g - a*h)*(m + n + p + 3)*x, x]
, x], x] /; FreeQ[{a, b, c, d, e, f, g, h, n, p}, x] && LtQ[m, -1] && Integ
ersQ[2*m, 2*n, 2*p]
```

Rule 204

```
Int[((a_) + (b_.)*(x_)^2)^(-1), x_Symbol] :> -Simp[ArcTan[(Rt[-b, 2]*x)/Rt[
-a, 2]]/(Rt[-a, 2]*Rt[-b, 2]), x] /; FreeQ[{a, b}, x] && PosQ[a/b] && (LtQ[
a, 0] || LtQ[b, 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 573

```
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[x^(Simpl
ify[(m + 1)/n] - 1)*(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] && IntegerQ[Simplify[(m + 1)/n
]]
```

Rule 6302

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))*((f_.)*(x_))^(m_.)*((d_.) + (e_.)*(
x_)^2)^(p_.), x_Symbol] :> With[{u = IntHide[(f*x)^m*(d + e*x^2)^p, x]}, Di
st[a + b*ArcCsch[c*x], u, x] - Dist[(b*c*x)/Sqrt[-(c^2*x^2)], Int[SimplifyI
ntegrand[u/(x*Sqrt[-1 - c^2*x^2]), x], x], x]] /; FreeQ[{a, b, c, d, e, f,
```

```
m, p}, x] && ((IGtQ[p, 0] &&  !(ILtQ[(m - 1)/2, 0] && GtQ[m + 2*p + 3, 0]))
 || (IGtQ[(m + 1)/2, 0] &&  !(ILtQ[p, 0] && GtQ[m + 2*p + 3, 0])) || (ILtQ[
(m + 2*p + 1)/2, 0] &&  !ILtQ[(m - 1)/2, 0]))
```

Rubi steps

$$\int \frac{x^3\left(a+b\operatorname{csch}^{-1}(cx)\right)}{\left(d+ex^2\right)^{5/2}}\,dx = \frac{d\left(a+b\operatorname{csch}^{-1}(cx)\right)}{3e^2\left(d+ex^2\right)^{3/2}} - \frac{a+b\operatorname{csch}^{-1}(cx)}{e^2\sqrt{d+ex^2}} - \frac{(bcx)\int \frac{-2d-3ex^2}{3e^2x\sqrt{-1-c^2x^2}\left(d+ex^2\right)^{3/2}}\,dx}{\sqrt{-c^2x^2}}$$

$$= \frac{d\left(a+b\operatorname{csch}^{-1}(cx)\right)}{3e^2\left(d+ex^2\right)^{3/2}} - \frac{a+b\operatorname{csch}^{-1}(cx)}{e^2\sqrt{d+ex^2}} - \frac{(bcx)\int \frac{-2d-3ex^2}{x\sqrt{-1-c^2x^2}\left(d+ex^2\right)^{3/2}}\,dx}{3e^2\sqrt{-c^2x^2}}$$

$$= \frac{d\left(a+b\operatorname{csch}^{-1}(cx)\right)}{3e^2\left(d+ex^2\right)^{3/2}} - \frac{a+b\operatorname{csch}^{-1}(cx)}{e^2\sqrt{d+ex^2}} - \frac{(bcx)\,\mathrm{Subst}\left(\int \frac{-2d-3ex}{x\sqrt{-1-c^2x}\,(d+ex)^{3/2}}\,dx, x, x^2\right)}{6e^2\sqrt{-c^2x^2}}$$

$$= -\frac{bcx\sqrt{-1-c^2x^2}}{3\left(c^2d-e\right)e\sqrt{-c^2x^2}\sqrt{d+ex^2}} + \frac{d\left(a+b\operatorname{csch}^{-1}(cx)\right)}{3e^2\left(d+ex^2\right)^{3/2}} - \frac{a+b\operatorname{csch}^{-1}(cx)}{e^2\sqrt{d+ex^2}} + \frac{(bcx)\,\mathrm{S}}{}$$

$$= -\frac{bcx\sqrt{-1-c^2x^2}}{3\left(c^2d-e\right)e\sqrt{-c^2x^2}\sqrt{d+ex^2}} + \frac{d\left(a+b\operatorname{csch}^{-1}(cx)\right)}{3e^2\left(d+ex^2\right)^{3/2}} - \frac{a+b\operatorname{csch}^{-1}(cx)}{e^2\sqrt{d+ex^2}} + \frac{(bcx)\,\mathrm{S}}{}$$

$$= -\frac{bcx\sqrt{-1-c^2x^2}}{3\left(c^2d-e\right)e\sqrt{-c^2x^2}\sqrt{d+ex^2}} + \frac{d\left(a+b\operatorname{csch}^{-1}(cx)\right)}{3e^2\left(d+ex^2\right)^{3/2}} - \frac{a+b\operatorname{csch}^{-1}(cx)}{e^2\sqrt{d+ex^2}} + \frac{(2bcx)}{}$$

$$= -\frac{bcx\sqrt{-1-c^2x^2}}{3\left(c^2d-e\right)e\sqrt{-c^2x^2}\sqrt{d+ex^2}} + \frac{d\left(a+b\operatorname{csch}^{-1}(cx)\right)}{3e^2\left(d+ex^2\right)^{3/2}} - \frac{a+b\operatorname{csch}^{-1}(cx)}{e^2\sqrt{d+ex^2}} - \frac{2bcx\,\mathrm{ta}}{3}$$

**Mathematica [A]** time = 0.30, size = 201, normalized size = 1.19

$$\frac{a\left(c^2d-e\right)\left(2d+3ex^2\right)+bcex\sqrt{\frac{1}{c^2x^2}+1}\left(d+ex^2\right)+b\left(c^2d-e\right)\operatorname{csch}^{-1}(cx)\left(2d+3ex^2\right)}{3e^2\left(e-c^2d\right)\left(d+ex^2\right)^{3/2}}+\frac{2bcx\sqrt{\frac{1}{c^2x^2}+1}\sqrt{-d-ex}}{3\sqrt{d}\,e^2\sqrt{c^2x^2+}}$$

Antiderivative was successfully verified.

```
[In] Integrate[(x^3*(a + b*ArcCsch[c*x]))/(d + e*x^2)^(5/2),x]
```

```
[Out] (b*c*e*Sqrt[1 + 1/(c^2*x^2)]*x*(d + e*x^2) + a*(c^2*d - e)*(2*d + 3*e*x^2)
+ b*(c^2*d - e)*(2*d + 3*e*x^2)*ArcCsch[c*x])/(3*e^2*(-(c^2*d) + e)*(d + e*
x^2)^(3/2)) + (2*b*c*Sqrt[1 + 1/(c^2*x^2)]*x*Sqrt[-d - e*x^2]*ArcTan[(Sqrt[
d]*Sqrt[1 + c^2*x^2])/Sqrt[-d - e*x^2]])/(3*Sqrt[d]*e^2*Sqrt[1 + c^2*x^2]*S
qrt[d + e*x^2])
```

**fricas [B]** time = 0.94, size = 786, normalized size = 4.65

$$\left[-\frac{2\left(2\,bc^2d^3 - 2\,bd^2e + 3\left(bc^2d^2e - bde^2\right)x^2\right)\sqrt{ex^2 + d}\,\log\left(\frac{cx\sqrt{\frac{c^2x^2+1}{c^2x^2}}+1}{cx}\right) - \left(bc^2d^3 + \left(bc^2de^2 - be^3\right)x^4 - bd^2e + 2\right.}{}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^3*(a+b*arccsch(c*x))/(e*x^2+d)^(5/2),x, algorithm="fricas")
```

```
[Out] [-1/6*(2*(2*b*c^2*d^3 - 2*b*d^2*e + 3*(b*c^2*d^2*e - b*d*e^2)*x^2)*sqrt(e*x
^2 + d)*log((c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) + 1)/(c*x)) - (b*c^2*d^3 + (
b*c^2*d*e^2 - b*e^3)*x^4 - b*d^2*e + 2*(b*c^2*d^2*e - b*d*e^2)*x^2)*sqrt(d)
*log(((c^4*d^2 + 6*c^2*d*e + e^2)*x^4 + 8*(c^2*d^2 + d*e)*x^2 + 4*((c^3*d +
 c*e)*x^3 + 2*c*d*x)*sqrt(e*x^2 + d)*sqrt(d)*sqrt((c^2*x^2 + 1)/(c^2*x^2))
+ 8*d^2)/x^4) + 2*(2*a*c^2*d^3 - 2*a*d^2*e + 3*(a*c^2*d^2*e - a*d*e^2)*x^2
+ (b*c*d*e^2*x^3 + b*c*d^2*e*x)*sqrt((c^2*x^2 + 1)/(c^2*x^2)))*sqrt(e*x^2 +
 d))/(c^2*d^4*e^2 - d^3*e^3 + (c^2*d^2*e^4 - d*e^5)*x^4 + 2*(c^2*d^3*e^3 -
d^2*e^4)*x^2), -1/3*((b*c^2*d^3 + (b*c^2*d*e^2 - b*e^3)*x^4 - b*d^2*e + 2*(
b*c^2*d^2*e - b*d*e^2)*x^2)*sqrt(-d)*arctan(1/2*((c^3*d + c*e)*x^3 + 2*c*d*
x)*sqrt(e*x^2 + d)*sqrt(-d)*sqrt((c^2*x^2 + 1)/(c^2*x^2))/(c^2*d*e*x^4 + (c
^2*d^2 + d*e)*x^2 + d^2)) + (2*b*c^2*d^3 - 2*b*d^2*e + 3*(b*c^2*d^2*e - b*d
*e^2)*x^2)*sqrt(e*x^2 + d)*log((c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) + 1)/(c*x
)) + (2*a*c^2*d^3 - 2*a*d^2*e + 3*(a*c^2*d^2*e - a*d*e^2)*x^2 + (b*c*d*e^2*
x^3 + b*c*d^2*e*x)*sqrt((c^2*x^2 + 1)/(c^2*x^2)))*sqrt(e*x^2 + d))/(c^2*d^4
*e^2 - d^3*e^3 + (c^2*d^2*e^4 - d*e^5)*x^4 + 2*(c^2*d^3*e^3 - d^2*e^4)*x^2)
]
```

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

$$\int \frac{(b\,\mathrm{arcsch}\,(cx) + a)x^3}{\left(ex^2 + d\right)^{\frac{5}{2}}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^3*(a+b*arccsch(c*x))/(e*x^2+d)^(5/2),x, algorithm="giac")
```

```
[Out] integrate((b*arccsch(c*x) + a)*x^3/(e*x^2 + d)^(5/2), x)
```

**maple [F]** time = 0.45, size = 0, normalized size = 0.00

$$\int \frac{x^{3} \left(a +b \,\mathrm{arccsch}\left(c x \right)\right)}{\left(e \,x^{2}+d \right)^{\frac{5}{2}}}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^3*(a+b*arccsch(c*x))/(e*x^2+d)^(5/2),x)
```

```
[Out] int(x^3*(a+b*arccsch(c*x))/(e*x^2+d)^(5/2),x)
```

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

$$-\frac{1}{3} \, a {\left(\frac{3 \, x^{2}}{{\left(e x^{2} + d\right)}^{\frac{3}{2}} e} + \frac{2 \, d}{{\left(e x^{2} + d\right)}^{\frac{3}{2}} e^{2}}\right)} + b \int \frac{x^{3} \log\left(\sqrt{\frac{1}{c^{2} x^{2}} + 1} + \frac{1}{c x}\right)}{{\left(e x^{2} + d\right)}^{\frac{5}{2}}}\,{d x}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^3*(a+b*arccsch(c*x))/(e*x^2+d)^(5/2),x, algorithm="maxima")
```

```
[Out] -1/3*a*(3*x^2/((e*x^2 + d)^(3/2)*e) + 2*d/((e*x^2 + d)^(3/2)*e^2)) + b*inte
grate(x^3*log(sqrt(1/(c^2*x^2) + 1) + 1/(c*x))/(e*x^2 + d)^(5/2), x)
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.01

$$\int \frac{x^3\,\left(a+b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)\right)}{{\left(e\,x^2+d\right)}^{5/2}} \,d x$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((x^3*(a + b*asinh(1/(c*x))))/(d + e*x^2)^(5/2),x)
```

```
[Out] int((x^3*(a + b*asinh(1/(c*x))))/(d + e*x^2)^(5/2), 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**3*(a+b*acsch(c*x))/(e*x**2+d)**(5/2),x)
```

```
[Out] Timed out
```

# 3.158 $\int \frac{x\left(a+b\textbf{csch}^{-1}(cx)\right)}{\left(d+ex^2\right)^{5/2}}\,dx$

**Optimal**. Leaf size=144

$$-\frac{a+b\text{csch}^{-1}(cx)}{3e\left(d+ex^2\right)^{3/2}}-\frac{bcx\tan^{-1}\left(\frac{\sqrt{d+ex^2}}{\sqrt{d}\sqrt{-c^2x^2-1}}\right)}{3d^{3/2}e\sqrt{-c^2x^2}}+\frac{bcx\sqrt{-c^2x^2-1}}{3d\sqrt{-c^2x^2}\left(c^2d-e\right)\sqrt{d+ex^2}}$$

```
[Out] 1/3*(-a-b*arccsch(c*x))/e/(e*x^2+d)^(3/2)-1/3*b*c*x*arctan((e*x^2+d)^(1/2)/
d^(1/2)/(-c^2*x^2-1)^(1/2))/d^(3/2)/e/(-c^2*x^2)^(1/2)+1/3*b*c*x*(-c^2*x^2-
1)^(1/2)/d/(c^2*d-e)/(-c^2*x^2)^(1/2)/(e*x^2+d)^(1/2)
```

**Rubi [A]** time = 0.14, antiderivative size = 144, normalized size of antiderivative = 1.00, number of steps used = 5, number of rules used = 5, integrand size = 21, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.238, Rules used = {6300, 446, 96, 93, 204}

$$-\frac{a+b\text{csch}^{-1}(cx)}{3e\left(d+ex^2\right)^{3/2}}-\frac{bcx\tan^{-1}\left(\frac{\sqrt{d+ex^2}}{\sqrt{d}\sqrt{-c^2x^2-1}}\right)}{3d^{3/2}e\sqrt{-c^2x^2}}+\frac{bcx\sqrt{-c^2x^2-1}}{3d\sqrt{-c^2x^2}\left(c^2d-e\right)\sqrt{d+ex^2}}$$

Antiderivative was successfully verified.

```
[In] Int[(x*(a + b*ArcCsch[c*x]))/(d + e*x^2)^(5/2),x]
```

```
[Out] (b*c*x*Sqrt[-1 - c^2*x^2])/(3*d*(c^2*d - e)*Sqrt[-(c^2*x^2)]*Sqrt[d + e*x^2
]) - (a + b*ArcCsch[c*x])/(3*e*(d + e*x^2)^(3/2)) - (b*c*x*ArcTan[Sqrt[d +
e*x^2]/(Sqrt[d]*Sqrt[-1 - c^2*x^2])])/(3*d^(3/2)*e*Sqrt[-(c^2*x^2)])
```

Rule 93

```
Int[(((a_.) + (b_.)*(x_))^(m_)*((c_.) + (d_.)*(x_))^(n_))/((e_.) + (f_.)*(x
_)), x_Symbol] :> With[{q = Denominator[m]}, Dist[q, Subst[Int[x^(q*(m + 1)
 - 1)/(b*e - a*f - (d*e - c*f)*x^q), x], x, (a + b*x)^(1/q)/(c + d*x)^(1/q)
], x]] /; FreeQ[{a, b, c, d, e, f}, x] && EqQ[m + n + 1, 0] && RationalQ[n]
 && LtQ[-1, m, 0] && SimplerQ[a + b*x, c + d*x]
```

Rule 96

```
Int[((a_.) + (b_.)*(x_))^(m_)*((c_.) + (d_.)*(x_))^(n_.)*((e_.) + (f_.)*(x_
))^(p_.), x_Symbol] :> Simp[(b*(a + b*x)^(m + 1)*(c + d*x)^(n + 1)*(e + f*x
)^(p + 1))/((m + 1)*(b*c - a*d)*(b*e - a*f)), x] + Dist[(a*d*f*(m + 1) + b*
c*f*(n + 1) + b*d*e*(p + 1))/((m + 1)*(b*c - a*d)*(b*e - a*f)), Int[(a + b*
```

```
x)^(m + 1)*(c + d*x)^n*(e + f*x)^p, x], x] /; FreeQ[{a, b, c, d, e, f, m, n
, p}, x] && EqQ[Simplify[m + n + p + 3], 0] && (LtQ[m, -1] || SumSimplerQ[m
, 1])
```

Rule 204

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

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 6300

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))*(x_)*((d_.) + (e_.)*(x_)^2)^(p_.),
x_Symbol] :> Simp[((d + e*x^2)^(p + 1)*(a + b*ArcCsch[c*x]))/(2*e*(p + 1)),
 x] - Dist[(b*c*x)/(2*e*(p + 1)*Sqrt[-(c^2*x^2)]), Int[(d + e*x^2)^(p + 1)/
(x*Sqrt[-1 - c^2*x^2]), x], x] /; FreeQ[{a, b, c, d, e, p}, x] && NeQ[p, -1
]
```

Rubi steps

$$\int \frac{x\left(a+b\operatorname{csch}^{-1}(cx)\right)}{\left(d+ex^2\right)^{5/2}}\,dx = -\frac{a+b\operatorname{csch}^{-1}(cx)}{3e\left(d+ex^2\right)^{3/2}} + \frac{(bcx)\int \frac{1}{x\sqrt{-1-c^2x^2}\left(d+ex^2\right)^{3/2}}\,dx}{3e\sqrt{-c^2x^2}}$$

$$= -\frac{a+b\operatorname{csch}^{-1}(cx)}{3e\left(d+ex^2\right)^{3/2}} + \frac{(bcx)\,\text{Subst}\left(\int \frac{1}{x\sqrt{-1-c^2x}\,(d+ex)^{3/2}}\,dx, x, x^2\right)}{6e\sqrt{-c^2x^2}}$$

$$= \frac{bcx\sqrt{-1-c^2x^2}}{3d\left(c^2d-e\right)\sqrt{-c^2x^2}\,\sqrt{d+ex^2}} - \frac{a+b\operatorname{csch}^{-1}(cx)}{3e\left(d+ex^2\right)^{3/2}} + \frac{(bcx)\,\text{Subst}\left(\int \frac{1}{x\sqrt{-1-c^2x}\,\sqrt{d+ex}}\ \cdots\right.}{6de\sqrt{-c^2x^2}}$$

$$= \frac{bcx\sqrt{-1-c^2x^2}}{3d\left(c^2d-e\right)\sqrt{-c^2x^2}\,\sqrt{d+ex^2}} - \frac{a+b\operatorname{csch}^{-1}(cx)}{3e\left(d+ex^2\right)^{3/2}} + \frac{(bcx)\,\text{Subst}\left(\int \frac{1}{-d-x^2}\,dx, x, \frac{\sqrt{\cdots}}{\sqrt{-\cdots}}\right.}{3de\sqrt{-c^2x^2}}$$

$$= \frac{bcx\sqrt{-1-c^2x^2}}{3d\left(c^2d-e\right)\sqrt{-c^2x^2}\,\sqrt{d+ex^2}} - \frac{a+b\operatorname{csch}^{-1}(cx)}{3e\left(d+ex^2\right)^{3/2}} - \frac{bcx\tan^{-1}\left(\frac{\sqrt{d+ex^2}}{\sqrt{d}\,\sqrt{-1-c^2x^2}}\right)}{3d^{3/2}e\sqrt{-c^2x^2}}$$

**Mathematica** [A] time = 0.23, size = 185, normalized size = 1.28

$$\frac{ad\left(e-c^2d\right)+bcex\sqrt{\frac{1}{c^2x^2}+1}\left(d+ex^2\right)+bd\left(e-c^2d\right)\operatorname{csch}^{-1}(cx)}{3de\left(c^2d-e\right)\left(d+ex^2\right)^{3/2}}+\frac{bcx\sqrt{\frac{1}{c^2x^2}+1}\,\sqrt{-d-ex^2}\,\tan^{-1}\left(\frac{\sqrt{d}\,\sqrt{c^2x^2+1}}{\sqrt{-d-ex^2}}\right)}{3d^{3/2}e\sqrt{c^2x^2+1}\,\sqrt{d+ex^2}}$$

Antiderivative was successfully verified.

```
[In] Integrate[(x*(a + b*ArcCsch[c*x]))/(d + e*x^2)^(5/2),x]
```

```
[Out] (a*d*(-(c^2*d) + e) + b*c*e*Sqrt[1 + 1/(c^2*x^2)]*x*(d + e*x^2) + b*d*(-(c^
2*d) + e)*ArcCsch[c*x])/(3*d*(c^2*d - e)*e*(d + e*x^2)^(3/2)) + (b*c*Sqrt[1
 + 1/(c^2*x^2)]*x*Sqrt[-d - e*x^2]*ArcTan[(Sqrt[d]*Sqrt[1 + c^2*x^2])/Sqrt[
-d - e*x^2]])/(3*d^(3/2)*e*Sqrt[1 + c^2*x^2]*Sqrt[d + e*x^2])
```

**fricas** [B] time = 0.66, size = 698, normalized size = 4.85

$$\left[-\frac{4\left(bc^2d^3-bd^2e\right)\sqrt{ex^2+d}\,\log\left(\frac{cx\sqrt{\frac{c^2x^2+1}{c^2x^2}}+1}{cx}\right)-\left(bc^2d^3+\left(bc^2de^2-be^3\right)x^4-bd^2e+2\left(bc^2d^2e-bde^2\right)x^2\right)\sqrt{d}\,\log\cdots}{12\left(c^2d^5e-d^4e^2+\left(\cdots\right.\right.}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*(a+b*arccsch(c*x))/(e*x^2+d)^(5/2),x, algorithm="fricas")
```

```
[Out] [-1/12*(4*(b*c^2*d^3 - b*d^2*e)*sqrt(e*x^2 + d)*log((c*x*sqrt((c^2*x^2 + 1)
/(c^2*x^2)) + 1)/(c*x)) - (b*c^2*d^3 + (b*c^2*d*e^2 - b*e^3)*x^4 - b*d^2*e
+ 2*(b*c^2*d^2*e - b*d*e^2)*x^2)*sqrt(d)*log(((c^4*d^2 + 6*c^2*d*e + e^2)*x
^4 + 8*(c^2*d^2 + d*e)*x^2 + 4*((c^3*d + c*e)*x^3 + 2*c*d*x)*sqrt(e*x^2 + d
)*sqrt(d)*sqrt((c^2*x^2 + 1)/(c^2*x^2)) + 8*d^2)/x^4) + 4*(a*c^2*d^3 - a*d^
2*e - (b*c*d*e^2*x^3 + b*c*d^2*e*x)*sqrt((c^2*x^2 + 1)/(c^2*x^2)))*sqrt(e*x
^2 + d))/(c^2*d^5*e - d^4*e^2 + (c^2*d^3*e^3 - d^2*e^4)*x^4 + 2*(c^2*d^4*e^
2 - d^3*e^3)*x^2), -1/6*((b*c^2*d^3 + (b*c^2*d*e^2 - b*e^3)*x^4 - b*d^2*e +
 2*(b*c^2*d^2*e - b*d*e^2)*x^2)*sqrt(-d)*arctan(1/2*((c^3*d + c*e)*x^3 + 2*
c*d*x)*sqrt(e*x^2 + d)*sqrt(-d)*sqrt((c^2*x^2 + 1)/(c^2*x^2))/(c^2*d*e*x^4
+ (c^2*d^2 + d*e)*x^2 + d^2)) + 2*(b*c^2*d^3 - b*d^2*e)*sqrt(e*x^2 + d)*log
((c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) + 1)/(c*x)) + 2*(a*c^2*d^3 - a*d^2*e -
(b*c*d*e^2*x^3 + b*c*d^2*e*x)*sqrt((c^2*x^2 + 1)/(c^2*x^2)))*sqrt(e*x^2 + d
))/(c^2*d^5*e - d^4*e^2 + (c^2*d^3*e^3 - d^2*e^4)*x^4 + 2*(c^2*d^4*e^2 - d^
3*e^3)*x^2)]
```

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

$$\int \frac{(b \operatorname{arcsch}(cx) + a)x}{\left(ex^2 + d\right)^{\frac{5}{2}}}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*(a+b*arccsch(c*x))/(e*x^2+d)^(5/2),x, algorithm="giac")
```

```
[Out] integrate((b*arccsch(c*x) + a)*x/(e*x^2 + d)^(5/2), x)
```

**maple [F]** time = 0.43, size = 0, normalized size = 0.00

$$\int \frac{x\left(a + b \operatorname{arccsch}(cx)\right)}{\left(e\, x^2 + d\right)^{\frac{5}{2}}}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x*(a+b*arccsch(c*x))/(e*x^2+d)^(5/2),x)
```

```
[Out] int(x*(a+b*arccsch(c*x))/(e*x^2+d)^(5/2),x)
```

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

$$b \int \frac{x \log\left(\sqrt{\frac{1}{c^2x^2} + 1} + \frac{1}{cx}\right)}{\left(ex^2 + d\right)^{\frac{5}{2}}}\, dx - \frac{a}{3\left(ex^2 + d\right)^{\frac{3}{2}} e}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x*(a+b*arccsch(c*x))/(e*x^2+d)^(5/2),x, algorithm="maxima")
```

```
[Out] b*integrate(x*log(sqrt(1/(c^2*x^2) + 1) + 1/(c*x))/(e*x^2 + d)^(5/2), x) -
1/3*a/((e*x^2 + d)^(3/2)*e)
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.01

$$\int \frac{x\left(a+b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)\right)}{\left(e\,x^2+d\right)^{5/2}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((x*(a + b*asinh(1/(c*x))))/(d + e*x^2)^(5/2),x)
```

```
[Out] int((x*(a + b*asinh(1/(c*x))))/(d + e*x^2)^(5/2), 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*acsch(c*x))/(e*x**2+d)**(5/2),x)
```

```
[Out] Timed out
```

## 3.159 $\int \frac{a+b\text{csch}^{-1}(cx)}{x\left(d+ex^2\right)^{5/2}}\,dx$

**Optimal**. Leaf size=26

$$\text{Int}\left(\frac{a+b\text{csch}^{-1}(cx)}{x\left(d+ex^2\right)^{5/2}},x\right)$$

```
[Out] Unintegrable((a+b*arccsch(c*x))/x/(e*x^2+d)^(5/2),x)
```

**Rubi [A]** time = 0.12, 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 = {}

$$\int \frac{a+b\text{csch}^{-1}(cx)}{x\left(d+ex^2\right)^{5/2}}\,dx$$

Verification is Not applicable to the result.

```
[In] Int[(a + b*ArcCsch[c*x])/(x*(d + e*x^2)^(5/2)),x]
```

```
[Out] Defer[Int][(a + b*ArcCsch[c*x])/(x*(d + e*x^2)^(5/2)), x]
```

Rubi steps

$$\int \frac{a+b\text{csch}^{-1}(cx)}{x\left(d+ex^2\right)^{5/2}}\,dx=\int \frac{a+b\text{csch}^{-1}(cx)}{x\left(d+ex^2\right)^{5/2}}\,dx$$

**Mathematica [A]** time = 45.84, size = 0, normalized size = 0.00

$$\int \frac{a+b\text{csch}^{-1}(cx)}{x\left(d+ex^2\right)^{5/2}}\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[(a + b*ArcCsch[c*x])/(x*(d + e*x^2)^(5/2)),x]
```

```
[Out] Integrate[(a + b*ArcCsch[c*x])/(x*(d + e*x^2)^(5/2)), x]
```

**fricas [A]** time = 0.69, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{\sqrt{ex^2+d}\,(b\,\text{arcsch}\,(cx)+a)}{e^3x^7+3\,de^2x^5+3\,d^2ex^3+d^3x},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

[In] integrate((a+b*arccsch(c*x))/x/(e*x^2+d)^(5/2),x, algorithm="fricas")

[Out] integral(sqrt(e*x^2 + d)*(b*arccsch(c*x) + a)/(e^3*x^7 + 3*d*e^2*x^5 + 3*d^2*e*x^3 + d^3*x), x)

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

$$\int \frac{b \operatorname{arcsch}(cx) + a}{\left(ex^2 + d\right)^{\frac{5}{2}} x}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

[In] integrate((a+b*arccsch(c*x))/x/(e*x^2+d)^(5/2),x, algorithm="giac")

[Out] integrate((b*arccsch(c*x) + a)/((e*x^2 + d)^(5/2)*x), x)

**maple** [A] time = 0.50, size = 0, normalized size = 0.00

$$\int \frac{a + b \operatorname{arccsch}(cx)}{x \left(e x^2 + d\right)^{\frac{5}{2}}}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

[In] int((a+b*arccsch(c*x))/x/(e*x^2+d)^(5/2),x)

[Out] int((a+b*arccsch(c*x))/x/(e*x^2+d)^(5/2),x)

**maxima** [A] time = 0.00, size = 0, normalized size = 0.00

$$-\frac{1}{3} a \left( \frac{3 \operatorname{arsinh}\left(\frac{d}{\sqrt{de}\,|x|}\right)}{d^{\frac{5}{2}}} - \frac{3}{\sqrt{ex^2 + d}\, d^2} - \frac{1}{\left(ex^2 + d\right)^{\frac{3}{2}} d} \right) + b \int \frac{\log\left(\sqrt{\frac{1}{c^2x^2} + 1} + \frac{1}{cx}\right)}{\left(ex^2 + d\right)^{\frac{5}{2}} x}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

[In] integrate((a+b*arccsch(c*x))/x/(e*x^2+d)^(5/2),x, algorithm="maxima")

[Out] -1/3*a*(3*arcsinh(d/(sqrt(d*e)*abs(x)))/d^(5/2) - 3/(sqrt(e*x^2 + d)*d^2) - 1/((e*x^2 + d)^(3/2)*d)) + b*integrate(log(sqrt(1/(c^2*x^2) + 1) + 1/(c*x))/((e*x^2 + d)^(5/2)*x), x)

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

$$\int \frac{a + b \operatorname{asinh}\left(\frac{1}{c\,x}\right)}{x \left(e\,x^2 + d\right)^{5/2}}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a + b*asinh(1/(c*x)))/(x*(d + e*x^2)^(5/2)),x)
[Out] int((a + b*asinh(1/(c*x)))/(x*(d + e*x^2)^(5/2)), 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*acsch(c*x))/x/(e*x**2+d)**(5/2),x)
[Out] Timed out
```

# 3.160 $\int \frac{a+b\text{csch}^{-1}(cx)}{x^3(d+ex^2)^{5/2}}\,dx$

**Optimal**. Leaf size=26

$$\text{Int}\left(\frac{a+b\text{csch}^{-1}(cx)}{x^3\left(d+ex^2\right)^{5/2}},x\right)$$

```
[Out] Unintegrable((a+b*arccsch(c*x))/x^3/(e*x^2+d)^(5/2),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 = {}

$$\int \frac{a+b\text{csch}^{-1}(cx)}{x^3\left(d+ex^2\right)^{5/2}}\,dx$$

Verification is Not applicable to the result.

```
[In] Int[(a + b*ArcCsch[c*x])/(x^3*(d + e*x^2)^(5/2)),x]
```

```
[Out] Defer[Int][(a + b*ArcCsch[c*x])/(x^3*(d + e*x^2)^(5/2)), x]
```

Rubi steps

$$\int \frac{a+b\text{csch}^{-1}(cx)}{x^3\left(d+ex^2\right)^{5/2}}\,dx=\int \frac{a+b\text{csch}^{-1}(cx)}{x^3\left(d+ex^2\right)^{5/2}}\,dx$$

**Mathematica [A]** time = 59.84, size = 0, normalized size = 0.00

$$\int \frac{a+b\text{csch}^{-1}(cx)}{x^3\left(d+ex^2\right)^{5/2}}\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[(a + b*ArcCsch[c*x])/(x^3*(d + e*x^2)^(5/2)),x]
```

```
[Out] Integrate[(a + b*ArcCsch[c*x])/(x^3*(d + e*x^2)^(5/2)), x]
```

**fricas [A]** time = 0.76, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{\sqrt{ex^2+d}\,(b\,\text{arcsch}\,(cx)+a)}{e^3x^9+3\,de^2x^7+3\,d^2ex^5+d^3x^3},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))/x^3/(e*x^2+d)^(5/2),x, algorithm="fricas")
```

```
[Out] integral(sqrt(e*x^2 + d)*(b*arccsch(c*x) + a)/(e^3*x^9 + 3*d*e^2*x^7 + 3*d^
2*e*x^5 + d^3*x^3), x)
```

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

$$\int \frac{b\,\mathrm{arcsch}\,(cx) + a}{\left(ex^2 + d\right)^{\frac{5}{2}} x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))/x^3/(e*x^2+d)^(5/2),x, algorithm="giac")
```

```
[Out] integrate((b*arccsch(c*x) + a)/((e*x^2 + d)^(5/2)*x^3), x)
```

**maple [A]** time = 0.51, size = 0, normalized size = 0.00

$$\int \frac{a + b\,\mathrm{arccsch}\,(cx)}{x^3 \left(e\,x^2 + d\right)^{\frac{5}{2}}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a+b*arccsch(c*x))/x^3/(e*x^2+d)^(5/2),x)
```

```
[Out] int((a+b*arccsch(c*x))/x^3/(e*x^2+d)^(5/2),x)
```

**maxima [A]** time = 0.00, size = 0, normalized size = 0.00

$$\frac{1}{6}\,a\left(\frac{15\,e\,\mathrm{arsinh}\left(\frac{d}{\sqrt{de}\,|x|}\right)}{d^{\frac{7}{2}}} - \frac{15\,e}{\sqrt{ex^2 + d}\,d^3} - \frac{5\,e}{\left(ex^2 + d\right)^{\frac{3}{2}} d^2} - \frac{3}{\left(ex^2 + d\right)^{\frac{3}{2}} dx^2}\right) + b\int \frac{\log\left(\sqrt{\frac{1}{c^2x^2} + 1} + \frac{1}{cx}\right)}{\left(ex^2 + d\right)^{\frac{5}{2}} x^3}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))/x^3/(e*x^2+d)^(5/2),x, algorithm="maxima")
```

```
[Out] 1/6*a*(15*e*arcsinh(d/(sqrt(d*e)*abs(x)))/d^(7/2) - 15*e/(sqrt(e*x^2 + d)*d
^3) - 5*e/((e*x^2 + d)^(3/2)*d^2) - 3/((e*x^2 + d)^(3/2)*d*x^2)) + b*integr
ate(log(sqrt(1/(c^2*x^2) + 1) + 1/(c*x))/((e*x^2 + d)^(5/2)*x^3), x)
```

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

$$\int \frac{a + b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)}{x^3 \left(e\,x^2 + d\right)^{5/2}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a + b*asinh(1/(c*x)))/(x^3*(d + e*x^2)^(5/2)),x)
```

```
[Out] int((a + b*asinh(1/(c*x)))/(x^3*(d + e*x^2)^(5/2)), 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*acsch(c*x))/x**3/(e*x**2+d)**(5/2),x)
```

```
[Out] Timed out
```

# 3.161 $\int \frac{x^6\left(a+b\text{csch}^{-1}(cx)\right)}{\left(d+ex^2\right)^{5/2}}\,dx$

**Optimal**. Leaf size=26

$$\text{Int}\left(\frac{x^6\left(a+b\text{csch}^{-1}(cx)\right)}{\left(d+ex^2\right)^{5/2}},x\right)$$

```
[Out] Unintegrable(x^6*(a+b*arccsch(c*x))/(e*x^2+d)^(5/2),x)
```

**Rubi** [A] time = 0.13, 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 = {}

$$\int \frac{x^6\left(a+b\text{csch}^{-1}(cx)\right)}{\left(d+ex^2\right)^{5/2}}\,dx$$

Verification is Not applicable to the result.

```
[In] Int[(x^6*(a + b*ArcCsch[c*x]))/(d + e*x^2)^(5/2),x]
[Out] Defer[Int][(x^6*(a + b*ArcCsch[c*x]))/(d + e*x^2)^(5/2), x]
```

Rubi steps

$$\int \frac{x^6\left(a+b\text{csch}^{-1}(cx)\right)}{\left(d+ex^2\right)^{5/2}}\,dx=\int \frac{x^6\left(a+b\text{csch}^{-1}(cx)\right)}{\left(d+ex^2\right)^{5/2}}\,dx$$

**Mathematica** [A] time = 13.40, size = 0, normalized size = 0.00

$$\int \frac{x^6\left(a+b\text{csch}^{-1}(cx)\right)}{\left(d+ex^2\right)^{5/2}}\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[(x^6*(a + b*ArcCsch[c*x]))/(d + e*x^2)^(5/2),x]
[Out] Integrate[(x^6*(a + b*ArcCsch[c*x]))/(d + e*x^2)^(5/2), x]
```

**fricas** [A] time = 0.79, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{\left(bx^6\,\text{arcsch}\,(cx)+ax^6\right)\sqrt{ex^2+d}}{e^3x^6+3\,de^2x^4+3\,d^2ex^2+d^3},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^6*(a+b*arccsch(c*x))/(e*x^2+d)^(5/2),x, algorithm="fricas")
```

```
[Out] integral((b*x^6*arccsch(c*x) + a*x^6)*sqrt(e*x^2 + d)/(e^3*x^6 + 3*d*e^2*x^
4 + 3*d^2*e*x^2 + d^3), x)
```

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

$$\int \frac{(b\,\mathrm{arcsch}\,(cx) + a)x^6}{\left(ex^2 + d\right)^{\frac{5}{2}}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^6*(a+b*arccsch(c*x))/(e*x^2+d)^(5/2),x, algorithm="giac")
```

```
[Out] integrate((b*arccsch(c*x) + a)*x^6/(e*x^2 + d)^(5/2), x)
```

**maple [A]** time = 0.48, size = 0, normalized size = 0.00

$$\int \frac{x^6\,(a + b\,\mathrm{arccsch}\,(cx))}{\left(e\,x^2 + d\right)^{\frac{5}{2}}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^6*(a+b*arccsch(c*x))/(e*x^2+d)^(5/2),x)
```

```
[Out] int(x^6*(a+b*arccsch(c*x))/(e*x^2+d)^(5/2),x)
```

**maxima [A]** time = 0.00, size = 0, normalized size = 0.00

$$\frac{1}{6}\left(\frac{3\,x^5}{\left(ex^2 + d\right)^{\frac{3}{2}}e} + \frac{5\,dx\left(\frac{3\,x^2}{\left(ex^2+d\right)^{\frac{3}{2}}e} + \frac{2\,d}{\left(ex^2+d\right)^{\frac{3}{2}}e^2}\right)}{e} + \frac{5\,dx}{\sqrt{ex^2 + d}\,e^3} - \frac{15\,d\,\mathrm{arsinh}\left(\frac{ex}{\sqrt{de}}\right)}{e^{\frac{7}{2}}}\right)a + b\int \frac{x^6 \log\left(\sqrt{\frac{1}{c^2x^2} + 1} + \right.}{\left(ex^2 + d\right)^{\frac{5}{2}}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^6*(a+b*arccsch(c*x))/(e*x^2+d)^(5/2),x, algorithm="maxima")
```

```
[Out] 1/6*(3*x^5/((e*x^2 + d)^(3/2)*e) + 5*d*x*(3*x^2/((e*x^2 + d)^(3/2)*e) + 2*d
/((e*x^2 + d)^(3/2)*e^2))/e + 5*d*x/(sqrt(e*x^2 + d)*e^3) - 15*d*arcsinh(e*
x/sqrt(d*e))/e^(7/2))*a + b*integrate(x^6*log(sqrt(1/(c^2*x^2) + 1) + 1/(c*
x))/(e*x^2 + d)^(5/2), x)
```

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

$$\int \frac{x^6\,\left(a+b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)\right)}{{\left(e\,x^2+d\right)}^{5/2}} \,d x$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((x^6*(a + b*asinh(1/(c*x))))/(d + e*x^2)^(5/2),x)
[Out] int((x^6*(a + b*asinh(1/(c*x))))/(d + e*x^2)^(5/2), 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**6*(a+b*acsch(c*x))/(e*x**2+d)**(5/2),x)
[Out] Timed out
```

## 3.162 $\int \frac{x^4(a+b\text{csch}^{-1}(cx))}{(d+ex^2)^{5/2}}\,dx$

**Optimal**. Leaf size=26

$$\text{Int}\left(\frac{x^4\left(a+b\text{csch}^{-1}(cx)\right)}{\left(d+ex^2\right)^{5/2}},x\right)$$

```
[Out] Unintegrable(x^4*(a+b*arccsch(c*x))/(e*x^2+d)^(5/2),x)
```

**Rubi [A]** time = 0.11, 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 = {}

$$\int \frac{x^4\left(a+b\text{csch}^{-1}(cx)\right)}{\left(d+ex^2\right)^{5/2}}\,dx$$

Verification is Not applicable to the result.

```
[In] Int[(x^4*(a + b*ArcCsch[c*x]))/(d + e*x^2)^(5/2),x]
```

```
[Out] Defer[Int][(x^4*(a + b*ArcCsch[c*x]))/(d + e*x^2)^(5/2), x]
```

Rubi steps

$$\int \frac{x^4\left(a+b\text{csch}^{-1}(cx)\right)}{\left(d+ex^2\right)^{5/2}}\,dx=\int \frac{x^4\left(a+b\text{csch}^{-1}(cx)\right)}{\left(d+ex^2\right)^{5/2}}\,dx$$

**Mathematica [A]** time = 12.60, size = 0, normalized size = 0.00

$$\int \frac{x^4\left(a+b\text{csch}^{-1}(cx)\right)}{\left(d+ex^2\right)^{5/2}}\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[(x^4*(a + b*ArcCsch[c*x]))/(d + e*x^2)^(5/2),x]
```

```
[Out] Integrate[(x^4*(a + b*ArcCsch[c*x]))/(d + e*x^2)^(5/2), x]
```

**fricas [A]** time = 0.62, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{\left(bx^4\,\text{arcsch}\,(cx)+ax^4\right)\sqrt{ex^2+d}}{e^3x^6+3\,de^2x^4+3\,d^2ex^2+d^3},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^4*(a+b*arccsch(c*x))/(e*x^2+d)^(5/2),x, algorithm="fricas")
```

```
[Out] integral((b*x^4*arccsch(c*x) + a*x^4)*sqrt(e*x^2 + d)/(e^3*x^6 + 3*d*e^2*x^
4 + 3*d^2*e*x^2 + d^3), x)
```

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

$$\int \frac{(b \operatorname{arcsch}(cx) + a)x^4}{\left(ex^2 + d\right)^{\frac{5}{2}}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^4*(a+b*arccsch(c*x))/(e*x^2+d)^(5/2),x, algorithm="giac")
```

```
[Out] integrate((b*arccsch(c*x) + a)*x^4/(e*x^2 + d)^(5/2), x)
```

**maple** [A] time = 0.44, size = 0, normalized size = 0.00

$$\int \frac{x^4\left(a + b \operatorname{arccsch}(cx)\right)}{\left(e\,x^2 + d\right)^{\frac{5}{2}}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^4*(a+b*arccsch(c*x))/(e*x^2+d)^(5/2),x)
```

```
[Out] int(x^4*(a+b*arccsch(c*x))/(e*x^2+d)^(5/2),x)
```

**maxima** [A] time = 0.00, size = 0, normalized size = 0.00

$$-\frac{1}{3}\left(x\left(\frac{3\,x^2}{\left(ex^2+d\right)^{\frac{3}{2}}e} + \frac{2\,d}{\left(ex^2+d\right)^{\frac{3}{2}}e^2}\right) + \frac{x}{\sqrt{ex^2+d}\,e^2} - \frac{3\,\operatorname{arsinh}\left(\frac{ex}{\sqrt{de}}\right)}{e^{\frac{5}{2}}}\right)a + b\int \frac{x^4 \log\left(\sqrt{\frac{1}{c^2x^2}+1} + \frac{1}{cx}\right)}{\left(ex^2+d\right)^{\frac{5}{2}}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^4*(a+b*arccsch(c*x))/(e*x^2+d)^(5/2),x, algorithm="maxima")
```

```
[Out] -1/3*(x*(3*x^2/((e*x^2 + d)^(3/2)*e) + 2*d/((e*x^2 + d)^(3/2)*e^2)) + x/(sq
rt(e*x^2 + d)*e^2) - 3*arcsinh(e*x/sqrt(d*e))/e^(5/2))*a + b*integrate(x^4*
log(sqrt(1/(c^2*x^2) + 1) + 1/(c*x))/(e*x^2 + d)^(5/2), x)
```

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

$$\int \frac{x^4\left(a + b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)\right)}{\left(e\,x^2 + d\right)^{5/2}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((x^4*(a + b*asinh(1/(c*x))))/(d + e*x^2)^(5/2),x)
```

```
[Out] int((x^4*(a + b*asinh(1/(c*x))))/(d + e*x^2)^(5/2), 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**4*(a+b*acsch(c*x))/(e*x**2+d)**(5/2),x)
```

```
[Out] Timed out
```

# 3.163 $\int \frac{x^2\left(a+b\,\mathbf{csch}^{-1}(cx)\right)}{\left(d+ex^2\right)^{5/2}}\,dx$

**Optimal**. Leaf size=359

$$\frac{x^3\left(a+b\operatorname{csch}^{-1}(cx)\right)}{3d\left(d+ex^2\right)^{3/2}}+\frac{bx\sqrt{d+ex^2}\,F\left(\tan^{-1}(cx)|1-\frac{e}{c^2d}\right)}{3d^2\sqrt{-c^2x^2}\,\sqrt{-c^2x^2-1}\,\left(c^2d-e\right)\sqrt{\frac{d+ex^2}{d\left(c^2x^2+1\right)}}}+\frac{bcx^2\sqrt{-c^2x^2-1}}{3d\sqrt{-c^2x^2}\,\left(c^2d-e\right)\sqrt{d+ex^2}}-\frac{bc^2x\sqrt{d}}{3de\sqrt{-c^2x^2}}$$

```
[Out] 1/3*x^3*(a+b*arccsch(c*x))/d/(e*x^2+d)^(3/2)+1/3*b*c*x^2*(-c^2*x^2-1)^(1/2)
/d/(c^2*d-e)/(-c^2*x^2)^(1/2)/(e*x^2+d)^(1/2)+1/3*b*c^3*x^2*(e*x^2+d)^(1/2)
/d/(c^2*d-e)/e/(-c^2*x^2)^(1/2)/(-c^2*x^2-1)^(1/2)-1/3*b*c^2*x*(1/(c^2*x^2+
1))^(1/2)*(c^2*x^2+1)^(1/2)*EllipticE(c*x/(c^2*x^2+1)^(1/2),(1-e/c^2/d)^(1/
2))*(e*x^2+d)^(1/2)/d/(c^2*d-e)/e/(-c^2*x^2)^(1/2)/(-c^2*x^2-1)^(1/2)/((e*x
^2+d)/d/(c^2*x^2+1))^(1/2)+1/3*b*x*(1/(c^2*x^2+1))^(1/2)*(c^2*x^2+1)^(1/2)*
EllipticF(c*x/(c^2*x^2+1)^(1/2),(1-e/c^2/d)^(1/2))*(e*x^2+d)^(1/2)/d^2/(c^2
*d-e)/(-c^2*x^2)^(1/2)/(-c^2*x^2-1)^(1/2)/((e*x^2+d)/d/(c^2*x^2+1))^(1/2)
```

**Rubi [A]** time = 0.31, antiderivative size = 359, normalized size of antiderivative = 1.00, number of steps used = 7, number of rules used = 8, integrand size = 23, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.348, Rules used = {264, 6302, 12, 471, 422, 418, 492, 411}

$$\frac{x^3\left(a+b\operatorname{csch}^{-1}(cx)\right)}{3d\left(d+ex^2\right)^{3/2}}+\frac{bx\sqrt{d+ex^2}\,F\left(\tan^{-1}(cx)|1-\frac{e}{c^2d}\right)}{3d^2\sqrt{-c^2x^2}\,\sqrt{-c^2x^2-1}\,\left(c^2d-e\right)\sqrt{\frac{d+ex^2}{d\left(c^2x^2+1\right)}}}+\frac{bc^3x^2\sqrt{d+ex^2}}{3de\sqrt{-c^2x^2}\,\sqrt{-c^2x^2-1}\,\left(c^2d-e\right)}+\frac{bc}{3d\sqrt{-c^2}}$$

Antiderivative was successfully verified.

```
[In] Int[(x^2*(a + b*ArcCsch[c*x]))/(d + e*x^2)^(5/2),x]
```

```
[Out] (b*c*x^2*Sqrt[-1 - c^2*x^2])/(3*d*(c^2*d - e)*Sqrt[-(c^2*x^2)]*Sqrt[d + e*x
^2]) + (b*c^3*x^2*Sqrt[d + e*x^2])/(3*d*(c^2*d - e)*e*Sqrt[-(c^2*x^2)]*Sqrt
[-1 - c^2*x^2]) + (x^3*(a + b*ArcCsch[c*x]))/(3*d*(d + e*x^2)^(3/2)) - (b*c
^2*x*Sqrt[d + e*x^2]*EllipticE[ArcTan[c*x], 1 - e/(c^2*d)])/(3*d*(c^2*d - e
)*e*Sqrt[-(c^2*x^2)]*Sqrt[-1 - c^2*x^2]*Sqrt[(d + e*x^2)/(d*(1 + c^2*x^2))]
) + (b*x*Sqrt[d + e*x^2]*EllipticF[ArcTan[c*x], 1 - e/(c^2*d)])/(3*d^2*(c^2
*d - e)*Sqrt[-(c^2*x^2)]*Sqrt[-1 - c^2*x^2]*Sqrt[(d + e*x^2)/(d*(1 + c^2*x^
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 264

```
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] /; FreeQ[{a, b, c, m, n,
 p}, x] && EqQ[(m + 1)/n + p + 1, 0] && NeQ[m, -1]
```

Rule 411

```
Int[Sqrt[(a_) + (b_.)*(x_)^2]/((c_) + (d_.)*(x_)^2)^(3/2), x_Symbol] :> Sim
p[(Sqrt[a + b*x^2]*EllipticE[ArcTan[Rt[d/c, 2]*x], 1 - (b*c)/(a*d)])/(c*Rt[
d/c, 2]*Sqrt[c + d*x^2]*Sqrt[(c*(a + b*x^2))/(a*(c + d*x^2))]), x] /; FreeQ
[{a, b, c, d}, x] && PosQ[b/a] && PosQ[d/c]
```

Rule 418

```
Int[1/(Sqrt[(a_) + (b_.)*(x_)^2]*Sqrt[(c_) + (d_.)*(x_)^2]), x_Symbol] :> S
imp[(Sqrt[a + b*x^2]*EllipticF[ArcTan[Rt[d/c, 2]*x], 1 - (b*c)/(a*d)])/(a*R
t[d/c, 2]*Sqrt[c + d*x^2]*Sqrt[(c*(a + b*x^2))/(a*(c + d*x^2))]), x] /; Fre
eQ[{a, b, c, d}, x] && PosQ[d/c] && PosQ[b/a] &&  !SimplerSqrtQ[b/a, d/c]
```

Rule 422

```
Int[Sqrt[(a_) + (b_.)*(x_)^2]/Sqrt[(c_) + (d_.)*(x_)^2], x_Symbol] :> Dist[
a, Int[1/(Sqrt[a + b*x^2]*Sqrt[c + d*x^2]), x], x] + Dist[b, Int[x^2/(Sqrt[
a + b*x^2]*Sqrt[c + d*x^2]), x], x] /; FreeQ[{a, b, c, d}, x] && PosQ[d/c]
&& PosQ[b/a]
```

Rule 471

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

Rule 492

```
Int[(x_)^2/(Sqrt[(a_) + (b_.)*(x_)^2]*Sqrt[(c_) + (d_.)*(x_)^2]), x_Symbol]
 :> Simp[(x*Sqrt[a + b*x^2])/(b*Sqrt[c + d*x^2]), x] - Dist[c/b, Int[Sqrt[a
 + b*x^2]/(c + d*x^2)^(3/2), x], x] /; FreeQ[{a, b, c, d}, x] && NeQ[b*c -
a*d, 0] && PosQ[b/a] && PosQ[d/c] &&  !SimplerSqrtQ[b/a, d/c]
```

Rule 6302

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))*((f_.)*(x_))^(m_.)*((d_.) + (e_.)*(
x_)^2)^(p_.), x_Symbol] :> With[{u = IntHide[(f*x)^m*(d + e*x^2)^p, x]}, Di
st[a + b*ArcCsch[c*x], u, x] - Dist[(b*c*x)/Sqrt[-(c^2*x^2)], Int[SimplifyI
ntegrand[u/(x*Sqrt[-1 - c^2*x^2]), x], x], x]] /; FreeQ[{a, b, c, d, e, f,
m, p}, x] && ((IGtQ[p, 0] &&  !(ILtQ[(m - 1)/2, 0] && GtQ[m + 2*p + 3, 0]))
 || (IGtQ[(m + 1)/2, 0] &&  !(ILtQ[p, 0] && GtQ[m + 2*p + 3, 0])) || (ILtQ[
(m + 2*p + 1)/2, 0] &&  !ILtQ[(m - 1)/2, 0]))
```

Rubi steps

$$\int \frac{x^2\left(a+b\text{csch}^{-1}(cx)\right)}{\left(d+ex^2\right)^{5/2}}\,dx = \frac{x^3\left(a+b\text{csch}^{-1}(cx)\right)}{3d\left(d+ex^2\right)^{3/2}} - \frac{(bcx)\int \frac{x^2}{3d\sqrt{-1-c^2x^2}\left(d+ex^2\right)^{3/2}}\,dx}{\sqrt{-c^2x^2}}$$

$$= \frac{x^3\left(a+b\text{csch}^{-1}(cx)\right)}{3d\left(d+ex^2\right)^{3/2}} - \frac{(bcx)\int \frac{x^2}{\sqrt{-1-c^2x^2}\left(d+ex^2\right)^{3/2}}\,dx}{3d\sqrt{-c^2x^2}}$$

$$= \frac{bcx^2\sqrt{-1-c^2x^2}}{3d\left(c^2d-e\right)\sqrt{-c^2x^2}\sqrt{d+ex^2}} + \frac{x^3\left(a+b\text{csch}^{-1}(cx)\right)}{3d\left(d+ex^2\right)^{3/2}} + \frac{(bcx)\int \frac{\sqrt{-1-c^2x^2}}{\sqrt{d+ex^2}}\,dx}{3d\left(-c^2d+e\right)\sqrt{-c^2x^2}}$$

$$= \frac{bcx^2\sqrt{-1-c^2x^2}}{3d\left(c^2d-e\right)\sqrt{-c^2x^2}\sqrt{d+ex^2}} + \frac{x^3\left(a+b\text{csch}^{-1}(cx)\right)}{3d\left(d+ex^2\right)^{3/2}} - \frac{(bcx)\int \frac{1}{\sqrt{-1-c^2x^2}\sqrt{d+ex^2}}\,dx}{3d\left(-c^2d+e\right)\sqrt{-c^2x^2}} \cdots$$

$$= \frac{bcx^2\sqrt{-1-c^2x^2}}{3d\left(c^2d-e\right)\sqrt{-c^2x^2}\sqrt{d+ex^2}} + \frac{bc^3x^2\sqrt{d+ex^2}}{3d\left(c^2d-e\right)e\sqrt{-c^2x^2}\sqrt{-1-c^2x^2}} + \frac{x^3\left(a+b\text{csch}\cdots\right.}{3d\left(d+ex\cdots\right.}$$

$$= \frac{bcx^2\sqrt{-1-c^2x^2}}{3d\left(c^2d-e\right)\sqrt{-c^2x^2}\sqrt{d+ex^2}} + \frac{bc^3x^2\sqrt{d+ex^2}}{3d\left(c^2d-e\right)e\sqrt{-c^2x^2}\sqrt{-1-c^2x^2}} + \frac{x^3\left(a+b\text{csch}\cdots\right.}{3d\left(d+ex\cdots\right.}$$

**Mathematica [A]** time = 0.30, size = 189, normalized size = 0.53

$$\frac{x^2\left(ax\left(c^2d-e\right)+bc\sqrt{\frac{1}{c^2x^2}+1}\left(d+ex^2\right)+bx\left(c^2d-e\right)\text{csch}^{-1}(cx)\right)}{3d\left(c^2d-e\right)\left(d+ex^2\right)^{3/2}} - \frac{bcx\sqrt{\frac{1}{c^2x^2}+1}\sqrt{\frac{ex^2}{d}+1}\,E\left(\sin^{-1}\left(\sqrt{-\frac{e}{d}}\,x\right)|\frac{c^2\cdots}{e}\right.}{3d\sqrt{c^2x^2+1}\sqrt{-\frac{e}{d}}\left(c^2d-e\right)\sqrt{d+ex^2}}$$

Antiderivative was successfully verified.

```
[In] Integrate[(x^2*(a + b*ArcCsch[c*x]))/(d + e*x^2)^(5/2),x]
```

```
[Out] (x^2*(a*(c^2*d - e)*x + b*c*Sqrt[1 + 1/(c^2*x^2)]*(d + e*x^2) + b*(c^2*d -
e)*x*ArcCsch[c*x]))/(3*d*(c^2*d - e)*(d + e*x^2)^(3/2)) - (b*c*Sqrt[1 + 1/(
c^2*x^2)]*x*Sqrt[1 + (e*x^2)/d]*EllipticE[ArcSin[Sqrt[-(e/d)]*x], (c^2*d)/e
])/(3*d*(c^2*d - e)*Sqrt[-(e/d)]*Sqrt[1 + c^2*x^2]*Sqrt[d + e*x^2])
```

**fricas [F]** time = 0.51, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{\left(bx^2\,\text{arcsch}\,(cx)+ax^2\right)\sqrt{ex^2+d}}{e^3x^6+3\,de^2x^4+3\,d^2ex^2+d^3},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*(a+b*arccsch(c*x))/(e*x^2+d)^(5/2),x, algorithm="fricas")
```

```
[Out] integral((b*x^2*arccsch(c*x) + a*x^2)*sqrt(e*x^2 + d)/(e^3*x^6 + 3*d*e^2*x^
4 + 3*d^2*e*x^2 + d^3), x)
```

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

$$\int \frac{(b\,\text{arcsch}\,(cx)+a)x^2}{\left(ex^2+d\right)^{\frac{5}{2}}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*(a+b*arccsch(c*x))/(e*x^2+d)^(5/2),x, algorithm="giac")
```

```
[Out] integrate((b*arccsch(c*x) + a)*x^2/(e*x^2 + d)^(5/2), x)
```

**maple [F]** time = 0.43, size = 0, normalized size = 0.00

$$\int \frac{x^2\,(a+b\,\text{arccsch}\,(cx))}{\left(e\,x^2+d\right)^{\frac{5}{2}}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^2*(a+b*arccsch(c*x))/(e*x^2+d)^(5/2),x)
```

```
[Out] int(x^2*(a+b*arccsch(c*x))/(e*x^2+d)^(5/2),x)
```

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

$$-\frac{1}{3}\,a\left(\frac{x}{\left(ex^2+d\right)^{\frac{3}{2}}e}-\frac{x}{\sqrt{ex^2+d}\,de}\right)+b\int \frac{x^2\log\left(\sqrt{\frac{1}{c^2x^2}+1}+\frac{1}{cx}\right)}{\left(ex^2+d\right)^{\frac{5}{2}}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^2*(a+b*arccsch(c*x))/(e*x^2+d)^(5/2),x, algorithm="maxima")
```

```
[Out] -1/3*a*(x/((e*x^2 + d)^(3/2)*e) - x/(sqrt(e*x^2 + d)*d*e)) + b*integrate(x^
2*log(sqrt(1/(c^2*x^2) + 1) + 1/(c*x))/(e*x^2 + d)^(5/2), x)
```

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

$$\int \frac{x^2\,\left(a+b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)\right)}{{\left(e\,x^2+d\right)}^{5/2}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((x^2*(a + b*asinh(1/(c*x))))/(d + e*x^2)^(5/2),x)
```

```
[Out] int((x^2*(a + b*asinh(1/(c*x))))/(d + e*x^2)^(5/2), 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**2*(a+b*acsch(c*x))/(e*x**2+d)**(5/2),x)
```

```
[Out] Timed out
```

# 3.164 $\int \frac{a+b\,\mathrm{csch}^{-1}(cx)}{\left(d+ex^2\right)^{5/2}}\,dx$

**Optimal**. Leaf size=278

$$\frac{2x\left(a+b\,\mathrm{csch}^{-1}(cx)\right)}{3d^2\sqrt{d+ex^2}}+\frac{x\left(a+b\,\mathrm{csch}^{-1}(cx)\right)}{3d\left(d+ex^2\right)^{3/2}}-\frac{bc\sqrt{e}\,x\sqrt{-c^2x^2-1}\,E\left(\tan^{-1}\left(\frac{\sqrt{e}\,x}{\sqrt{d}}\right)|1-\frac{c^2d}{e}\right)}{3d^{3/2}\sqrt{-c^2x^2}\left(c^2d-e\right)\sqrt{d+ex^2}\sqrt{\frac{d\left(c^2x^2+1\right)}{d+ex^2}}}-\frac{bx\left(3c^2d-2e\right)\sqrt{d+e}}{3d^3\sqrt{-c^2x^2}\sqrt{-c^2x^2-}}$$

```
[Out] 1/3*x*(a+b*arccsch(c*x))/d/(e*x^2+d)^(3/2)+2/3*x*(a+b*arccsch(c*x))/d^2/(e*
x^2+d)^(1/2)-1/3*b*c*x*(1/(1+e*x^2/d))^(1/2)*(1+e*x^2/d)^(1/2)*EllipticE(x*
e^(1/2)/d^(1/2)/(1+e*x^2/d)^(1/2),(1-c^2*d/e)^(1/2))*e^(1/2)*(-c^2*x^2-1)^(
1/2)/d^(3/2)/(c^2*d-e)/(-c^2*x^2)^(1/2)/(d*(c^2*x^2+1)/(e*x^2+d))^(1/2)/(e*
x^2+d)^(1/2)-1/3*b*(3*c^2*d-2*e)*x*(1/(c^2*x^2+1))^(1/2)*(c^2*x^2+1)^(1/2)*
EllipticF(c*x/(c^2*x^2+1)^(1/2),(1-e/c^2/d)^(1/2))*(e*x^2+d)^(1/2)/d^3/(c^2
*d-e)/(-c^2*x^2)^(1/2)/(-c^2*x^2-1)^(1/2)/((e*x^2+d)/d/(c^2*x^2+1))^(1/2)
```

**Rubi** [A] time = 0.18, antiderivative size = 278, normalized size of antiderivative = 1.00, number of steps used = 5, number of rules used = 7, integrand size = 20, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.350, Rules used = {192, 191, 6292, 12, 525, 418, 411}

$$\frac{2x\left(a+b\,\mathrm{csch}^{-1}(cx)\right)}{3d^2\sqrt{d+ex^2}}+\frac{x\left(a+b\,\mathrm{csch}^{-1}(cx)\right)}{3d\left(d+ex^2\right)^{3/2}}-\frac{bx\left(3c^2d-2e\right)\sqrt{d+ex^2}\,F\left(\tan^{-1}(cx)|1-\frac{e}{c^2d}\right)}{3d^3\sqrt{-c^2x^2}\sqrt{-c^2x^2-1}\left(c^2d-e\right)\sqrt{\frac{d+ex^2}{d\left(c^2x^2+1\right)}}}-\frac{bc\sqrt{e}\,x\sqrt{-c^2x^2-1}\,E}{3d^{3/2}\sqrt{-c^2x^2}\left(c^2d-\right.}$$

Antiderivative was successfully verified.

```
[In] Int[(a + b*ArcCsch[c*x])/(d + e*x^2)^(5/2),x]
```

```
[Out] (x*(a + b*ArcCsch[c*x]))/(3*d*(d + e*x^2)^(3/2)) + (2*x*(a + b*ArcCsch[c*x]
))/(3*d^2*Sqrt[d + e*x^2]) - (b*c*Sqrt[e]*x*Sqrt[-1 - c^2*x^2]*EllipticE[Ar
cTan[(Sqrt[e]*x)/Sqrt[d]], 1 - (c^2*d)/e])/(3*d^(3/2)*(c^2*d - e)*Sqrt[-(c^
2*x^2)]*Sqrt[(d*(1 + c^2*x^2))/(d + e*x^2)]*Sqrt[d + e*x^2]) - (b*(3*c^2*d
- 2*e)*x*Sqrt[d + e*x^2]*EllipticF[ArcTan[c*x], 1 - e/(c^2*d)])/(3*d^3*(c^2
*d - e)*Sqrt[-(c^2*x^2)]*Sqrt[-1 - c^2*x^2]*Sqrt[(d + e*x^2)/(d*(1 + c^2*x^
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 411

```
Int[Sqrt[(a_) + (b_.)*(x_)^2]/((c_) + (d_.)*(x_)^2)^(3/2), x_Symbol] :> Sim
p[(Sqrt[a + b*x^2]*EllipticE[ArcTan[Rt[d/c, 2]*x], 1 - (b*c)/(a*d)])/(c*Rt[
d/c, 2]*Sqrt[c + d*x^2]*Sqrt[(c*(a + b*x^2))/(a*(c + d*x^2))]), x] /; FreeQ
[{a, b, c, d}, x] && PosQ[b/a] && PosQ[d/c]
```

Rule 418

```
Int[1/(Sqrt[(a_) + (b_.)*(x_)^2]*Sqrt[(c_) + (d_.)*(x_)^2]), x_Symbol] :> S
imp[(Sqrt[a + b*x^2]*EllipticF[ArcTan[Rt[d/c, 2]*x], 1 - (b*c)/(a*d)])/(a*R
t[d/c, 2]*Sqrt[c + d*x^2]*Sqrt[(c*(a + b*x^2))/(a*(c + d*x^2))]), x] /; Fre
eQ[{a, b, c, d}, x] && PosQ[d/c] && PosQ[b/a] &&  !SimplerSqrtQ[b/a, d/c]
```

Rule 525

```
Int[((e_) + (f_.)*(x_)^2)/(Sqrt[(a_) + (b_.)*(x_)^2]*((c_) + (d_.)*(x_)^2)^
(3/2)), x_Symbol] :> Dist[(b*e - a*f)/(b*c - a*d), Int[1/(Sqrt[a + b*x^2]*S
qrt[c + d*x^2]), x], x] - Dist[(d*e - c*f)/(b*c - a*d), Int[Sqrt[a + b*x^2]
/(c + d*x^2)^(3/2), x], x] /; FreeQ[{a, b, c, d, e, f}, x] && PosQ[b/a] &&
PosQ[d/c]
```

Rule 6292

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))*((d_.) + (e_.)*(x_)^2)^(p_.), x_Sym
bol] :> With[{u = IntHide[(d + e*x^2)^p, x]}, Dist[a + b*ArcCsch[c*x], u, x
] - Dist[(b*c*x)/Sqrt[-(c^2*x^2)], Int[SimplifyIntegrand[u/(x*Sqrt[-1 - c^2
*x^2]), x], x], x]] /; FreeQ[{a, b, c, d, e}, x] && (IGtQ[p, 0] || ILtQ[p +
 1/2, 0])
```

Rubi steps

$$\int \frac{a+b\operatorname{csch}^{-1}(cx)}{\left(d+ex^2\right)^{5/2}}\,dx = \frac{x\left(a+b\operatorname{csch}^{-1}(cx)\right)}{3d\left(d+ex^2\right)^{3/2}} + \frac{2x\left(a+b\operatorname{csch}^{-1}(cx)\right)}{3d^2\sqrt{d+ex^2}} - \frac{(bcx)\int \frac{3d+2ex^2}{3d^2\sqrt{-1-c^2x^2}\left(d+ex^2\right)^{3/2}}\,dx}{\sqrt{-c^2x^2}}$$

$$= \frac{x\left(a+b\operatorname{csch}^{-1}(cx)\right)}{3d\left(d+ex^2\right)^{3/2}} + \frac{2x\left(a+b\operatorname{csch}^{-1}(cx)\right)}{3d^2\sqrt{d+ex^2}} - \frac{(bcx)\int \frac{3d+2ex^2}{\sqrt{-1-c^2x^2}\left(d+ex^2\right)^{3/2}}\,dx}{3d^2\sqrt{-c^2x^2}}$$

$$= \frac{x\left(a+b\operatorname{csch}^{-1}(cx)\right)}{3d\left(d+ex^2\right)^{3/2}} + \frac{2x\left(a+b\operatorname{csch}^{-1}(cx)\right)}{3d^2\sqrt{d+ex^2}} - \frac{\left(bc\left(3c^2d-2e\right)x\right)\int \frac{1}{\sqrt{-1-c^2x^2}\sqrt{d+ex^2}}\,dx}{3d^2\left(c^2d-e\right)\sqrt{-c^2x^2}}$$

$$= \frac{x\left(a+b\operatorname{csch}^{-1}(cx)\right)}{3d\left(d+ex^2\right)^{3/2}} + \frac{2x\left(a+b\operatorname{csch}^{-1}(cx)\right)}{3d^2\sqrt{d+ex^2}} - \frac{bc\sqrt{e}\,x\sqrt{-1-c^2x^2}\,E\left(\tan^{-1}\left(\frac{\sqrt{e}\,x}{\sqrt{d}}\right)|1-\right.}{3d^{3/2}\left(c^2d-e\right)\sqrt{-c^2x^2}\sqrt{\frac{d\left(1+c^2x^2\right)}{d+ex^2}}\sqrt{d+}}$$

**Mathematica [C]** time = 0.56, size = 248, normalized size = 0.89

$$\frac{x\left(a\left(c^2d-e\right)\left(3d+2ex^2\right)-bcex\sqrt{\frac{1}{c^2x^2}+1}\left(d+ex^2\right)+b\left(c^2d-e\right)\operatorname{csch}^{-1}(cx)\left(3d+2ex^2\right)\right)}{3d^2\left(c^2d-e\right)\left(d+ex^2\right)^{3/2}} - \frac{ibcx\sqrt{\frac{1}{c^2x^2}+1}\sqrt{\frac{ex^2}{d}}}{}$$

Antiderivative was successfully verified.

```
[In] Integrate[(a + b*ArcCsch[c*x])/(d + e*x^2)^(5/2),x]
```

```
[Out] (x*(-(b*c*e*Sqrt[1 + 1/(c^2*x^2)]*x*(d + e*x^2)) + a*(c^2*d - e)*(3*d + 2*e
*x^2) + b*(c^2*d - e)*(3*d + 2*e*x^2)*ArcCsch[c*x]))/(3*d^2*(c^2*d - e)*(d
+ e*x^2)^(3/2)) - ((I/3)*b*c*Sqrt[1 + 1/(c^2*x^2)]*x*Sqrt[1 + (e*x^2)/d]*(c
^2*d*EllipticE[I*ArcSinh[Sqrt[c^2]*x], e/(c^2*d)] + 2*(c^2*d - e)*EllipticF
[I*ArcSinh[Sqrt[c^2]*x], e/(c^2*d)]))/(Sqrt[c^2]*d^2*(c^2*d - e)*Sqrt[1 + c
^2*x^2]*Sqrt[d + e*x^2])
```

**fricas [F]** time = 0.52, size = 0, normalized size = 0.00

$$\operatorname{integral}\left(\frac{\sqrt{ex^2+d}\,(b\operatorname{arcsch}(cx)+a)}{e^3x^6+3\,de^2x^4+3\,d^2ex^2+d^3}, x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))/(e*x^2+d)^(5/2),x, algorithm="fricas")
```

```
[Out] integral(sqrt(e*x^2 + d)*(b*arccsch(c*x) + a)/(e^3*x^6 + 3*d*e^2*x^4 + 3*d^
2*e*x^2 + d^3), x)
```

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

$$\int \frac{b \operatorname{arcsch}(cx) + a}{\left(ex^2 + d\right)^{\frac{5}{2}}}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))/(e*x^2+d)^(5/2),x, algorithm="giac")
```

```
[Out] integrate((b*arccsch(c*x) + a)/(e*x^2 + d)^(5/2), x)
```

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

$$\int \frac{a + b \operatorname{arccsch}(cx)}{\left(e\,x^2 + d\right)^{\frac{5}{2}}}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a+b*arccsch(c*x))/(e*x^2+d)^(5/2),x)
```

```
[Out] int((a+b*arccsch(c*x))/(e*x^2+d)^(5/2),x)
```

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

$$\frac{1}{3}\,a\left(\frac{2\,x}{\sqrt{ex^2 + d}\,d^2} + \frac{x}{\left(ex^2 + d\right)^{\frac{3}{2}} d}\right) + b\int \frac{\log\left(\sqrt{\frac{1}{c^2x^2} + 1} + \frac{1}{cx}\right)}{\left(ex^2 + d\right)^{\frac{5}{2}}}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))/(e*x^2+d)^(5/2),x, algorithm="maxima")
```

```
[Out] 1/3*a*(2*x/(sqrt(e*x^2 + d)*d^2) + x/((e*x^2 + d)^(3/2)*d)) + b*integrate(l
og(sqrt(1/(c^2*x^2) + 1) + 1/(c*x))/(e*x^2 + d)^(5/2), x)
```

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

$$\int \frac{a + b \operatorname{asinh}\left(\frac{1}{c\,x}\right)}{\left(e\,x^2 + d\right)^{5/2}}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a + b*asinh(1/(c*x)))/(d + e*x^2)^(5/2),x)
```

```
[Out] int((a + b*asinh(1/(c*x)))/(d + e*x^2)^(5/2), 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*acsch(c*x))/(e*x**2+d)**(5/2),x)
```

```
[Out] Timed out
```

# 3.165 $\int (fx)^m \left(d+ex^2\right)^3 \left(a+b\,\mathbf{csch}^{-1}(cx)\right)\,dx$

**Optimal**. Leaf size=596

$$\frac{d^3(fx)^{m+1}\left(a+b\text{csch}^{-1}(cx)\right)}{f(m+1)}+\frac{3d^2e(fx)^{m+3}\left(a+b\text{csch}^{-1}(cx)\right)}{f^3(m+3)}+\frac{3de^2(fx)^{m+5}\left(a+b\text{csch}^{-1}(cx)\right)}{f^5(m+5)}+\frac{e^3(fx)^{m+7}\left(a+b\right.}{f^7(m+}$$

```
[Out] d^3*(f*x)^(1+m)*(a+b*arccsch(c*x))/f/(1+m)+3*d^2*e*(f*x)^(3+m)*(a+b*arccsch
(c*x))/f^3/(3+m)+3*d*e^2*(f*x)^(5+m)*(a+b*arccsch(c*x))/f^5/(5+m)+e^3*(f*x)
^(7+m)*(a+b*arccsch(c*x))/f^7/(7+m)+b*e*(e^2*(m^2+8*m+15)^2-3*c^2*d*e*(3+m)
^2*(m^2+13*m+42)+3*c^4*d^2*(m^4+22*m^3+179*m^2+638*m+840))*x*(f*x)^(1+m)*(-
c^2*x^2-1)^(1/2)/c^5/f/(6+m)/(m^2+6*m+8)/(m^3+15*m^2+71*m+105)/(-c^2*x^2)^(
1/2)-b*e^2*(e*(5+m)^2-3*c^2*d*(m^2+13*m+42))*x*(f*x)^(3+m)*(-c^2*x^2-1)^(1/
2)/c^3/f^3/(4+m)/(6+m)/(m^2+12*m+35)/(-c^2*x^2)^(1/2)+b*e^3*x*(f*x)^(5+m)*(
-c^2*x^2-1)^(1/2)/c/f^5/(6+m)/(7+m)/(-c^2*x^2)^(1/2)-b*(c^6*d^3*(2+m)*(4+m)
*(6+m)/(1+m)-e*(1+m)*(e^2*(m^2+8*m+15)^2-3*c^2*d*e*(3+m)^2*(m^2+13*m+42)+3*
c^4*d^2*(m^4+22*m^3+179*m^2+638*m+840))/(m^3+15*m^2+71*m+105))*x*(f*x)^(1+m
)*hypergeom([1/2, 1/2+1/2*m],[3/2+1/2*m],-c^2*x^2)*(c^2*x^2+1)^(1/2)/c^5/f/
(1+m)/(2+m)/(4+m)/(6+m)/(-c^2*x^2)^(1/2)/(-c^2*x^2-1)^(1/2)
```

**Rubi [A]** time = 2.57, antiderivative size = 577, normalized size of antiderivative = 0.97, number of steps used = 6, number of rules used = 7, integrand size = 23, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.304, Rules used = {270, 6302, 1809, 1267, 459, 365, 364}

$$\frac{3d^2e(fx)^{m+3}\left(a+b\text{csch}^{-1}(cx)\right)}{f^3(m+3)}+\frac{d^3(fx)^{m+1}\left(a+b\text{csch}^{-1}(cx)\right)}{f(m+1)}+\frac{3de^2(fx)^{m+5}\left(a+b\text{csch}^{-1}(cx)\right)}{f^5(m+5)}+\frac{e^3(fx)^{m+7}\left(a+b\right.}{f^7(m+}$$

Antiderivative was successfully verified.

```
[In] Int[(f*x)^m*(d + e*x^2)^3*(a + b*ArcCsch[c*x]),x]
```

```
[Out] (b*e*(e^2*(15 + 8*m + m^2)^2 - 3*c^2*d*e*(3 + m)^2*(42 + 13*m + m^2) + 3*c^
4*d^2*(840 + 638*m + 179*m^2 + 22*m^3 + m^4))*x*(f*x)^(1 + m)*Sqrt[-1 - c^2
*x^2])/(c^5*f*(2 + m)*(3 + m)*(4 + m)*(5 + m)*(6 + m)*(7 + m)*Sqrt[-(c^2*x^
2)]) - (b*e^2*(e*(5 + m)^2 - 3*c^2*d*(42 + 13*m + m^2))*x*(f*x)^(3 + m)*Sqr
t[-1 - c^2*x^2])/(c^3*f^3*(4 + m)*(5 + m)*(6 + m)*(7 + m)*Sqrt[-(c^2*x^2)])
 + (b*e^3*x*(f*x)^(5 + m)*Sqrt[-1 - c^2*x^2])/(c*f^5*(6 + m)*(7 + m)*Sqrt[-
(c^2*x^2)]) + (d^3*(f*x)^(1 + m)*(a + b*ArcCsch[c*x]))/(f*(1 + m)) + (3*d^2
*e*(f*x)^(3 + m)*(a + b*ArcCsch[c*x]))/(f^3*(3 + m)) + (3*d*e^2*(f*x)^(5 +
m)*(a + b*ArcCsch[c*x]))/(f^5*(5 + m)) + (e^3*(f*x)^(7 + m)*(a + b*ArcCsch[
```

```
c*x]))/(f^7*(7 + m)) - (b*c*(d^3/(1 + m)^2 - (e*(e^2*(15 + 8*m + m^2)^2 - 3
*c^2*d*e*(3 + m)^2*(42 + 13*m + m^2) + 3*c^4*d^2*(840 + 638*m + 179*m^2 + 2
2*m^3 + m^4)))/(c^6*(2 + m)*(3 + m)*(4 + m)*(5 + m)*(6 + m)*(7 + m)))*x*(f*
x)^(1 + m)*Sqrt[1 + c^2*x^2]*Hypergeometric2F1[1/2, (1 + m)/2, (3 + m)/2, -
(c^2*x^2)])/(f*Sqrt[-(c^2*x^2)]*Sqrt[-1 - c^2*x^2])
```

Rule 270

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

Rule 364

```
Int[((c_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Simp[(a^
p*(c*x)^(m + 1)*Hypergeometric2F1[-p, (m + 1)/n, (m + 1)/n + 1, -((b*x^n)/a
)])/(c*(m + 1)), x] /; FreeQ[{a, b, c, m, n, p}, x] &&  !IGtQ[p, 0] && (ILt
Q[p, 0] || GtQ[a, 0])
```

Rule 365

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

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 1267

```
Int[((f_.)*(x_))^(m_.)*((d_) + (e_.)*(x_)^2)^(q_.)*((a_) + (b_.)*(x_)^2 + (
c_.)*(x_)^4)^(p_.), x_Symbol] :> Simp[(c^p*(f*x)^(m + 4*p - 1)*(d + e*x^2)^
(q + 1))/(e*f^(4*p - 1)*(m + 4*p + 2*q + 1)), x] + Dist[1/(e*(m + 4*p + 2*q
 + 1)), Int[(f*x)^m*(d + e*x^2)^q*ExpandToSum[e*(m + 4*p + 2*q + 1)*((a + b
*x^2 + c*x^4)^p - c^p*x^(4*p)) - d*c^p*(m + 4*p - 1)*x^(4*p - 2), x], x], x
] /; FreeQ[{a, b, c, d, e, f, m, q}, x] && NeQ[b^2 - 4*a*c, 0] && IGtQ[p, 0
] &&  !IntegerQ[q] && NeQ[m + 4*p + 2*q + 1, 0]
```

Rule 1809

```
Int[(Pq_)*((c_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^2)^(p_), x_Symbol] :> With[
{q = Expon[Pq, x], f = Coeff[Pq, x, Expon[Pq, x]]}, Simp[(f*(c*x)^(m + q -
1)*(a + b*x^2)^(p + 1))/(b*c^(q - 1)*(m + q + 2*p + 1)), x] + Dist[1/(b*(m
+ q + 2*p + 1)), Int[(c*x)^m*(a + b*x^2)^p*ExpandToSum[b*(m + q + 2*p + 1)*
Pq - b*f*(m + q + 2*p + 1)*x^q - a*f*(m + q - 1)*x^(q - 2), x], x], x] /; G
tQ[q, 1] && NeQ[m + q + 2*p + 1, 0]] /; FreeQ[{a, b, c, m, p}, x] && PolyQ[
Pq, x] && ( !IGtQ[m, 0] || IGtQ[p + 1/2, -1])
```

Rule 6302

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))*((f_.)*(x_))^(m_.)*((d_.) + (e_.)*(
x_)^2)^(p_.), x_Symbol] :> With[{u = IntHide[(f*x)^m*(d + e*x^2)^p, x]}, Di
st[a + b*ArcCsch[c*x], u, x] - Dist[(b*c*x)/Sqrt[-(c^2*x^2)], Int[SimplifyI
ntegrand[u/(x*Sqrt[-1 - c^2*x^2]), x], x], x]] /; FreeQ[{a, b, c, d, e, f,
m, p}, x] && ((IGtQ[p, 0] &&  !(ILtQ[(m - 1)/2, 0] && GtQ[m + 2*p + 3, 0]))
 || (IGtQ[(m + 1)/2, 0] &&  !(ILtQ[p, 0] && GtQ[m + 2*p + 3, 0])) || (ILtQ[
(m + 2*p + 1)/2, 0] &&  !ILtQ[(m - 1)/2, 0]))
```

Rubi steps

$$\int (fx)^m \left(d+ex^2\right)^3 \left(a+b\text{csch}^{-1}(cx)\right) dx = \frac{d^3(fx)^{1+m}\left(a+b\text{csch}^{-1}(cx)\right)}{f(1+m)} + \frac{3d^2e(fx)^{3+m}\left(a+b\text{csch}^{-1}(cx)\right)}{f^3(3+m)} + \frac{3\ldots}{\ldots}$$

$$= \frac{be^3x(fx)^{5+m}\sqrt{-1-c^2x^2}}{cf^5(6+m)(7+m)\sqrt{-c^2x^2}} + \frac{d^3(fx)^{1+m}\left(a+b\text{csch}^{-1}(cx)\right)}{f(1+m)} + \frac{3d^2e(\ldots}{\ldots}$$

$$= -\frac{be^2\left(e(5+m)^2-3c^2d\left(42+13m+m^2\right)\right)x(fx)^{3+m}\sqrt{-1-c^2x^2}}{c^3f^3(4+m)(5+m)(6+m)(7+m)\sqrt{-c^2x^2}} + \frac{\ldots}{c\ldots}$$

$$= \frac{be\left(e^2\left(15+8m+m^2\right)^2-3c^2de(3+m)^2\left(42+13m+m^2\right)+3c^4d^2\left(\ldots\right.\right.}{c^5f(2+m)(3+m)(4+m)(5+m\ldots}$$

$$= \frac{be\left(e^2\left(15+8m+m^2\right)^2-3c^2de(3+m)^2\left(42+13m+m^2\right)+3c^4d^2\left(\ldots\right.\right.}{c^5f(2+m)(3+m)(4+m)(5+m\ldots}$$

$$= \frac{be\left(e^2\left(15+8m+m^2\right)^2-3c^2de(3+m)^2\left(42+13m+m^2\right)+3c^4d^2\left(\ldots\right.\right.}{c^5f(2+m)(3+m)(4+m)(5+m\ldots}$$

**Mathematica [F]** time = 0.23, size = 0, normalized size = 0.00

$$\int (fx)^m \left(d+ex^2\right)^3 \left(a+b\text{csch}^{-1}(cx)\right) dx$$

Verification is Not applicable to the result.

```
[In] Integrate[(f*x)^m*(d + e*x^2)^3*(a + b*ArcCsch[c*x]),x]
[Out] Integrate[(f*x)^m*(d + e*x^2)^3*(a + b*ArcCsch[c*x]), x]
```

**fricas [F]** time = 0.78, size = 0, normalized size = 0.00

$$\text{integral}\left(\left(ae^3x^6+3\,ade^2x^4+3\,ad^2ex^2+ad^3+\left(be^3x^6+3\,bde^2x^4+3\,bd^2ex^2+bd^3\right)\text{arcsch}\left(cx\right)\right)\left(fx\right)^m, x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((f*x)^m*(e*x^2+d)^3*(a+b*arccsch(c*x)),x, algorithm="fricas")
```

```
[Out] integral((a*e^3*x^6 + 3*a*d*e^2*x^4 + 3*a*d^2*e*x^2 + a*d^3 + (b*e^3*x^6 +
3*b*d*e^2*x^4 + 3*b*d^2*e*x^2 + b*d^3)*arccsch(c*x))*(f*x)^m, x)
```

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

$$\int \left(ex^2+d\right)^3 (b\,\mathrm{arcsch}\,(cx)+a)\left(fx\right)^m\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((f*x)^m*(e*x^2+d)^3*(a+b*arccsch(c*x)),x, algorithm="giac")
```

```
[Out] integrate((e*x^2 + d)^3*(b*arccsch(c*x) + a)*(f*x)^m, x)
```

**maple [F]** time = 0.42, size = 0, normalized size = 0.00

$$\int \left(fx\right)^m \left(e\,x^2+d\right)^3 (a+b\,\mathrm{arccsch}\,(cx))\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((f*x)^m*(e*x^2+d)^3*(a+b*arccsch(c*x)),x)
```

```
[Out] int((f*x)^m*(e*x^2+d)^3*(a+b*arccsch(c*x)),x)
```

**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)^m*(e*x^2+d)^3*(a+b*arccsch(c*x)),x, algorithm="maxima")
```

```
[Out] a*e^3*f^m*x^7*x^m/(m + 7) + 3*a*d*e^2*f^m*x^5*x^m/(m + 5) + 3*a*d^2*e*f^m*x
^3*x^m/(m + 3) + (f*x)^(m + 1)*a*d^3/(f*(m + 1)) - (((m^3 + 9*m^2 + 23*m +
15)*b*e^3*f^m*x^7 + 3*(m^3 + 11*m^2 + 31*m + 21)*b*d*e^2*f^m*x^5 + 3*(m^3 +
 13*m^2 + 47*m + 35)*b*d^2*e*f^m*x^3 + (m^3 + 15*m^2 + 71*m + 105)*b*d^3*f^
m*x)*x^m*log(x) - ((m^3 + 9*m^2 + 23*m + 15)*b*e^3*f^m*x^7 + 3*(m^3 + 11*m^
2 + 31*m + 21)*b*d*e^2*f^m*x^5 + 3*(m^3 + 13*m^2 + 47*m + 35)*b*d^2*e*f^m*x
^3 + (m^3 + 15*m^2 + 71*m + 105)*b*d^3*f^m*x)*x^m*log(sqrt(c^2*x^2 + 1) + 1
))/(m^4 + 16*m^3 + 86*m^2 + 176*m + 105) + integrate(((m^3 + 9*m^2 + 23*m +
 15)*b*c^2*e^3*f^m*x^8 + 3*(m^3 + 11*m^2 + 31*m + 21)*b*c^2*d*e^2*f^m*x^6 +
 3*(m^3 + 13*m^2 + 47*m + 35)*b*c^2*d^2*e*f^m*x^4 + (m^3 + 15*m^2 + 71*m +
105)*b*c^2*d^3*f^m*x^2)*x^m/((m^4 + 16*m^3 + 86*m^2 + 176*m + 105)*c^2*x^2
+ m^4 + 16*m^3 + 86*m^2 + ((m^4 + 16*m^3 + 86*m^2 + 176*m + 105)*c^2*x^2 +
m^4 + 16*m^3 + 86*m^2 + 176*m + 105)*sqrt(c^2*x^2 + 1) + 176*m + 105), x) -
```

```
 integrate(((m^4 + 16*m^3 + 86*m^2 + 176*m + 105)*b*c^2*e^3*f^m*x^8*log(c)
+ (3*(m^4 + 16*m^3 + 86*m^2 + 176*m + 105)*c^2*d*e^2*f^m*log(c) + (m^4 + 16
*m^3 + 86*m^2 + 176*m + 105)*e^3*f^m*log(c) - (m^3 + 9*m^2 + 23*m + 15)*e^3
*f^m)*b*x^6 + 3*((m^4 + 16*m^3 + 86*m^2 + 176*m + 105)*c^2*d^2*e*f^m*log(c)
 + (m^4 + 16*m^3 + 86*m^2 + 176*m + 105)*d*e^2*f^m*log(c) - (m^3 + 11*m^2 +
 31*m + 21)*d*e^2*f^m)*b*x^4 + ((m^4 + 16*m^3 + 86*m^2 + 176*m + 105)*c^2*d
^3*f^m*log(c) + 3*(m^4 + 16*m^3 + 86*m^2 + 176*m + 105)*d^2*e*f^m*log(c) -
3*(m^3 + 13*m^2 + 47*m + 35)*d^2*e*f^m)*b*x^2 + ((m^4 + 16*m^3 + 86*m^2 + 1
76*m + 105)*d^3*f^m*log(c) - (m^3 + 15*m^2 + 71*m + 105)*d^3*f^m)*b)*x^m/((
m^4 + 16*m^3 + 86*m^2 + 176*m + 105)*c^2*x^2 + m^4 + 16*m^3 + 86*m^2 + 176*
m + 105), x)
```

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

$$\int {\left(f\,x\right)}^m\,{\left(e\,x^2+d\right)}^3\,\left(a+b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)\right) \,d x$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((f*x)^m*(d + e*x^2)^3*(a + b*asinh(1/(c*x))),x)
```

```
[Out] int((f*x)^m*(d + e*x^2)^3*(a + b*asinh(1/(c*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((f*x)**m*(e*x**2+d)**3*(a+b*acsch(c*x)),x)
```

```
[Out] Timed out
```

# 3.166 $\int (fx)^m \left(d+ex^2\right)^2 \left(a+b\text{csch}^{-1}(cx)\right) dx$

**Optimal**. Leaf size=379

$$\frac{d^2(fx)^{m+1}\left(a+b\text{csch}^{-1}(cx)\right)}{f(m+1)}+\frac{2de(fx)^{m+3}\left(a+b\text{csch}^{-1}(cx)\right)}{f^3(m+3)}+\frac{e^2(fx)^{m+5}\left(a+b\text{csch}^{-1}(cx)\right)}{f^5(m+5)}+\frac{be^2x\sqrt{-c^2x^2-1}\,(f}{cf^3(m+4)(m+5)}$$

```
[Out] d^2*(f*x)^(1+m)*(a+b*arccsch(c*x))/f/(1+m)+2*d*e*(f*x)^(3+m)*(a+b*arccsch(c
*x))/f^3/(3+m)+e^2*(f*x)^(5+m)*(a+b*arccsch(c*x))/f^5/(5+m)-b*e*(e*(3+m)^2-
2*c^2*d*(m^2+9*m+20))*x*(f*x)^(1+m)*(-c^2*x^2-1)^(1/2)/c^3/f/(4+m)/(5+m)/(m
^2+5*m+6)/(-c^2*x^2)^(1/2)+b*e^2*x*(f*x)^(3+m)*(-c^2*x^2-1)^(1/2)/c/f^3/(4+
m)/(5+m)/(-c^2*x^2)^(1/2)-b*(c^4*d^2*(2+m)*(3+m)*(4+m)*(5+m)+e*(1+m)^2*(e*(
3+m)^2-2*c^2*d*(m^2+9*m+20)))*x*(f*x)^(1+m)*hypergeom([1/2, 1/2+1/2*m],[3/2
+1/2*m],-c^2*x^2)*(c^2*x^2+1)^(1/2)/c^3/f/(1+m)^2/(2+m)/(3+m)/(4+m)/(5+m)/(
-c^2*x^2)^(1/2)/(-c^2*x^2-1)^(1/2)
```

**Rubi [A]** time = 0.49, antiderivative size = 360, normalized size of antiderivative = 0.95, number of steps used = 6, number of rules used = 7, integrand size = 23, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.304, Rules used = {270, 6302, 12, 1267, 459, 365, 364}

$$\frac{d^2(fx)^{m+1}\left(a+b\text{csch}^{-1}(cx)\right)}{f(m+1)}+\frac{2de(fx)^{m+3}\left(a+b\text{csch}^{-1}(cx)\right)}{f^3(m+3)}+\frac{e^2(fx)^{m+5}\left(a+b\text{csch}^{-1}(cx)\right)}{f^5(m+5)}-\frac{bcx\sqrt{c^2x^2+1}\,(fx)^m}{}$$

Antiderivative was successfully verified.

```
[In] Int[(f*x)^m*(d + e*x^2)^2*(a + b*ArcCsch[c*x]),x]
```

```
[Out] -((b*e*(e*(3 + m)^2 - 2*c^2*d*(20 + 9*m + m^2))*x*(f*x)^(1 + m)*Sqrt[-1 - c
^2*x^2])/(c^3*f*(2 + m)*(3 + m)*(4 + m)*(5 + m)*Sqrt[-(c^2*x^2)])) + (b*e^2
*x*(f*x)^(3 + m)*Sqrt[-1 - c^2*x^2])/(c*f^3*(4 + m)*(5 + m)*Sqrt[-(c^2*x^2)
]) + (d^2*(f*x)^(1 + m)*(a + b*ArcCsch[c*x]))/(f*(1 + m)) + (2*d*e*(f*x)^(3
 + m)*(a + b*ArcCsch[c*x]))/(f^3*(3 + m)) + (e^2*(f*x)^(5 + m)*(a + b*ArcCs
ch[c*x]))/(f^5*(5 + m)) - (b*c*(d^2/(1 + m)^2 + (e*(e*(3 + m)^2 - 2*c^2*d*(
20 + 9*m + m^2)))/(c^4*(2 + m)*(3 + m)*(4 + m)*(5 + m)))*x*(f*x)^(1 + m)*Sq
rt[1 + c^2*x^2]*Hypergeometric2F1[1/2, (1 + m)/2, (3 + m)/2, -(c^2*x^2)])/(
f*Sqrt[-(c^2*x^2)]*Sqrt[-1 - c^2*x^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 270

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

Rule 364

```
Int[((c_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Simp[(a^
p*(c*x)^(m + 1)*Hypergeometric2F1[-p, (m + 1)/n, (m + 1)/n + 1, -((b*x^n)/a
)])/(c*(m + 1)), x] /; FreeQ[{a, b, c, m, n, p}, x] &&  !IGtQ[p, 0] && (ILt
Q[p, 0] || GtQ[a, 0])
```

Rule 365

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

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 1267

```
Int[((f_.)*(x_))^(m_.)*((d_) + (e_.)*(x_)^2)^(q_.)*((a_) + (b_.)*(x_)^2 + (
c_.)*(x_)^4)^(p_.), x_Symbol] :> Simp[(c^p*(f*x)^(m + 4*p - 1)*(d + e*x^2)^
(q + 1))/(e*f^(4*p - 1)*(m + 4*p + 2*q + 1)), x] + Dist[1/(e*(m + 4*p + 2*q
 + 1)), Int[(f*x)^m*(d + e*x^2)^q*ExpandToSum[e*(m + 4*p + 2*q + 1)*((a + b
*x^2 + c*x^4)^p - c^p*x^(4*p)) - d*c^p*(m + 4*p - 1)*x^(4*p - 2), x], x], x
] /; FreeQ[{a, b, c, d, e, f, m, q}, x] && NeQ[b^2 - 4*a*c, 0] && IGtQ[p, 0
] &&  !IntegerQ[q] && NeQ[m + 4*p + 2*q + 1, 0]
```

Rule 6302

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))*((f_.)*(x_))^(m_.)*((d_.) + (e_.)*(
x_)^2)^(p_.), x_Symbol] :> With[{u = IntHide[(f*x)^m*(d + e*x^2)^p, x]}, Di
st[a + b*ArcCsch[c*x], u, x] - Dist[(b*c*x)/Sqrt[-(c^2*x^2)], Int[SimplifyI
ntegrand[u/(x*Sqrt[-1 - c^2*x^2]), x], x], x]] /; FreeQ[{a, b, c, d, e, f,
m, p}, x] && ((IGtQ[p, 0] &&  !(ILtQ[(m - 1)/2, 0] && GtQ[m + 2*p + 3, 0]))
 || (IGtQ[(m + 1)/2, 0] &&  !(ILtQ[p, 0] && GtQ[m + 2*p + 3, 0])) || (ILtQ[
```

```
(m + 2*p + 1)/2, 0] &&  !ILtQ[(m - 1)/2, 0]))
```

Rubi steps

$$\int (fx)^m \left(d+ex^2\right)^2 \left(a+b\operatorname{csch}^{-1}(cx)\right) dx = \frac{d^2(fx)^{1+m}\left(a+b\operatorname{csch}^{-1}(cx)\right)}{f(1+m)} + \frac{2de(fx)^{3+m}\left(a+b\operatorname{csch}^{-1}(cx)\right)}{f^3(3+m)} + \frac{e^2(f}{}$$

$$= \frac{d^2(fx)^{1+m}\left(a+b\operatorname{csch}^{-1}(cx)\right)}{f(1+m)} + \frac{2de(fx)^{3+m}\left(a+b\operatorname{csch}^{-1}(cx)\right)}{f^3(3+m)} + \frac{e^2(f}{}$$

$$= \frac{be^2x(fx)^{3+m}\sqrt{-1-c^2x^2}}{cf^3(4+m)(5+m)\sqrt{-c^2x^2}} + \frac{d^2(fx)^{1+m}\left(a+b\operatorname{csch}^{-1}(cx)\right)}{f(1+m)} + \frac{2de(fx}{}$$

$$= -\frac{be\left(e(3+m)^2-2c^2d\left(20+9m+m^2\right)\right)x(fx)^{1+m}\sqrt{-1-c^2x^2}}{c^3f(2+m)(4+m)\left(15+8m+m^2\right)\sqrt{-c^2x^2}} + \frac{be^2}{cf^3(4}$$

$$= -\frac{be\left(e(3+m)^2-2c^2d\left(20+9m+m^2\right)\right)x(fx)^{1+m}\sqrt{-1-c^2x^2}}{c^3f(2+m)(4+m)\left(15+8m+m^2\right)\sqrt{-c^2x^2}} + \frac{be^2}{cf^3(4}$$

$$= -\frac{be\left(e(3+m)^2-2c^2d\left(20+9m+m^2\right)\right)x(fx)^{1+m}\sqrt{-1-c^2x^2}}{c^3f(2+m)(4+m)\left(15+8m+m^2\right)\sqrt{-c^2x^2}} + \frac{be^2}{cf^3(4}$$

**Mathematica [F]** time = 0.16, size = 0, normalized size = 0.00

$$\int (fx)^m \left(d+ex^2\right)^2 \left(a+b\operatorname{csch}^{-1}(cx)\right) dx$$

Verification is Not applicable to the result.

```
[In] Integrate[(f*x)^m*(d + e*x^2)^2*(a + b*ArcCsch[c*x]),x]
[Out] Integrate[(f*x)^m*(d + e*x^2)^2*(a + b*ArcCsch[c*x]), x]
```

**fricas [F]** time = 0.49, size = 0, normalized size = 0.00

$$\text{integral}\left(\left(ae^2x^4 + 2\,adex^2 + ad^2 + \left(be^2x^4 + 2\,bdex^2 + bd^2\right)\operatorname{arcsch}(cx)\right)(fx)^m, x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((f*x)^m*(e*x^2+d)^2*(a+b*arccsch(c*x)),x, algorithm="fricas")
```

```
[Out] integral((a*e^2*x^4 + 2*a*d*e*x^2 + a*d^2 + (b*e^2*x^4 + 2*b*d*e*x^2 + b*d^
2)*arccsch(c*x))*(f*x)^m, x)
```

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

$$\int \left(ex^2+d\right)^2 (b\,\mathrm{arcsch}\,(cx)+a)\left(fx\right)^m\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((f*x)^m*(e*x^2+d)^2*(a+b*arccsch(c*x)),x, algorithm="giac")
```

```
[Out] integrate((e*x^2 + d)^2*(b*arccsch(c*x) + a)*(f*x)^m, x)
```

**maple [F]** time = 0.41, size = 0, normalized size = 0.00

$$\int \left(fx\right)^m \left(e\,x^2+d\right)^2 \left(a+b\,\mathrm{arccsch}\,(cx)\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((f*x)^m*(e*x^2+d)^2*(a+b*arccsch(c*x)),x)
```

```
[Out] int((f*x)^m*(e*x^2+d)^2*(a+b*arccsch(c*x)),x)
```

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

$$\frac{ae^2f^mx^5x^m}{m+5}+\frac{2\,adef^mx^3x^m}{m+3}+\frac{\left(fx\right)^{m+1}ad^2}{f(m+1)}-\frac{\left(\left(m^2+4\,m+3\right)be^2f^mx^5+2\left(m^2+6\,m+5\right)bdef^mx^3+\left(m^2+8\,m+\right.\right.}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((f*x)^m*(e*x^2+d)^2*(a+b*arccsch(c*x)),x, algorithm="maxima")
```

```
[Out] a*e^2*f^m*x^5*x^m/(m + 5) + 2*a*d*e*f^m*x^3*x^m/(m + 3) + (f*x)^(m + 1)*a*d
^2/(f*(m + 1)) - (((m^2 + 4*m + 3)*b*e^2*f^m*x^5 + 2*(m^2 + 6*m + 5)*b*d*e*
f^m*x^3 + (m^2 + 8*m + 15)*b*d^2*f^m*x)*x^m*log(x) - ((m^2 + 4*m + 3)*b*e^2
*f^m*x^5 + 2*(m^2 + 6*m + 5)*b*d*e*f^m*x^3 + (m^2 + 8*m + 15)*b*d^2*f^m*x)*
x^m*log(sqrt(c^2*x^2 + 1) + 1))/(m^3 + 9*m^2 + 23*m + 15) + integrate(((m^2
 + 4*m + 3)*b*c^2*e^2*f^m*x^6 + 2*(m^2 + 6*m + 5)*b*c^2*d*e*f^m*x^4 + (m^2
+ 8*m + 15)*b*c^2*d^2*f^m*x^2)*x^m/((m^3 + 9*m^2 + 23*m + 15)*c^2*x^2 + m^3
 + 9*m^2 + ((m^3 + 9*m^2 + 23*m + 15)*c^2*x^2 + m^3 + 9*m^2 + 23*m + 15)*sq
rt(c^2*x^2 + 1) + 23*m + 15), x) - integrate(((m^3 + 9*m^2 + 23*m + 15)*b*c
^2*e^2*f^m*x^6*log(c) + (2*(m^3 + 9*m^2 + 23*m + 15)*c^2*d*e*f^m*log(c) + (
m^3 + 9*m^2 + 23*m + 15)*e^2*f^m*log(c) - (m^2 + 4*m + 3)*e^2*f^m)*b*x^4 +
```

```
((m^3 + 9*m^2 + 23*m + 15)*c^2*d^2*f^m*log(c) + 2*(m^3 + 9*m^2 + 23*m + 15)
*d*e*f^m*log(c) - 2*(m^2 + 6*m + 5)*d*e*f^m)*b*x^2 + ((m^3 + 9*m^2 + 23*m +
 15)*d^2*f^m*log(c) - (m^2 + 8*m + 15)*d^2*f^m)*b)*x^m/((m^3 + 9*m^2 + 23*m
 + 15)*c^2*x^2 + m^3 + 9*m^2 + 23*m + 15), x)
```

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

$$\int {\left (f\,x\right )}^m\,{\left (e\,x^2+d\right )}^2\,\left (a+b\,\mathrm {asinh}\left (\frac {1}{c\,x}\right )\right ) \,d x$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((f*x)^m*(d + e*x^2)^2*(a + b*asinh(1/(c*x))),x)
[Out] int((f*x)^m*(d + e*x^2)^2*(a + b*asinh(1/(c*x))), x)
```

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

$$\int \left (f x\right )^{m} \left (a + b \operatorname {acsch}{\left (c x \right )}\right ) \left (d + e x^{2}\right )^{2}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((f*x)**m*(e*x**2+d)**2*(a+b*acsch(c*x)),x)
[Out] Integral((f*x)**m*(a + b*acsch(c*x))*(d + e*x**2)**2, x)
```

# 3.167 $\int (fx)^m \left(d+ex^2\right) \left(a+b\text{csch}^{-1}(cx)\right) dx$

**Optimal**. Leaf size=220

$$\frac{d(fx)^{m+1}\left(a+b\text{csch}^{-1}(cx)\right)}{f(m+1)}+\frac{e(fx)^{m+3}\left(a+b\text{csch}^{-1}(cx)\right)}{f^3(m+3)}+\frac{bx\sqrt{c^2x^2+1}(fx)^{m+1}\left(e(m+1)^2-c^2d(m+2)(m+3\right.}{cf(m+1)^2(m+2)(m+3)\sqrt{-c^2x^2}\ \sqrt{}}$$

```
[Out] d*(f*x)^(1+m)*(a+b*arccsch(c*x))/f/(1+m)+e*(f*x)^(3+m)*(a+b*arccsch(c*x))/f
^3/(3+m)+b*e*x*(f*x)^(1+m)*(-c^2*x^2-1)^(1/2)/c/f/(m^2+5*m+6)/(-c^2*x^2)^(1
/2)+b*(e*(1+m)^2-c^2*d*(2+m)*(3+m))*x*(f*x)^(1+m)*hypergeom([1/2, 1/2+1/2*m
],[3/2+1/2*m],-c^2*x^2)*(c^2*x^2+1)^(1/2)/c/f/(1+m)^2/(2+m)/(3+m)/(-c^2*x^2
)^(1/2)/(-c^2*x^2-1)^(1/2)
```

**Rubi [A]** time = 0.22, antiderivative size = 208, normalized size of antiderivative = 0.95, number of steps used = 5, number of rules used = 6, integrand size = 21, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.286, Rules used = {14, 6302, 12, 459, 365, 364}

$$\frac{d(fx)^{m+1}\left(a+b\text{csch}^{-1}(cx)\right)}{f(m+1)}+\frac{e(fx)^{m+3}\left(a+b\text{csch}^{-1}(cx)\right)}{f^3(m+3)}-\frac{bcx\sqrt{c^2x^2+1}(fx)^{m+1}\left(\frac{d}{(m+1)^2}-\frac{e}{c^2(m+2)(m+3)}\right)\,_2F_1\left(\frac{1}{2},\right.}{f\sqrt{-c^2x^2}\sqrt{-c^2x^2-1}}$$

Antiderivative was successfully verified.

```
[In] Int[(f*x)^m*(d + e*x^2)*(a + b*ArcCsch[c*x]),x]
```

```
[Out] (b*e*x*(f*x)^(1 + m)*Sqrt[-1 - c^2*x^2])/(c*f*(6 + 5*m + m^2)*Sqrt[-(c^2*x^
2)]) + (d*(f*x)^(1 + m)*(a + b*ArcCsch[c*x]))/(f*(1 + m)) + (e*(f*x)^(3 + m
)*(a + b*ArcCsch[c*x]))/(f^3*(3 + m)) - (b*c*(d/(1 + m)^2 - e/(c^2*(2 + m)*
(3 + m)))*x*(f*x)^(1 + m)*Sqrt[1 + c^2*x^2]*Hypergeometric2F1[1/2, (1 + m)/
2, (3 + m)/2, -(c^2*x^2)])/(f*Sqrt[-(c^2*x^2)]*Sqrt[-1 - c^2*x^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 14

```
Int[(u_)*((c_.)*(x_))^(m_.), x_Symbol] :> Int[ExpandIntegrand[(c*x)^m*u, x]
, x] /; FreeQ[{c, m}, x] && SumQ[u] &&  !LinearQ[u, x] &&  !MatchQ[u, (a_)
+ (b_.)*(v_) /; FreeQ[{a, b}, x] && InverseFunctionQ[v]]
```

Rule 364

```
Int[((c_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Simp[(a^
p*(c*x)^(m + 1)*Hypergeometric2F1[-p, (m + 1)/n, (m + 1)/n + 1, -((b*x^n)/a
)])/(c*(m + 1)), x] /; FreeQ[{a, b, c, m, n, p}, x] && !IGtQ[p, 0] && (ILt
Q[p, 0] || GtQ[a, 0])
```

Rule 365

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

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 6302

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))*((f_.)*(x_))^(m_.)*((d_.) + (e_.)*(
x_)^2)^(p_.), x_Symbol] :> With[{u = IntHide[(f*x)^m*(d + e*x^2)^p, x]}, Di
st[a + b*ArcCsch[c*x], u, x] - Dist[(b*c*x)/Sqrt[-(c^2*x^2)], Int[SimplifyI
ntegrand[u/(x*Sqrt[-1 - c^2*x^2]), x], x], x]] /; FreeQ[{a, b, c, d, e, f,
m, p}, x] && ((IGtQ[p, 0] && !(ILtQ[(m - 1)/2, 0] && GtQ[m + 2*p + 3, 0]))
 || (IGtQ[(m + 1)/2, 0] && !(ILtQ[p, 0] && GtQ[m + 2*p + 3, 0])) || (ILtQ[
(m + 2*p + 1)/2, 0] && !ILtQ[(m - 1)/2, 0]))
```

Rubi steps

$$\int (fx)^m \left(d+ex^2\right)\left(a+b\text{csch}^{-1}(cx)\right) dx = \frac{d(fx)^{1+m}\left(a+b\text{csch}^{-1}(cx)\right)}{f(1+m)} + \frac{e(fx)^{3+m}\left(a+b\text{csch}^{-1}(cx)\right)}{f^3(3+m)} - \frac{(bcx)\int}{}$$

$$= \frac{d(fx)^{1+m}\left(a+b\text{csch}^{-1}(cx)\right)}{f(1+m)} + \frac{e(fx)^{3+m}\left(a+b\text{csch}^{-1}(cx)\right)}{f^3(3+m)} - \frac{(bcx)\int}{(3-}$$

$$= \frac{bex(fx)^{1+m}\sqrt{-1-c^2x^2}}{cf\left(6+5m+m^2\right)\sqrt{-c^2x^2}} + \frac{d(fx)^{1+m}\left(a+b\text{csch}^{-1}(cx)\right)}{f(1+m)} + \frac{e(fx)^{3+m}}{}$$

$$= \frac{bex(fx)^{1+m}\sqrt{-1-c^2x^2}}{cf\left(6+5m+m^2\right)\sqrt{-c^2x^2}} + \frac{d(fx)^{1+m}\left(a+b\text{csch}^{-1}(cx)\right)}{f(1+m)} + \frac{e(fx)^{3+m}}{}$$

$$= \frac{bex(fx)^{1+m}\sqrt{-1-c^2x^2}}{cf\left(6+5m+m^2\right)\sqrt{-c^2x^2}} + \frac{d(fx)^{1+m}\left(a+b\text{csch}^{-1}(cx)\right)}{f(1+m)} + \frac{e(fx)^{3+m}}{}$$

**Mathematica [F]** time = 0.11, size = 0, normalized size = 0.00

$$\int (fx)^m \left(d+ex^2\right)\left(a+b\text{csch}^{-1}(cx)\right) dx$$

Verification is Not applicable to the result.

```
[In] Integrate[(f*x)^m*(d + e*x^2)*(a + b*ArcCsch[c*x]),x]
[Out] Integrate[(f*x)^m*(d + e*x^2)*(a + b*ArcCsch[c*x]), x]
```

**fricas [F]** time = 0.57, size = 0, normalized size = 0.00

$$\text{integral}\left(\left(aex^2+ad+\left(bex^2+bd\right)\text{arcsch}\left(cx\right)\right)\left(fx\right)^m, x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((f*x)^m*(e*x^2+d)*(a+b*arccsch(c*x)),x, algorithm="fricas")
[Out] integral((a*e*x^2 + a*d + (b*e*x^2 + b*d)*arccsch(c*x))*(f*x)^m, x)
```

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

$$\int \left(ex^2+d\right)(b\,\text{arcsch}\left(cx\right)+a)\left(fx\right)^m\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((f*x)^m*(e*x^2+d)*(a+b*arccsch(c*x)),x, algorithm="giac")
```

```
[Out] integrate((e*x^2 + d)*(b*arccsch(c*x) + a)*(f*x)^m, x)
```

**maple [F]** time = 0.06, size = 0, normalized size = 0.00

$$\int (fx)^{m} \left(e\,x^{2}+d\right) (a+b\,\mathrm{arccsch}\,(cx))\;dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((f*x)^m*(e*x^2+d)*(a+b*arccsch(c*x)),x)
```

```
[Out] int((f*x)^m*(e*x^2+d)*(a+b*arccsch(c*x)),x)
```

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

$$\frac{aef^{m}x^{3}x^{m}}{m+3}+\frac{(fx)^{m+1}ad}{f(m+1)}-\frac{\left(bef^{m}(m+1)x^{3}+bdf^{m}(m+3)x\right)x^{m}\log(x)-\left(bef^{m}(m+1)x^{3}+bdf^{m}(m+3)x\right)x^{m}\log}{m^{2}+4\,m+3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((f*x)^m*(e*x^2+d)*(a+b*arccsch(c*x)),x, algorithm="maxima")
```

```
[Out] a*e*f^m*x^3*x^m/(m + 3) + (f*x)^(m + 1)*a*d/(f*(m + 1)) - ((b*e*f^m*(m + 1)
*x^3 + b*d*f^m*(m + 3)*x)*x^m*log(x) - (b*e*f^m*(m + 1)*x^3 + b*d*f^m*(m +
3)*x)*x^m*log(sqrt(c^2*x^2 + 1) + 1))/(m^2 + 4*m + 3) + integrate((b*c^2*e*
f^m*(m + 1)*x^4 + b*c^2*d*f^m*(m + 3)*x^2)*x^m/((m^2 + 4*m + 3)*c^2*x^2 + m
^2 + ((m^2 + 4*m + 3)*c^2*x^2 + m^2 + 4*m + 3)*sqrt(c^2*x^2 + 1) + 4*m + 3)
, x) - integrate(((m^2 + 4*m + 3)*b*c^2*e*f^m*x^4*log(c) + ((m^2 + 4*m + 3)
*c^2*d*f^m*log(c) + (m^2 + 4*m + 3)*e*f^m*log(c) - e*f^m*(m + 1))*b*x^2 + (
(m^2 + 4*m + 3)*d*f^m*log(c) - d*f^m*(m + 3))*b)*x^m/((m^2 + 4*m + 3)*c^2*x
^2 + m^2 + 4*m + 3), x)
```

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

$$\int {\left(f\,x\right)}^m\,\left(e\,x^2+d\right)\,\left(a+b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)\right) \,d x$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((f*x)^m*(d + e*x^2)*(a + b*asinh(1/(c*x))),x)
```

```
[Out] int((f*x)^m*(d + e*x^2)*(a + b*asinh(1/(c*x))), x)
```

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

$$\int \left(fx\right)^{m}\left(a+b\operatorname{acsch}\left(cx\right)\right)\left(d+ex^{2}\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((f*x)**m*(e*x**2+d)*(a+b*acsch(c*x)),x)
```

```
[Out] Integral((f*x)**m*(a + b*acsch(c*x))*(d + e*x**2), x)
```

## 3.168 $\int \frac{(fx)^m\left(a+b\mathbf{csch}^{-1}(cx)\right)}{d+ex^2}\,dx$

**Optimal**. Leaf size=26

$$\operatorname{Int}\left(\frac{(fx)^m\left(a+b\operatorname{csch}^{-1}(cx)\right)}{d+ex^2},x\right)$$

```
[Out] Unintegrable((f*x)^m*(a+b*arccsch(c*x))/(e*x^2+d),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 = {}

$$\int \frac{(fx)^m\left(a+b\operatorname{csch}^{-1}(cx)\right)}{d+ex^2}\,dx$$

Verification is Not applicable to the result.

```
[In] Int[((f*x)^m*(a + b*ArcCsch[c*x]))/(d + e*x^2),x]
```

```
[Out] Defer[Int][((f*x)^m*(a + b*ArcCsch[c*x]))/(d + e*x^2), x]
```

Rubi steps

$$\int \frac{(fx)^m\left(a+b\operatorname{csch}^{-1}(cx)\right)}{d+ex^2}\,dx=\int \frac{(fx)^m\left(a+b\operatorname{csch}^{-1}(cx)\right)}{d+ex^2}\,dx$$

**Mathematica** [A] time = 1.87, size = 0, normalized size = 0.00

$$\int \frac{(fx)^m\left(a+b\operatorname{csch}^{-1}(cx)\right)}{d+ex^2}\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[((f*x)^m*(a + b*ArcCsch[c*x]))/(d + e*x^2),x]
```

```
[Out] Integrate[((f*x)^m*(a + b*ArcCsch[c*x]))/(d + e*x^2), x]
```

**fricas** [A] time = 0.63, size = 0, normalized size = 0.00

$$\operatorname{integral}\left(\frac{(b\operatorname{arcsch}(cx)+a)\left(fx\right)^m}{ex^2+d},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((f*x)^m*(a+b*arccsch(c*x))/(e*x^2+d),x, algorithm="fricas")
[Out] integral((b*arccsch(c*x) + a)*(f*x)^m/(e*x^2 + d), x)
```

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

$$\int \frac{(b \operatorname{arcsch}(cx) + a)\left(fx\right)^m}{ex^2 + d}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((f*x)^m*(a+b*arccsch(c*x))/(e*x^2+d),x, algorithm="giac")
[Out] integrate((b*arccsch(c*x) + a)*(f*x)^m/(e*x^2 + d), x)
```

**maple [A]** time = 0.44, size = 0, normalized size = 0.00

$$\int \frac{\left(fx\right)^m (a + b \operatorname{arccsch}(cx))}{e\,x^2 + d}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((f*x)^m*(a+b*arccsch(c*x))/(e*x^2+d),x)
[Out] int((f*x)^m*(a+b*arccsch(c*x))/(e*x^2+d),x)
```

**maxima [A]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{(b \operatorname{arcsch}(cx) + a)\left(fx\right)^m}{ex^2 + d}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((f*x)^m*(a+b*arccsch(c*x))/(e*x^2+d),x, algorithm="maxima")
[Out] integrate((b*arccsch(c*x) + a)*(f*x)^m/(e*x^2 + d), x)
```

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

$$\int \frac{\left(f\,x\right)^m\,\left(a + b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)\right)}{e\,x^2 + d}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(((f*x)^m*(a + b*asinh(1/(c*x))))/(d + e*x^2),x)
[Out] int(((f*x)^m*(a + b*asinh(1/(c*x))))/(d + e*x^2), x)
```

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

$$\int \frac{(fx)^m (a + b\operatorname{acsch}(cx))}{d + ex^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((f*x)**m*(a+b*acsch(c*x))/(e*x**2+d),x)
```

```
[Out] Integral((f*x)**m*(a + b*acsch(c*x))/(d + e*x**2), x)
```

## 3.169 $\int \frac{(fx)^m \left(a+b\text{csch}^{-1}(cx)\right)}{\left(d+ex^2\right)^2} \, dx$

**Optimal**. Leaf size=26

$$\text{Int}\left(\frac{(fx)^m \left(a+b\text{csch}^{-1}(cx)\right)}{\left(d+ex^2\right)^2},x\right)$$

```
[Out] Unintegrable((f*x)^m*(a+b*arccsch(c*x))/(e*x^2+d)^2,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 = {}

$$\int \frac{(fx)^m \left(a+b\text{csch}^{-1}(cx)\right)}{\left(d+ex^2\right)^2} \, dx$$

Verification is Not applicable to the result.

```
[In] Int[((f*x)^m*(a + b*ArcCsch[c*x]))/(d + e*x^2)^2,x]
```

```
[Out] Defer[Int][((f*x)^m*(a + b*ArcCsch[c*x]))/(d + e*x^2)^2, x]
```

Rubi steps

$$\int \frac{(fx)^m \left(a+b\text{csch}^{-1}(cx)\right)}{\left(d+ex^2\right)^2} \, dx=\int \frac{(fx)^m \left(a+b\text{csch}^{-1}(cx)\right)}{\left(d+ex^2\right)^2} \, dx$$

**Mathematica** [A] time = 6.96, size = 0, normalized size = 0.00

$$\int \frac{(fx)^m \left(a+b\text{csch}^{-1}(cx)\right)}{\left(d+ex^2\right)^2} \, dx$$

Verification is Not applicable to the result.

```
[In] Integrate[((f*x)^m*(a + b*ArcCsch[c*x]))/(d + e*x^2)^2,x]
```

```
[Out] Integrate[((f*x)^m*(a + b*ArcCsch[c*x]))/(d + e*x^2)^2, x]
```

**fricas** [A] time = 0.88, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{(b\,\text{arcsch}\left(cx\right)+a)\left(fx\right)^{m}}{e^{2}x^{4}+2\,dex^{2}+d^{2}},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((f*x)^m*(a+b*arccsch(c*x))/(e*x^2+d)^2,x, algorithm="fricas")
[Out] integral((b*arccsch(c*x) + a)*(f*x)^m/(e^2*x^4 + 2*d*e*x^2 + d^2), x)
```

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

$$\int \frac{(b \operatorname{arcsch}(cx) + a)(fx)^m}{(ex^2 + d)^2}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((f*x)^m*(a+b*arccsch(c*x))/(e*x^2+d)^2,x, algorithm="giac")
[Out] integrate((b*arccsch(c*x) + a)*(f*x)^m/(e*x^2 + d)^2, x)
```

**maple [A]** time = 0.43, size = 0, normalized size = 0.00

$$\int \frac{(fx)^m (a + b \operatorname{arccsch}(cx))}{(e x^2 + d)^2}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((f*x)^m*(a+b*arccsch(c*x))/(e*x^2+d)^2,x)
[Out] int((f*x)^m*(a+b*arccsch(c*x))/(e*x^2+d)^2,x)
```

**maxima [A]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{(b \operatorname{arcsch}(cx) + a)(fx)^m}{(ex^2 + d)^2}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((f*x)^m*(a+b*arccsch(c*x))/(e*x^2+d)^2,x, algorithm="maxima")
[Out] integrate((b*arccsch(c*x) + a)*(f*x)^m/(e*x^2 + d)^2, x)
```

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

$$\int \frac{(fx)^m \left(a + b \operatorname{asinh}\left(\frac{1}{c x}\right)\right)}{(e x^2 + d)^2}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(((f*x)^m*(a + b*asinh(1/(c*x))))/(d + e*x^2)^2,x)
```

```
[Out] int(((f*x)^m*(a + b*asinh(1/(c*x))))/(d + e*x^2)^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)**m*(a+b*acsch(c*x))/(e*x**2+d)**2,x)
```

```
[Out] Timed out
```

# 3.170 $\int (fx)^m \left(d+ex^2\right)^{3/2} \left(a+b\,\mathbf{csch}^{-1}(cx)\right)\,dx$

**Optimal**. Leaf size=28

$$\text{Int}\left(\left(d+ex^2\right)^{3/2}(fx)^m\left(a+b\text{csch}^{-1}(cx)\right),x\right)$$

```
[Out] Unintegrable((f*x)^m*(e*x^2+d)^(3/2)*(a+b*arccsch(c*x)),x)
```

**Rubi** [A] time = 0.12, 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 = {}

$$\int (fx)^m\left(d+ex^2\right)^{3/2}\left(a+b\text{csch}^{-1}(cx)\right)\,dx$$

Verification is Not applicable to the result.

```
[In] Int[(f*x)^m*(d + e*x^2)^(3/2)*(a + b*ArcCsch[c*x]),x]
```

```
[Out] Defer[Int][(f*x)^m*(d + e*x^2)^(3/2)*(a + b*ArcCsch[c*x]), x]
```

Rubi steps

$$\int (fx)^m\left(d+ex^2\right)^{3/2}\left(a+b\text{csch}^{-1}(cx)\right)\,dx=\int (fx)^m\left(d+ex^2\right)^{3/2}\left(a+b\text{csch}^{-1}(cx)\right)\,dx$$

**Mathematica** [A] time = 1.15, size = 0, normalized size = 0.00

$$\int (fx)^m\left(d+ex^2\right)^{3/2}\left(a+b\text{csch}^{-1}(cx)\right)\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[(f*x)^m*(d + e*x^2)^(3/2)*(a + b*ArcCsch[c*x]),x]
```

```
[Out] Integrate[(f*x)^m*(d + e*x^2)^(3/2)*(a + b*ArcCsch[c*x]), x]
```

**fricas** [A] time = 0.56, size = 0, normalized size = 0.00

$$\text{integral}\left(\left(aex^2+ad+\left(bex^2+bd\right)\text{arcsch}\left(cx\right)\right)\sqrt{ex^2+d}\,\left(fx\right)^m,x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((f*x)^m*(e*x^2+d)^(3/2)*(a+b*arccsch(c*x)),x, algorithm="fricas")
```

```
[Out] integral((a*e*x^2 + a*d + (b*e*x^2 + b*d)*arccsch(c*x))*sqrt(e*x^2 + d)*(f*
x)^m, x)
```

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

$$\int \left(ex^2+d\right)^{\frac{3}{2}}(b\,\mathrm{arcsch}\,(cx)+a)\left(fx\right)^m\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((f*x)^m*(e*x^2+d)^(3/2)*(a+b*arccsch(c*x)),x, algorithm="giac")
```

```
[Out] integrate((e*x^2 + d)^(3/2)*(b*arccsch(c*x) + a)*(f*x)^m, x)
```

**maple** [A] time = 0.45, size = 0, normalized size = 0.00

$$\int \left(fx\right)^m\left(e\,x^2+d\right)^{\frac{3}{2}}\left(a+b\,\mathrm{arccsch}\,(cx)\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((f*x)^m*(e*x^2+d)^(3/2)*(a+b*arccsch(c*x)),x)
```

```
[Out] int((f*x)^m*(e*x^2+d)^(3/2)*(a+b*arccsch(c*x)),x)
```

**maxima** [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \left(ex^2+d\right)^{\frac{3}{2}}(b\,\mathrm{arcsch}\,(cx)+a)\left(fx\right)^m\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((f*x)^m*(e*x^2+d)^(3/2)*(a+b*arccsch(c*x)),x, algorithm="maxima")
```

```
[Out] integrate((e*x^2 + d)^(3/2)*(b*arccsch(c*x) + a)*(f*x)^m, x)
```

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

$$\int {\left(f\,x\right)}^m\,{\left(e\,x^2+d\right)}^{3/2}\,\left(a+b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((f*x)^m*(d + e*x^2)^(3/2)*(a + b*asinh(1/(c*x))),x)
```

```
[Out] int((f*x)^m*(d + e*x^2)^(3/2)*(a + b*asinh(1/(c*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((f*x)**m*(e*x**2+d)**(3/2)*(a+b*acsch(c*x)),x)
```

```
[Out] Timed out
```

# 3.171 $\int (fx)^m\sqrt{d+ex^2}\left(a+b\operatorname{csch}^{-1}(cx)\right)dx$

**Optimal**. Leaf size=28

$$\operatorname{Int}\left(\sqrt{d+ex^2}(fx)^m\left(a+b\operatorname{csch}^{-1}(cx)\right),x\right)$$

```
[Out] Unintegrable((f*x)^m*(a+b*arccsch(c*x))*(e*x^2+d)^(1/2),x)
```

**Rubi** [A] time = 0.10, 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 = {}

$$\int (fx)^m\sqrt{d+ex^2}\left(a+b\operatorname{csch}^{-1}(cx)\right)dx$$

Verification is Not applicable to the result.

```
[In] Int[(f*x)^m*Sqrt[d + e*x^2]*(a + b*ArcCsch[c*x]),x]
[Out] Defer[Int][(f*x)^m*Sqrt[d + e*x^2]*(a + b*ArcCsch[c*x]), x]
```

Rubi steps

$$\int (fx)^m\sqrt{d+ex^2}\left(a+b\operatorname{csch}^{-1}(cx)\right)dx=\int (fx)^m\sqrt{d+ex^2}\left(a+b\operatorname{csch}^{-1}(cx)\right)dx$$

**Mathematica** [A] time = 0.12, size = 0, normalized size = 0.00

$$\int (fx)^m\sqrt{d+ex^2}\left(a+b\operatorname{csch}^{-1}(cx)\right)dx$$

Verification is Not applicable to the result.

```
[In] Integrate[(f*x)^m*Sqrt[d + e*x^2]*(a + b*ArcCsch[c*x]),x]
[Out] Integrate[(f*x)^m*Sqrt[d + e*x^2]*(a + b*ArcCsch[c*x]), x]
```

**fricas** [A] time = 0.61, size = 0, normalized size = 0.00

$$\operatorname{integral}\left(\sqrt{ex^2+d}\,(b\operatorname{arcsch}(cx)+a)\left(fx\right)^m,x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((f*x)^m*(a+b*arccsch(c*x))*(e*x^2+d)^(1/2),x, algorithm="fricas")
```

```
[Out] integral(sqrt(e*x^2 + d)*(b*arccsch(c*x) + a)*(f*x)^m, x)
```

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

$$\int \sqrt{ex^2+d}\,(b\,\mathrm{arcsch}\,(cx)+a)\left(fx\right)^m\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((f*x)^m*(a+b*arccsch(c*x))*(e*x^2+d)^(1/2),x, algorithm="giac")
[Out] integrate(sqrt(e*x^2 + d)*(b*arccsch(c*x) + a)*(f*x)^m, x)
```

**maple** [A] time = 0.46, size = 0, normalized size = 0.00

$$\int \left(fx\right)^m(a+b\,\mathrm{arccsch}\,(cx))\sqrt{e\,x^2+d}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((f*x)^m*(a+b*arccsch(c*x))*(e*x^2+d)^(1/2),x)
[Out] int((f*x)^m*(a+b*arccsch(c*x))*(e*x^2+d)^(1/2),x)
```

**maxima** [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \sqrt{ex^2+d}\,(b\,\mathrm{arcsch}\,(cx)+a)\left(fx\right)^m\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((f*x)^m*(a+b*arccsch(c*x))*(e*x^2+d)^(1/2),x, algorithm="maxima")
[Out] integrate(sqrt(e*x^2 + d)*(b*arccsch(c*x) + a)*(f*x)^m, x)
```

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

$$\int \left(f\,x\right)^m\,\sqrt{e\,x^2+d}\,\left(a+b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)\right)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((f*x)^m*(d + e*x^2)^(1/2)*(a + b*asinh(1/(c*x))),x)
[Out] int((f*x)^m*(d + e*x^2)^(1/2)*(a + b*asinh(1/(c*x))), x)
```

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

$$\int \left(fx\right)^m(a+b\,\mathrm{acsch}\,(cx))\sqrt{d+ex^2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((f*x)**m*(a+b*acsch(c*x))*(e*x**2+d)**(1/2),x)
```

```
[Out] Integral((f*x)**m*(a + b*acsch(c*x))*sqrt(d + e*x**2), x)
```

## 3.172 $\int \frac{(fx)^m\left(a+b\,\mathrm{csch}^{-1}(cx)\right)}{\sqrt{d+ex^2}}\,dx$

**Optimal**. Leaf size=28

$$\mathrm{Int}\left(\frac{(fx)^m\left(a+b\,\mathrm{csch}^{-1}(cx)\right)}{\sqrt{d+ex^2}},x\right)$$

[Out] Unintegrable((f*x)^m*(a+b*arccsch(c*x))/(e*x^2+d)^(1/2),x)

**Rubi** [A] time = 0.10, 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 = {}

$$\int \frac{(fx)^m\left(a+b\,\mathrm{csch}^{-1}(cx)\right)}{\sqrt{d+ex^2}}\,dx$$

Verification is Not applicable to the result.

[In] Int[((f*x)^m*(a + b*ArcCsch[c*x]))/Sqrt[d + e*x^2],x]

[Out] Defer[Int][((f*x)^m*(a + b*ArcCsch[c*x]))/Sqrt[d + e*x^2], x]

Rubi steps

$$\int \frac{(fx)^m\left(a+b\,\mathrm{csch}^{-1}(cx)\right)}{\sqrt{d+ex^2}}\,dx=\int \frac{(fx)^m\left(a+b\,\mathrm{csch}^{-1}(cx)\right)}{\sqrt{d+ex^2}}\,dx$$

**Mathematica** [A] time = 1.46, size = 0, normalized size = 0.00

$$\int \frac{(fx)^m\left(a+b\,\mathrm{csch}^{-1}(cx)\right)}{\sqrt{d+ex^2}}\,dx$$

Verification is Not applicable to the result.

[In] Integrate[((f*x)^m*(a + b*ArcCsch[c*x]))/Sqrt[d + e*x^2],x]

[Out] Integrate[((f*x)^m*(a + b*ArcCsch[c*x]))/Sqrt[d + e*x^2], x]

**fricas** [A] time = 0.71, size = 0, normalized size = 0.00

$$\mathrm{integral}\left(\frac{(b\,\mathrm{arcsch}\,(cx)+a)\left(fx\right)^m}{\sqrt{ex^2+d}},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((f*x)^m*(a+b*arccsch(c*x))/(e*x^2+d)^(1/2),x, algorithm="fricas")
[Out] integral((b*arccsch(c*x) + a)*(f*x)^m/sqrt(e*x^2 + d), x)
```

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

$$\int \frac{(b\,\mathrm{arcsch}\,(cx)+a)\left(fx\right)^{m}}{\sqrt{ex^{2}+d}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((f*x)^m*(a+b*arccsch(c*x))/(e*x^2+d)^(1/2),x, algorithm="giac")
[Out] integrate((b*arccsch(c*x) + a)*(f*x)^m/sqrt(e*x^2 + d), x)
```

**maple** [A] time = 0.44, size = 0, normalized size = 0.00

$$\int \frac{\left(fx\right)^{m}(a+b\,\mathrm{arccsch}\,(cx))}{\sqrt{e\,x^{2}+d}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((f*x)^m*(a+b*arccsch(c*x))/(e*x^2+d)^(1/2),x)
[Out] int((f*x)^m*(a+b*arccsch(c*x))/(e*x^2+d)^(1/2),x)
```

**maxima** [A] time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{(b\,\mathrm{arcsch}\,(cx)+a)\left(fx\right)^{m}}{\sqrt{ex^{2}+d}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((f*x)^m*(a+b*arccsch(c*x))/(e*x^2+d)^(1/2),x, algorithm="maxima")
[Out] integrate((b*arccsch(c*x) + a)*(f*x)^m/sqrt(e*x^2 + d), x)
```

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

$$\int \frac{\left(f\,x\right)^{m}\left(a+b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)\right)}{\sqrt{e\,x^{2}+d}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(((f*x)^m*(a + b*asinh(1/(c*x))))/(d + e*x^2)^(1/2),x)
```

```
[Out] int(((f*x)^m*(a + b*asinh(1/(c*x))))/(d + e*x^2)^(1/2), x)
```

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

$$\int \frac{(fx)^m (a + b\,\mathrm{acsch}\,(cx))}{\sqrt{d + ex^2}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((f*x)**m*(a+b*acsch(c*x))/(e*x**2+d)**(1/2),x)
```

```
[Out] Integral((f*x)**m*(a + b*acsch(c*x))/sqrt(d + e*x**2), x)
```

# 3.173 $\int \frac{(fx)^m\left(a+b\,\mathbf{csch}^{-1}(cx)\right)}{\left(d+ex^2\right)^{3/2}}\,dx$

**Optimal**. Leaf size=28

$$\text{Int}\left(\frac{(fx)^m\left(a+b\text{csch}^{-1}(cx)\right)}{\left(d+ex^2\right)^{3/2}},x\right)$$

```
[Out] Unintegrable((f*x)^m*(a+b*arccsch(c*x))/(e*x^2+d)^(3/2),x)
```

**Rubi** [A] time = 0.11, 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 = {}

$$\int \frac{(fx)^m\left(a+b\text{csch}^{-1}(cx)\right)}{\left(d+ex^2\right)^{3/2}}\,dx$$

Verification is Not applicable to the result.

```
[In] Int[((f*x)^m*(a + b*ArcCsch[c*x]))/(d + e*x^2)^(3/2),x]
```

```
[Out] Defer[Int][((f*x)^m*(a + b*ArcCsch[c*x]))/(d + e*x^2)^(3/2), x]
```

Rubi steps

$$\int \frac{(fx)^m\left(a+b\text{csch}^{-1}(cx)\right)}{\left(d+ex^2\right)^{3/2}}\,dx=\int \frac{(fx)^m\left(a+b\text{csch}^{-1}(cx)\right)}{\left(d+ex^2\right)^{3/2}}\,dx$$

**Mathematica** [A] time = 1.87, size = 0, normalized size = 0.00

$$\int \frac{(fx)^m\left(a+b\text{csch}^{-1}(cx)\right)}{\left(d+ex^2\right)^{3/2}}\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[((f*x)^m*(a + b*ArcCsch[c*x]))/(d + e*x^2)^(3/2),x]
```

```
[Out] Integrate[((f*x)^m*(a + b*ArcCsch[c*x]))/(d + e*x^2)^(3/2), x]
```

**fricas** [A] time = 0.55, size = 0, normalized size = 0.00

$$\text{integral}\left(\frac{\sqrt{ex^2+d}\,(b\,\text{arcsch}\,(cx)+a)\left(fx\right)^m}{e^2x^4+2\,dex^2+d^2},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((f*x)^m*(a+b*arccsch(c*x))/(e*x^2+d)^(3/2),x, algorithm="fricas")
```

```
[Out] integral(sqrt(e*x^2 + d)*(b*arccsch(c*x) + a)*(f*x)^m/(e^2*x^4 + 2*d*e*x^2
+ d^2), x)
```

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

$$\int \frac{(b\,\mathrm{arcsch}\,(cx) + a)\left(fx\right)^{m}}{\left(ex^{2} + d\right)^{\frac{3}{2}}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((f*x)^m*(a+b*arccsch(c*x))/(e*x^2+d)^(3/2),x, algorithm="giac")
```

```
[Out] integrate((b*arccsch(c*x) + a)*(f*x)^m/(e*x^2 + d)^(3/2), x)
```

**maple [A]** time = 0.52, size = 0, normalized size = 0.00

$$\int \frac{\left(fx\right)^{m}(a + b\,\mathrm{arccsch}\,(cx))}{\left(e\,x^{2} + d\right)^{\frac{3}{2}}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((f*x)^m*(a+b*arccsch(c*x))/(e*x^2+d)^(3/2),x)
```

```
[Out] int((f*x)^m*(a+b*arccsch(c*x))/(e*x^2+d)^(3/2),x)
```

**maxima [A]** time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{(b\,\mathrm{arcsch}\,(cx) + a)\left(fx\right)^{m}}{\left(ex^{2} + d\right)^{\frac{3}{2}}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((f*x)^m*(a+b*arccsch(c*x))/(e*x^2+d)^(3/2),x, algorithm="maxima")
```

```
[Out] integrate((b*arccsch(c*x) + a)*(f*x)^m/(e*x^2 + d)^(3/2), x)
```

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

$$\int \frac{\left(f\,x\right)^{m}\left(a + b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)\right)}{\left(e\,x^{2} + d\right)^{3/2}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(((f*x)^m*(a + b*asinh(1/(c*x))))/(d + e*x^2)^(3/2),x)
[Out] int(((f*x)^m*(a + b*asinh(1/(c*x))))/(d + e*x^2)^(3/2), 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)**m*(a+b*acsch(c*x))/(e*x**2+d)**(3/2),x)
[Out] Timed out
```

# 3.174 $\int \frac{x^{11}\left(a+b\mathbf{csch}^{-1}(cx)\right)}{\sqrt{1-c^4x^4}}\,dx$

**Optimal**. Leaf size=395

$$-\frac{\left(1-c^4x^4\right)^{5/2}\left(a+b\text{csch}^{-1}(cx)\right)}{10c^{12}}+\frac{\left(1-c^4x^4\right)^{3/2}\left(a+b\text{csch}^{-1}(cx)\right)}{3c^{12}}-\frac{\sqrt{1-c^4x^4}\left(a+b\text{csch}^{-1}(cx)\right)}{2c^{12}}-\frac{b\sqrt{c^2x^2+1}\,(1}{90c^{13}x\sqrt{\frac{1}{c^2}}}$$

```
[Out] 1/3*(-c^4*x^4+1)^(3/2)*(a+b*arccsch(c*x))/c^12-1/10*(-c^4*x^4+1)^(5/2)*(a+b
*arccsch(c*x))/c^12+7/90*b*(-c^2*x^2+1)^(3/2)*(c^2*x^2+1)^(1/2)/c^13/x/(1+1
/c^2/x^2)^(1/2)-13/150*b*(-c^2*x^2+1)^(5/2)*(c^2*x^2+1)^(1/2)/c^13/x/(1+1/c
^2/x^2)^(1/2)+3/70*b*(-c^2*x^2+1)^(7/2)*(c^2*x^2+1)^(1/2)/c^13/x/(1+1/c^2/x
^2)^(1/2)-1/90*b*(-c^2*x^2+1)^(9/2)*(c^2*x^2+1)^(1/2)/c^13/x/(1+1/c^2/x^2)^
(1/2)+4/15*b*arctanh((-c^2*x^2+1)^(1/2))*(c^2*x^2+1)^(1/2)/c^13/x/(1+1/c^2/
x^2)^(1/2)-4/15*b*(-c^2*x^2+1)^(1/2)*(c^2*x^2+1)^(1/2)/c^13/x/(1+1/c^2/x^2)
^(1/2)-1/2*(a+b*arccsch(c*x))*(-c^4*x^4+1)^(1/2)/c^12
```

**Rubi [A]** time = 2.34, antiderivative size = 395, normalized size of antiderivative = 1.00, number of steps used = 16, number of rules used = 11, integrand size = 26, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.423, Rules used = {266, 43, 6310, 12, 6721, 6742, 848, 50, 63, 208, 783}

$$-\frac{\left(1-c^4x^4\right)^{5/2}\left(a+b\text{csch}^{-1}(cx)\right)}{10c^{12}}+\frac{\left(1-c^4x^4\right)^{3/2}\left(a+b\text{csch}^{-1}(cx)\right)}{3c^{12}}-\frac{\sqrt{1-c^4x^4}\left(a+b\text{csch}^{-1}(cx)\right)}{2c^{12}}-\frac{b\sqrt{c^2x^2+1}\,(1}{90c^{13}x\sqrt{\frac{1}{c^2}}}$$

Antiderivative was successfully verified.

```
[In] Int[(x^11*(a + b*ArcCsch[c*x]))/Sqrt[1 - c^4*x^4],x]
```

```
[Out] (-4*b*Sqrt[1 - c^2*x^2]*Sqrt[1 + c^2*x^2])/(15*c^13*Sqrt[1 + 1/(c^2*x^2)]*x
) + (7*b*(1 - c^2*x^2)^(3/2)*Sqrt[1 + c^2*x^2])/(90*c^13*Sqrt[1 + 1/(c^2*x^
2)]*x) - (13*b*(1 - c^2*x^2)^(5/2)*Sqrt[1 + c^2*x^2])/(150*c^13*Sqrt[1 + 1/
(c^2*x^2)]*x) + (3*b*(1 - c^2*x^2)^(7/2)*Sqrt[1 + c^2*x^2])/(70*c^13*Sqrt[1
 + 1/(c^2*x^2)]*x) - (b*(1 - c^2*x^2)^(9/2)*Sqrt[1 + c^2*x^2])/(90*c^13*Sqr
t[1 + 1/(c^2*x^2)]*x) - (Sqrt[1 - c^4*x^4]*(a + b*ArcCsch[c*x]))/(2*c^12) +
 ((1 - c^4*x^4)^(3/2)*(a + b*ArcCsch[c*x]))/(3*c^12) - ((1 - c^4*x^4)^(5/2)
*(a + b*ArcCsch[c*x]))/(10*c^12) + (4*b*Sqrt[1 + c^2*x^2]*ArcTanh[Sqrt[1 -
c^2*x^2]])/(15*c^13*Sqrt[1 + 1/(c^2*x^2)]*x)
```

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 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 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 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 783

```
Int[((d_) + (e_.)*(x_))^(m_)*((f_.) + (g_.)*(x_))*((a_) + (c_.)*(x_)^2)^(p_
.), x_Symbol] :> Int[(d + e*x)^(m + p)*(f + g*x)*(a/d + (c*x)/e)^p, x] /; F
reeQ[{a, c, d, e, f, g, m}, x] && EqQ[c*d^2 + a*e^2, 0] && (IntegerQ[p] ||
(GtQ[a, 0] && GtQ[d, 0] && EqQ[m + p, 0]))
```

Rule 848

```
Int[((d_) + (e_.)*(x_))^(m_)*((f_.) + (g_.)*(x_))^(n_)*((a_) + (c_.)*(x_)^2
```

```
)^(p_.), x_Symbol] :> Int[(d + e*x)^(m + p)*(f + g*x)^n*(a/d + (c*x)/e)^p,
x] /; FreeQ[{a, c, d, e, f, g, m, n}, x] && NeQ[e*f - d*g, 0] && EqQ[c*d^2
+ a*e^2, 0] && (IntegerQ[p] || (GtQ[a, 0] && GtQ[d, 0] && EqQ[m + p, 0]))
```

Rule 6310

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))*(u_), x_Symbol] :> With[{v = IntHid
e[u, x]}, Dist[a + b*ArcCsch[c*x], v, x] + Dist[b/c, Int[SimplifyIntegrand[
v/(x^2*Sqrt[1 + 1/(c^2*x^2)]), x], x], x] /; InverseFunctionFreeQ[v, x]] /;
 FreeQ[{a, b, c}, x]
```

Rule 6721

```
Int[(u_.)*((a_.) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Dist[(b^IntPart[p]*(
a + b*x^n)^FracPart[p])/(x^(n*FracPart[p])*(1 + a/(x^n*b))^FracPart[p]), In
t[u*x^(n*p)*(1 + a/(x^n*b))^p, x], x] /; FreeQ[{a, b, p}, x] &&  !IntegerQ[
p] && ILtQ[n, 0] &&  !RationalFunctionQ[u, x] && IntegerQ[p + 1/2]
```

Rule 6742

```
Int[u_, x_Symbol] :> With[{v = ExpandIntegrand[u, x]}, Int[v, x] /; SumQ[v]
]
```

Rubi steps

$$\int \frac{x^{11}\left(a+b\text{csch}^{-1}(cx)\right)}{\sqrt{1-c^4x^4}}\,dx = -\frac{\sqrt{1-c^4x^4}\left(a+b\text{csch}^{-1}(cx)\right)}{2c^{12}} + \frac{\left(1-c^4x^4\right)^{3/2}\left(a+b\text{csch}^{-1}(cx)\right)}{3c^{12}} - \frac{\left(1-c^4x^4\right)^{5/2}}{}$$

$$= -\frac{\sqrt{1-c^4x^4}\left(a+b\text{csch}^{-1}(cx)\right)}{2c^{12}} + \frac{\left(1-c^4x^4\right)^{3/2}\left(a+b\text{csch}^{-1}(cx)\right)}{3c^{12}} - \frac{\left(1-c^4x^4\right)^{5/2}}{}$$

$$= -\frac{\sqrt{1-c^4x^4}\left(a+b\text{csch}^{-1}(cx)\right)}{2c^{12}} + \frac{\left(1-c^4x^4\right)^{3/2}\left(a+b\text{csch}^{-1}(cx)\right)}{3c^{12}} - \frac{\left(1-c^4x^4\right)^{5/2}}{}$$

$$= -\frac{\sqrt{1-c^4x^4}\left(a+b\text{csch}^{-1}(cx)\right)}{2c^{12}} + \frac{\left(1-c^4x^4\right)^{3/2}\left(a+b\text{csch}^{-1}(cx)\right)}{3c^{12}} - \frac{\left(1-c^4x^4\right)^{5/2}}{}$$

$$= -\frac{\sqrt{1-c^4x^4}\left(a+b\text{csch}^{-1}(cx)\right)}{2c^{12}} + \frac{\left(1-c^4x^4\right)^{3/2}\left(a+b\text{csch}^{-1}(cx)\right)}{3c^{12}} - \frac{\left(1-c^4x^4\right)^{5/2}}{}$$

$$= -\frac{\sqrt{1-c^4x^4}\left(a+b\text{csch}^{-1}(cx)\right)}{2c^{12}} + \frac{\left(1-c^4x^4\right)^{3/2}\left(a+b\text{csch}^{-1}(cx)\right)}{3c^{12}} - \frac{\left(1-c^4x^4\right)^{5/2}}{}$$

$$= -\frac{\sqrt{1-c^4x^4}\left(a+b\text{csch}^{-1}(cx)\right)}{2c^{12}} + \frac{\left(1-c^4x^4\right)^{3/2}\left(a+b\text{csch}^{-1}(cx)\right)}{3c^{12}} - \frac{\left(1-c^4x^4\right)^{5/2}}{}$$

$$= -\frac{4b\sqrt{1-c^2x^2}\,\sqrt{1+c^2x^2}}{15c^{13}\sqrt{1+\frac{1}{c^2x^2}}\,x} - \frac{\sqrt{1-c^4x^4}\left(a+b\text{csch}^{-1}(cx)\right)}{2c^{12}} + \frac{\left(1-c^4x^4\right)^{3/2}\left(a+bcs\right.}{3c^{12}}$$

$$= -\frac{4b\sqrt{1-c^2x^2}\,\sqrt{1+c^2x^2}}{15c^{13}\sqrt{1+\frac{1}{c^2x^2}}\,x} + \frac{7b\left(1-c^2x^2\right)^{3/2}\sqrt{1+c^2x^2}}{90c^{13}\sqrt{1+\frac{1}{c^2x^2}}\,x} - \frac{13b\left(1-c^2x^2\right)^{5/2}\sqrt{1+c}}{150c^{13}\sqrt{1+\frac{1}{c^2x^2}}\,x}$$

$$= -\frac{4b\sqrt{1-c^2x^2}\,\sqrt{1+c^2x^2}}{15c^{13}\sqrt{1+\frac{1}{c^2x^2}}\,x} + \frac{7b\left(1-c^2x^2\right)^{3/2}\sqrt{1+c^2x^2}}{90c^{13}\sqrt{1+\frac{1}{c^2x^2}}\,x} - \frac{13b\left(1-c^2x^2\right)^{5/2}\sqrt{1+c}}{150c^{13}\sqrt{1+\frac{1}{c^2x^2}}\,x}$$

**Mathematica** [A] time = 0.31, size = 214, normalized size = 0.54

$$-\frac{105a\sqrt{1-c^4x^4}\left(3c^8x^8+4c^4x^4+8\right)+840b\log\left(c^2x^3+x\right)+105b\sqrt{1-c^4x^4}\left(3c^8x^8+4c^4x^4+8\right)\operatorname{csch}^{-1}(cx)-8}{3150c^{12}}$$

Antiderivative was successfully verified.

```
[In] Integrate[(x^11*(a + b*ArcCsch[c*x]))/Sqrt[1 - c^4*x^4],x]
```

```
[Out] -1/3150*(105*a*Sqrt[1 - c^4*x^4]*(8 + 4*c^4*x^4 + 3*c^8*x^8) + (b*c*Sqrt[1
+ 1/(c^2*x^2)]*x*Sqrt[1 - c^4*x^4]*(768 - 36*c^2*x^2 + 78*c^4*x^4 - 5*c^6*x
^6 + 35*c^8*x^8))/(1 + c^2*x^2) + 105*b*Sqrt[1 - c^4*x^4]*(8 + 4*c^4*x^4 +
3*c^8*x^8)*ArcCsch[c*x] + 840*b*Log[x + c^2*x^3] - 840*b*Log[1 + c^2*x^2 +
c*Sqrt[1 + 1/(c^2*x^2)]*x*Sqrt[1 - c^4*x^4]])/c^12
```

**fricas** [A] time = 0.61, size = 382, normalized size = 0.97

$$-\frac{105\left(3\,bc^{10}x^{10}+3\,bc^{8}x^{8}+4\,bc^{6}x^{6}+4\,bc^{4}x^{4}+8\,bc^{2}x^{2}+8\,b\right)\sqrt{-c^4x^4+1}\,\log\left(\frac{cx\sqrt{\frac{c^2x^2+1}{c^2x^2}}+1}{cx}\right)+\left(35\,bc^{9}x^{9}-5\,bc^{7}x\right.}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^11*(a+b*arccsch(c*x))/(-c^4*x^4+1)^(1/2),x, algorithm="fricas")
```

```
[Out] -1/3150*(105*(3*b*c^10*x^10 + 3*b*c^8*x^8 + 4*b*c^6*x^6 + 4*b*c^4*x^4 + 8*b
*c^2*x^2 + 8*b)*sqrt(-c^4*x^4 + 1)*log((c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) +
 1)/(c*x)) + (35*b*c^9*x^9 - 5*b*c^7*x^7 + 78*b*c^5*x^5 - 36*b*c^3*x^3 + 76
8*b*c*x)*sqrt(-c^4*x^4 + 1)*sqrt((c^2*x^2 + 1)/(c^2*x^2)) - 420*(b*c^2*x^2
+ b)*log((c^2*x^2 + sqrt(-c^4*x^4 + 1)*c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) +
1)/(c^2*x^2 + 1)) + 420*(b*c^2*x^2 + b)*log(-(c^2*x^2 - sqrt(-c^4*x^4 + 1)*
c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) + 1)/(c^2*x^2 + 1)) + 105*(3*a*c^10*x^10
+ 3*a*c^8*x^8 + 4*a*c^6*x^6 + 4*a*c^4*x^4 + 8*a*c^2*x^2 + 8*a)*sqrt(-c^4*x^
4 + 1))/(c^14*x^2 + c^12)
```

**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^11*(a+b*arccsch(c*x))/(-c^4*x^4+1)^(1/2),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 [F]** time = 0.55, size = 0, normalized size = 0.00

$$\int \frac{x^{11} \left(a + b \,\mathrm{arccsch}\left(cx\right)\right)}{\sqrt{-c^{4} x^{4}+1}}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^11*(a+b*arccsch(c*x))/(-c^4*x^4+1)^(1/2),x)
```

```
[Out] int(x^11*(a+b*arccsch(c*x))/(-c^4*x^4+1)^(1/2),x)
```

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

$$-\frac{1}{30}\, a\left(\frac{3\left(-c^{4} x^{4}+1\right)^{\frac{5}{2}}}{c^{12}} - \frac{10\left(-c^{4} x^{4}+1\right)^{\frac{3}{2}}}{c^{12}} + \frac{15\sqrt{-c^{4} x^{4}+1}}{c^{12}}\right) + \frac{1}{30}\, b\left(\frac{\left(3\, c^{12} x^{12} + c^{8} x^{8} + 4\, c^{4} x^{4} - 8\right)\log\left(\sqrt{c^{2} x^{2} +\right.}{\sqrt{c^{2} x^{2}+1}\,\sqrt{cx+1}\,\sqrt{-cx+1}\, c^{12}}\right.$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^11*(a+b*arccsch(c*x))/(-c^4*x^4+1)^(1/2),x, algorithm="maxima")
```

```
[Out] -1/30*a*(3*(-c^4*x^4 + 1)^(5/2)/c^12 - 10*(-c^4*x^4 + 1)^(3/2)/c^12 + 15*sq
rt(-c^4*x^4 + 1)/c^12) + 1/30*b*((3*c^12*x^12 + c^8*x^8 + 4*c^4*x^4 - 8)*lo
g(sqrt(c^2*x^2 + 1) + 1)/(sqrt(c^2*x^2 + 1)*sqrt(c*x + 1)*sqrt(-c*x + 1)*c^
12) - 30*integrate((x^11*log(c) + x^11*log(x))*e^(-1/2*log(c^2*x^2 + 1) - 1
/2*log(c*x + 1) - 1/2*log(-c*x + 1)), x) - 30*integrate(1/30*(3*c^10*x^11 -
 3*c^8*x^9 + 4*c^6*x^7 - 4*c^4*x^5 + 8*c^2*x^3 - 8*x)/(sqrt(c^2*x^2 + 1)*sq
rt(c*x + 1)*sqrt(-c*x + 1)*c^10 + sqrt(c*x + 1)*sqrt(-c*x + 1)*c^10), x))
```

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

$$\int \frac{x^{11}\,\left(a+b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)\right)}{\sqrt{1-c^4\,x^4}} \,d x$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((x^11*(a + b*asinh(1/(c*x))))/(1 - c^4*x^4)^(1/2),x)
```

```
[Out] int((x^11*(a + b*asinh(1/(c*x))))/(1 - c^4*x^4)^(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(x**11*(a+b*acsch(c*x))/(-c**4*x**4+1)**(1/2),x)
```

```
[Out] Timed out
```

# 3.175 $\int \frac{x^7\left(a+b\,\mathbf{csch}^{-1}(cx)\right)}{\sqrt{1-c^4x^4}}\,dx$

**Optimal**. Leaf size=264

$$\frac{\left(1-c^4x^4\right)^{3/2}\left(a+b\operatorname{csch}^{-1}(cx)\right)}{6c^8}-\frac{\sqrt{1-c^4x^4}\left(a+b\operatorname{csch}^{-1}(cx)\right)}{2c^8}-\frac{b\sqrt{c^2x^2+1}\left(1-c^2x^2\right)^{5/2}}{30c^9x\sqrt{\frac{1}{c^2x^2}+1}}+\frac{b\sqrt{c^2x^2+1}\left(1-c^2x^2\right.}{18c^9x\sqrt{\frac{1}{c^2x^2}+1}}$$

```
[Out] 1/6*(-c^4*x^4+1)^(3/2)*(a+b*arccsch(c*x))/c^8+1/18*b*(-c^2*x^2+1)^(3/2)*(c^
2*x^2+1)^(1/2)/c^9/x/(1+1/c^2/x^2)^(1/2)-1/30*b*(-c^2*x^2+1)^(5/2)*(c^2*x^2
+1)^(1/2)/c^9/x/(1+1/c^2/x^2)^(1/2)+1/3*b*arctanh((-c^2*x^2+1)^(1/2))*(c^2*
x^2+1)^(1/2)/c^9/x/(1+1/c^2/x^2)^(1/2)-1/3*b*(-c^2*x^2+1)^(1/2)*(c^2*x^2+1)
^(1/2)/c^9/x/(1+1/c^2/x^2)^(1/2)-1/2*(a+b*arccsch(c*x))*(-c^4*x^4+1)^(1/2)/
c^8
```

**Rubi** [A] time = 1.92, antiderivative size = 264, normalized size of antiderivative = 1.00, number of steps used = 13, number of rules used = 11, integrand size = 26, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.423, Rules used = {266, 43, 6310, 12, 6721, 6742, 848, 50, 63, 208, 783}


$$\frac{\left(1-c^4x^4\right)^{3/2}\left(a+b\operatorname{csch}^{-1}(cx)\right)}{6c^8}-\frac{\sqrt{1-c^4x^4}\left(a+b\operatorname{csch}^{-1}(cx)\right)}{2c^8}-\frac{b\sqrt{c^2x^2+1}\left(1-c^2x^2\right)^{5/2}}{30c^9x\sqrt{\frac{1}{c^2x^2}+1}}+\frac{b\sqrt{c^2x^2+1}\left(1-c^2x^2\right.}{18c^9x\sqrt{\frac{1}{c^2x^2}+1}}$$


Antiderivative was successfully verified.

```
[In] Int[(x^7*(a + b*ArcCsch[c*x]))/Sqrt[1 - c^4*x^4],x]
```

```
[Out] -(b*Sqrt[1 - c^2*x^2]*Sqrt[1 + c^2*x^2])/(3*c^9*Sqrt[1 + 1/(c^2*x^2)]*x) +
(b*(1 - c^2*x^2)^(3/2)*Sqrt[1 + c^2*x^2])/(18*c^9*Sqrt[1 + 1/(c^2*x^2)]*x)
- (b*(1 - c^2*x^2)^(5/2)*Sqrt[1 + c^2*x^2])/(30*c^9*Sqrt[1 + 1/(c^2*x^2)]*x
) - (Sqrt[1 - c^4*x^4]*(a + b*ArcCsch[c*x]))/(2*c^8) + ((1 - c^4*x^4)^(3/2)
*(a + b*ArcCsch[c*x]))/(6*c^8) + (b*Sqrt[1 + c^2*x^2]*ArcTanh[Sqrt[1 - c^2*
x^2]])/(3*c^9*Sqrt[1 + 1/(c^2*x^2)]*x)
```

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 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 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 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 783

```
Int[((d_) + (e_.)*(x_))^(m_)*((f_.) + (g_.)*(x_))*((a_) + (c_.)*(x_)^2)^(p_
.), x_Symbol] :> Int[(d + e*x)^(m + p)*(f + g*x)*(a/d + (c*x)/e)^p, x] /; F
reeQ[{a, c, d, e, f, g, m}, x] && EqQ[c*d^2 + a*e^2, 0] && (IntegerQ[p] ||
(GtQ[a, 0] && GtQ[d, 0] && EqQ[m + p, 0]))
```

Rule 848

```
Int[((d_) + (e_.)*(x_))^(m_)*((f_.) + (g_.)*(x_))^(n_)*((a_) + (c_.)*(x_)^2
)^(p_.), x_Symbol] :> Int[(d + e*x)^(m + p)*(f + g*x)^n*(a/d + (c*x)/e)^p,
x] /; FreeQ[{a, c, d, e, f, g, m, n}, x] && NeQ[e*f - d*g, 0] && EqQ[c*d^2
+ a*e^2, 0] && (IntegerQ[p] || (GtQ[a, 0] && GtQ[d, 0] && EqQ[m + p, 0]))
```

Rule 6310

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))*(u_), x_Symbol] :> With[{v = IntHid
e[u, x]}, Dist[a + b*ArcCsch[c*x], v, x] + Dist[b/c, Int[SimplifyIntegrand[
v/(x^2*Sqrt[1 + 1/(c^2*x^2)]), x], x], x] /; InverseFunctionFreeQ[v, x]] /;
 FreeQ[{a, b, c}, x]
```

Rule 6721

```
Int[(u_.)*((a_.) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Dist[(b^IntPart[p]*(
a + b*x^n)^FracPart[p])/(x^(n*FracPart[p])*(1 + a/(x^n*b))^FracPart[p]), In
t[u*x^(n*p)*(1 + a/(x^n*b))^p, x], x] /; FreeQ[{a, b, p}, x] &&  !IntegerQ[
p] && ILtQ[n, 0] &&  !RationalFunctionQ[u, x] && IntegerQ[p + 1/2]
```

Rule 6742

```
Int[u_, x_Symbol] :> With[{v = ExpandIntegrand[u, x]}, Int[v, x] /; SumQ[v]
]
```

Rubi steps

$$\int \frac{x^7 \left(a+b\text{csch}^{-1}(cx)\right)}{\sqrt{1-c^4x^4}}\,dx = -\frac{\sqrt{1-c^4x^4}\,\left(a+b\text{csch}^{-1}(cx)\right)}{2c^8}+\frac{\left(1-c^4x^4\right)^{3/2}\left(a+b\text{csch}^{-1}(cx)\right)}{6c^8}+\frac{b\int \frac{\left(-2-c^4x^4\right)\sqrt{1-}}{6c^8\sqrt{1+\frac{1}{c^2x^2}}}}{c}$$

$$= -\frac{\sqrt{1-c^4x^4}\,\left(a+b\text{csch}^{-1}(cx)\right)}{2c^8}+\frac{\left(1-c^4x^4\right)^{3/2}\left(a+b\text{csch}^{-1}(cx)\right)}{6c^8}+\frac{b\int \frac{\left(-2-c^4x^4\right)\sqrt{1-}}{\sqrt{1+\frac{1}{c^2x^2}}\,x}}{6c^9}$$

$$= -\frac{\sqrt{1-c^4x^4}\,\left(a+b\text{csch}^{-1}(cx)\right)}{2c^8}+\frac{\left(1-c^4x^4\right)^{3/2}\left(a+b\text{csch}^{-1}(cx)\right)}{6c^8}+\frac{\left(b\sqrt{1+c^2x^2}\right)\int}{6c^9\sqrt{}}$$

$$= -\frac{\sqrt{1-c^4x^4}\,\left(a+b\text{csch}^{-1}(cx)\right)}{2c^8}+\frac{\left(1-c^4x^4\right)^{3/2}\left(a+b\text{csch}^{-1}(cx)\right)}{6c^8}-\frac{\left(b\sqrt{1+c^2x^2}\right)\text{S}}{}$$

$$= -\frac{\sqrt{1-c^4x^4}\,\left(a+b\text{csch}^{-1}(cx)\right)}{2c^8}+\frac{\left(1-c^4x^4\right)^{3/2}\left(a+b\text{csch}^{-1}(cx)\right)}{6c^8}-\frac{\left(b\sqrt{1+c^2x^2}\right)\text{S}}{}$$

$$= -\frac{\sqrt{1-c^4x^4}\,\left(a+b\text{csch}^{-1}(cx)\right)}{2c^8}+\frac{\left(1-c^4x^4\right)^{3/2}\left(a+b\text{csch}^{-1}(cx)\right)}{6c^8}-\frac{\left(b\sqrt{1+c^2x^2}\right)\text{S}}{6c}$$

$$= -\frac{\sqrt{1-c^4x^4}\,\left(a+b\text{csch}^{-1}(cx)\right)}{2c^8}+\frac{\left(1-c^4x^4\right)^{3/2}\left(a+b\text{csch}^{-1}(cx)\right)}{6c^8}-\frac{\left(b\sqrt{1+c^2x^2}\right)\text{S}}{6c^9}$$

$$= -\frac{b\sqrt{1-c^2x^2}\,\sqrt{1+c^2x^2}}{3c^9\sqrt{1+\frac{1}{c^2x^2}}\,x}-\frac{\sqrt{1-c^4x^4}\,\left(a+b\text{csch}^{-1}(cx)\right)}{2c^8}+\frac{\left(1-c^4x^4\right)^{3/2}\left(a+b\text{csch}\right.}{6c^8}$$

$$= -\frac{b\sqrt{1-c^2x^2}\,\sqrt{1+c^2x^2}}{3c^9\sqrt{1+\frac{1}{c^2x^2}}\,x}+\frac{b\left(1-c^2x^2\right)^{3/2}\sqrt{1+c^2x^2}}{18c^9\sqrt{1+\frac{1}{c^2x^2}}\,x}-\frac{b\left(1-c^2x^2\right)^{5/2}\sqrt{1+c^2x^2}}{30c^9\sqrt{1+\frac{1}{c^2x^2}}\,x}-$$

$$= -\frac{b\sqrt{1-c^2x^2}\,\sqrt{1+c^2x^2}}{3c^9\sqrt{1+\frac{1}{c^2x^2}}\,x}+\frac{b\left(1-c^2x^2\right)^{3/2}\sqrt{1+c^2x^2}}{18c^9\sqrt{1+\frac{1}{c^2x^2}}\,x}-\frac{b\left(1-c^2x^2\right)^{5/2}\sqrt{1+c^2x^2}}{30c^9\sqrt{1+\frac{1}{c^2x^2}}\,x}-$$

**Mathematica [A]** time = 0.42, size = 180, normalized size = 0.68

$$-\frac{15a\sqrt{1-c^4x^4}\left(c^4x^4+2\right)+15b\sqrt{1-c^4x^4}\left(c^4x^4+2\right)\operatorname{csch}^{-1}(cx)+30b\log\left(c^2x^3+x\right)+\frac{bcx\sqrt{\frac{1}{c^2x^2}+1}\sqrt{1-c^4x^4}\left(3c^4x^4\right.}{c^2x^2+1}}{90c^8}$$

Antiderivative was successfully verified.

```
[In] Integrate[(x^7*(a + b*ArcCsch[c*x]))/Sqrt[1 - c^4*x^4],x]
```

```
[Out] -1/90*(15*a*Sqrt[1 - c^4*x^4]*(2 + c^4*x^4) + (b*c*Sqrt[1 + 1/(c^2*x^2)]*x*
Sqrt[1 - c^4*x^4]*(28 - c^2*x^2 + 3*c^4*x^4))/(1 + c^2*x^2) + 15*b*Sqrt[1 -
 c^4*x^4]*(2 + c^4*x^4)*ArcCsch[c*x] + 30*b*Log[x + c^2*x^3] - 30*b*Log[1 +
 c^2*x^2 + c*Sqrt[1 + 1/(c^2*x^2)]*x*Sqrt[1 - c^4*x^4]])/c^8
```

**fricas [A]** time = 0.59, size = 324, normalized size = 1.23

$$-\frac{15\left(bc^6x^6+bc^4x^4+2\,bc^2x^2+2\,b\right)\sqrt{-c^4x^4+1}\,\log\left(\frac{cx\sqrt{\frac{c^2x^2+1}{c^2x^2}}+1}{cx}\right)+\left(3\,bc^5x^5-bc^3x^3+28\,bcx\right)\sqrt{-c^4x^4+1}\,\sqrt{\frac{c^2x}{c^2}}}{}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^7*(a+b*arccsch(c*x))/(-c^4*x^4+1)^(1/2),x, algorithm="fricas")
```

```
[Out] -1/90*(15*(b*c^6*x^6 + b*c^4*x^4 + 2*b*c^2*x^2 + 2*b)*sqrt(-c^4*x^4 + 1)*lo
g((c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) + 1)/(c*x)) + (3*b*c^5*x^5 - b*c^3*x^3
 + 28*b*c*x)*sqrt(-c^4*x^4 + 1)*sqrt((c^2*x^2 + 1)/(c^2*x^2)) - 15*(b*c^2*x
^2 + b)*log((c^2*x^2 + sqrt(-c^4*x^4 + 1)*c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2))
 + 1)/(c^2*x^2 + 1)) + 15*(b*c^2*x^2 + b)*log(-(c^2*x^2 - sqrt(-c^4*x^4 + 1
)*c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) + 1)/(c^2*x^2 + 1)) + 15*(a*c^6*x^6 + a
*c^4*x^4 + 2*a*c^2*x^2 + 2*a)*sqrt(-c^4*x^4 + 1))/(c^10*x^2 + c^8)
```

**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^7*(a+b*arccsch(c*x))/(-c^4*x^4+1)^(1/2),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** [F] time = 0.48, size = 0, normalized size = 0.00

$$\int \frac{x^{7} \left(a + b \,\mathrm{arccsch}\left(c x\right)\right)}{\sqrt{-c^{4} x^{4}+1}}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(x^7*(a+b*arccsch(c*x))/(-c^4*x^4+1)^(1/2),x)
```

```
[Out] int(x^7*(a+b*arccsch(c*x))/(-c^4*x^4+1)^(1/2),x)
```

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

$$\frac{1}{6}\, a \left(\frac{\left(-c^{4} x^{4}+1\right)^{\frac{3}{2}}}{c^{8}} - \frac{3 \sqrt{-c^{4} x^{4}+1}}{c^{8}}\right) + \frac{1}{6}\, b \left(\frac{\left(c^{8} x^{8}+c^{4} x^{4}-2\right) \log\left(\sqrt{c^{2} x^{2}+1}+1\right)}{\sqrt{c^{2} x^{2}+1}\, \sqrt{c x+1}\, \sqrt{-c x+1}\, c^{8}} - 6 \int \left(x^{7} \log(c) + x^{7} \log(x)\right) e^{(-$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^7*(a+b*arccsch(c*x))/(-c^4*x^4+1)^(1/2),x, algorithm="maxima")
```

```
[Out] 1/6*a*((-c^4*x^4 + 1)^(3/2)/c^8 - 3*sqrt(-c^4*x^4 + 1)/c^8) + 1/6*b*((c^8*x
^8 + c^4*x^4 - 2)*log(sqrt(c^2*x^2 + 1) + 1)/(sqrt(c^2*x^2 + 1)*sqrt(c*x +
1)*sqrt(-c*x + 1)*c^8) - 6*integrate((x^7*log(c) + x^7*log(x))*e^(-1/2*log(
c^2*x^2 + 1) - 1/2*log(c*x + 1) - 1/2*log(-c*x + 1)), x) - 6*integrate(1/6*
(c^6*x^7 - c^4*x^5 + 2*c^2*x^3 - 2*x)/(sqrt(c^2*x^2 + 1)*sqrt(c*x + 1)*sqrt
(-c*x + 1)*c^6 + sqrt(c*x + 1)*sqrt(-c*x + 1)*c^6), x))
```

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

$$\int \frac{x^{7} \left(a + b\, \mathrm{asinh}\left(\frac{1}{c\, x}\right)\right)}{\sqrt{1 - c^{4}\, x^{4}}}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((x^7*(a + b*asinh(1/(c*x))))/(1 - c^4*x^4)^(1/2),x)
```

```
[Out] int((x^7*(a + b*asinh(1/(c*x))))/(1 - c^4*x^4)^(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(x**7*(a+b*acsch(c*x))/(-c**4*x**4+1)**(1/2),x)
```

```
[Out] Timed out
```

# 3.176 $\int \frac{x^3\left(a+b\mathbf{csch}^{-1}(cx)\right)}{\sqrt{1-c^4x^4}}\,dx$

**Optimal**. Leaf size=130

$$-\frac{\sqrt{1-c^4x^4}\,\left(a+b\text{csch}^{-1}(cx)\right)}{2c^4}+\frac{bx\sqrt{1-c^4x^4}}{2c^3\sqrt{-c^2x^2}\,\sqrt{-c^2x^2-1}}-\frac{bx\tan^{-1}\left(\frac{\sqrt{1-c^4x^4}}{\sqrt{-c^2x^2-1}}\right)}{2c^3\sqrt{-c^2x^2}}$$

```
[Out] -1/2*b*x*arctan((-c^4*x^4+1)^(1/2)/(-c^2*x^2-1)^(1/2))/c^3/(-c^2*x^2)^(1/2)
-1/2*(a+b*arccsch(c*x))*(-c^4*x^4+1)^(1/2)/c^4+1/2*b*x*(-c^4*x^4+1)^(1/2)/c
^3/(-c^2*x^2)^(1/2)/(-c^2*x^2-1)^(1/2)
```

**Rubi** [A] time = 0.21, antiderivative size = 133, normalized size of antiderivative = 1.02, number of steps used = 8, number of rules used = 9, integrand size = 26, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.346, Rules used = {261, 6310, 12, 1572, 1252, 848, 50, 63, 208}

$$-\frac{\sqrt{1-c^4x^4}\,\left(a+b\text{csch}^{-1}(cx)\right)}{2c^4}-\frac{b\sqrt{1-c^2x^2}\,\sqrt{c^2x^2+1}}{2c^5x\sqrt{\frac{1}{c^2x^2}+1}}+\frac{b\sqrt{c^2x^2+1}\,\tanh^{-1}\left(\sqrt{1-c^2x^2}\right)}{2c^5x\sqrt{\frac{1}{c^2x^2}+1}}$$

Antiderivative was successfully verified.

```
[In] Int[(x^3*(a + b*ArcCsch[c*x]))/Sqrt[1 - c^4*x^4],x]
```

```
[Out] -(b*Sqrt[1 - c^2*x^2]*Sqrt[1 + c^2*x^2])/(2*c^5*Sqrt[1 + 1/(c^2*x^2)]*x) -
(Sqrt[1 - c^4*x^4]*(a + b*ArcCsch[c*x]))/(2*c^4) + (b*Sqrt[1 + c^2*x^2]*Arc
Tanh[Sqrt[1 - c^2*x^2]])/(2*c^5*Sqrt[1 + 1/(c^2*x^2)]*x)
```

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 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 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 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 848

```
Int[((d_) + (e_.)*(x_))^(m_)*((f_.) + (g_.)*(x_))^(n_)*((a_) + (c_.)*(x_)^2
)^(p_.), x_Symbol] :> Int[(d + e*x)^(m + p)*(f + g*x)^n*(a/d + (c*x)/e)^p,
x] /; FreeQ[{a, c, d, e, f, g, m, n}, x] && NeQ[e*f - d*g, 0] && EqQ[c*d^2
+ a*e^2, 0] && (IntegerQ[p] || (GtQ[a, 0] && GtQ[d, 0] && EqQ[m + p, 0]))
```

Rule 1252

```
Int[(x_)^(m_.)*((d_) + (e_.)*(x_)^2)^(q_.)*((a_) + (c_.)*(x_)^4)^(p_.), x_S
ymbol] :> Dist[1/2, Subst[Int[x^((m - 1)/2)*(d + e*x)^q*(a + c*x^2)^p, x],
x, x^2], x] /; FreeQ[{a, c, d, e, p, q}, x] && IntegerQ[(m + 1)/2]
```

Rule 1572

```
Int[(x_)^(m_.)*((d_) + (e_.)*(x_)^(mn_.))^(q_)*((a_) + (c_.)*(x_)^(n2_.))^(
p_.), x_Symbol] :> Dist[(e^IntPart[q]*(d + e*x^mn)^FracPart[q])/(x^(mn*Frac
Part[q])*(1 + d/(x^mn*e))^FracPart[q]), Int[x^(m + mn*q)*(1 + d/(x^mn*e))^q
*(a + c*x^n2)^p, x], x] /; FreeQ[{a, c, d, e, m, mn, p, q}, x] && EqQ[n2, -
2*mn] &&  !IntegerQ[p] &&  !IntegerQ[q] && PosQ[n2]
```

Rule 6310

```
Int[((a_.) + ArcCsch[(c_.)*(x_)]*(b_.))*(u_), x_Symbol] :> With[{v = IntHid
e[u, x]}, Dist[a + b*ArcCsch[c*x], v, x] + Dist[b/c, Int[SimplifyIntegrand[
v/(x^2*Sqrt[1 + 1/(c^2*x^2)]), x], x], x] /; InverseFunctionFreeQ[v, x]] /;
 FreeQ[{a, b, c}, x]
```

Rubi steps

$$\int \frac{x^3\left(a+b\text{csch}^{-1}(cx)\right)}{\sqrt{1-c^4x^4}}\,dx = -\frac{\sqrt{1-c^4x^4}\left(a+b\text{csch}^{-1}(cx)\right)}{2c^4}+\frac{b\int -\frac{\sqrt{1-c^4x^4}}{2c^4\sqrt{1+\frac{1}{c^2x^2}}\,x^2}\,dx}{c}$$

$$= -\frac{\sqrt{1-c^4x^4}\left(a+b\text{csch}^{-1}(cx)\right)}{2c^4}-\frac{b\int \frac{\sqrt{1-c^4x^4}}{\sqrt{1+\frac{1}{c^2x^2}}\,x^2}\,dx}{2c^5}$$

$$= -\frac{\sqrt{1-c^4x^4}\left(a+b\text{csch}^{-1}(cx)\right)}{2c^4}-\frac{\left(b\sqrt{1+c^2x^2}\right)\int \frac{\sqrt{1-c^4x^4}}{x\sqrt{1+c^2x^2}}\,dx}{2c^5\sqrt{1+\frac{1}{c^2x^2}}\,x}$$

$$= -\frac{\sqrt{1-c^4x^4}\left(a+b\text{csch}^{-1}(cx)\right)}{2c^4}-\frac{\left(b\sqrt{1+c^2x^2}\right)\text{Subst}\left(\int \frac{\sqrt{1-c^4x^2}}{x\sqrt{1+c^2x}}\,dx,x,x^2\right)}{4c^5\sqrt{1+\frac{1}{c^2x^2}}\,x}$$

$$= -\frac{\sqrt{1-c^4x^4}\left(a+b\text{csch}^{-1}(cx)\right)}{2c^4}-\frac{\left(b\sqrt{1+c^2x^2}\right)\text{Subst}\left(\int \frac{\sqrt{1-c^2x}}{x}\,dx,x,x^2\right)}{4c^5\sqrt{1+\frac{1}{c^2x^2}}\,x}$$

$$= -\frac{b\sqrt{1-c^2x^2}\sqrt{1+c^2x^2}}{2c^5\sqrt{1+\frac{1}{c^2x^2}}\,x}-\frac{\sqrt{1-c^4x^4}\left(a+b\text{csch}^{-1}(cx)\right)}{2c^4}-\frac{\left(b\sqrt{1+c^2x^2}\right)\text{Subst}\left(\int\right.}{4c^5\sqrt{1+}}$$

$$= -\frac{b\sqrt{1-c^2x^2}\sqrt{1+c^2x^2}}{2c^5\sqrt{1+\frac{1}{c^2x^2}}\,x}-\frac{\sqrt{1-c^4x^4}\left(a+b\text{csch}^{-1}(cx)\right)}{2c^4}+\frac{\left(b\sqrt{1+c^2x^2}\right)\text{Subst}\left(\int\right.}{2c^7\sqrt{1}}$$

$$= -\frac{b\sqrt{1-c^2x^2}\sqrt{1+c^2x^2}}{2c^5\sqrt{1+\frac{1}{c^2x^2}}\,x}-\frac{\sqrt{1-c^4x^4}\left(a+b\text{csch}^{-1}(cx)\right)}{2c^4}+\frac{b\sqrt{1+c^2x^2}\tanh^{-1}\left(\sqrt{\right.}}{2c^5\sqrt{1+\frac{1}{c^2x^2}}}$$

**Mathematica [A]** time = 0.34, size = 141, normalized size = 1.08

$$-\frac{a\sqrt{1-c^4x^4}+b\sqrt{1-c^4x^4}\,\text{csch}^{-1}(cx)+b\log\left(c^2x^3+x\right)+\frac{bcx\sqrt{\frac{1}{c^2x^2}+1}\sqrt{1-c^4x^4}}{c^2x^2+1}-b\log\left(c^2x^2+cx\sqrt{\frac{1}{c^2x^2}+1}\sqrt{1-\right.}}{2c^4}$$

Antiderivative was successfully verified.

[In] Integrate[(x^3*(a + b*ArcCsch[c*x]))/Sqrt[1 - c^4*x^4],x]

[Out] -1/2*(a*Sqrt[1 - c^4*x^4] + (b*c*Sqrt[1 + 1/(c^2*x^2)]*x*Sqrt[1 - c^4*x^4])/(1 + c^2*x^2) + b*Sqrt[1 - c^4*x^4]*ArcCsch[c*x] + b*Log[x + c^2*x^3] - b*Log[1 + c^2*x^2 + c*Sqrt[1 + 1/(c^2*x^2)]*x*Sqrt[1 - c^4*x^4]])/c^4

**fricas [B]** time = 0.68, size = 265, normalized size = 2.04

$$-\frac{2\sqrt{-c^4x^4+1}\,bcx\sqrt{\frac{c^2x^2+1}{c^2x^2}}+2\sqrt{-c^4x^4+1}\left(bc^2x^2+b\right)\log\left(\frac{cx\sqrt{\frac{c^2x^2+1}{c^2x^2}}+1}{cx}\right)-\left(bc^2x^2+b\right)\log\left(\frac{c^2x^2+\sqrt{-c^4x^4+1}\,cx\sqrt{\frac{c^2x^2+1}{c^2x^2}}+1}{c^2x^2+1}\right)}{4\left(c^6x^2+c^4\right)}$$

Verification of antiderivative is not currently implemented for this CAS.

[In] integrate(x^3*(a+b*arccsch(c*x))/(-c^4*x^4+1)^(1/2),x, algorithm="fricas")

[Out] -1/4*(2*sqrt(-c^4*x^4 + 1)*b*c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) + 2*sqrt(-c^4*x^4 + 1)*(b*c^2*x^2 + b)*log((c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) + 1)/(c*x)) - (b*c^2*x^2 + b)*log((c^2*x^2 + sqrt(-c^4*x^4 + 1)*c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) + 1)/(c^2*x^2 + 1)) + (b*c^2*x^2 + b)*log(-(c^2*x^2 - sqrt(-c^4*x^4 + 1)*c*x*sqrt((c^2*x^2 + 1)/(c^2*x^2)) + 1)/(c^2*x^2 + 1)) + 2*sqrt(-c^4*x^4 + 1)*(a*c^2*x^2 + a))/(c^6*x^2 + c^4)

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

$$\int \frac{(b\,\mathrm{arcsch}\,(cx)+a)x^3}{\sqrt{-c^4x^4+1}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

[In] integrate(x^3*(a+b*arccsch(c*x))/(-c^4*x^4+1)^(1/2),x, algorithm="giac")

[Out] integrate((b*arccsch(c*x) + a)*x^3/sqrt(-c^4*x^4 + 1), x)

**maple [F]** time = 0.46, size = 0, normalized size = 0.00

$$\int \frac{x^3\left(a+b\,\mathrm{arccsch}\,(cx)\right)}{\sqrt{-c^4x^4+1}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

[In] int(x^3*(a+b*arccsch(c*x))/(-c^4*x^4+1)^(1/2),x)

[Out] int(x^3*(a+b*arccsch(c*x))/(-c^4*x^4+1)^(1/2),x)

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

$$\frac{1}{2}\,b\left(\frac{\left(c^4x^4-1\right)\log\left(\sqrt{c^2x^2+1}+1\right)}{\sqrt{c^2x^2+1}\,\sqrt{cx+1}\,\sqrt{-cx+1}\,c^4}-2\int\left(x^3\log(c)+x^3\log(x)\right)e^{\left(-\frac{1}{2}\log\left(c^2x^2+1\right)-\frac{1}{2}\log(cx+1)-\frac{1}{2}\log(-cx+1)\right)}\,dx-2$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x^3*(a+b*arccsch(c*x))/(-c^4*x^4+1)^(1/2),x, algorithm="maxima")
```

```
[Out] 1/2*b*((c^4*x^4 - 1)*log(sqrt(c^2*x^2 + 1) + 1)/(sqrt(c^2*x^2 + 1)*sqrt(c*x
 + 1)*sqrt(-c*x + 1)*c^4) - 2*integrate((x^3*log(c) + x^3*log(x))*e^(-1/2*l
og(c^2*x^2 + 1) - 1/2*log(c*x + 1) - 1/2*log(-c*x + 1)), x) - 2*integrate(1
/2*(c^2*x^3 - x)/(sqrt(c^2*x^2 + 1)*sqrt(c*x + 1)*sqrt(-c*x + 1)*c^2 + sqrt
(c*x + 1)*sqrt(-c*x + 1)*c^2), x)) - 1/2*sqrt(-c^4*x^4 + 1)*a/c^4
```

**mupad [F]** time = 0.00, size = -1, normalized size = -0.01

$$\int \frac{x^3\,\left(a+b\,\mathrm{asinh}\left(\frac{1}{c\,x}\right)\right)}{\sqrt{1-c^4\,x^4}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((x^3*(a + b*asinh(1/(c*x))))/(1 - c^4*x^4)^(1/2),x)
```

```
[Out] int((x^3*(a + b*asinh(1/(c*x))))/(1 - c^4*x^4)^(1/2), x)
```

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

$$\int \frac{x^3\left(a+b\,\mathrm{acsch}\,(cx)\right)}{\sqrt{-(cx-1)\,(cx+1)\left(c^2x^2+1\right)}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(x**3*(a+b*acsch(c*x))/(-c**4*x**4+1)**(1/2),x)
```

```
[Out] Integral(x**3*(a + b*acsch(c*x))/sqrt(-(c*x - 1)*(c*x + 1)*(c**2*x**2 + 1))
, x)
```

## 3.177 $\int \frac{a+b\operatorname{csch}^{-1}(cx)}{x\sqrt{1-c^4x^4}}\,dx$

**Optimal**. Leaf size=29

$$\operatorname{Int}\left(\frac{a+b\operatorname{csch}^{-1}(cx)}{x\sqrt{1-c^4x^4}},x\right)$$

```
[Out] Unintegrable((a+b*arccsch(c*x))/x/(-c^4*x^4+1)^(1/2),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 = {}

$$\int \frac{a+b\operatorname{csch}^{-1}(cx)}{x\sqrt{1-c^4x^4}}\,dx$$

Verification is Not applicable to the result.

```
[In] Int[(a + b*ArcCsch[c*x])/(x*Sqrt[1 - c^4*x^4]),x]
```

```
[Out] Defer[Int][(a + b*ArcCsch[c*x])/(x*Sqrt[1 - c^4*x^4]), x]
```

Rubi steps

$$\int \frac{a+b\operatorname{csch}^{-1}(cx)}{x\sqrt{1-c^4x^4}}\,dx=\int \frac{a+b\operatorname{csch}^{-1}(cx)}{x\sqrt{1-c^4x^4}}\,dx$$

**Mathematica** [A] time = 0.41, size = 0, normalized size = 0.00

$$\int \frac{a+b\operatorname{csch}^{-1}(cx)}{x\sqrt{1-c^4x^4}}\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[(a + b*ArcCsch[c*x])/(x*Sqrt[1 - c^4*x^4]),x]
```

```
[Out] Integrate[(a + b*ArcCsch[c*x])/(x*Sqrt[1 - c^4*x^4]), x]
```

**fricas** [A] time = 0.46, size = 0, normalized size = 0.00

$$\operatorname{integral}\left(-\frac{\sqrt{-c^4x^4+1}\,(b\operatorname{arcsch}(cx)+a)}{c^4x^5-x},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))/x/(-c^4*x^4+1)^(1/2),x, algorithm="fricas")
```

```
[Out] integral(-sqrt(-c^4*x^4 + 1)*(b*arccsch(c*x) + a)/(c^4*x^5 - x), x)
```

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

$$\int \frac{b \operatorname{arcsch}(cx) + a}{\sqrt{-c^4x^4 + 1}\, x}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))/x/(-c^4*x^4+1)^(1/2),x, algorithm="giac")
```

```
[Out] integrate((b*arccsch(c*x) + a)/(sqrt(-c^4*x^4 + 1)*x), x)
```

**maple** [A] time = 0.45, size = 0, normalized size = 0.00

$$\int \frac{a + b \operatorname{arccsch}(cx)}{x\sqrt{-c^4x^4 + 1}}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a+b*arccsch(c*x))/x/(-c^4*x^4+1)^(1/2),x)
```

```
[Out] int((a+b*arccsch(c*x))/x/(-c^4*x^4+1)^(1/2),x)
```

**maxima** [A] time = 0.00, size = 0, normalized size = 0.00

$$-\frac{1}{4}\, a\left(\log\left(\sqrt{-c^4x^4 + 1} + 1\right) - \log\left(\sqrt{-c^4x^4 + 1} - 1\right)\right) + b \int \frac{\log\left(\sqrt{\frac{1}{c^2x^2} + 1} + \frac{1}{cx}\right)}{\sqrt{-\left(c^2x^2 + 1\right)(cx + 1)(cx - 1)}\, x}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))/x/(-c^4*x^4+1)^(1/2),x, algorithm="maxima")
```

```
[Out] -1/4*a*(log(sqrt(-c^4*x^4 + 1) + 1) - log(sqrt(-c^4*x^4 + 1) - 1)) + b*inte
grate(log(sqrt(1/(c^2*x^2) + 1) + 1/(c*x))/(sqrt(-(c^2*x^2 + 1)*(c*x + 1)*(
c*x - 1))*x), x)
```

**mupad** [A] time = 0.00, size = -1, normalized size = -0.03

$$\int \frac{a + b \operatorname{asinh}\left(\frac{1}{c\,x}\right)}{x\,\sqrt{1 - c^4\,x^4}}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a + b*asinh(1/(c*x)))/(x*(1 - c^4*x^4)^(1/2)),x)
```

```
[Out] int((a + b*asinh(1/(c*x)))/(x*(1 - c^4*x^4)^(1/2)), x)
```

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

$$\int \frac{a + b\operatorname{acsch}(cx)}{x\sqrt{-(cx - 1)(cx + 1)(c^2x^2 + 1)}}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*acsch(c*x))/x/(-c**4*x**4+1)**(1/2),x)
```

```
[Out] Integral((a + b*acsch(c*x))/(x*sqrt(-(c*x - 1)*(c*x + 1)*(c**2*x**2 + 1))),
 x)
```

## 3.178 $\int \frac{a+b\mathbf{csch}^{-1}(cx)}{x^5\sqrt{1-c^4x^4}}\,dx$

**Optimal**. Leaf size=29

$$\text{Int}\left(\frac{a+b\text{csch}^{-1}(cx)}{x^5\sqrt{1-c^4x^4}},x\right)$$

```
[Out] Unintegrable((a+b*arccsch(c*x))/x^5/(-c^4*x^4+1)^(1/2),x)
```

**Rubi [A]** time = 0.10, 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 = {}

$$\int \frac{a+b\text{csch}^{-1}(cx)}{x^5\sqrt{1-c^4x^4}}\,dx$$

Verification is Not applicable to the result.

```
[In] Int[(a + b*ArcCsch[c*x])/(x^5*Sqrt[1 - c^4*x^4]),x]
```

```
[Out] Defer[Int][(a + b*ArcCsch[c*x])/(x^5*Sqrt[1 - c^4*x^4]), x]
```

Rubi steps

$$\int \frac{a+b\text{csch}^{-1}(cx)}{x^5\sqrt{1-c^4x^4}}\,dx = \int \frac{a+b\text{csch}^{-1}(cx)}{x^5\sqrt{1-c^4x^4}}\,dx$$

**Mathematica [A]** time = 3.49, size = 0, normalized size = 0.00

$$\int \frac{a+b\text{csch}^{-1}(cx)}{x^5\sqrt{1-c^4x^4}}\,dx$$

Verification is Not applicable to the result.

```
[In] Integrate[(a + b*ArcCsch[c*x])/(x^5*Sqrt[1 - c^4*x^4]),x]
```

```
[Out] Integrate[(a + b*ArcCsch[c*x])/(x^5*Sqrt[1 - c^4*x^4]), x]
```

**fricas [A]** time = 0.75, size = 0, normalized size = 0.00

$$\text{integral}\left(-\frac{\sqrt{-c^4x^4+1}\,(b\,\text{arcsch}\,(cx)+a)}{c^4x^9-x^5},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))/x^5/(-c^4*x^4+1)^(1/2),x, algorithm="fricas")
```

```
[Out] integral(-sqrt(-c^4*x^4 + 1)*(b*arccsch(c*x) + a)/(c^4*x^9 - x^5), x)
```

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

$$\int \frac{b \operatorname{arcsch}(cx) + a}{\sqrt{-c^4x^4 + 1}\, x^5}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))/x^5/(-c^4*x^4+1)^(1/2),x, algorithm="giac")
```

```
[Out] integrate((b*arccsch(c*x) + a)/(sqrt(-c^4*x^4 + 1)*x^5), x)
```

**maple** [A] time = 0.46, size = 0, normalized size = 0.00

$$\int \frac{a + b \operatorname{arccsch}(cx)}{x^5\sqrt{-c^4x^4 + 1}}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a+b*arccsch(c*x))/x^5/(-c^4*x^4+1)^(1/2),x)
```

```
[Out] int((a+b*arccsch(c*x))/x^5/(-c^4*x^4+1)^(1/2),x)
```

**maxima** [A] time = 0.00, size = 0, normalized size = 0.00

$$-\frac{1}{8}\left(c^4 \log\left(\sqrt{-c^4x^4+1}+1\right) - c^4 \log\left(\sqrt{-c^4x^4+1}-1\right) + \frac{2\sqrt{-c^4x^4+1}}{x^4}\right)a + b\int \frac{\log\left(\sqrt{\frac{1}{c^2x^2}+1}+\frac{1}{cx}\right)}{\sqrt{-\left(c^2x^2+1\right)(cx+1)(cx-1)}\, x^5}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*arccsch(c*x))/x^5/(-c^4*x^4+1)^(1/2),x, algorithm="maxima")
```

```
[Out] -1/8*(c^4*log(sqrt(-c^4*x^4 + 1) + 1) - c^4*log(sqrt(-c^4*x^4 + 1) - 1) + 2
*sqrt(-c^4*x^4 + 1)/x^4)*a + b*integrate(log(sqrt(1/(c^2*x^2) + 1) + 1/(c*x
))/(sqrt(-(c^2*x^2 + 1)*(c*x + 1)*(c*x - 1))*x^5), x)
```

**mupad** [A] time = 0.00, size = -1, normalized size = -0.03

$$\int \frac{a + b \operatorname{asinh}\left(\frac{1}{c\,x}\right)}{x^5\,\sqrt{1 - c^4\,x^4}}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a + b*asinh(1/(c*x)))/(x^5*(1 - c^4*x^4)^(1/2)),x)
```

```
[Out] int((a + b*asinh(1/(c*x)))/(x^5*(1 - c^4*x^4)^(1/2)), x)
```

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

$$\int \frac{a + b \operatorname{acsch}(cx)}{x^5 \sqrt{-(cx - 1)(cx + 1)\left(c^2 x^2 + 1\right)}} \, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*acsch(c*x))/x**5/(-c**4*x**4+1)**(1/2),x)
```

```
[Out] Integral((a + b*acsch(c*x))/(x**5*sqrt(-(c*x - 1)*(c*x + 1)*(c**2*x**2 + 1)
)), 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"
```