Computer algebra independent integration tests

Summer 2022 edition

6-Hyperbolic-functions/6.2-Hyperbolic-cosine/170-6.2.7-hyper^m-a+b-cosh^n-^p

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September 27, 2022 Compiled on September 27, 2022 at 5:30am

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Chapter 1

Introduction

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This report gives the result of running the computer algebra independent integration test.

The download section in the appendix contains links to download the problems in plain text format used for all CAS systems.

The number of integrals in this report is [85]. This is test number [170].

1.1 Listing of CAS systems tested

The following are the CAS systems tested:

1. Mathematica 13.1 (June 29, 2022) on windows 10.
2. Rubi 4.16.1 (Dec 19, 2018) on Mathematica 13.0.1 on windows 10.
3. Maple 2022.1 (June 1, 2022) on windows 10.
4. Maxima 5.46 (April 13, 2022) using Lisp SBCL 2.1.11.debian on Linux via sagemath 9.6.
5. Fricas 1.3.8 (June 21, 2022) based on sbcl 2.1.11.debian on Linux via sagemath 9.6.
6. Giac/Xcas 1.9.0-13 (July 3, 2022) on Linux via sagemath 9.6.
7. Sympy 1.10.1 (March 20, 2022) Using Python 3.10.4 on Linux.
8. Mupad using Matlab 2021a with Symbolic Math Toolbox Version 8.7 on windows 10.

Maxima and Fricas and Giac are called using 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 from 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 (85)	0.00 (0)
Maple	100.00 (85)	0.00 (0)
Mathematica	98.82 (84)	1.18 (1)
Fricas	84.71 (72)	15.29 (13)
Mupad	64.71 (55)	35.29 (30)
Giac	55.29 (47)	44.71 (38)
Maxima	40.00 (34)	60.00 (51)
Sympy	21.18 (18)	78.82 (67)

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 1. antiderivative contains a hypergeometric function and the optimal antiderivative does not. 2. antiderivative contains a special function and the optimal antiderivative does not. 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.

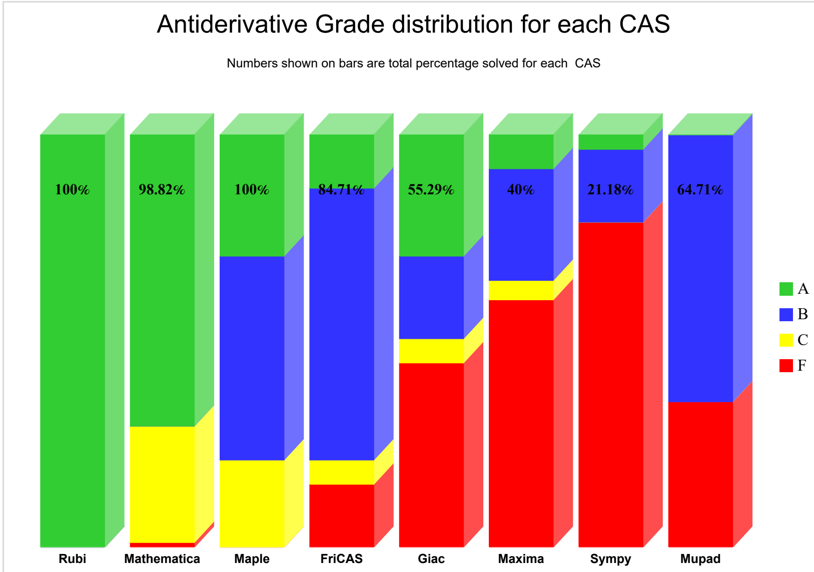
Table 1.2: Description of grading applied to integration result

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

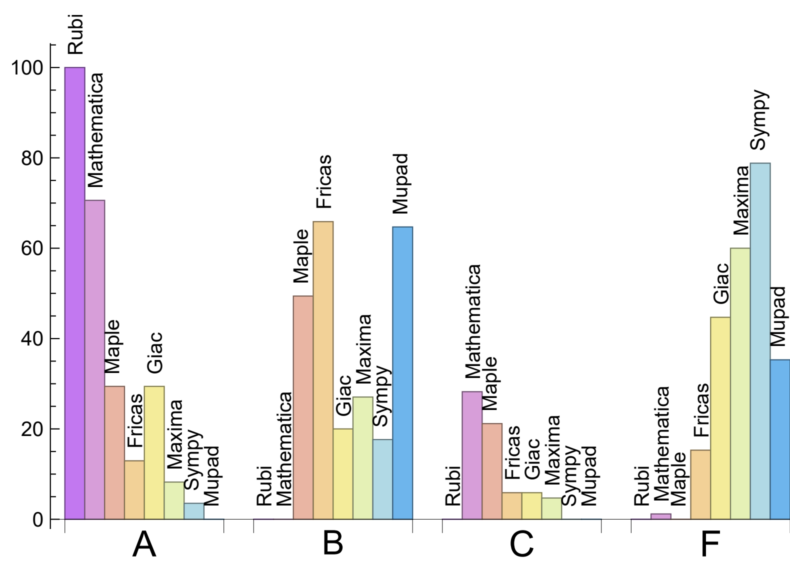
System	% A grade	% B grade	% C grade	% F grade
Rubi	100.00	0.00	0.00	0.00
Mathematica	70.59	0.00	28.24	1.18
Maple	29.41	49.41	21.18	0.00
Giac	29.41	20.00	5.88	44.71
Fricas	12.94	65.88	5.88	15.29
Maxima	8.24	27.06	4.71	60.00
Sympy	3.53	17.65	0.00	78.82
Mupad	N/A	64.71	0.00	35.29

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	1	100.00 %	0.00 %	0.00 %
Maple	0	0.00 %	0.00 %	0.00 %
Fricas	13	76.92 %	0.00 %	23.08 %
Giac	38	57.89 %	0.00 %	42.11 %
Maxima	51	100.00 %	0.00 %	0.00 %
Sympy	67	62.69 %	37.31 %	0.00 %
Mupad	30	76.67 %	23.33 %	0.00 %

Table 1.4: Failure statistics for each CAS

1.3 Time and leaf size Performance

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

Mean size is the average leaf size produced by the CAS (before any normalization). The Normalized mean is relative to the mean size of the optimal anti-derivative given in the input files.

For example, if CAS has **Normalized mean** of 3, then the mean size of its leaf size is 3 times as large as the mean size of the optimal leaf size.

Median size is value of leaf size where half the values are larger than this and half are smaller (before any normalization). i.e. The Middle value.

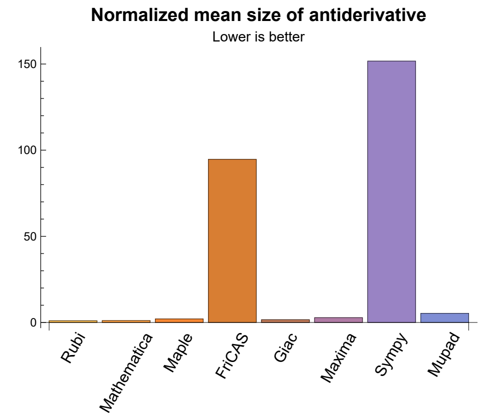
Similarly the **Normalized median** is relative to the median leaf size of the optimal.

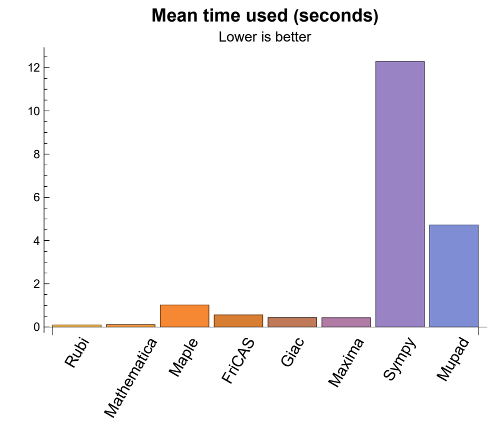
For example, if a CAS has Normalized median of 1.2, then its median is 1.2 as large as the median leaf size of the optimal.

System	Mean time (sec)	Mean size	Normalized mean	Median size	Normalized median
Rubi	0.09	83.32	1.00	49.00	1.00
Mathematica	0.11	74.51	1.08	52.00	1.00
Maple	1.02	112.12	2.06	96.00	1.83
Maxima	0.43	124.91	2.79	56.00	2.11
Fricas	0.56	19766.67	94.70	533.00	9.76
Sympy	12.28	4434.50	151.69	119.00	3.81
Giac	0.44	73.49	1.60	43.00	1.60
Mupad	4.72	397.04	5.29	243.00	3.33

Table 1.5: Time and leaf size performance for each CAS

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


Normalized mean size of antiderivative
Lower is better
150
100
50
0
Rubi
Mathematica
Maple
FriCAS
Giac
Maxima
Sympy
Mupad


Mean time used (seconds)
Lower is better
12
10
8
6
4
2
0
Rubi
Mathematica
Maple
FriCAS
Giac
Maxima
Sympy
Mupad

1.4 list of integrals that has no closed form antiderivative

{}

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 {}

Mathematica {}

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 `AbsoluteTiming[]` 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 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 CPU 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 was 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 was correct.

Verification phase also had 3 minutes time out. An integral whose result was not verified could still be correct, but further investigation is needed on those integrals. These integrals were 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 tests were run in a batch mode, and using an automated script, then any integral where Maxima needed an interactive response from the user to answer a question during the evaluation of the integral will fail.

The exception raised is `ValueError`. Therefore Maxima results is lower than what would result if Maxima was run directly and each question 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 percentage can be higher or lower depending on the specific input test file.

Such integrals can be identified by looking at the output of the integration in each section for Maxima. The exception message will indicate the cause of error.

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 automatic loading of Maxima `abs_integrate` was found to cause some problems. 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 result

There were few integrals which failed due to SageMath interface and not because FriCAS system could not do the integration.

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. These can be identified by looking at the exception message given in the result.

1.9.3 Important note about finding leaf size of antiderivative

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

The other CAS systems (SageMath and Sympy) do not have special builtin function for this purpose at this time. Therefore the leaf size for Fricas and Sympy antiderivative was 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 was called directly from Python, the following code was 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 Mupad result.

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.

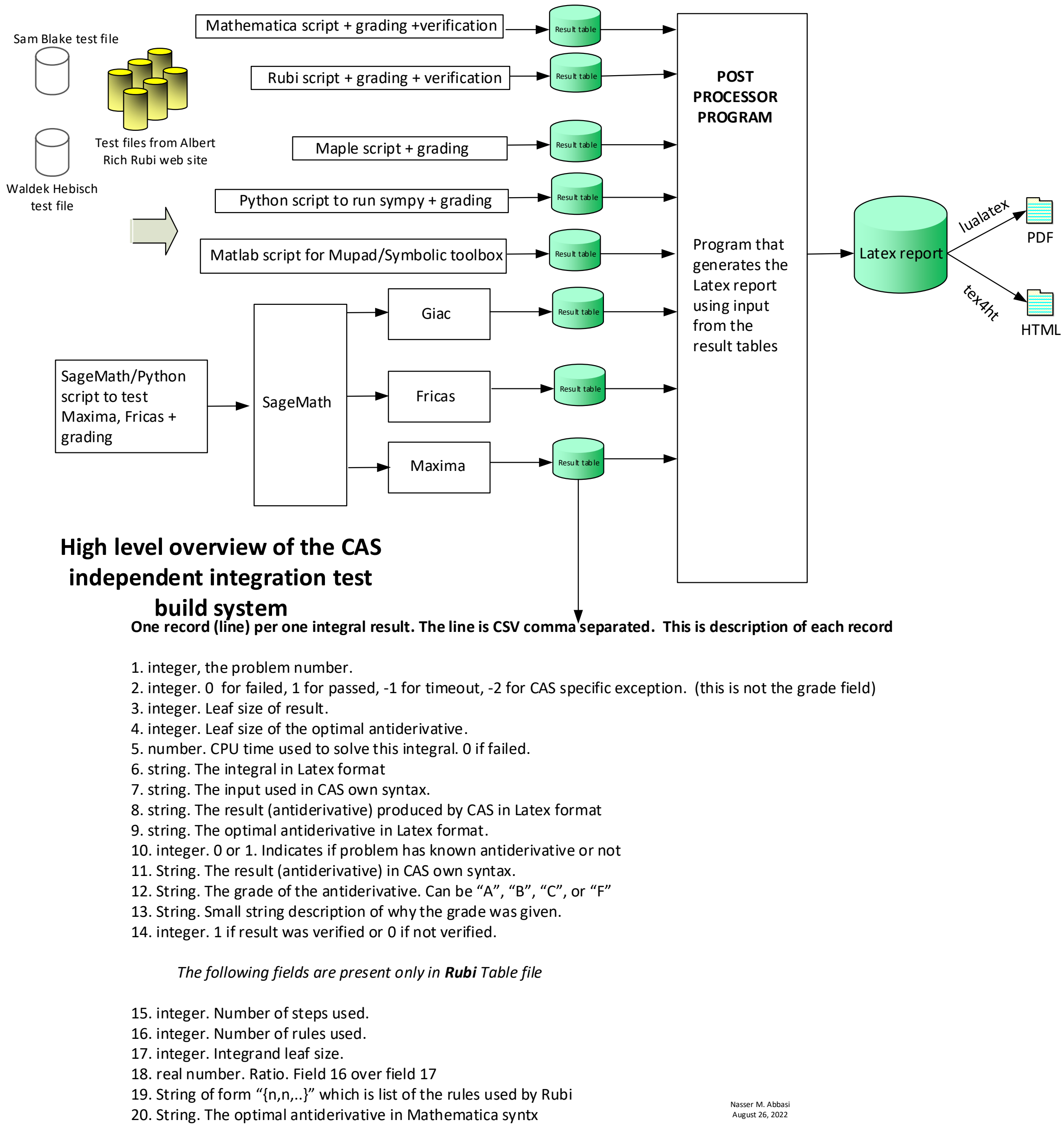
The following is an example of using Matlab's symbolic toolbox (Mupad) to solve an integral

```
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

Local contents

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2.1 List of integrals sorted by grade for each CAS

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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 }

B grade: { }

C grade: { }

F grade: { }

2.1.2 Mathematica

A grade: { 1, 2, 3, 4, 5, 9, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 61, 63, 75, 76, 77, 78, 79, 80, 82, 83, 84, 85 }

B grade: { }

C grade: { 6, 7, 8, 10, 11, 12, 56, 57, 58, 59, 60, 62, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 81 }

F grade: { 35 }

2.1.3 Maple

A grade: { 2, 9, 10, 11, 12, 19, 43, 44, 45, 47, 48, 49, 50, 51, 54, 55, 76, 77, 78, 79, 80, 82, 83, 84, 85 }

B grade: { 1, 4, 5, 6, 7, 8, 13, 14, 15, 16, 17, 18, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 46, 52, 53, 58, 59, 63, 74 }

C grade: { 3, 56, 57, 60, 61, 62, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 75, 81 }

F grade: { }

2.1.4 Maxima

A grade: { 1, 3, 37, 44, 49, 54, 76 }

B grade: { 2, 4, 5, 13, 14, 15, 16, 17, 18, 21, 23, 25, 27, 29, 31, 33, 34, 35, 36, 38, 39, 40, 63 }

C grade: { 43, 48, 53, 80 }

F grade: { 6, 7, 8, 9, 10, 11, 12, 19, 20, 22, 24, 26, 28, 30, 32, 41, 42, 45, 46, 47, 50, 51, 52, 55, 56, 57, 58, 59, 60, 61, 62, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 77, 78, 79, 81, 82, 83, 84, 85 }

2.1.5 FriCAS

A grade: { 1, 2, 3, 15, 25, 44, 49, 54, 55, 84, 85 }

B grade: { 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 16, 17, 18, 19, 20, 21, 22, 23, 24, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 51, 52, 58, 59, 60, 61, 62, 63, 66, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 83 }

C grade: { 56, 57, 65, 68, 81 }

F grade: { 41, 42, 43, 45, 46, 47, 48, 50, 53, 64, 67, 80, 82 }

2.1.6 Sympy

A grade: { 2, 3, 19 }

B grade: { 1, 9, 16, 26, 27, 35, 36, 37, 38, 39, 40, 58, 59, 63, 74 }

C grade: { }

F grade: { 4, 5, 6, 7, 8, 10, 11, 12, 13, 14, 15, 17, 18, 20, 21, 22, 23, 24, 25, 28, 29, 30, 31, 32, 33, 34, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 60, 61, 62, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85 }

2.1.7 Giac

A grade: { 1, 2, 3, 4, 5, 15, 16, 19, 25, 27, 29, 31, 33, 37, 39, 40, 65, 66, 68, 69, 72, 74, 75, 76, 81 }

B grade: { 13, 14, 17, 18, 21, 23, 34, 35, 36, 38, 44, 49, 54, 58, 59, 63, 71 }

C grade: { 43, 48, 53, 62, 80 }

F grade: { 6, 7, 8, 9, 10, 11, 12, 20, 22, 24, 26, 28, 30, 32, 41, 42, 45, 46, 47, 50, 51, 52, 55, 56, 57, 60, 61, 64, 67, 70, 73, 77, 78, 79, 82, 83, 84, 85 }

2.1.8 Mupad

A grade: { }

B 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, 35, 36, 37, 38, 39, 40, 43, 44, 56, 57, 58, 59, 60, 61, 62, 63, 65, 68, 71, 74, 75, 76, 81 }

C grade: { }

F grade: { 33, 34, 41, 42, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 64, 66, 67, 69, 70, 72, 73, 77, 78, 79, 80, 82, 83, 84, 85 }

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 `N.S.` in the table below, which stands for **normalized size** is defined as $\frac{\text{antiderivative leaf size}}{\text{optimal antiderivative leaf size}}$. To help make the table fit, **Mathematica** was abbreviated to **MMA**.

Problem 1	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	B	A	A	B	A	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	20	20	19	65	25	14	153	26	25
N.S.	1	1.00	0.95	3.25	1.25	0.70	7.65	1.30	1.25
time (sec)	N/A	0.034	0.004	0.497	0.261	0.366	0.881	0.421	0.944

Problem 2	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	B	A	A	A	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	7	7	7	8	17	7	10	12	7
N.S.	1	1.00	1.00	1.14	2.43	1.00	1.43	1.71	1.00
time (sec)	N/A	0.032	0.003	0.413	0.262	0.378	0.527	0.438	0.905

Problem 3	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	C	A	A	A	A	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	6	6	6	11	6	6	3	6	6
N.S.	1	1.00	1.00	1.83	1.00	1.00	0.50	1.00	1.00
time (sec)	N/A	0.027	0.000	0.597	0.257	0.375	0.279	0.409	0.027

Problem 4	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	B	B	B	F	A	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	19	19	22	37	61	100	0	21	21
N.S.	1	1.00	1.16	1.95	3.21	5.26	0.00	1.11	1.11
time (sec)	N/A	0.034	0.004	0.641	0.260	0.568	0.000	0.401	0.908

Problem 5	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	B	B	B	F	A	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	29	29	32	53	135	216	0	27	27
N.S.	1	1.00	1.10	1.83	4.66	7.45	0.00	0.93	0.93
time (sec)	N/A	0.038	0.004	0.674	0.268	0.365	0.000	0.405	0.919

Problem 6	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	C	B	F	B	F(-1)	F(-2)	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	78	78	148	245	0	2346	0	0	805
N.S.	1	1.00	1.90	3.14	0.00	30.08	0.00	0.00	10.32
time (sec)	N/A	0.078	0.170	0.656	0.000	0.425	0.000	0.000	1.546

Problem 7	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	C	B	F	B	F(-1)	F(-2)	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	54	54	120	140	0	1064	0	0	548
N.S.	1	1.00	2.22	2.59	0.00	19.70	0.00	0.00	10.15
time (sec)	N/A	0.064	0.126	0.648	0.000	0.404	0.000	0.000	1.304

Problem 8	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	C	B	F	B	F(-1)	F(-2)	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	36	36	83	66	0	416	0	0	257
N.S.	1	1.00	2.31	1.83	0.00	11.56	0.00	0.00	7.14
time (sec)	N/A	0.048	0.130	0.625	0.000	0.413	0.000	0.000	1.366

Problem 9	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	F	B	B	F(-2)	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	25	25	25	17	0	300	66	0	16
N.S.	1	1.00	1.00	0.68	0.00	12.00	2.64	0.00	0.64
time (sec)	N/A	0.024	0.017	0.335	0.000	0.395	0.437	0.000	0.971

Problem 10	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	C	A	F	B	F	F(-2)	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	42	42	99	52	0	349	0	0	462
N.S.	1	1.00	2.36	1.24	0.00	8.31	0.00	0.00	11.00
time (sec)	N/A	0.045	0.100	0.686	0.000	0.625	0.000	0.000	1.389

Problem 11	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	C	A	F	B	F	F(-2)	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	61	61	154	87	0	1332	0	0	2225
N.S.	1	1.00	2.52	1.43	0.00	21.84	0.00	0.00	36.48
time (sec)	N/A	0.074	0.196	0.796	0.000	0.422	0.000	0.000	6.894

Problem 12	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	C	A	F	B	F	F(-2)	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	94	94	219	135	0	5326	0	0	2500
N.S.	1	1.00	2.33	1.44	0.00	56.66	0.00	0.00	26.60
time (sec)	N/A	0.120	0.432	1.082	0.000	0.486	0.000	0.000	14.741

Problem 13	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	B	B	B	F(-1)	B	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	88	88	76	292	651	1308	0	166	248
N.S.	1	1.00	0.86	3.32	7.40	14.86	0.00	1.89	2.82
time (sec)	N/A	0.119	0.117	0.770	0.503	0.420	0.000	0.422	1.720

Problem 14	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	B	B	B	F(-1)	B	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	59	59	52	185	348	568	0	103	146
N.S.	1	1.00	0.88	3.14	5.90	9.63	0.00	1.75	2.47
time (sec)	N/A	0.083	0.065	0.737	0.492	0.400	0.000	0.397	1.266

Problem 15	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	B	B	A	F(-1)	A	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	39	39	36	110	120	300	0	52	79
N.S.	1	1.00	0.92	2.82	3.08	7.69	0.00	1.33	2.03
time (sec)	N/A	0.044	0.042	0.683	0.480	0.411	0.000	0.418	0.219

Problem 16	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	B	B	B	B	A	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	29	29	29	81	53	293	10924	39	267
N.S.	1	1.00	1.00	2.79	1.83	10.10	376.69	1.34	9.21
time (sec)	N/A	0.016	0.047	0.454	0.480	0.378	30.576	0.410	0.346

Problem 17	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	B	B	B	F	B	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	59	59	59	162	161	1875	0	107	245
N.S.	1	1.00	1.00	2.75	2.73	31.78	0.00	1.81	4.15
time (sec)	N/A	0.063	0.148	0.826	0.494	0.620	0.000	0.485	1.448

Problem 18	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	B	B	B	F(-1)	B	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	89	89	92	248	307	4977	0	189	333
N.S.	1	1.00	1.03	2.79	3.45	55.92	0.00	2.12	3.74
time (sec)	N/A	0.081	0.245	0.855	0.521	0.438	0.000	0.545	1.546

Problem 19	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	F	B	A	A	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	98	98	77	80	0	305	85	80	205
N.S.	1	1.00	0.79	0.82	0.00	3.11	0.87	0.82	2.09
time (sec)	N/A	0.083	0.063	0.458	0.000	0.385	0.533	0.416	3.512

Problem 20	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	B	F	B	F(-1)	F(-2)	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	78	78	86	257	0	2508	0	0	293
N.S.	1	1.00	1.10	3.29	0.00	32.15	0.00	0.00	3.76
time (sec)	N/A	0.062	0.199	0.545	0.000	0.397	0.000	0.000	1.394

Problem 21	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	B	B	B	F(-1)	B	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	88	88	76	273	651	1245	0	150	178
N.S.	1	1.00	0.86	3.10	7.40	14.15	0.00	1.70	2.02
time (sec)	N/A	0.144	0.154	0.588	0.499	0.401	0.000	0.416	1.330

Problem 22	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	B	F	B	F(-1)	F(-2)	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	56	56	61	165	0	1184	0	0	243
N.S.	1	1.00	1.09	2.95	0.00	21.14	0.00	0.00	4.34
time (sec)	N/A	0.050	0.120	0.521	0.000	0.389	0.000	0.000	1.255

Problem 23	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	B	B	B	F(-1)	B	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	59	59	52	175	347	573	0	95	142
N.S.	1	1.00	0.88	2.97	5.88	9.71	0.00	1.61	2.41
time (sec)	N/A	0.073	0.092	0.560	0.496	0.411	0.000	0.436	1.168

Problem 24	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	B	F	B	F(-1)	F(-2)	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	38	38	38	101	0	498	0	0	204
N.S.	1	1.00	1.00	2.66	0.00	13.11	0.00	0.00	5.37
time (sec)	N/A	0.040	0.021	0.520	0.000	0.404	0.000	0.000	1.162

Problem 25	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	B	B	A	F(-1)	A	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	39	39	36	108	120	317	0	50	376
N.S.	1	1.00	0.92	2.77	3.08	8.13	0.00	1.28	9.64
time (sec)	N/A	0.049	0.059	0.505	0.471	0.396	0.000	0.409	1.383

Problem 26	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	B	F	B	B	F(-2)	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	29	29	29	66	0	337	55498	0	87
N.S.	1	1.00	1.00	2.28	0.00	11.62	1913.72	0.00	3.00
time (sec)	N/A	0.022	0.010	0.414	0.000	0.378	134.735	0.000	1.189

Problem 27	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	B	B	B	B	A	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	29	29	29	81	53	293	10924	39	267
N.S.	1	1.00	1.00	2.79	1.83	10.10	376.69	1.34	9.21
time (sec)	N/A	0.015	0.037	0.359	0.477	0.546	29.880	0.399	0.002

Problem 28	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	B	F	B	F	F(-2)	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	41	41	45	85	0	360	0	0	208
N.S.	1	1.00	1.10	2.07	0.00	8.78	0.00	0.00	5.07
time (sec)	N/A	0.036	0.073	0.730	0.000	0.396	0.000	0.000	1.303

Problem 29	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	B	B	B	F	A	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	38	38	38	104	70	457	0	58	108
N.S.	1	1.00	1.00	2.74	1.84	12.03	0.00	1.53	2.84
time (sec)	N/A	0.052	0.056	0.746	0.483	0.404	0.000	0.409	0.279

Problem 30	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	B	F	B	F	F(-2)	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	59	59	58	123	0	963	0	0	447
N.S.	1	1.00	0.98	2.08	0.00	16.32	0.00	0.00	7.58
time (sec)	N/A	0.064	0.121	0.824	0.000	0.416	0.000	0.000	1.555

Problem 31	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	B	B	B	F	A	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	55	55	55	139	119	1377	0	87	239
N.S.	1	1.00	1.00	2.53	2.16	25.04	0.00	1.58	4.35
time (sec)	N/A	0.069	0.100	0.743	0.480	0.387	0.000	0.528	1.317

Problem 32	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	B	F	B	F	F(-2)	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	90	90	86	183	0	3239	0	0	1305
N.S.	1	1.00	0.96	2.03	0.00	35.99	0.00	0.00	14.50
time (sec)	N/A	0.099	0.211	0.806	0.000	0.457	0.000	0.000	36.098

Problem 33	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	B	B	B	F(-1)	A	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	65	65	68	168	134	1239	0	104	-1
N.S.	1	1.00	1.05	2.58	2.06	19.06	0.00	1.60	-0.02
time (sec)	N/A	0.042	0.148	0.533	0.488	0.395	0.000	0.424	0.000

Problem 34	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	B	B	B	F(-1)	B	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	107	107	106	264	344	5117	0	228	-1
N.S.	1	1.00	0.99	2.47	3.21	47.82	0.00	2.13	-0.01
time (sec)	N/A	0.091	0.430	0.591	0.516	0.447	0.000	0.610	0.000

Problem 35	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	F	B	B	B	B	B	B
verified	N/A	Yes	N/A	TBD	TBD	TBD	TBD	TBD	TBD
size	15	15	0	140	34	66	60	34	50
N.S.	1	1.00	0.00	9.33	2.27	4.40	4.00	2.27	3.33
time (sec)	N/A	0.009	0.017	0.366	0.479	0.376	0.477	0.397	0.136

Problem 36	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	B	B	B	B	B	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	35	35	35	167	59	214	211	59	76
N.S.	1	1.00	1.00	4.77	1.69	6.11	6.03	1.69	2.17
time (sec)	N/A	0.016	0.095	0.369	0.476	0.374	1.921	0.404	1.049

Problem 37	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	B	A	B	B	A	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	51	51	51	183	83	575	428	71	112
N.S.	1	1.00	1.00	3.59	1.63	11.27	8.39	1.39	2.20
time (sec)	N/A	0.038	0.127	0.377	0.480	0.504	3.988	0.411	0.995

Problem 38	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	B	B	B	B	B	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	2	2	2	16	10	20	14	10	10
N.S.	1	1.00	1.00	8.00	5.00	10.00	7.00	5.00	5.00
time (sec)	N/A	0.012	0.004	0.449	0.258	0.358	0.206	0.395	0.063

Problem 39	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	B	B	B	B	A	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	11	11	17	32	49	84	34	18	18
N.S.	1	1.00	1.55	2.91	4.45	7.64	3.09	1.64	1.64
time (sec)	N/A	0.013	0.003	0.454	0.273	0.394	0.516	0.412	0.980

Problem 40	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	B	B	B	B	A	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	19	19	27	48	111	185	54	24	24
N.S.	1	1.00	1.42	2.53	5.84	9.74	2.84	1.26	1.26
time (sec)	N/A	0.015	0.004	0.482	0.267	0.373	1.257	0.409	0.064

Problem 41	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	B	F	F	F	F	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	49	49	53	114	0	12	0	0	-1
N.S.	1	1.00	1.08	2.33	0.00	0.24	0.00	0.00	-0.02
time (sec)	N/A	0.023	0.056	1.222	0.000	0.092	0.000	0.000	0.000

Problem 42	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	B	F	F	F	F	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	17	17	18	58	0	10	0	0	-1
N.S.	1	1.00	1.06	3.41	0.00	0.59	0.00	0.00	-0.06
time (sec)	N/A	0.008	0.017	0.997	0.000	0.076	0.000	0.000	0.000

Problem 43	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	C	F	F	C	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	13	13	13	15	11	1	0	31	13
N.S.	1	1.00	1.00	1.15	0.85	0.08	0.00	2.38	1.00
time (sec)	N/A	0.016	0.004	1.003	0.487	0.394	0.000	0.419	1.016

Problem 44	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	A	A	F	B	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	11	11	11	14	11	2	0	31	11
N.S.	1	1.00	1.00	1.27	1.00	0.18	0.00	2.82	1.00
time (sec)	N/A	0.013	0.005	0.917	0.473	0.379	0.000	0.413	0.953

Problem 45	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	F	F	F	F	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	39	39	40	62	0	108	0	0	-1
N.S.	1	1.00	1.03	1.59	0.00	2.77	0.00	0.00	-0.03
time (sec)	N/A	0.017	0.028	0.826	0.000	0.073	0.000	0.000	0.000

Problem 46	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	B	F	F	F	F	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	133	133	135	321	0	12	0	0	-1
N.S.	1	1.00	1.02	2.41	0.00	0.09	0.00	0.00	-0.01
time (sec)	N/A	0.110	0.334	1.250	0.000	0.083	0.000	0.000	0.000

Problem 47	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	F	F	F	F	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	55	55	51	99	0	10	0	0	-1
N.S.	1	1.00	0.93	1.80	0.00	0.18	0.00	0.00	-0.02
time (sec)	N/A	0.043	0.036	1.023	0.000	0.074	0.000	0.000	0.000

Problem 48	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	C	F	F	C	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	33	33	25	21	23	1	0	66	-1
N.S.	1	1.00	0.76	0.64	0.70	0.03	0.00	2.00	-0.03
time (sec)	N/A	0.021	0.021	0.878	0.481	0.519	0.000	0.430	0.000

Problem 49	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	A	A	F	B	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	29	29	23	21	23	19	0	66	-1
N.S.	1	1.00	0.79	0.72	0.79	0.66	0.00	2.28	-0.03
time (sec)	N/A	0.018	0.015	0.937	0.490	0.372	0.000	0.417	0.000

Problem 50	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	F	F	F	F	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	101	101	78	96	0	143	0	0	-1
N.S.	1	1.00	0.77	0.95	0.00	1.42	0.00	0.00	-0.01
time (sec)	N/A	0.066	0.051	1.076	0.000	0.080	0.000	0.000	0.000

Problem 51	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	F	B	F	F	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	49	49	53	66	0	132	0	0	-1
N.S.	1	1.00	1.08	1.35	0.00	2.69	0.00	0.00	-0.02
time (sec)	N/A	0.023	0.045	0.885	0.000	0.080	0.000	0.000	0.000

Problem 52	Optimal	Rubi	MMA	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	17	17	18	45	0	42	0	0	-1
N.S.	1	1.00	1.06	2.65	0.00	2.47	0.00	0.00	-0.06
time (sec)	N/A	0.007	0.024	0.773	0.000	0.094	0.000	0.000	0.000

Problem 53	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	B	C	F	F	C	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	17	17	20	34	19	1	0	40	-1
N.S.	1	1.00	1.18	2.00	1.12	0.06	0.00	2.35	-0.06
time (sec)	N/A	0.018	0.007	0.846	0.487	0.386	0.000	0.416	0.000

Problem 54	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	A	A	F	B	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	15	15	18	16	17	17	0	39	-1
N.S.	1	1.00	1.20	1.07	1.13	1.13	0.00	2.60	-0.07
time (sec)	N/A	0.014	0.006	0.918	0.503	0.378	0.000	0.420	0.000

Problem 55	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	F	A	F	F	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	39	39	40	61	0	39	0	0	-1
N.S.	1	1.00	1.03	1.56	0.00	1.00	0.00	0.00	-0.03
time (sec)	N/A	0.015	0.030	0.768	0.000	0.071	0.000	0.000	0.000

Problem 56	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	C	C	F	C	F(-1)	F	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	288	288	105	100	0	18612	0	0	633
N.S.	1	1.00	0.36	0.35	0.00	64.62	0.00	0.00	2.20
time (sec)	N/A	0.335	0.076	4.181	0.000	1.243	0.000	0.000	5.157

Problem 57	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	C	C	F	C	F(-1)	F	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	288	288	105	94	0	18612	0	0	633
N.S.	1	1.00	0.36	0.33	0.00	64.62	0.00	0.00	2.20
time (sec)	N/A	0.223	0.061	3.694	0.000	1.198	0.000	0.000	5.894

Problem 58	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	C	B	F	B	B	B	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	91	91	133	194	0	602	330	275	291
N.S.	1	1.00	1.46	2.13	0.00	6.62	3.63	3.02	3.20
time (sec)	N/A	0.096	0.561	0.489	0.000	0.409	1.960	0.422	3.431

Problem 59	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	C	B	F	B	B	B	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	95	95	147	190	0	602	320	275	295
N.S.	1	1.00	1.55	2.00	0.00	6.34	3.37	2.89	3.11
time (sec)	N/A	0.089	0.360	0.487	0.000	0.384	1.703	0.428	3.416

Problem 60	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	C	C	F	B	F(-1)	F(-2)	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	361	485	121	121	0	771	0	0	1563
N.S.	1	1.34	0.34	0.34	0.00	2.14	0.00	0.00	4.33
time (sec)	N/A	0.763	0.164	0.751	0.000	0.426	0.000	0.000	7.553

Problem 61	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	C	F	B	F(-1)	F(-2)	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	101	101	109	127	0	779	0	0	1487
N.S.	1	1.00	1.08	1.26	0.00	7.71	0.00	0.00	14.72
time (sec)	N/A	0.093	0.137	0.777	0.000	0.437	0.000	0.000	8.901

Problem 62	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	C	C	F	B	F(-1)	C	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	176	176	45	37	0	590	0	281	205
N.S.	1	1.00	0.26	0.21	0.00	3.35	0.00	1.60	1.16
time (sec)	N/A	0.111	0.053	0.542	0.000	0.425	0.000	0.457	1.010

Problem 63	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	B	B	B	B	B	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	25	25	24	154	45	115	75	43	61
N.S.	1	1.00	0.96	6.16	1.80	4.60	3.00	1.72	2.44
time (sec)	N/A	0.013	0.078	0.503	0.489	0.434	0.707	0.411	0.118

Problem 64	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	C	C	F	F(-2)	F	F	F(-1)
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	494	494	139	156	0	0	0	0	-1
N.S.	1	1.00	0.28	0.32	0.00	0.00	0.00	0.00	-0.00
time (sec)	N/A	0.681	0.171	1.358	0.000	0.000	0.000	0.000	0.000

Problem 65	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	C	C	F	C	F	A	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	171	171	132	177	0	15201	0	1	844
N.S.	1	1.00	0.77	1.04	0.00	88.89	0.00	0.01	4.94
time (sec)	N/A	0.179	0.151	0.901	0.000	1.507	0.000	0.463	58.392

Problem 66	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	C	C	F	B	F	A	F(-1)
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	245	245	158	233	0	661324	0	1	-1
N.S.	1	1.00	0.64	0.95	0.00	2699.28	0.00	0.00	-0.00
time (sec)	N/A	0.362	0.182	1.114	0.000	3.305	0.000	0.542	0.000

Problem 67	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	C	C	F	F(-2)	F	F	F(-1)
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	494	494	139	150	0	0	0	0	-1
N.S.	1	1.00	0.28	0.30	0.00	0.00	0.00	0.00	-0.00
time (sec)	N/A	0.545	0.156	1.366	0.000	0.000	0.000	0.000	0.000

Problem 68	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	C	C	F	C	F	A	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	175	175	132	183	0	16379	0	1	855
N.S.	1	1.00	0.75	1.05	0.00	93.59	0.00	0.01	4.89
time (sec)	N/A	0.187	0.116	0.923	0.000	1.405	0.000	0.462	57.402

Problem 69	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	C	C	F	B	F	A	F(-1)
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	213	213	158	239	0	631813	0	1	-1
N.S.	1	1.00	0.74	1.12	0.00	2966.26	0.00	0.00	-0.00
time (sec)	N/A	0.167	0.154	1.123	0.000	3.290	0.000	0.542	0.000

Problem 70	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	C	C	F	B	F(-1)	F	F(-1)
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	223	223	445	62	0	3228	0	0	-1
N.S.	1	1.00	2.00	0.28	0.00	14.48	0.00	0.00	-0.00
time (sec)	N/A	0.376	0.071	0.601	0.000	0.513	0.000	0.000	0.000

Problem 71	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	C	C	F	B	F(-1)	B	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	83	83	68	262	0	158	0	140	337
N.S.	1	1.00	0.82	3.16	0.00	1.90	0.00	1.69	4.06
time (sec)	N/A	0.075	0.317	0.583	0.000	0.524	0.000	0.427	2.555

Problem 72	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	C	C	F	B	F(-1)	A	F(-1)
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	129	129	127	47	0	3773	0	1	-1
N.S.	1	1.00	0.98	0.36	0.00	29.25	0.00	0.01	-0.01
time (sec)	N/A	0.131	0.095	0.590	0.000	0.513	0.000	0.431	0.000

Problem 73	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	C	C	F	B	F(-1)	F	F(-1)
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	205	205	445	64	0	3260	0	0	-1
N.S.	1	1.00	2.17	0.31	0.00	15.90	0.00	0.00	-0.00
time (sec)	N/A	0.319	0.064	0.625	0.000	0.526	0.000	0.000	0.000

Problem 74	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	C	B	F	B	B	A	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	71	71	111	382	0	694	632	10	329
N.S.	1	1.00	1.56	5.38	0.00	9.77	8.90	0.14	4.63
time (sec)	N/A	0.082	0.183	0.619	0.000	0.411	10.447	0.425	4.524

Problem 75	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	C	F	B	F(-1)	A	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	69	69	64	190	0	713	0	45	271
N.S.	1	1.00	0.93	2.75	0.00	10.33	0.00	0.65	3.93
time (sec)	N/A	0.053	0.320	0.744	0.000	0.428	0.000	0.491	2.628

Problem 76	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	A	B	F	A	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	15	15	15	14	23	47	0	23	27
N.S.	1	1.00	1.00	0.93	1.53	3.13	0.00	1.53	1.80
time (sec)	N/A	0.021	0.011	0.606	0.264	0.380	0.000	0.420	1.112

Problem 77	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	F	B	F	F	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	39	39	39	42	0	357	0	0	-1
N.S.	1	1.00	1.00	1.08	0.00	9.15	0.00	0.00	-0.03
time (sec)	N/A	0.046	0.028	0.541	0.000	0.572	0.000	0.000	0.000

Problem 78	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	F	B	F	F	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	26	26	26	31	0	248	0	0	-1
N.S.	1	1.00	1.00	1.19	0.00	9.54	0.00	0.00	-0.04
time (sec)	N/A	0.041	0.016	0.679	0.000	0.437	0.000	0.000	0.000

Problem 79	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	F	B	F	F	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	13	13	13	12	0	63	0	0	-1
N.S.	1	1.00	1.00	0.92	0.00	4.85	0.00	0.00	-0.08
time (sec)	N/A	0.026	0.012	0.653	0.000	0.404	0.000	0.000	0.000

Problem 80	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	C	F	F	C	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	13	13	21	12	7	1	0	38	-1
N.S.	1	1.00	1.62	0.92	0.54	0.08	0.00	2.92	-0.08
time (sec)	N/A	0.038	0.012	1.080	0.490	0.447	0.000	0.416	0.000

Problem 81	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	C	C	F	C	F	A	B
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	153	153	145	145	0	1138	0	191	1173
N.S.	1	1.00	0.95	0.95	0.00	7.44	0.00	1.25	7.67
time (sec)	N/A	0.148	0.922	1.000	0.000	1.199	0.000	0.425	0.915

Problem 82	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	F	F(-2)	F	F	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	28	28	28	21	0	0	0	0	-1
N.S.	1	1.00	1.00	0.75	0.00	0.00	0.00	0.00	-0.04
time (sec)	N/A	0.050	0.018	7.130	0.000	0.000	0.000	0.000	0.000

Problem 83	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	F	B	F	F	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	45	45	45	34	0	1648	0	0	-1
N.S.	1	1.00	1.00	0.76	0.00	36.62	0.00	0.00	-0.02
time (sec)	N/A	0.053	0.017	6.062	0.000	0.942	0.000	0.000	0.000

Problem 84	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	F	A	F	F	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	29	29	29	24	0	113	0	0	-1
N.S.	1	1.00	1.00	0.83	0.00	3.90	0.00	0.00	-0.03
time (sec)	N/A	0.056	0.018	7.017	0.000	0.396	0.000	0.000	0.000

Problem 85	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	A	A	A	A	F	A	F	F	F
verified	N/A	Yes	Yes	TBD	TBD	TBD	TBD	TBD	TBD
size	47	47	45	38	0	156	0	0	-1
N.S.	1	1.00	0.96	0.81	0.00	3.32	0.00	0.00	-0.02
time (sec)	N/A	0.064	0.017	1.596	0.000	0.399	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 [1] had the largest ratio of [16]

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	3	3	1.00	16	0.188
2	A	2	2	1.00	16	0.125
3	A	2	2	1.00	16	0.125
4	A	3	2	1.00	16	0.125
5	A	3	2	1.00	16	0.125
6	A	4	3	1.00	15	0.200
7	A	4	3	1.00	15	0.200
8	A	3	3	1.00	15	0.200
9	A	2	2	1.00	13	0.154
10	A	4	4	1.00	13	0.308
11	A	5	5	1.00	15	0.333
12	A	6	6	1.00	15	0.400
13	A	6	6	1.00	15	0.400
14	A	5	5	1.00	15	0.333
15	A	4	4	1.00	15	0.267
16	A	2	2	1.00	10	0.200
17	A	4	3	1.00	15	0.200
18	A	4	3	1.00	15	0.200
19	A	7	7	1.00	13	0.538
20	A	4	3	1.00	15	0.200
21	A	6	6	1.00	15	0.400
22	A	4	3	1.00	15	0.200
23	A	5	5	1.00	15	0.333
24	A	3	3	1.00	15	0.200
25	A	3	3	1.00	15	0.200

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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	$\frac{\text{number of rules}}{\text{integrand leaf size}}$
26	A	2	2	1.00	13	0.154
27	A	2	2	1.00	10	0.200
28	A	4	4	1.00	13	0.308
29	A	3	3	1.00	15	0.200
30	A	5	5	1.00	15	0.333
31	A	4	3	1.00	15	0.200
32	A	6	6	1.00	15	0.400
33	A	4	4	1.00	10	0.400
34	A	5	5	1.00	10	0.500
35	A	2	2	1.00	8	0.250
36	A	4	4	1.00	8	0.500
37	A	5	5	1.00	8	0.625
38	A	3	3	1.00	10	0.300
39	A	3	2	1.00	10	0.200
40	A	3	2	1.00	10	0.200
41	A	2	2	1.00	12	0.167
42	A	1	1	1.00	10	0.100
43	A	3	3	1.00	12	0.250
44	A	3	3	1.00	10	0.300
45	A	2	2	1.00	12	0.167
46	A	6	6	1.00	12	0.500
47	A	4	4	1.00	10	0.400
48	A	4	4	1.00	12	0.333
49	A	4	4	1.00	10	0.400
50	A	6	6	1.00	12	0.500
51	A	2	2	1.00	12	0.167
52	A	1	1	1.00	10	0.100
53	A	3	3	1.00	12	0.250
54	A	3	3	1.00	10	0.300
55	A	2	2	1.00	12	0.167
56	A	8	3	1.00	10	0.300
57	A	8	3	1.00	11	0.273
58	A	7	5	1.00	8	0.625
59	A	7	5	1.00	10	0.500
60	A	10	6	1.34	10	0.600

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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	$\frac{\text{number of rules}}{\text{integrand leaf size}}$
61	A	4	3	1.00	11	0.273
62	A	10	6	1.00	8	0.750
63	A	3	3	1.00	10	0.300
64	A	12	3	1.00	10	0.300
65	A	7	3	1.00	10	0.300
66	A	9	3	1.00	10	0.300
67	A	12	3	1.00	11	0.273
68	A	7	3	1.00	11	0.273
69	A	9	3	1.00	11	0.273
70	A	11	5	1.00	8	0.625
71	A	7	3	1.00	8	0.375
72	A	9	3	1.00	8	0.375
73	A	11	5	1.00	10	0.500
74	A	8	6	1.00	10	0.600
75	A	10	6	1.00	10	0.600
76	A	4	4	1.00	11	0.364
77	A	4	4	1.00	15	0.267
78	A	3	3	1.00	15	0.200
79	A	3	3	1.00	13	0.231
80	A	4	4	1.00	15	0.267
81	A	11	10	1.00	15	0.667
82	A	4	4	1.00	15	0.267
83	A	5	5	1.00	15	0.333
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Chapter 3

Listing of integrals

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3.1 $\int \frac{\sinh^4(x)}{a-a\cosh^2(x)}\,dx$

Optimal. Leaf size=20

$$\frac{x}{2a}-\frac{\cosh(x)\sinh(x)}{2a}$$

```
[Out] 1/2*x/a-1/2*cosh(x)*sinh(x)/a
```

Rubi [A]
time = 0.03, antiderivative size = 20, normalized size of antiderivative = 1.00, number of steps used = 3, number of rules used = 3, integrand size = 16, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.188, Rules used = {3254, 2715, 8}

$$\frac{x}{2a}-\frac{\sinh(x)\cosh(x)}{2a}$$

Antiderivative was successfully verified.

```
[In] Int[Sinh[x]^4/(a - a*Cosh[x]^2),x]
```

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

Rule 8

```
Int[a_, x_Symbol] :> Simp[a*x, x] /; FreeQ[a, x]
```

Rule 2715

```
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 3254

```
Int[(u_.)*((a_) + (b_.)*sin[(e_.) + (f_.)*(x_)]^2)^(p_), x_Symbol] :> Dist[
a^p, Int[ActivateTrig[u*cos[e + f*x]^(2*p)], x], x] /; FreeQ[{a, b, e, f, p
}, x] && EqQ[a + b, 0] && IntegerQ[p]
```

Rubi steps

$$\begin{aligned}\int \frac{\sinh^4(x)}{a-a\cosh^2(x)}\,dx &= -\frac{\int \sinh^2(x)\,dx}{a}\\ &= -\frac{\cosh(x)\sinh(x)}{2a}+\frac{\int 1\,dx}{2a}\\ &= \frac{x}{2a}-\frac{\cosh(x)\sinh(x)}{2a}\end{aligned}$$

Mathematica [A]
time = 0.00, size = 19, normalized size = 0.95

$$-\frac{-\frac{x}{2}+\frac{1}{4}\sinh(2x)}{a}$$

Antiderivative was successfully verified.

```
[In] Integrate[Sinh[x]^4/(a - a*Cosh[x]^2),x]
[Out] -((-1/2*x + Sinh[2*x]/4)/a)
```

Maple [B] Leaf count of result is larger than twice the leaf count of optimal. 64 vs. 2(16) = 32.
time = 0.50, size = 65, normalized size = 3.25

method	result	size
risch	$\frac{x}{2a}-\frac{e^{2x}}{8a}+\frac{e^{-2x}}{8a}$	26
default	$\frac{\frac{1}{2\left(\tanh\left(\frac{x}{2}\right)+1\right)^{2}}-\frac{1}{2\left(\tanh\left(\frac{x}{2}\right)+1\right)}+\frac{\ln\left(\tanh\left(\frac{x}{2}\right)+1\right)}{2}-\frac{1}{2\left(\tanh\left(\frac{x}{2}\right)-1\right)^{2}}-\frac{1}{2\left(\tanh\left(\frac{x}{2}\right)-1\right)}-\frac{\ln\left(\tanh\left(\frac{x}{2}\right)-1\right)}{2}}{a}$	65

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(sinh(x)^4/(a-a*cosh(x)^2),x,method=_RETURNVERBOSE)
[Out] 8/a*(1/16/(tanh(1/2*x)+1)^2-1/16/(tanh(1/2*x)+1)+1/16*ln(tanh(1/2*x)+1)-1/1
6/(tanh(1/2*x)-1)^2-1/16/(tanh(1/2*x)-1)-1/16*ln(tanh(1/2*x)-1))
```

Maxima [A]
time = 0.26, size = 25, normalized size = 1.25

$$\frac{x}{2\,a}-\frac{e^{(2\,x)}}{8\,a}+\frac{e^{(-2\,x)}}{8\,a}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(sinh(x)^4/(a-a*cosh(x)^2),x, algorithm="maxima")
[Out] 1/2*x/a - 1/8*e^(2*x)/a + 1/8*e^(-2*x)/a
```

Fricas [A]
time = 0.37, size = 14, normalized size = 0.70

$$-\frac{\cosh\left(x\right)\sinh\left(x\right)-x}{2\,a}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(sinh(x)^4/(a-a*cosh(x)^2),x, algorithm="fricas")
```

```
[Out] -1/2*(cosh(x)*sinh(x) - x)/a
```

Sympy [B] Leaf count of result is larger than twice the leaf count of optimal. 153 vs. $2(14) = 28$.
time = 0.88, size = 153, normalized size = 7.65

$$\frac{x\tanh^4\left(\frac{x}{2}\right)}{2a\tanh^4\left(\frac{x}{2}\right)-4a\tanh^2\left(\frac{x}{2}\right)+2a}-\frac{2x\tanh^2\left(\frac{x}{2}\right)}{2a\tanh^4\left(\frac{x}{2}\right)-4a\tanh^2\left(\frac{x}{2}\right)+2a}+\frac{x}{2a\tanh^4\left(\frac{x}{2}\right)-4a\tanh^2\left(\frac{x}{2}\right)+2a}-\frac{2\tanh^3\left(\frac{x}{2}\right)}{2a\tanh^4\left(\frac{x}{2}\right)-4a\tanh^2\left(\frac{x}{2}\right)+2a}-\frac{2\tanh\left(\frac{x}{2}\right)}{2a\tanh^4\left(\frac{x}{2}\right)-4a\tanh^2\left(\frac{x}{2}\right)+2a}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(sinh(x)**4/(a-a*cosh(x)**2),x)
```

```
[Out] x*tanh(x/2)**4/(2*a*tanh(x/2)**4 - 4*a*tanh(x/2)**2 + 2*a) - 2*x*tanh(x/2)*
*2/(2*a*tanh(x/2)**4 - 4*a*tanh(x/2)**2 + 2*a) + x/(2*a*tanh(x/2)**4 - 4*a*
tanh(x/2)**2 + 2*a) - 2*tanh(x/2)**3/(2*a*tanh(x/2)**4 - 4*a*tanh(x/2)**2 +
 2*a) - 2*tanh(x/2)/(2*a*tanh(x/2)**4 - 4*a*tanh(x/2)**2 + 2*a)
```

Giac [A]
time = 0.42, size = 26, normalized size = 1.30

$$-\frac{\left(2\,e^{(2\,x)}-1\right)e^{(-2\,x)}-4\,x+e^{(2\,x)}}{8\,a}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(sinh(x)^4/(a-a*cosh(x)^2),x, algorithm="giac")
```

```
[Out] -1/8*((2*e^(2*x) - 1)*e^(-2*x) - 4*x + e^(2*x))/a
```

Mupad [B]
time = 0.94, size = 25, normalized size = 1.25

$$\frac{\mathrm{e}^{-2\,x}}{8\,a}-\frac{\mathrm{e}^{2\,x}}{8\,a}+\frac{x}{2\,a}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(sinh(x)^4/(a - a*cosh(x)^2),x)
```

```
[Out] exp(-2*x)/(8*a) - exp(2*x)/(8*a) + x/(2*a)
```

3.2 $\int \frac{\sinh^3(x)}{a-a\cosh^2(x)}\,dx$

Optimal. Leaf size=7

$$-\frac{\cosh(x)}{a}$$

```
[Out] -cosh(x)/a
```

Rubi [A]
time = 0.03, antiderivative size = 7, normalized size of antiderivative = 1.00, number of steps used = 2, number of rules used = 2, integrand size = 16, $\frac{\text{number of rules}}{\text{integrand size}} = 0.125$, Rules used = {3254, 2718}

$$-\frac{\cosh(x)}{a}$$

Antiderivative was successfully verified.

```
[In] Int[Sinh[x]^3/(a - a*Cosh[x]^2),x]
```

```
[Out] -(Cosh[x]/a)
```

Rule 2718

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

Rule 3254

```
Int[(u_.)*((a_) + (b_.)*sin[(e_.) + (f_.)*(x_)]^2)^(p_), x_Symbol] :> Dist[
a^p, Int[ActivateTrig[u*cos[e + f*x]^(2*p)], x], x] /; FreeQ[{a, b, e, f, p
}, x] && EqQ[a + b, 0] && IntegerQ[p]
```

Rubi steps

$$\begin{aligned}\int \frac{\sinh^3(x)}{a-a\cosh^2(x)}\,dx &= -\frac{\int \sinh(x)\,dx}{a}\\ &= -\frac{\cosh(x)}{a}\end{aligned}$$

Mathematica [A]
time = 0.00, size = 7, normalized size = 1.00

$$-\frac{\cosh(x)}{a}$$

Antiderivative was successfully verified.

```
[In] Integrate[Sinh[x]^3/(a - a*Cosh[x]^2),x]
```

```
[Out] -(Cosh[x]/a)
```

Maple [A]
time = 0.41, size = 8, normalized size = 1.14

method	result	size
derivativedivides	$-\frac{\cosh(x)}{a}$	8
default	$-\frac{\cosh(x)}{a}$	8
risch	$-\frac{e^{x}}{2a}-\frac{e^{-x}}{2a}$	18

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(sinh(x)^3/(a-a*cosh(x)^2),x,method=_RETURNVERBOSE)
```

```
[Out] -cosh(x)/a
```

Maxima [B] Leaf count of result is larger than twice the leaf count of optimal. 17 vs. 2(7) = 14.
time = 0.26, size = 17, normalized size = 2.43

$$-\frac{e^{(-x)}}{2\,a}-\frac{e^{x}}{2\,a}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(sinh(x)^3/(a-a*cosh(x)^2),x, algorithm="maxima")
```

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

Fricas [A]
time = 0.38, size = 7, normalized size = 1.00

$$-\frac{\cosh\left(x\right)}{a}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(sinh(x)^3/(a-a*cosh(x)^2),x, algorithm="fricas")
```

```
[Out] -cosh(x)/a
```

Sympy [A]
time = 0.53, size = 10, normalized size = 1.43

$$\frac{2}{a\tanh^{2}\left(\frac{x}{2}\right)-a}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(sinh(x)**3/(a-a*cosh(x)**2),x)
```

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

Giac [A]
time = 0.44, size = 12, normalized size = 1.71

$$-\frac{e^{(-x)} + e^{x}}{2\,a}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(sinh(x)^3/(a-a*cosh(x)^2),x, algorithm="giac")
```

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

Mupad [B]
time = 0.91, size = 7, normalized size = 1.00

$$-\frac{\cosh(x)}{a}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(sinh(x)^3/(a - a*cosh(x)^2),x)
```

```
[Out] -cosh(x)/a
```

3.3 $\int \frac{\sinh^2(x)}{a-a\cosh^2(x)}\,dx$

Optimal. Leaf size=6

$$-\frac{x}{a}$$

```
[Out] -x/a
```

Rubi [A]
time = 0.03, antiderivative size = 6, normalized size of antiderivative = 1.00, number of steps used = 2, number of rules used = 2, integrand size = 16, $\frac{\text{number of rules}}{\text{integrand size}} = 0.125$, Rules used = {3254, 8}

$$-\frac{x}{a}$$

Antiderivative was successfully verified.

```
[In] Int[Sinh[x]^2/(a - a*Cosh[x]^2),x]
```

```
[Out] -(x/a)
```

Rule 8

```
Int[a_, x_Symbol] :> Simp[a*x, x] /; FreeQ[a, x]
```

Rule 3254

```
Int[(u_.)*((a_) + (b_.)*sin[(e_.) + (f_.)*(x_)]^2)^(p_), x_Symbol] :> Dist[
a^p, Int[ActivateTrig[u*cos[e + f*x]^(2*p)], x], x] /; FreeQ[{a, b, e, f, p
}, x] && EqQ[a + b, 0] && IntegerQ[p]
```

Rubi steps

$$\begin{aligned}\int \frac{\sinh^2(x)}{a-a\cosh^2(x)}\,dx &= -\frac{\int 1\,dx}{a}\\ &= -\frac{x}{a}\end{aligned}$$

Mathematica [A]
time = 0.00, size = 6, normalized size = 1.00

$$-\frac{x}{a}$$

Antiderivative was successfully verified.

```
[In] Integrate[Sinh[x]^2/(a - a*Cosh[x]^2),x]
```

```
[Out] -(x/a)
```

Maple [C] Result contains higher order function than in optimal. Order 3 vs. order 1.
time = 0.60, size = 11, normalized size = 1.83

method	result	size
risch	$-\frac{x}{a}$	7
default	$-\frac{2\,\mathrm{arctanh}\left(\tanh\left(\frac{x}{2}\right)\right)}{a}$	11

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(sinh(x)^2/(a-a*cosh(x)^2),x,method=_RETURNVERBOSE)
```

```
[Out] -2/a*arctanh(tanh(1/2*x))
```

Maxima [A]
time = 0.26, size = 6, normalized size = 1.00

$$-\frac{x}{a}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] -x/a
```

Fricas [A]
time = 0.38, size = 6, normalized size = 1.00

$$-\frac{x}{a}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(sinh(x)^2/(a-a*cosh(x)^2),x, algorithm="fricas")
```

```
[Out] -x/a
```

Sympy [A]
time = 0.28, size = 3, normalized size = 0.50

$$-\frac{x}{a}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(sinh(x)**2/(a-a*cosh(x)**2),x)
```

```
[Out] -x/a
```

Giac [A]
time = 0.41, size = 6, normalized size = 1.00

$$-\frac{x}{a}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(sinh(x)^2/(a-a*cosh(x)^2),x, algorithm="giac")
```

```
[Out] -x/a
```

Mupad [B]
time = 0.03, size = 6, normalized size = 1.00

$$-\frac{x}{a}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(sinh(x)^2/(a - a*cosh(x)^2),x)
```

```
[Out] -x/a
```

3.4 $\int \frac{\operatorname{csch}^2(x)}{a-a\cosh^2(x)}\,dx$

Optimal. Leaf size=19

$$-\frac{\coth(x)}{a}+\frac{\coth^3(x)}{3a}$$

```
[Out] -coth(x)/a+1/3*coth(x)^3/a
```

Rubi [A]
time = 0.03, antiderivative size = 19, normalized size of antiderivative = 1.00, number of steps used = 3, number of rules used = 2, integrand size = 16, $\frac{\text{number of rules}}{\text{integrand size}} = 0.125$, Rules used = {3254, 3852}

$$\frac{\coth^3(x)}{3a}-\frac{\coth(x)}{a}$$

Antiderivative was successfully verified.

```
[In] Int[Csch[x]^2/(a - a*Cosh[x]^2),x]
```

```
[Out] -(Coth[x]/a) + Coth[x]^3/(3*a)
```

Rule 3254

```
Int[(u_.)*((a_) + (b_.)*sin[(e_.) + (f_.)*(x_)]^2)^(p_), x_Symbol] :> Dist[
a^p, Int[ActivateTrig[u*cos[e + f*x]^(2*p)], x], x] /; FreeQ[{a, b, e, f, p
}, x] && EqQ[a + b, 0] && IntegerQ[p]
```

Rule 3852

```
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]
```

Rubi steps

$$\begin{aligned}\int \frac{\operatorname{csch}^2(x)}{a-a\cosh^2(x)}\,dx &= -\frac{\int \operatorname{csch}^4(x)\,dx}{a}\\ &= -\frac{i\operatorname{Subst}\left(\int \left(1+x^2\right)\,dx,x,-i\coth(x)\right)}{a}\\ &= -\frac{\coth(x)}{a}+\frac{\coth^3(x)}{3a}\end{aligned}$$

Mathematica [**A**]
time = 0.00, size = 22, normalized size = 1.16

$$-\frac{\frac{2\coth(x)}{3}-\frac{1}{3}\coth(x)\text{csch}^2(x)}{a}$$

Antiderivative was successfully verified.

```
[In] Integrate[Csch[x]^2/(a - a*Cosh[x]^2),x]
```

```
[Out] -(((2*Coth[x])/3 - (Coth[x]*Csch[x]^2)/3)/a)
```

Maple [**B**] Leaf count of result is larger than twice the leaf count of optimal. 36 vs. 2(17) = 34.
time = 0.64, size = 37, normalized size = 1.95

method	result	size
risch	$\frac{4\,e^{2x}-\frac{4}{3}}{\left(e^{2x}-1\right)^3 a}$	22
default	$\frac{\frac{\left(\tanh^3\left(\frac{x}{2}\right)\right)}{3}-3\tanh\left(\frac{x}{2}\right)-\frac{3}{\tanh\left(\frac{x}{2}\right)}+\frac{1}{3\tanh\left(\frac{x}{2}\right)^3}}{8a}$	37

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(csch(x)^2/(a-a*cosh(x)^2),x,method=_RETURNVERBOSE)
```

```
[Out] 1/8/a*(1/3*tanh(1/2*x)^3-3*tanh(1/2*x)-3/tanh(1/2*x)+1/3/tanh(1/2*x)^3)
```

Maxima [**B**] Leaf count of result is larger than twice the leaf count of optimal. 61 vs. 2(17) = 34.
time = 0.26, size = 61, normalized size = 3.21

$$-\frac{4\,e^{(-2\,x)}}{3\,ae^{(-2\,x)}-3\,ae^{(-4\,x)}+ae^{(-6\,x)}-a}+\frac{4}{3\,(3\,ae^{(-2\,x)}-3\,ae^{(-4\,x)}+ae^{(-6\,x)}-a)}$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

Fricas [**B**] Leaf count of result is larger than twice the leaf count of optimal. 100 vs. 2(17) = 34.
time = 0.57, size = 100, normalized size = 5.26

$$\frac{8\,(\cosh(x)+2\,\sinh(x))}{3\,\left(a\cosh(x)^5+5\,a\cosh(x)\sinh(x)^4+a\sinh(x)^5-3\,a\cosh(x)^3+\left(10\,a\cosh(x)^2-3\,a\right)\sinh(x)^3+\left(10\,a\cosh(x)^3-9\,a\cosh(x)\right)\sinh(x)^2+2\,a\cosh(x)+\left(5\,a\cosh(x)^4-9\,a\cosh(x)^2+4\,a\right)\sinh(x)\right)}$$

Verification of antiderivative is not currently implemented for this CAS.

[In] integrate(csch(x)^2/(a-a*cosh(x)^2),x, algorithm="fricas")

[Out] 8/3*(cosh(x) + 2*sinh(x))/(a*cosh(x)^5 + 5*a*cosh(x)*sinh(x)^4 + a*sinh(x)^5 - 3*a*cosh(x)^3 + (10*a*cosh(x)^2 - 3*a)*sinh(x)^3 + (10*a*cosh(x)^3 - 9*a*cosh(x))*sinh(x)^2 + 2*a*cosh(x) + (5*a*cosh(x)^4 - 9*a*cosh(x)^2 + 4*a)*sinh(x))

Sympy [F]
time = 0.00, size = 0, normalized size = 0.00

$$-\frac{\int \frac{\operatorname{csch}^2(x)}{\cosh^2(x)-1}\,dx}{a}$$

Verification of antiderivative is not currently implemented for this CAS.

[In] integrate(csch(x)**2/(a-a*cosh(x)**2),x)

[Out] -Integral(csch(x)**2/(cosh(x)**2 - 1), x)/a

Giac [A]
time = 0.40, size = 21, normalized size = 1.11

$$\frac{4\left(3\,e^{(2\,x)}-1\right)}{3\,a(e^{(2\,x)}-1)^3}$$

Verification of antiderivative is not currently implemented for this CAS.

[In] integrate(csch(x)^2/(a-a*cosh(x)^2),x, algorithm="giac")

[Out] 4/3*(3*e^(2*x) - 1)/(a*(e^(2*x) - 1)^3)

Mupad [B]
time = 0.91, size = 21, normalized size = 1.11

$$\frac{4\,\left(3\,\mathrm{e}^{2\,x}-1\right)}{3\,a\,{\left(\mathrm{e}^{2\,x}-1\right)}^3}$$

Verification of antiderivative is not currently implemented for this CAS.

[In] int(1/(sinh(x)^2*(a - a*cosh(x)^2)),x)

[Out] (4*(3*exp(2*x) - 1))/(3*a*(exp(2*x) - 1)^3)

3.5 $\int \frac{\operatorname{csch}^4(x)}{a-a\cosh^2(x)}\,dx$

Optimal. Leaf size=29

$$\frac{\coth(x)}{a}-\frac{2\coth^3(x)}{3a}+\frac{\coth^5(x)}{5a}$$

```
[Out] coth(x)/a-2/3*coth(x)^3/a+1/5*coth(x)^5/a
```

Rubi [A]
time = 0.04, antiderivative size = 29, normalized size of antiderivative = 1.00, number of steps used = 3, number of rules used = 2, integrand size = 16, $\frac{\text{number of rules}}{\text{integrand size}} = 0.125$, Rules used = {3254, 3852}

$$\frac{\coth^5(x)}{5a}-\frac{2\coth^3(x)}{3a}+\frac{\coth(x)}{a}$$

Antiderivative was successfully verified.

```
[In] Int[Csch[x]^4/(a - a*Cosh[x]^2),x]
```

```
[Out] Coth[x]/a - (2*Coth[x]^3)/(3*a) + Coth[x]^5/(5*a)
```

Rule 3254

```
Int[(u_.)*((a_) + (b_.)*sin[(e_.) + (f_.)*(x_)]^2)^(p_), x_Symbol] :> Dist[
a^p, Int[ActivateTrig[u*cos[e + f*x]^(2*p)], x], x] /; FreeQ[{a, b, e, f, p
}, x] && EqQ[a + b, 0] && IntegerQ[p]
```

Rule 3852

```
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]
```

Rubi steps

$$\begin{aligned}\int \frac{\operatorname{csch}^4(x)}{a-a\cosh^2(x)}\,dx &= -\frac{\int \operatorname{csch}^6(x)\,dx}{a}\\ &= \frac{i\text{Subst}\left(\int \left(1+2x^2+x^4\right)\,dx, x, -i\coth(x)\right)}{a}\\ &= \frac{\coth(x)}{a}-\frac{2\coth^3(x)}{3a}+\frac{\coth^5(x)}{5a}\end{aligned}$$

Mathematica [A]
time = 0.00, size = 32, normalized size = 1.10

$$-\frac{-\frac{8\coth(x)}{15}+\frac{4}{15}\coth(x)\operatorname{csch}^2(x)-\frac{1}{5}\coth(x)\operatorname{csch}^4(x)}{a}$$

Antiderivative was successfully verified.

```
[In] Integrate[Csch[x]^4/(a - a*Cosh[x]^2),x]
```

```
[Out] -(((-8*Coth[x])/15 + (4*Coth[x]*Csch[x]^2)/15 - (Coth[x]*Csch[x]^4)/5)/a)
```

Maple [B] Leaf count of result is larger than twice the leaf count of optimal. 52 vs. $2(25) = 50$.
time = 0.67, size = 53, normalized size = 1.83

method	result	size
risch	$\frac{\frac{32\,{\mathrm e}^{4x}}{3}-\frac{16\,{\mathrm e}^{2x}}{3}+\frac{16}{15}}{\left({\mathrm e}^{2x}-1\right)^{5}a}$	28
default	$\frac{\frac{\left(\tanh^{5}\left(\frac{x}{2}\right)\right)}{5}-\frac{5\left(\tanh^{3}\left(\frac{x}{2}\right)\right)}{3}+10\tanh\left(\frac{x}{2}\right)+\frac{10}{\tanh\left(\frac{x}{2}\right)}-\frac{5}{3\tanh\left(\frac{x}{2}\right)^{3}}+\frac{1}{5\tanh\left(\frac{x}{2}\right)^{5}}}{32a}$	53

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(csch(x)^4/(a-a*cosh(x)^2),x,method=_RETURNVERBOSE)
```

```
[Out] 1/32/a*(1/5*tanh(1/2*x)^5-5/3*tanh(1/2*x)^3+10*tanh(1/2*x)+10/tanh(1/2*x)-5
/3/tanh(1/2*x)^3+1/5/tanh(1/2*x)^5)
```

Maxima [B] Leaf count of result is larger than twice the leaf count of optimal. 135 vs. $2(25) = 50$.
time = 0.27, size = 135, normalized size = 4.66

$$\frac{16\,e^{(-2\,x)}}{3\,(5\,ae^{(-2\,x)}-10\,ae^{(-4\,x)}+10\,ae^{(-6\,x)}-5\,ae^{(-8\,x)}+ae^{(-10\,x)}-a)}-\frac{32\,e^{(-4\,x)}}{3\,(5\,ae^{(-2\,x)}-10\,ae^{(-4\,x)}+10\,ae^{(-6\,x)}-5\,ae^{(-8\,x)}+ae^{(-10\,x)}-a)}-\frac{16}{15\,(5\,ae^{(-2\,x)}-10\,ae^{(-4\,x)}+10\,ae^{(-6\,x)}-5\,ae^{(-8\,x)}+ae^{(-10\,x)}-a)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(csch(x)^4/(a-a*cosh(x)^2),x, algorithm="maxima")
```

```
[Out] 16/3*e^(-2*x)/(5*a*e^(-2*x) - 10*a*e^(-4*x) + 10*a*e^(-6*x) - 5*a*e^(-8*x)
+ a*e^(-10*x) - a) - 32/3*e^(-4*x)/(5*a*e^(-2*x) - 10*a*e^(-4*x) + 10*a*e^(
-6*x) - 5*a*e^(-8*x) + a*e^(-10*x) - a) - 16/15/(5*a*e^(-2*x) - 10*a*e^(-4*
x) + 10*a*e^(-6*x) - 5*a*e^(-8*x) + a*e^(-10*x) - a)
```

Fricas [B] Leaf count of result is larger than twice the leaf count of optimal. 216 vs. $2(25) = 50$.
time = 0.36, size = 216, normalized size = 7.45

$$\frac{16\,\left(11\,\cosh\left(x\right)^{2}+18\,\cosh\left(x\right)\sinh\left(x\right)+11\,\sinh\left(x\right)^{2}-5\right)}{15\,\left(a\cosh\left(x\right)^{8}+8\,a\cosh\left(x\right)\sinh\left(x\right)^{7}+a\sinh\left(x\right)^{8}-5\,a\cosh\left(x\right)^{6}+\left(28\,a\cosh\left(x\right)^{2}-5\,a\right)\sinh\left(x\right)^{6}+2\,\left(28\,a\cosh\left(x\right)^{3}-15\,a\cosh\left(x\right)\right)\sinh\left(x\right)^{5}+10\,a\cosh\left(x\right)^{4}+5\,\left(14\,a\cosh\left(x\right)^{4}-15\,a\cosh\left(x\right)^{2}+2\,a\right)\sinh\left(x\right)^{4}+4\,\left(14\,a\cosh\left(x\right)^{5}-25\,a\cosh\left(x\right)^{3}+10\,a\cosh\left(x\right)\right)\sinh\left(x\right)^{3}-11\,a\cosh\left(x\right)^{2}+\left(28\,a\cosh\left(x\right)^{6}-75\,a\cosh\left(x\right)^{4}+60\,a\cosh\left(x\right)^{2}-11\,a\right)\sinh\left(x\right)^{2}+2\,\left(4\,a\cosh\left(x\right)^{7}-15\,a\cosh\left(x\right)^{5}+20\,a\cosh\left(x\right)^{3}-9\,a\cosh\left(x\right)\right)\sinh\left(x\right)+5\,a\right)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(csch(x)^4/(a-a*cosh(x)^2),x, algorithm="fricas")
```

```
[Out] 16/15*(11*cosh(x)^2 + 18*cosh(x)*sinh(x) + 11*sinh(x)^2 - 5)/(a*cosh(x)^8 +
 8*a*cosh(x)*sinh(x)^7 + a*sinh(x)^8 - 5*a*cosh(x)^6 + (28*a*cosh(x)^2 - 5*
a)*sinh(x)^6 + 2*(28*a*cosh(x)^3 - 15*a*cosh(x))*sinh(x)^5 + 10*a*cosh(x)^4
 + 5*(14*a*cosh(x)^4 - 15*a*cosh(x)^2 + 2*a)*sinh(x)^4 + 4*(14*a*cosh(x)^5
- 25*a*cosh(x)^3 + 10*a*cosh(x))*sinh(x)^3 - 11*a*cosh(x)^2 + (28*a*cosh(x)
^6 - 75*a*cosh(x)^4 + 60*a*cosh(x)^2 - 11*a)*sinh(x)^2 + 2*(4*a*cosh(x)^7 -
 15*a*cosh(x)^5 + 20*a*cosh(x)^3 - 9*a*cosh(x))*sinh(x) + 5*a)
```

Sympy [F]
time = 0.00, size = 0, normalized size = 0.00

$$-\frac{\int \frac{\operatorname{csch}^4(x)}{\cosh^2(x)-1}\,dx}{a}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(csch(x)**4/(a-a*cosh(x)**2),x)
```

```
[Out] -Integral(csch(x)**4/(cosh(x)**2 - 1), x)/a
```

Giac [A]
time = 0.41, size = 27, normalized size = 0.93

$$\frac{16\left(10\,e^{(4\,x)}-5\,e^{(2\,x)}+1\right)}{15\,a(e^{(2\,x)}-1)^5}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(csch(x)^4/(a-a*cosh(x)^2),x, algorithm="giac")
```

```
[Out] 16/15*(10*e^(4*x) - 5*e^(2*x) + 1)/(a*(e^(2*x) - 1)^5)
```

Mupad [B]
time = 0.92, size = 27, normalized size = 0.93

$$\frac{16\left(10\,e^{4\,x}-5\,e^{2\,x}+1\right)}{15\,a\left(e^{2\,x}-1\right)^5}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(1/(sinh(x)^4*(a - a*cosh(x)^2)),x)
```

```
[Out] (16*(10*exp(4*x) - 5*exp(2*x) + 1))/(15*a*(exp(2*x) - 1)^5)
```

3.6 $\int \frac{\sinh^7(x)}{a+b\cosh^2(x)} \, dx$

Optimal. Leaf size=78

$$-\frac{(a+b)^3\text{ArcTan}\left(\frac{\sqrt{b}\cosh(x)}{\sqrt{a}}\right)}{\sqrt{a}\,b^{7/2}}+\frac{(a^2+3ab+3b^2)\cosh(x)}{b^3}-\frac{(a+3b)\cosh^3(x)}{3b^2}+\frac{\cosh^5(x)}{5b}$$

```
[Out] (a^2+3*a*b+3*b^2)*cosh(x)/b^3-1/3*(a+3*b)*cosh(x)^3/b^2+1/5*cosh(x)^5/b-(a+
b)^3*arctan(cosh(x)*b^(1/2)/a^(1/2))/b^(7/2)/a^(1/2)
```

Rubi [A]
time = 0.08, antiderivative size = 78, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 3, integrand size = 15, $\frac{\text{number of rules}}{\text{integrand size}} = 0.200$, Rules used = {3269, 398, 211}

$$\frac{(a^2+3ab+3b^2)\cosh(x)}{b^3}-\frac{(a+b)^3\text{ArcTan}\left(\frac{\sqrt{b}\cosh(x)}{\sqrt{a}}\right)}{\sqrt{a}\,b^{7/2}}-\frac{(a+3b)\cosh^3(x)}{3b^2}+\frac{\cosh^5(x)}{5b}$$

Antiderivative was successfully verified.

```
[In] Int[Sinh[x]^7/(a + b*Cosh[x]^2),x]
```

```
[Out] -(((a + b)^3*ArcTan[(Sqrt[b]*Cosh[x])/Sqrt[a]])/(Sqrt[a]*b^(7/2))) + ((a^2
+ 3*a*b + 3*b^2)*Cosh[x])/b^3 - ((a + 3*b)*Cosh[x]^3)/(3*b^2) + Cosh[x]^5/(
5*b)
```

Rule 211

```
Int[((a_) + (b_.)*(x_)^2)^(-1), x_Symbol] :> Simp[(Rt[a/b, 2]/a)*ArcTan[x/R
t[a/b, 2]], x] /; FreeQ[{a, b}, x] && PosQ[a/b]
```

Rule 398

```
Int[((a_) + (b_.)*(x_)^(n_))^(p_)*((c_) + (d_.)*(x_)^(n_))^(q_), x_Symbol]
:> Int[PolynomialDivide[(a + b*x^n)^p, (c + d*x^n)^(-q), x], x] /; FreeQ[{a
, b, c, d}, x] && NeQ[b*c - a*d, 0] && IGtQ[n, 0] && IGtQ[p, 0] && ILtQ[q,
0] && GeQ[p, -q]
```

Rule 3269

```
Int[cos[(e_.) + (f_.)*(x_)]^(m_.)*((a_) + (b_.)*sin[(e_.) + (f_.)*(x_)]^2)^
(p_.), x_Symbol] :> With[{ff = FreeFactors[Sin[e + f*x], x]}, Dist[ff/f, Su
bst[Int[(1 - ff^2*x^2)^((m - 1)/2)*(a + b*ff^2*x^2)^p, x], x, Sin[e + f*x]/
ff], x]] /; FreeQ[{a, b, e, f, p}, x] && IntegerQ[(m - 1)/2]
```

Rubi steps

$$\int \frac{\sinh^7(x)}{a+b\cosh^2(x)}\,dx = -\text{Subst}\left(\int \frac{(1-x^2)^3}{a+bx^2}\,dx, x, \cosh(x)\right)$$
$$= -\text{Subst}\left(\int \left(-\frac{a^2+3ab+3b^2}{b^3}+\frac{(a+3b)x^2}{b^2}-\frac{x^4}{b}+\frac{a^3+3a^2b+3ab^2+b^3}{b^3(a+bx^2)}\right) dx, x,$$
$$= \frac{(a^2+3ab+3b^2)\cosh(x)}{b^3}-\frac{(a+3b)\cosh^3(x)}{3b^2}+\frac{\cosh^5(x)}{5b}-\frac{(a+b)^3\text{Subst}\left(\int \frac{1}{a+bx^2}\right.}{b^3}$$
$$= -\frac{(a+b)^3\tan^{-1}\left(\frac{\sqrt{b}\cosh(x)}{\sqrt{a}}\right)}{\sqrt{a}\,b^{7/2}}+\frac{(a^2+3ab+3b^2)\cosh(x)}{b^3}-\frac{(a+3b)\cosh^3(x)}{3b^2}+$$

Mathematica [C] Result contains complex when optimal does not.
time = 0.17, size = 148, normalized size = 1.90

$$-\frac{(a+b)^3\text{ArcTan}\left(\frac{\sqrt{b}-i\sqrt{a+b}\tanh\left(\frac{x}{2}\right)}{\sqrt{a}}\right)}{\sqrt{a}\,b^{7/2}}-\frac{(a+b)^3\text{ArcTan}\left(\frac{\sqrt{b}+i\sqrt{a+b}\tanh\left(\frac{x}{2}\right)}{\sqrt{a}}\right)}{\sqrt{a}\,b^{7/2}}+\frac{(8a^2+22ab+19b^2)\cosh(x)}{8b^3}-\frac{(4a+9b)\cosh(3x)}{48b^2}+\frac{\cosh(5x)}{80b}$$

Antiderivative was successfully verified.

```
[In] Integrate[Sinh[x]^7/(a + b*Cosh[x]^2),x]
```

```
[Out] -(((a + b)^3*ArcTan[(Sqrt[b] - I*Sqrt[a + b]*Tanh[x/2])/Sqrt[a]])/(Sqrt[a]*
b^(7/2))) - ((a + b)^3*ArcTan[(Sqrt[b] + I*Sqrt[a + b]*Tanh[x/2])/Sqrt[a]])
/(Sqrt[a]*b^(7/2)) + ((8*a^2 + 22*a*b + 19*b^2)*Cosh[x])/(8*b^3) - ((4*a +
9*b)*Cosh[3*x])/(48*b^2) + Cosh[5*x]/(80*b)
```

Maple [B] Leaf count of result is larger than twice the leaf count of optimal. 244 vs. 2(66) = 132.
time = 0.66, size = 245, normalized size = 3.14

method	result
default	$-\frac{1}{5b(\tanh(\frac{x}{2})-1)^5}-\frac{1}{2b(\tanh(\frac{x}{2})-1)^4}-\frac{-4a-3b}{12b^2(\tanh(\frac{x}{2})-1)^3}-\frac{-7b-4a}{8b^2(\tanh(\frac{x}{2})-1)^2}-\frac{8a^2+20ab+15b^2}{8b^3(\tanh(\frac{x}{2})-1)}+\frac{1}{5b(\tanh(\frac{x}{2})+1)}$
risch	$\frac{e^{5x}}{160b}-\frac{3\,e^{3x}}{32b}-\frac{e^{3x}a}{24b^2}+\frac{e^{x}a^2}{2b^3}+\frac{11a\,e^{x}}{8b^2}+\frac{19\,e^{x}}{16b}+\frac{e^{-x}a^2}{2b^3}+\frac{11\,e^{-x}a}{8b^2}+\frac{19\,e^{-x}}{16b}-\frac{3\,e^{-3x}}{32b}-\frac{e^{-3x}a}{24b^2}+\frac{e^{-5x}}{160b}-\frac{\ln\left(e^{2x}\right.}{}$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(sinh(x)^7/(a+b*cosh(x)^2),x,method=_RETURNVERBOSE)
```

```
[Out] -1/5/b/(tanh(1/2*x)-1)^5-1/2/b/(tanh(1/2*x)-1)^4-1/12*(-4*a-3*b)/b^2/(tanh(
1/2*x)-1)^3-1/8*(-7*b-4*a)/b^2/(tanh(1/2*x)-1)^2-1/8*(8*a^2+20*a*b+15*b^2)/
b^3/(tanh(1/2*x)-1)+1/5/b/(tanh(1/2*x)+1)^5-1/2/b/(tanh(1/2*x)+1)^4-1/12*(4
*a+3*b)/b^2/(tanh(1/2*x)+1)^3-1/8*(-7*b-4*a)/b^2/(tanh(1/2*x)+1)^2-1/8/b^3*
(-8*a^2-20*a*b-15*b^2)/(tanh(1/2*x)+1)-(a^3+3*a^2*b+3*a*b^2+b^3)/b^3/(a*b)^
(1/2)*arctan(1/4*(2*(a+b)*tanh(1/2*x)^2-2*a+2*b)/(a*b)^(1/2))
```

<u>Maxima</u> [F]
time = 0.00, size = 0, normalized size = 0.00

Failed to integrate

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(sinh(x)^7/(a+b*cosh(x)^2),x, algorithm="maxima")
```

```
[Out] 1/480*(3*b^2*e^(10*x) + 3*b^2 - 5*(4*a*b + 9*b^2)*e^(8*x) + 30*(8*a^2 + 22*
a*b + 19*b^2)*e^(6*x) + 30*(8*a^2 + 22*a*b + 19*b^2)*e^(4*x) - 5*(4*a*b + 9
*b^2)*e^(2*x))*e^(-5*x)/b^3 - 1/128*integrate(256*((a^3 + 3*a^2*b + 3*a*b^2
 + b^3)*e^(3*x) - (a^3 + 3*a^2*b + 3*a*b^2 + b^3)*e^x)/(b^4*e^(4*x) + b^4 +
 2*(2*a*b^3 + b^4)*e^(2*x)), x)
```

<u>Fricas</u> [B] Leaf count of result is larger than twice the leaf count of optimal. 1199 vs. 2(66) = 132.
time = 0.42, size = 2346, normalized size = 30.08

Too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(sinh(x)^7/(a+b*cosh(x)^2),x, algorithm="fricas")
```

```
[Out] [1/480*(3*a*b^3*cosh(x)^10 + 30*a*b^3*cosh(x)*sinh(x)^9 + 3*a*b^3*sinh(x)^1
0 - 5*(4*a^2*b^2 + 9*a*b^3)*cosh(x)^8 + 5*(27*a*b^3*cosh(x)^2 - 4*a^2*b^2 -
 9*a*b^3)*sinh(x)^8 + 40*(9*a*b^3*cosh(x)^3 - (4*a^2*b^2 + 9*a*b^3)*cosh(x)
)*sinh(x)^7 + 30*(8*a^3*b + 22*a^2*b^2 + 19*a*b^3)*cosh(x)^6 + 10*(63*a*b^3
*cosh(x)^4 + 24*a^3*b + 66*a^2*b^2 + 57*a*b^3 - 14*(4*a^2*b^2 + 9*a*b^3)*co
sh(x)^2)*sinh(x)^6 + 4*(189*a*b^3*cosh(x)^5 - 70*(4*a^2*b^2 + 9*a*b^3)*cosh
(x)^3 + 45*(8*a^3*b + 22*a^2*b^2 + 19*a*b^3)*cosh(x))*sinh(x)^5 + 30*(8*a^3
*b + 22*a^2*b^2 + 19*a*b^3)*cosh(x)^4 + 10*(63*a*b^3*cosh(x)^6 - 35*(4*a^2*
b^2 + 9*a*b^3)*cosh(x)^4 + 24*a^3*b + 66*a^2*b^2 + 57*a*b^3 + 45*(8*a^3*b +
 22*a^2*b^2 + 19*a*b^3)*cosh(x)^2)*sinh(x)^4 + 3*a*b^3 + 40*(9*a*b^3*cosh(x
)^7 - 7*(4*a^2*b^2 + 9*a*b^3)*cosh(x)^5 + 15*(8*a^3*b + 22*a^2*b^2 + 19*a*b
^3)*cosh(x)^3 + 3*(8*a^3*b + 22*a^2*b^2 + 19*a*b^3)*cosh(x))*sinh(x)^3 - 5*
(4*a^2*b^2 + 9*a*b^3)*cosh(x)^2 + 5*(27*a*b^3*cosh(x)^8 - 28*(4*a^2*b^2 + 9
*a*b^3)*cosh(x)^6 + 90*(8*a^3*b + 22*a^2*b^2 + 19*a*b^3)*cosh(x)^4 - 4*a^2*
b^2 - 9*a*b^3 + 36*(8*a^3*b + 22*a^2*b^2 + 19*a*b^3)*cosh(x)^2)*sinh(x)^2 -
 240*((a^3 + 3*a^2*b + 3*a*b^2 + b^3)*cosh(x)^5 + 5*(a^3 + 3*a^2*b + 3*a*b^
```

```
2 + b^3)*cosh(x)^4*sinh(x) + 10*(a^3 + 3*a^2*b + 3*a*b^2 + b^3)*cosh(x)^3*s
inh(x)^2 + 10*(a^3 + 3*a^2*b + 3*a*b^2 + b^3)*cosh(x)^2*sinh(x)^3 + 5*(a^3
+ 3*a^2*b + 3*a*b^2 + b^3)*cosh(x)*sinh(x)^4 + (a^3 + 3*a^2*b + 3*a*b^2 + b
^3)*sinh(x)^5)*sqrt(-a*b)*log((b*cosh(x)^4 + 4*b*cosh(x)*sinh(x)^3 + b*sinh
(x)^4 - 2*(2*a - b)*cosh(x)^2 + 2*(3*b*cosh(x)^2 - 2*a + b)*sinh(x)^2 + 4*(
b*cosh(x)^3 - (2*a - b)*cosh(x))*sinh(x) + 4*(cosh(x)^3 + 3*cosh(x)*sinh(x)
^2 + sinh(x)^3 + (3*cosh(x)^2 + 1)*sinh(x) + cosh(x))*sqrt(-a*b) + b)/(b*co
sh(x)^4 + 4*b*cosh(x)*sinh(x)^3 + b*sinh(x)^4 + 2*(2*a + b)*cosh(x)^2 + 2*(
3*b*cosh(x)^2 + 2*a + b)*sinh(x)^2 + 4*(b*cosh(x)^3 + (2*a + b)*cosh(x))*si
nh(x) + b)) + 10*(3*a*b^3*cosh(x)^9 - 4*(4*a^2*b^2 + 9*a*b^3)*cosh(x)^7 + 1
8*(8*a^3*b + 22*a^2*b^2 + 19*a*b^3)*cosh(x)^5 + 12*(8*a^3*b + 22*a^2*b^2 +
19*a*b^3)*cosh(x)^3 - (4*a^2*b^2 + 9*a*b^3)*cosh(x))*sinh(x))/(a*b^4*cosh(x
)^5 + 5*a*b^4*cosh(x)^4*sinh(x) + 10*a*b^4*cosh(x)^3*sinh(x)^2 + 10*a*b^4*c
osh(x)^2*sinh(x)^3 + 5*a*b^4*cosh(x)*sinh(x)^4 + a*b^4*sinh(x)^5), 1/480*(3
*a*b^3*cosh(x)^10 + 30*a*b^3*cosh(x)*sinh(x)^9 + 3*a*b^3*sinh(x)^10 - 5*(4*
a^2*b^2 + 9*a*b^3)*cosh(x)^8 + 5*(27*a*b^3*cosh(x)^2 - 4*a^2*b^2 - 9*a*b^3)
*sinh(x)^8 + 40*(9*a*b^3*cosh(x)^3 - (4*a^2*b^2 + 9*a*b^3)*cosh(x))*sinh(x)
^7 + 30*(8*a^3*b + 22*a^2*b^2 + 19*a*b^3)*cosh(x)^6 + 10*(63*a*b^3*cosh(x)^
4 + 24*a^3*b + 66*a^2*b^2 + 57*a*b^3 - 14*(4*a^2*b^2 + 9*a*b^3)*cosh(x)^2)*
sinh(x)^6 + 4*(189*a*b^3*cosh(x)^5 - 70*(4*a^2*b^2 + 9*a*b^3)*cosh(x)^3 + 4
5*(8*a^3*b + 22*a^2*b^2 + 19*a*b^3)*cosh(x))*sinh(x)^5 + 30*(8*a^3*b + 22*a
^2*b^2 + 19*a*b^3)*cosh(x)^4 + 10*(63*a*b^3*cosh(x)^6 - 35*(4*a^2*b^2 + 9*a
*b^3)*cosh(x)^4 + 24*a^3*b + 66*a^2*b^2 + 57*a*b^3 + 45*(8*a^3*b + 22*a^2*b
^2 + 19*a*b^3)*cosh(x)^2)*sinh(x)^4 + 3*a*b^3 + 40*(9*a*b^3*cosh(x)^7 - 7*(
4*a^2*b^2 + 9*a*b^3)*cosh(x)^5 + 15*(8*a^3*b + 22*a^2*b^2 + 19*a*b^3)*cosh(
x)^3 + 3*(8*a^3*b + 22*a^2*b^2 + 19*a*b^3)*cosh(x))*sinh(x)^3 - 5*(4*a^2*b^
2 + 9*a*b^3)*cosh(x)^2 + 5*(27*a*b^3*cosh(x)^8 - 28*(4*a^2*b^2 + 9*a*b^3)*c
osh(x)^6 + 90*(8*a^3*b + 22*a^2*b^2 + 19*a*b^3)*cosh(x)^4 - 4*a^2*b^2 - 9*a
*b^3 + 36*(8*a^3*b + 22*a^2*b^2 + 19*a*b^3)*cosh(x)^2)*sinh(x)^2 - 480*((a^
3 + 3*a^2*b + 3*a*b^2 + b^3)*cosh(x)^5 + 5*(a^3 + 3*a^2*b + 3*a*b^2 + b^3)*
cosh(x)^4*sinh(x) + 10*(a^3 + 3*a^2*b + 3*a*b^2 + b^3)*cosh(x)^3*sinh(x)^2
+ 10*(a^3 + 3*a^2*b + 3*a*b^2 + b^3)*cosh(x)^2*sinh(x)^3 + 5*(a^3 + 3*a^2*b
 + 3*a*b^2 + b^3)*cosh(x)*sinh(x)^4 + (a^3 + 3*a^2*b + 3*a*b^2 + b^3)*sinh(
x)^5)*sqrt(a*b)*arctan(1/2*sqrt(a*b)*(cosh(x) + sinh(x))/a) + 480*((a^3 + 3
*a^2*b + 3*a*b^2 + b^3)*cosh(x)^5 + 5*(a^3 + 3*a^2*b + 3*a*b^2 + b^3)*cosh(
x)^4*sinh(x) + 10*(a^3 + 3*a^2*b + 3*a*b^2 + b^3)*cosh(x)^3*sinh(x)^2 + 10*
(a^3 + 3*a^2*b + 3*a*b^2 + b^3)*cosh(x)^2*sinh(x)^3 + 5*(a^3 + 3*a^2*b + 3*
a*b^2 + b^3)*cosh(x)*sinh(x)^4 + (a^3 + 3*a^2*b + 3*a*b^2 + b^3)*sinh(x)^5)
*sqrt(a*b)*arctan(1/2*(b*cosh(x)^3 + 3*b*cosh(x)*sinh(x)^2 + b*sinh(x)^3 +
(4*a + b)*cosh(x) + (3*b*cosh(x)^2 + 4*a + b)*sinh(x))*sqrt(a*b)/(a*b)) + 1
0*(3*a*b^3*cosh(x)^9 - 4*(4*a^2*b^2 + 9*a*b^3)*cosh(x)^7 + 18*(8*a^3*b + 22
*a^2*b^2 + 19*a*b^3)*cosh(x)^5 + 12*(8*a^3*b + 22*a^2*b^2 + 19*a*b^3)*cosh(
x)^3 - (4*a^2*b^2 + 9*a*b^3)*cosh(x))*sinh(x))/(a*b^4*cosh(x)^5 + 5*a*b^4*c
osh(x)^4*sinh(x) + 10*a*b^4*cosh(x)^3*sinh(x)^2 + 10*a*b^4*cosh(x)^2*sinh(x
)^3 + 5*a*b^4*cosh(x)*sinh(x)^4 + a*b^4*sinh(x)^5)]
```

Sympy [F(-1)] Timed out
time = 0.00, size = 0, normalized size = 0.00

Timed out

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(sinh(x)**7/(a+b*cosh(x)**2),x)
```

```
[Out] Timed out
```

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(sinh(x)^7/(a+b*cosh(x)^2),x, algorithm="giac")
```

```
[Out] Exception raised: TypeError >> An error occurred running a Giac command:INP
UT:sage2:=int(sage0,sageVARx):;OUTPUT:Warning, need to choose a branch for
the root of a polynomial with parameters. This might be wrong.The choice wa
s done
```

Mupad [B]
time = 1.55, size = 805, normalized size = 10.32

$$\frac{e^{-5x}}{160b}+\frac{e^{5x}}{160b}+\frac{e^{-x}\left(8a^2+22ab+19b^2\right)}{16b^3}-\frac{[illegible]}{2\sqrt{a\,b^7}}-\frac{e^{-3x}\left(4a+9b\right)}{96b^2}-\frac{e^{3x}\left(4a+9b\right)}{96b^2}+\frac{e^{x}\left(8a^2+22ab+19b^2\right)}{16b^3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(sinh(x)^7/(a + b*cosh(x)^2),x)
```

```
[Out] exp(-5*x)/(160*b) + exp(5*x)/(160*b) + (exp(-x)*(22*a*b + 8*a^2 + 19*b^2))/
(16*b^3) - ((2*atan((exp(x)*(a + b)^3*(a*b^7)^(1/2))/(2*a*b^3*((a + b)^6)^(
1/2))) - 2*atan((2*exp(3*x)*(a^7*(a*b^7)^(1/2) + b^7*(a*b^7)^(1/2) + 7*a*b^
6*(a*b^7)^(1/2) + 7*a^6*b*(a*b^7)^(1/2) + 21*a^2*b^5*(a*b^7)^(1/2) + 35*a^3
*b^4*(a*b^7)^(1/2) + 35*a^4*b^3*(a*b^7)^(1/2) + 21*a^5*b^2*(a*b^7)^(1/2)))/
(a*b^3*((a + b)^6)^(1/2)*(16*a*b^3 + 16*a^3*b + 4*a^4 + 4*b^4 + 24*a^2*b^2)
) + (a*b^8*exp(x)*(a*b^7)^(1/2)*((4*(2*a*b^7*(6*a*b^5 + 6*a^5*b + a^6 + b^6
 + 15*a^2*b^4 + 20*a^3*b^3 + 15*a^4*b^2)^(1/2) + 8*a^2*b^6*(6*a*b^5 + 6*a^5
*b + a^6 + b^6 + 15*a^2*b^4 + 20*a^3*b^3 + 15*a^4*b^2)^(1/2) + 12*a^3*b^5*(
6*a*b^5 + 6*a^5*b + a^6 + b^6 + 15*a^2*b^4 + 20*a^3*b^3 + 15*a^4*b^2)^(1/2)
 + 8*a^4*b^4*(6*a*b^5 + 6*a^5*b + a^6 + b^6 + 15*a^2*b^4 + 20*a^3*b^3 + 15*
a^4*b^2)^(1/2) + 2*a^5*b^3*(6*a*b^5 + 6*a^5*b + a^6 + b^6 + 15*a^2*b^4 + 20
*a^3*b^3 + 15*a^4*b^2)^(1/2)))/(a^2*b^15*(a + b)^3) + (2*(a^7*(a*b^7)^(1/2)
 + b^7*(a*b^7)^(1/2) + 7*a*b^6*(a*b^7)^(1/2) + 7*a^6*b*(a*b^7)^(1/2) + 21*a
```

```
^2*b^5*(a*b^7)^(1/2) + 35*a^3*b^4*(a*b^7)^(1/2) + 35*a^4*b^3*(a*b^7)^(1/2)
+ 21*a^5*b^2*(a*b^7)^(1/2)))/(a^2*b^11*(a*b^7)^(1/2)*((a + b)^6)^(1/2))))/(
16*a*b^3 + 16*a^3*b + 4*a^4 + 4*b^4 + 24*a^2*b^2)))*(6*a*b^5 + 6*a^5*b + a^
6 + b^6 + 15*a^2*b^4 + 20*a^3*b^3 + 15*a^4*b^2)^(1/2))/(2*(a*b^7)^(1/2)) -
(exp(-3*x)*(4*a + 9*b))/(96*b^2) - (exp(3*x)*(4*a + 9*b))/(96*b^2) + (exp(x
)*(22*a*b + 8*a^2 + 19*b^2))/(16*b^3)
```

3.7 $\int \frac{\sinh^5(x)}{a+b\cosh^2(x)}\,dx$

Optimal. Leaf size=54

$$\frac{(a+b)^2\operatorname{ArcTan}\left(\frac{\sqrt{b}\,\cosh(x)}{\sqrt{a}}\right)}{\sqrt{a}\,b^{5/2}}-\frac{(a+2b)\cosh(x)}{b^2}+\frac{\cosh^3(x)}{3b}$$

```
[Out] -(a+2*b)*cosh(x)/b^2+1/3*cosh(x)^3/b+(a+b)^2*arctan(cosh(x)*b^(1/2)/a^(1/2)
)/b^(5/2)/a^(1/2)
```

Rubi [A]

time = 0.06, antiderivative size = 54, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 3, integrand size = 15, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.200, Rules used = {3269, 398, 211}

$$\frac{(a+b)^2\operatorname{ArcTan}\left(\frac{\sqrt{b}\,\cosh(x)}{\sqrt{a}}\right)}{\sqrt{a}\,b^{5/2}}-\frac{(a+2b)\cosh(x)}{b^2}+\frac{\cosh^3(x)}{3b}$$

Antiderivative was successfully verified.

```
[In] Int[Sinh[x]^5/(a + b*Cosh[x]^2),x]
```

```
[Out] ((a + b)^2*ArcTan[(Sqrt[b]*Cosh[x])/Sqrt[a]])/(Sqrt[a]*b^(5/2)) - ((a + 2*b
)*Cosh[x])/b^2 + Cosh[x]^3/(3*b)
```

Rule 211

```
Int[((a_) + (b_.)*(x_)^2)^(-1), x_Symbol] :> Simp[(Rt[a/b, 2]/a)*ArcTan[x/R
t[a/b, 2]], x] /; FreeQ[{a, b}, x] && PosQ[a/b]
```

Rule 398

```
Int[((a_) + (b_.)*(x_)^(n_))^(p_)*((c_) + (d_.)*(x_)^(n_))^(q_), x_Symbol]
:> Int[PolynomialDivide[(a + b*x^n)^p, (c + d*x^n)^(-q), x], x] /; FreeQ[{a
, b, c, d}, x] && NeQ[b*c - a*d, 0] && IGtQ[n, 0] && IGtQ[p, 0] && ILtQ[q,
0] && GeQ[p, -q]
```

Rule 3269

```
Int[cos[(e_.) + (f_.)*(x_)]^(m_.)*((a_) + (b_.)*sin[(e_.) + (f_.)*(x_)]^2)^
(p_.), x_Symbol] :> With[{ff = FreeFactors[Sin[e + f*x], x]}, Dist[ff/f, Su
bst[Int[(1 - ff^2*x^2)^((m - 1)/2)*(a + b*ff^2*x^2)^p, x], x, Sin[e + f*x]/
ff], x]] /; FreeQ[{a, b, e, f, p}, x] && IntegerQ[(m - 1)/2]
```

Rubi steps

$$\int \frac{\sinh^5(x)}{a+b\cosh^2(x)}\,dx = \text{Subst}\left(\int \frac{(1-x^2)^2}{a+bx^2}\,dx, x, \cosh(x)\right)$$
$$= \text{Subst}\left(\int \left(-\frac{a+2b}{b^2}+\frac{x^2}{b}+\frac{a^2+2ab+b^2}{b^2(a+bx^2)}\right)dx, x, \cosh(x)\right)$$
$$= -\frac{(a+2b)\cosh(x)}{b^2}+\frac{\cosh^3(x)}{3b}+\frac{(a+b)^2\text{Subst}\left(\int \frac{1}{a+bx^2}\,dx, x, \cosh(x)\right)}{b^2}$$
$$= \frac{(a+b)^2\tan^{-1}\left(\frac{\sqrt{b}\cosh(x)}{\sqrt{a}}\right)}{\sqrt{a}\,b^{5/2}}-\frac{(a+2b)\cosh(x)}{b^2}+\frac{\cosh^3(x)}{3b}$$

Mathematica [C] Result contains complex when optimal does not.
time = 0.13, size = 120, normalized size = 2.22

$$\frac{\frac{12(a+b)^2\text{ArcTan}\left(\frac{\sqrt{b}-i\sqrt{a+b}\tanh\left(\frac{x}{2}\right)}{\sqrt{a}}\right)}{\sqrt{a}}+\frac{12(a+b)^2\text{ArcTan}\left(\frac{\sqrt{b}+i\sqrt{a+b}\tanh\left(\frac{x}{2}\right)}{\sqrt{a}}\right)}{\sqrt{a}}-3\sqrt{b}\,(4a+7b)\cosh(x)+b^{3/2}\cosh(3x)}{12b^{5/2}}$$

Antiderivative was successfully verified.

```
[In] Integrate[Sinh[x]^5/(a + b*Cosh[x]^2),x]
```

```
[Out] ((12*(a + b)^2*ArcTan[(Sqrt[b] - I*Sqrt[a + b]*Tanh[x/2])/Sqrt[a]])/Sqrt[a]
 + (12*(a + b)^2*ArcTan[(Sqrt[b] + I*Sqrt[a + b]*Tanh[x/2])/Sqrt[a]])/Sqrt[
a] - 3*Sqrt[b]*(4*a + 7*b)*Cosh[x] + b^(3/2)*Cosh[3*x])/(12*b^(5/2))
```

Maple [B] Leaf count of result is larger than twice the leaf count of optimal. 139 vs. 2(44) = 88.
time = 0.65, size = 140, normalized size = 2.59

method	result
default	$-\frac{1}{3b\left(\tanh\left(\frac{x}{2}\right)-1\right)^3}-\frac{1}{2b\left(\tanh\left(\frac{x}{2}\right)-1\right)^2}-\frac{-2a-3b}{2b^2\left(\tanh\left(\frac{x}{2}\right)-1\right)}+\frac{\left(a^2+2ab+b^2\right)\arctan\left(\frac{2(a+b)\left(\tanh^2\left(\frac{x}{2}\right)\right)-2a+2b}{4\sqrt{ab}}\right)}{b^2\sqrt{ab}}+\frac{1}{3b(\tanh($
risch	$\frac{e^{3x}}{24b}-\frac{7\,e^{x}}{8b}-\frac{a\,e^{x}}{2b^2}-\frac{7\,e^{-x}}{8b}-\frac{e^{-x}a}{2b^2}+\frac{e^{-3x}}{24b}-\frac{\ln\left(e^{2x}-\frac{2a\,e^{x}}{\sqrt{-ab}}+1\right)a^2}{2\sqrt{-ab}\,b^2}-\frac{\ln\left(e^{2x}-\frac{2a\,e^{x}}{\sqrt{-ab}}+1\right)a}{\sqrt{-ab}\,b}-\frac{\ln\left(e^{2x}-\frac{2a\,e}{\sqrt{-}}\right.}{2\sqrt{-a}}$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(sinh(x)^5/(a+b*cosh(x)^2),x,method=_RETURNVERBOSE)
```

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

```
2*a+2*b)/(a*b)^(1/2))+1/3/b/(tanh(1/2*x)+1)^3-1/2/b/(tanh(1/2*x)+1)^2-1/2*(
2*a+3*b)/b^2/(tanh(1/2*x)+1)
```

Maxima [F]
time = 0.00, size = 0, normalized size = 0.00

Failed to integrate

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(sinh(x)^5/(a+b*cosh(x)^2),x, algorithm="maxima")
```

```
[Out] 1/24*(b*e^(6*x) - 3*(4*a + 7*b)*e^(4*x) - 3*(4*a + 7*b)*e^(2*x) + b)*e^(-3*
x)/b^2 + 1/32*integrate(64*((a^2 + 2*a*b + b^2)*e^(3*x) - (a^2 + 2*a*b + b^
2)*e^x)/(b^3*e^(4*x) + b^3 + 2*(2*a*b^2 + b^3)*e^(2*x)), x)
```

Fricas [B] Leaf count of result is larger than twice the leaf count of optimal. 513 vs. $2(44) = 88$.
time = 0.40, size = 1064, normalized size = 19.70

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(sinh(x)^5/(a+b*cosh(x)^2),x, algorithm="fricas")
```

```
[Out] [1/24*(a*b^2*cosh(x)^6 + 6*a*b^2*cosh(x)*sinh(x)^5 + a*b^2*sinh(x)^6 - 3*(4
*a^2*b + 7*a*b^2)*cosh(x)^4 + 3*(5*a*b^2*cosh(x)^2 - 4*a^2*b - 7*a*b^2)*sin
h(x)^4 + 4*(5*a*b^2*cosh(x)^3 - 3*(4*a^2*b + 7*a*b^2)*cosh(x))*sinh(x)^3 +
a*b^2 - 3*(4*a^2*b + 7*a*b^2)*cosh(x)^2 + 3*(5*a*b^2*cosh(x)^4 - 4*a^2*b -
7*a*b^2 - 6*(4*a^2*b + 7*a*b^2)*cosh(x)^2)*sinh(x)^2 - 12*((a^2 + 2*a*b + b
^2)*cosh(x)^3 + 3*(a^2 + 2*a*b + b^2)*cosh(x)^2*sinh(x) + 3*(a^2 + 2*a*b +
b^2)*cosh(x)*sinh(x)^2 + (a^2 + 2*a*b + b^2)*sinh(x)^3)*sqrt(-a*b)*log((b*c
osh(x)^4 + 4*b*cosh(x)*sinh(x)^3 + b*sinh(x)^4 - 2*(2*a - b)*cosh(x)^2 + 2*
(3*b*cosh(x)^2 - 2*a + b)*sinh(x)^2 + 4*(b*cosh(x)^3 - (2*a - b)*cosh(x))*s
inh(x) - 4*(cosh(x)^3 + 3*cosh(x)*sinh(x)^2 + sinh(x)^3 + (3*cosh(x)^2 + 1)
*sinh(x) + cosh(x))*sqrt(-a*b) + b)/(b*cosh(x)^4 + 4*b*cosh(x)*sinh(x)^3 +
b*sinh(x)^4 + 2*(2*a + b)*cosh(x)^2 + 2*(3*b*cosh(x)^2 + 2*a + b)*sinh(x)^2
 + 4*(b*cosh(x)^3 + (2*a + b)*cosh(x))*sinh(x) + b)) + 6*(a*b^2*cosh(x)^5 -
 2*(4*a^2*b + 7*a*b^2)*cosh(x)^3 - (4*a^2*b + 7*a*b^2)*cosh(x))*sinh(x))/(a
*b^3*cosh(x)^3 + 3*a*b^3*cosh(x)^2*sinh(x) + 3*a*b^3*cosh(x)*sinh(x)^2 + a*
b^3*sinh(x)^3), 1/24*(a*b^2*cosh(x)^6 + 6*a*b^2*cosh(x)*sinh(x)^5 + a*b^2*s
inh(x)^6 - 3*(4*a^2*b + 7*a*b^2)*cosh(x)^4 + 3*(5*a*b^2*cosh(x)^2 - 4*a^2*b
 - 7*a*b^2)*sinh(x)^4 + 4*(5*a*b^2*cosh(x)^3 - 3*(4*a^2*b + 7*a*b^2)*cosh(x
))*sinh(x)^3 + a*b^2 - 3*(4*a^2*b + 7*a*b^2)*cosh(x)^2 + 3*(5*a*b^2*cosh(x)
^4 - 4*a^2*b - 7*a*b^2 - 6*(4*a^2*b + 7*a*b^2)*cosh(x)^2)*sinh(x)^2 + 24*((
a^2 + 2*a*b + b^2)*cosh(x)^3 + 3*(a^2 + 2*a*b + b^2)*cosh(x)^2*sinh(x) + 3*
(a^2 + 2*a*b + b^2)*cosh(x)*sinh(x)^2 + (a^2 + 2*a*b + b^2)*sinh(x)^3)*sqrt
```

```
(a*b)*arctan(1/2*sqrt(a*b)*(cosh(x) + sinh(x))/a) - 24*((a^2 + 2*a*b + b^2)
*cosh(x)^3 + 3*(a^2 + 2*a*b + b^2)*cosh(x)^2*sinh(x) + 3*(a^2 + 2*a*b + b^2
)*cosh(x)*sinh(x)^2 + (a^2 + 2*a*b + b^2)*sinh(x)^3)*sqrt(a*b)*arctan(1/2*(
b*cosh(x)^3 + 3*b*cosh(x)*sinh(x)^2 + b*sinh(x)^3 + (4*a + b)*cosh(x) + (3*
b*cosh(x)^2 + 4*a + b)*sinh(x))*sqrt(a*b)/(a*b)) + 6*(a*b^2*cosh(x)^5 - 2*(
4*a^2*b + 7*a*b^2)*cosh(x)^3 - (4*a^2*b + 7*a*b^2)*cosh(x))*sinh(x))/(a*b^3
*cosh(x)^3 + 3*a*b^3*cosh(x)^2*sinh(x) + 3*a*b^3*cosh(x)*sinh(x)^2 + a*b^3*
sinh(x)^3)]
```

Sympy [**F(-1)**] Timed out
time = 0.00, size = 0, normalized size = 0.00

Timed out

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(sinh(x)**5/(a+b*cosh(x)**2),x)
```

```
[Out] Timed out
```

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(sinh(x)^5/(a+b*cosh(x)^2),x, algorithm="giac")
```

```
[Out] Exception raised: TypeError >> An error occurred running a Giac command:INP
UT:sage2:=int(sage0,sageVARx):;OUTPUT:Warning, need to choose a branch for
the root of a polynomial with parameters. This might be wrong.The choice wa
s done
```

Mupad [**B**]
time = 1.30, size = 548, normalized size = 10.15

$$\frac{e^{-3x}}{24b}+\frac{e^{3x}}{24b}-\frac{e^{-x}(4a+7b)}{8b^2}+\frac{\left(2\,\mathrm{atan}\left(\frac{e^x(a+b)^2\sqrt{ab^5}}{2ab^2\sqrt{(a+b)^4}}\right)-2\,\mathrm{atan}\left(\frac{ab^6e^x\left(\frac{4\left(6a^2b^4\sqrt{a^4+4a^3b+6a^2b^2+4ab^3+b^4}+6a^3b^3\sqrt{a^4+4a^3b+6a^2b^2+4ab^3+b^4}+2a^4b^2\sqrt{a^4+4a^3b+6a^2b^2+4ab^3+b^4}+2ab^5\sqrt{a^4+4a^3b+6a^2b^2+4ab^3+b^4}\right)}{a^2b^{11}(a+b)^2}+\frac{2\left(a^5\sqrt{ab^5}+b^5\sqrt{ab^5}+5ab^4\sqrt{ab^5}+5a^4b\sqrt{ab^5}+10a^2b^3\sqrt{ab^5}+10a^3b^2\sqrt{ab^5}\right)}{a^2b^8\sqrt{ab^5}\sqrt{(a+b)^4}}\right)\sqrt{ab^5}}{4a^3+12a^2b+12ab^2+4b^3}+\frac{2e^{3x}\left(a^5\sqrt{ab^5}+b^5\sqrt{ab^5}+5ab^4\sqrt{ab^5}+5a^4b\sqrt{ab^5}+10a^2b^3\sqrt{ab^5}+10a^3b^2\sqrt{ab^5}\right)}{ab^2\sqrt{(a+b)^4}\,(4a^3+12a^2b+12ab^2+4b^3)}\right)\right)\sqrt{a^4+4a^3b+6a^2b^2+4ab^3+b^4}}{2\sqrt{ab^5}}-\frac{e^x(4a+7b)}{8b^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(sinh(x)^5/(a + b*cosh(x)^2),x)
```

```
[Out] exp(-3*x)/(24*b) + exp(3*x)/(24*b) - (exp(-x)*(4*a + 7*b))/(8*b^2) + ((2*at
an((exp(x)*(a + b)^2*(a*b^5)^(1/2))/(2*a*b^2*((a + b)^4)^(1/2))) - 2*atan((
a*b^6*exp(x)*((4*(6*a^2*b^4*(4*a*b^3 + 4*a^3*b + a^4 + b^4 + 6*a^2*b^2)^(1/
2) + 6*a^3*b^3*(4*a*b^3 + 4*a^3*b + a^4 + b^4 + 6*a^2*b^2)^(1/2) + 2*a^4*b^
2*(4*a*b^3 + 4*a^3*b + a^4 + b^4 + 6*a^2*b^2)^(1/2) + 2*a*b^5*(4*a*b^3 + 4*
```

```
a^3*b + a^4 + b^4 + 6*a^2*b^2)^(1/2)))/(a^2*b^11*(a + b)^2) + (2*(a^5*(a*b^
5)^(1/2) + b^5*(a*b^5)^(1/2) + 5*a*b^4*(a*b^5)^(1/2) + 5*a^4*b*(a*b^5)^(1/2
) + 10*a^2*b^3*(a*b^5)^(1/2) + 10*a^3*b^2*(a*b^5)^(1/2)))/(a^2*b^8*(a*b^5)^
(1/2)*((a + b)^4)^(1/2)))*(a*b^5)^(1/2))/(12*a*b^2 + 12*a^2*b + 4*a^3 + 4*b
^3) + (2*exp(3*x)*(a^5*(a*b^5)^(1/2) + b^5*(a*b^5)^(1/2) + 5*a*b^4*(a*b^5)^
(1/2) + 5*a^4*b*(a*b^5)^(1/2) + 10*a^2*b^3*(a*b^5)^(1/2) + 10*a^3*b^2*(a*b^
5)^(1/2)))/(a*b^2*((a + b)^4)^(1/2)*(12*a*b^2 + 12*a^2*b + 4*a^3 + 4*b^3)))
)*(4*a*b^3 + 4*a^3*b + a^4 + b^4 + 6*a^2*b^2)^(1/2))/(2*(a*b^5)^(1/2)) - (e
xp(x)*(4*a + 7*b))/(8*b^2)
```

3.8 $\int \frac{\sinh^3(x)}{a+b\cosh^2(x)}\,dx$

Optimal. Leaf size=36

$$-\frac{(a+b)\text{ArcTan}\left(\frac{\sqrt{b}\cosh(x)}{\sqrt{a}}\right)}{\sqrt{a}\,b^{3/2}}+\frac{\cosh(x)}{b}$$

```
[Out] cosh(x)/b-(a+b)*arctan(cosh(x)*b^(1/2)/a^(1/2))/b^(3/2)/a^(1/2)
```

Rubi [A]
time = 0.05, antiderivative size = 36, normalized size of antiderivative = 1.00, number of steps used = 3, number of rules used = 3, integrand size = 15, $\frac{\text{number of rules}}{\text{integrand size}} = 0.200$, Rules used = {3269, 396, 211}

$$\frac{\cosh(x)}{b}-\frac{(a+b)\text{ArcTan}\left(\frac{\sqrt{b}\cosh(x)}{\sqrt{a}}\right)}{\sqrt{a}\,b^{3/2}}$$

Antiderivative was successfully verified.

```
[In] Int[Sinh[x]^3/(a + b*Cosh[x]^2),x]
```

```
[Out] -(((a + b)*ArcTan[(Sqrt[b]*Cosh[x])/Sqrt[a]])/(Sqrt[a]*b^(3/2))) + Cosh[x]/
b
```

Rule 211

```
Int[((a_) + (b_.)*(x_)^2)^(-1), x_Symbol] :> Simp[(Rt[a/b, 2]/a)*ArcTan[x/R
t[a/b, 2]], x] /; FreeQ[{a, b}, x] && PosQ[a/b]
```

Rule 396

```
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 3269

```
Int[cos[(e_.) + (f_.)*(x_)]^(m_.)*((a_) + (b_.)*sin[(e_.) + (f_.)*(x_)]^2)^
(p_.), x_Symbol] :> With[{ff = FreeFactors[Sin[e + f*x], x]}, Dist[ff/f, Su
bst[Int[(1 - ff^2*x^2)^((m - 1)/2)*(a + b*ff^2*x^2)^p, x], x, Sin[e + f*x]/
ff], x]] /; FreeQ[{a, b, e, f, p}, x] && IntegerQ[(m - 1)/2]
```

Rubi steps

$$\int \frac{\sinh^3(x)}{a+b\cosh^2(x)}\,dx = -\text{Subst}\left(\int \frac{1-x^2}{a+bx^2}\,dx, x, \cosh(x)\right)$$
$$= \frac{\cosh(x)}{b} - \frac{(a+b)\text{Subst}\left(\int \frac{1}{a+bx^2}\,dx, x, \cosh(x)\right)}{b}$$
$$= -\frac{(a+b)\tan^{-1}\left(\frac{\sqrt{b}\cosh(x)}{\sqrt{a}}\right)}{\sqrt{a}\,b^{3/2}} + \frac{\cosh(x)}{b}$$

Mathematica [C] Result contains complex when optimal does not.
time = 0.13, size = 83, normalized size = 2.31

$$-\frac{(a+b)\left(\text{ArcTan}\left(\frac{\sqrt{b}-i\sqrt{a+b}\tanh\left(\frac{x}{2}\right)}{\sqrt{a}}\right)+\text{ArcTan}\left(\frac{\sqrt{b}+i\sqrt{a+b}\tanh\left(\frac{x}{2}\right)}{\sqrt{a}}\right)\right)}{\sqrt{a}\,b^{3/2}}+\frac{\cosh(x)}{b}$$

Antiderivative was successfully verified.

```
[In] Integrate[Sinh[x]^3/(a + b*Cosh[x]^2),x]
```

```
[Out] -(((a + b)*(ArcTan[(Sqrt[b] - I*Sqrt[a + b]*Tanh[x/2])/Sqrt[a]] + ArcTan[(S
qrt[b] + I*Sqrt[a + b]*Tanh[x/2])/Sqrt[a]]))/(Sqrt[a]*b^(3/2))) + Cosh[x]/b
```

Maple [B] Leaf count of result is larger than twice the leaf count of optimal. 65 vs. $2(28) = 56$.
time = 0.62, size = 66, normalized size = 1.83

method	result	s
default	$-\frac{1}{b\left(\tanh\left(\frac{x}{2}\right)-1\right)}-\frac{(a+b)\arctan\left(\frac{2(a+b)\left(\tanh^2\left(\frac{x}{2}\right)\right)-2a+2b}{4\sqrt{ab}}\right)}{b\sqrt{ab}}+\frac{1}{b\left(\tanh\left(\frac{x}{2}\right)+1\right)}$	6
risch	$\frac{e^x}{2b}+\frac{e^{-x}}{2b}-\frac{\ln\left(e^{2x}+\frac{2a\,e^x}{\sqrt{-ab}}+1\right)a}{2\sqrt{-ab}\,b}-\frac{\ln\left(e^{2x}+\frac{2a\,e^x}{\sqrt{-ab}}+1\right)}{2\sqrt{-ab}}+\frac{\ln\left(e^{2x}-\frac{2a\,e^x}{\sqrt{-ab}}+1\right)a}{2\sqrt{-ab}\,b}+\frac{\ln\left(e^{2x}-\frac{2a\,e^x}{\sqrt{-ab}}+1\right)}{2\sqrt{-ab}}$	1

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(sinh(x)^3/(a+b*cosh(x)^2),x,method=_RETURNVERBOSE)
```

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

Maxima [F]
time = 0.00, size = 0, normalized size = 0.00

Failed to integrate

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(sinh(x)^3/(a+b*cosh(x)^2),x, algorithm="maxima")
```

```
[Out] 1/2*(e^(2*x) + 1)*e^(-x)/b - 1/8*integrate(16*((a + b)*e^(3*x) - (a + b)*e^^
x)/(b^2*e^(4*x) + b^2 + 2*(2*a*b + b^2)*e^(2*x)), x)
```

Fricas [**B**] Leaf count of result is larger than twice the leaf count of optimal. 160 vs. $2(28) = 56$.
time = 0.41, size = 416, normalized size = 11.56

$$\left[\frac{ab\cosh(x)^2 + 2\,ab\cosh(x)\sinh(x) + ab\sinh(x)^2 - \sqrt{-ab}\,((a+b)\cosh(x) + (a+b)\sinh(x))\log\left(\frac{b\cosh(x)^4 + 4\,b\cosh(x)\sinh(x)^3 + b\sinh(x)^4 - 2\,(2\,a-b)\cosh(x)^2 + 2\,\left(3\,b\cosh(x)^2 - 2\,a + b\right)\sinh(x)^2 + 4\,\left(b\cosh(x)^3 - (2\,a-b)\cosh(x)\right)\sinh(x) + 4\,\left(\cosh(x)^3 + 3\,\cosh(x)\sinh(x)^2 + \sinh(x)^3 + \left(3\,\cosh(x)^2 + 1\right)\sinh(x) + \cosh(x)\right)\sqrt{-ab} + b}{b\cosh(x)^4 + 4\,b\cosh(x)\sinh(x)^3 + b\sinh(x)^4 + 2\,(2\,a+b)\cosh(x)^2 + 2\,\left(3\,b\cosh(x)^2 + 2\,a + b\right)\sinh(x)^2 + 4\,\left(b\cosh(x)^3 + (2\,a+b)\cosh(x)\right)\sinh(x) + b}\right) + ab}{2\,(ab^2\cosh(x) + ab^2\sinh(x))}, \frac{ab\cosh(x)^2 + 2\,ab\cosh(x)\sinh(x) + ab\sinh(x)^2 - 2\,\sqrt{ab}\,((a+b)\cosh(x) + (a+b)\sinh(x))\arctan\left(\frac{\sqrt{ab}\,(\cosh(x) + \sinh(x))}{2\,a}\right) + 2\,\sqrt{ab}\,((a+b)\cosh(x) + (a+b)\sinh(x))\arctan\left(\frac{\left(b\cosh(x)^3 + 3\,b\cosh(x)\sinh(x)^2 + b\sinh(x)^3 + (4\,a+b)\cosh(x) + \left(3\,b\cosh(x)^2 + 4\,a + b\right)\sinh(x)\right)\sqrt{ab}}{2\,ab}\right) + ab}{2\,(ab^2\cosh(x) + ab^2\sinh(x))}\right]$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] [1/2*(a*b*cosh(x)^2 + 2*a*b*cosh(x)*sinh(x) + a*b*sinh(x)^2 - sqrt(-a*b)*((
a + b)*cosh(x) + (a + b)*sinh(x))*log((b*cosh(x)^4 + 4*b*cosh(x)*sinh(x)^3
+ b*sinh(x)^4 - 2*(2*a - b)*cosh(x)^2 + 2*(3*b*cosh(x)^2 - 2*a + b)*sinh(x)
^2 + 4*(b*cosh(x)^3 - (2*a - b)*cosh(x))*sinh(x) + 4*(cosh(x)^3 + 3*cosh(x)
*sinh(x)^2 + sinh(x)^3 + (3*cosh(x)^2 + 1)*sinh(x) + cosh(x))*sqrt(-a*b) +
b)/(b*cosh(x)^4 + 4*b*cosh(x)*sinh(x)^3 + b*sinh(x)^4 + 2*(2*a + b)*cosh(x)
^2 + 2*(3*b*cosh(x)^2 + 2*a + b)*sinh(x)^2 + 4*(b*cosh(x)^3 + (2*a + b)*cos
h(x))*sinh(x) + b)) + a*b)/(a*b^2*cosh(x) + a*b^2*sinh(x)), 1/2*(a*b*cosh(x
)^2 + 2*a*b*cosh(x)*sinh(x) + a*b*sinh(x)^2 - 2*sqrt(a*b)*((a + b)*cosh(x)
+ (a + b)*sinh(x))*arctan(1/2*sqrt(a*b)*(cosh(x) + sinh(x))/a) + 2*sqrt(a*b
)*((a + b)*cosh(x) + (a + b)*sinh(x))*arctan(1/2*(b*cosh(x)^3 + 3*b*cosh(x)
*sinh(x)^2 + b*sinh(x)^3 + (4*a + b)*cosh(x) + (3*b*cosh(x)^2 + 4*a + b)*si
nh(x))*sqrt(a*b)/(a*b)) + a*b)/(a*b^2*cosh(x) + a*b^2*sinh(x))]
```

Sympy [**F(-1)**] Timed out
time = 0.00, size = 0, normalized size = 0.00

Timed out

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(sinh(x)**3/(a+b*cosh(x)**2),x)
```

```
[Out] Timed out
```

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(sinh(x)^3/(a+b*cosh(x)^2),x, algorithm="giac")
```

```
[Out] Exception raised: TypeError >> An error occurred running a Giac command:INP
UT:sage2:=int(sage0,sageVARx):;OUTPUT:Warning, need to choose a branch for
the root of a polynomial with parameters. This might be wrong.The choice wa
s done
```

Mupad [B]
time = 1.37, size = 257, normalized size = 7.14

$$\frac{\mathrm{e}^{-x}}{2\,b}+\frac{\mathrm{e}^{x}}{2\,b}+\frac{\left(2\,\mathrm{atan}\left(\frac{\mathrm{e}^{3\,x}\,\left(a^3\,\sqrt{a\,b^3}+b^3\,\sqrt{a\,b^3}+3\,a\,b^2\,\sqrt{a\,b^3}+3\,a^2\,b\,\sqrt{a\,b^3}\right)}{2\,a\,b\,{\left({\left(a+b\right)}^2\right)}^{3/2}}+\frac{a\,b^4\,\mathrm{e}^{x}\,\sqrt{a\,b^3}\,\left(\frac{8\,{\left(a^2+2\,a\,b+b^2\right)}^{3/2}}{a\,b^6\,{\left(a+b\right)}^3}+\frac{2\,\left(a^3\,\sqrt{a\,b^3}+b^3\,\sqrt{a\,b^3}+3\,a\,b^2\,\sqrt{a\,b^3}+3\,a^2\,b\,\sqrt{a\,b^3}\right)}{a^2\,b^5\,\sqrt{a\,b^3}\,{\left({\left(a+b\right)}^2\right)}^{3/2}}\right)}{4}\right)-2\,\mathrm{atan}\left(\frac{\mathrm{e}^{x}\,{\left(a+b\right)}^3\,\sqrt{a\,b^3}}{2\,a\,b\,{\left({\left(a+b\right)}^2\right)}^{3/2}}\right)\right)\,\sqrt{a^2+2\,a\,b+b^2}}{2\,\sqrt{a\,b^3}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(sinh(x)^3/(a + b*cosh(x)^2),x)
```

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

3.9 $\int \frac{\sinh(x)}{a+b\cosh^2(x)}\,dx$

Optimal. Leaf size=25

$$\frac{\text{ArcTan}\left(\frac{\sqrt{b}\cosh(x)}{\sqrt{a}}\right)}{\sqrt{a}\sqrt{b}}$$

[Out] arctan(cosh(x)*b^(1/2)/a^(1/2))/a^(1/2)/b^(1/2)

Rubi [A]
time = 0.02, antiderivative size = 25, normalized size of antiderivative = 1.00, number of steps used = 2, number of rules used = 2, integrand size = 13, $\frac{\text{number of rules}}{\text{integrand size}} = 0.154$, Rules used = {3269, 211}

$$\frac{\text{ArcTan}\left(\frac{\sqrt{b}\cosh(x)}{\sqrt{a}}\right)}{\sqrt{a}\sqrt{b}}$$

Antiderivative was successfully verified.

[In] Int[Sinh[x]/(a + b*Cosh[x]^2),x]

[Out] ArcTan[(Sqrt[b]*Cosh[x])/Sqrt[a]]/(Sqrt[a]*Sqrt[b])

Rule 211

```
Int[((a_) + (b_.)*(x_)^2)^(-1), x_Symbol] :> Simp[(Rt[a/b, 2]/a)*ArcTan[x/R
t[a/b, 2]], x] /; FreeQ[{a, b}, x] && PosQ[a/b]
```

Rule 3269

```
Int[cos[(e_.) + (f_.)*(x_)]^(m_.)*((a_) + (b_.)*sin[(e_.) + (f_.)*(x_)]^2)^
(p_.), x_Symbol] :> With[{ff = FreeFactors[Sin[e + f*x], x]}, Dist[ff/f, Su
bst[Int[(1 - ff^2*x^2)^((m - 1)/2)*(a + b*ff^2*x^2)^p, x], x, Sin[e + f*x]/
ff], x]] /; FreeQ[{a, b, e, f, p}, x] && IntegerQ[(m - 1)/2]
```

Rubi steps

$$\begin{aligned}\int \frac{\sinh(x)}{a+b\cosh^2(x)}\,dx &= \text{Subst}\left(\int \frac{1}{a+bx^2}\,dx, x, \cosh(x)\right)\\ &= \frac{\tan^{-1}\left(\frac{\sqrt{b}\cosh(x)}{\sqrt{a}}\right)}{\sqrt{a}\sqrt{b}}\end{aligned}$$

Mathematica [A]
time = 0.02, size = 25, normalized size = 1.00

$$\frac{\operatorname{ArcTan}\left(\frac{\sqrt{b}\cosh(x)}{\sqrt{a}}\right)}{\sqrt{a}\sqrt{b}}$$

Antiderivative was successfully verified.

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

```
[Out] ArcTan[(Sqrt[b]*Cosh[x])/Sqrt[a]]/(Sqrt[a]*Sqrt[b])
```

Maple [A]
time = 0.34, size = 17, normalized size = 0.68

method	result	size
derivativedivides	$\frac{\arctan\left(\frac{b\cosh(x)}{\sqrt{ab}}\right)}{\sqrt{ab}}$	17
default	$\frac{\arctan\left(\frac{b\cosh(x)}{\sqrt{ab}}\right)}{\sqrt{ab}}$	17
risch	$-\frac{\ln\left(e^{2x}-\frac{2a\,e^{x}}{\sqrt{-ab}}+1\right)}{2\sqrt{-ab}}+\frac{\ln\left(e^{2x}+\frac{2a\,e^{x}}{\sqrt{-ab}}+1\right)}{2\sqrt{-ab}}$	54

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(sinh(x)/(a+b*cosh(x)^2),x,method=_RETURNVERBOSE)
```

```
[Out] 1/(a*b)^(1/2)*arctan(b*cosh(x)/(a*b)^(1/2))
```

Maxima [F]
time = 0.00, size = 0, normalized size = 0.00

Failed to integrate

Verification of antiderivative is not currently implemented for this CAS.

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

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

Fricas [B] Leaf count of result is larger than twice the leaf count of optimal. 96 vs. $2(17) = 34$.
time = 0.39, size = 300, normalized size = 12.00

$$\left[-\frac{\sqrt{-ab}\log\left(\frac{b\cosh(x)^4+4\,b\cosh(x)\sinh(x)^3+b\sinh(x)^4-2\,(2\,a-b)\cosh(x)^2+2\left(3\,b\cosh(x)^2-2\,a+b\right)\sinh(x)^2+4\left(b\cosh(x)^3-(2\,a-b)\cosh(x)\right)\sinh(x)-4\left(\cosh(x)^3+3\cosh(x)\sinh(x)^2+\sinh(x)^3+\left(3\cosh(x)^2+1\right)\sinh(x)+\cosh(x)\right)\sqrt{-ab}+b}{b\cosh(x)^4+4\,b\cosh(x)\sinh(x)^3+b\sinh(x)^4+2\,(2\,a+b)\cosh(x)^2+2\left(3\,b\cosh(x)^2+2\,a+b\right)\sinh(x)^2+4\left(b\cosh(x)^3+(2\,a+b)\cosh(x)\right)\sinh(x)+b}\right)}{2\,ab},\ \frac{\sqrt{ab}\arctan\left(\frac{\sqrt{ab}\,(\cosh(x)+\sinh(x))}{2\,a}\right)-\sqrt{ab}\arctan\left(\frac{\left(b\cosh(x)^3+3\,b\cosh(x)\sinh(x)^2+b\sinh(x)^3+(4\,a+b)\cosh(x)+\left(3\,b\cosh(x)^2+4\,a+b\right)\sinh(x)\right)\sqrt{ab}}{2\,ab}\right)}{ab}\right]$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

Sympy [B] Leaf count of result is larger than twice the leaf count of optimal. 66 vs. $2(24) = 48$.
time = 0.44, size = 66, normalized size = 2.64

$$\begin{cases} \frac{\tilde{\infty}}{\cosh(x)} & \text{for } a = 0 \wedge b = 0 \\ -\frac{1}{b\cosh(x)} & \text{for } a = 0 \\ \frac{\cosh(x)}{a} & \text{for } b = 0 \\ \frac{\log\left(-\sqrt{-\frac{a}{b}} + \cosh(x)\right)}{2b\sqrt{-\frac{a}{b}}} - \frac{\log\left(\sqrt{-\frac{a}{b}} + \cosh(x)\right)}{2b\sqrt{-\frac{a}{b}}} & \text{otherwise} \end{cases}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(sinh(x)/(a+b*cosh(x)**2),x)
```

```
[Out] Piecewise((zoo/cosh(x), Eq(a, 0) & Eq(b, 0)), (-1/(b*cosh(x)), Eq(a, 0)), (
cosh(x)/a, Eq(b, 0)), (log(-sqrt(-a/b) + cosh(x))/(2*b*sqrt(-a/b)) - log(sq
rt(-a/b) + cosh(x))/(2*b*sqrt(-a/b)), True))
```

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(sinh(x)/(a+b*cosh(x)^2),x, algorithm="giac")
```

```
[Out] Exception raised: TypeError >> An error occurred running a Giac command:INP
UT:sage2:=int(sage0,sageVARx):;OUTPUT:Warning, need to choose a branch for
the root of a polynomial with parameters. This might be wrong.The choice wa
s done
```

Mupad [B]
time = 0.97, size = 16, normalized size = 0.64

$$\frac{\operatorname{atan}\left(\frac{b\cosh(x)}{\sqrt{a\,b}}\right)}{\sqrt{a\,b}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(sinh(x)/(a + b*cosh(x)^2),x)
[Out] atan((b*cosh(x))/(a*b)^(1/2))/(a*b)^(1/2)
```

3.10 $\int \frac{\text{csch}(x)}{a+b\cosh^2(x)}\,dx$

Optimal. Leaf size=42

$$-\frac{\sqrt{b}\,\text{ArcTan}\left(\frac{\sqrt{b}\,\cosh(x)}{\sqrt{a}}\right)}{\sqrt{a}\,(a+b)}-\frac{\tanh^{-1}(\cosh(x))}{a+b}$$

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

Rubi [A]
time = 0.05, antiderivative size = 42, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 4, integrand size = 13, $\frac{\text{number of rules}}{\text{integrand size}} = 0.308$, Rules used = {3269, 400, 212, 211}

$$-\frac{\sqrt{b}\,\text{ArcTan}\left(\frac{\sqrt{b}\,\cosh(x)}{\sqrt{a}}\right)}{\sqrt{a}\,(a+b)}-\frac{\tanh^{-1}(\cosh(x))}{a+b}$$

Antiderivative was successfully verified.

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

```
[Out] -((Sqrt[b]*ArcTan[(Sqrt[b]*Cosh[x])/Sqrt[a]])/(Sqrt[a]*(a + b))) - ArcTanh[
Cosh[x]]/(a + b)
```

Rule 211

```
Int[((a_) + (b_.)*(x_)^2)^(-1), x_Symbol] :> Simp[(Rt[a/b, 2]/a)*ArcTan[x/R
t[a/b, 2]], x] /; FreeQ[{a, b}, x] && PosQ[a/b]
```

Rule 212

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

Rule 400

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

Rule 3269

```
Int[cos[(e_.) + (f_.)*(x_)]^(m_.)*((a_) + (b_.)*sin[(e_.) + (f_.)*(x_)]^2)^
(p_.), x_Symbol] :> With[{ff = FreeFactors[Sin[e + f*x], x]}, Dist[ff/f, Su
bst[Int[(1 - ff^2*x^2)^((m - 1)/2)*(a + b*ff^2*x^2)^p, x], x, Sin[e + f*x]/
ff], x]] /; FreeQ[{a, b, e, f, p}, x] && IntegerQ[(m - 1)/2]
```

Rubi steps

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

Mathematica [C] Result contains complex when optimal does not.
time = 0.10, size = 99, normalized size = 2.36

$$\frac{-\sqrt{b}\,\text{ArcTan}\left(\frac{\sqrt{b}-i\sqrt{a+b}\tanh\left(\frac{x}{2}\right)}{\sqrt{a}}\right)-\sqrt{b}\,\text{ArcTan}\left(\frac{\sqrt{b}+i\sqrt{a+b}\tanh\left(\frac{x}{2}\right)}{\sqrt{a}}\right)+\sqrt{a}\log\left(\tanh\left(\frac{x}{2}\right)\right)}{\sqrt{a}(a+b)}$$

Antiderivative was successfully verified.

```
[In] Integrate[Csch[x]/(a + b*Cosh[x]^2),x]
[Out] (-(Sqrt[b]*ArcTan[(Sqrt[b] - I*Sqrt[a + b]*Tanh[x/2])/Sqrt[a]]) - Sqrt[b]*A
rcTan[(Sqrt[b] + I*Sqrt[a + b]*Tanh[x/2])/Sqrt[a]] + Sqrt[a]*Log[Tanh[x/2]]
)/(Sqrt[a]*(a + b))
```

Maple [A]
time = 0.69, size = 52, normalized size = 1.24

method	result	size
default	$-\frac{b\arctan\left(\frac{2(a+b)\left(\tanh^2\left(\frac{x}{2}\right)\right)-2a+2b}{4\sqrt{ab}}\right)}{(a+b)\sqrt{ab}}+\frac{\ln\left(\tanh\left(\frac{x}{2}\right)\right)}{a+b}$	52
risch	$-\frac{\ln(e^x+1)}{a+b}+\frac{\ln(e^x-1)}{a+b}+\frac{\sqrt{-ab}\ln\left(e^{2x}-\frac{2\sqrt{-ab}\,e^x}{b}+1\right)}{2a(a+b)}-\frac{\sqrt{-ab}\ln\left(e^{2x}+\frac{2\sqrt{-ab}\,e^x}{b}+1\right)}{2a(a+b)}$	97

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(csch(x)/(a+b*cosh(x)^2),x,method=_RETURNVERBOSE)
```

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

Maxima [F]
time = 0.00, size = 0, normalized size = 0.00

Failed to integrate

Verification of antiderivative is not currently implemented for this CAS.

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

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

Fricas [B] Leaf count of result is larger than twice the leaf count of optimal. 114 vs. $2(34) = 68$.
time = 0.63, size = 349, normalized size = 8.31

$$\left[\frac{\sqrt{-\frac{b}{a}}\log\left(\frac{b\cosh(x)^4+4\,b\cosh(x)\sinh(x)^3+b\sinh(x)^4-2\,(2\,a-b)\cosh(x)^2+2\left(3\,b\cosh(x)^2-2\,a+b\right)\sinh(x)^2+4\left(b\cosh(x)^3-(2\,a-b)\cosh(x)\right)\sinh(x)-4\left(a\cosh(x)^3+3\,a\cosh(x)\sinh(x)^2+a\sinh(x)^3+a\cosh(x)+\left(3\,a\cosh(x)^2+a\right)\sinh(x)\right)\sqrt{-\frac{b}{a}}+b}{b\cosh(x)^4+4\,b\cosh(x)\sinh(x)^3+b\sinh(x)^4+2\,(2\,a+b)\cosh(x)^2+2\left(3\,b\cosh(x)^2+2\,a+b\right)\sinh(x)^2+4\left(b\cosh(x)^3+(2\,a+b)\cosh(x)\right)\sinh(x)+b}\right)-2\,\log\left(\cosh\left(x\right)+\sinh\left(x\right)+1\right)+2\,\log\left(\cosh\left(x\right)+\sinh\left(x\right)-1\right)}{2\,(a+b)},\,-\frac{\sqrt{\frac{b}{a}}\arctan\left(\frac{1}{2}\,\sqrt{\frac{b}{a}}\left(\cosh\left(x\right)+\sinh\left(x\right)\right)\right)-\sqrt{\frac{b}{a}}\arctan\left(\frac{\left(b\cosh(x)^3+3\,b\cosh(x)\sinh(x)^2+b\sinh(x)^3+(4\,a+b)\cosh(x)+\left(3\,b\cosh(x)^2+4\,a+b\right)\sinh(x)\right)\sqrt{\frac{b}{a}}}{2\,b}\right)+\log\left(\cosh\left(x\right)+\sinh\left(x\right)+1\right)-\log\left(\cosh\left(x\right)+\sinh\left(x\right)-1\right)}{a+b}\right]$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] [1/2*(sqrt(-b/a)*log((b*cosh(x)^4 + 4*b*cosh(x)*sinh(x)^3 + b*sinh(x)^4 - 2
*(2*a - b)*cosh(x)^2 + 2*(3*b*cosh(x)^2 - 2*a + b)*sinh(x)^2 + 4*(b*cosh(x)
^3 - (2*a - b)*cosh(x))*sinh(x) - 4*(a*cosh(x)^3 + 3*a*cosh(x)*sinh(x)^2 +
a*sinh(x)^3 + a*cosh(x) + (3*a*cosh(x)^2 + a)*sinh(x))*sqrt(-b/a) + b)/(b*c
osh(x)^4 + 4*b*cosh(x)*sinh(x)^3 + b*sinh(x)^4 + 2*(2*a + b)*cosh(x)^2 + 2*
(3*b*cosh(x)^2 + 2*a + b)*sinh(x)^2 + 4*(b*cosh(x)^3 + (2*a + b)*cosh(x))*s
inh(x) + b)) - 2*log(cosh(x) + sinh(x) + 1) + 2*log(cosh(x) + sinh(x) - 1))
/(a + b), -(sqrt(b/a)*arctan(1/2*sqrt(b/a)*(cosh(x) + sinh(x))) - sqrt(b/a)
*arctan(1/2*(b*cosh(x)^3 + 3*b*cosh(x)*sinh(x)^2 + b*sinh(x)^3 + (4*a + b)*
cosh(x) + (3*b*cosh(x)^2 + 4*a + b)*sinh(x))*sqrt(b/a)/b) + log(cosh(x) + s
inh(x) + 1) - log(cosh(x) + sinh(x) - 1))/(a + b)]
```

Sympy [F]
time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{csch}\left(x\right)}{a+b\cosh^{2}\left(x\right)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(csch(x)/(a+b*cosh(x)**2),x)
```

```
[Out] Integral(csch(x)/(a + b*cosh(x)**2), x)
```

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(csch(x)/(a+b*cosh(x)^2),x, algorithm="giac")
```

```
[Out] Exception raised: TypeError >> An error occurred running a Giac command:INP
UT:sage2:=int(sage0,sageVARx):;OUTPUT:Warning, need to choose a branch for
the root of a polynomial with parameters. This might be wrong.The choice wa
s done
```

Mupad [B]
time = 1.39, size = 462, normalized size = 11.00

$$-\frac{2\,\mathrm{atan}\left(\frac{{\mathrm{e}}^x\,\left(16\,a^2\,\sqrt{-a^2-2\,a\,b-b^2}+b^2\,\sqrt{-a^2-2\,a\,b-b^2}+8\,a\,b\,\sqrt{-a^2-2\,a\,b-b^2}\right)}{16\,a^3+24\,a^2\,b+9\,a\,b^2+b^3}\right)}{\sqrt{-a^2-2\,a\,b-b^2}}-\frac{\sqrt{b}\,\left(2\,\mathrm{atan}\left(\frac{\sqrt{b}\,{\mathrm{e}}^x\,\sqrt{a\,{\left(a+b\right)}^2}}{2\,a\,\left(a+b\right)}\right)-2\,\mathrm{atan}\left(\frac{\left(a^3\,b^{5/2}\,\sqrt{a^3+2\,a^2\,b+a\,b^2}+a^2\,b^{7/2}\,\sqrt{a^3+2\,a^2\,b+a\,b^2}\right)\,\left({\mathrm{e}}^x\,\left(\frac{64\,\left(8\,a^3+10\,a^2\,b+2\,a\,b^2\right)}{a\,b^3\,\sqrt{a\,{\left(a+b\right)}^2}\,\left(a^2+b\,a\right)\,\sqrt{a^3+2\,a^2\,b+a\,b^2}}+\frac{32\,\left(b^{3/2}\,\sqrt{a^3+2\,a^2\,b+a\,b^2}+4\,a\,\sqrt{b}\,\sqrt{a^3+2\,a^2\,b+a\,b^2}\right)}{a^2\,b^{5/2}\,\left(a+b\right)\,\left(a^2+b\,a\right)\,\sqrt{a^3+2\,a^2\,b+a\,b^2}}\right)+\frac{32\,{\mathrm{e}}^{3\,x}\,\left(b^{3/2}\,\sqrt{a^3+2\,a^2\,b+a\,b^2}+4\,a\,\sqrt{b}\,\sqrt{a^3+2\,a^2\,b+a\,b^2}\right)}{a^2\,b^{5/2}\,\left(a+b\right)\,\left(a^2+b\,a\right)\,\sqrt{a^3+2\,a^2\,b+a\,b^2}}\right)}{256\,a+64\,b}\right)\right)}{2\,\sqrt{a^3+2\,a^2\,b+a\,b^2}}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] - (2*atan((exp(x)*(16*a^2*(- 2*a*b - a^2 - b^2)^(1/2) + b^2*(- 2*a*b - a^2
- b^2)^(1/2) + 8*a*b*(- 2*a*b - a^2 - b^2)^(1/2)))/(9*a*b^2 + 24*a^2*b + 16
*a^3 + b^3)))/(- 2*a*b - a^2 - b^2)^(1/2) - (b^(1/2)*(2*atan((b^(1/2)*exp(x
)*(a*(a + b)^2)^(1/2))/(2*a*(a + b))) - 2*atan(((a^3*b^(5/2)*(a*b^2 + 2*a^2
*b + a^3)^(1/2) + a^2*b^(7/2)*(a*b^2 + 2*a^2*b + a^3)^(1/2))*(exp(x)*((64*(
2*a*b^2 + 10*a^2*b + 8*a^3))/(a*b^3*(a*(a + b)^2)^(1/2)*(a*b + a^2)*(a*b^2
+ 2*a^2*b + a^3)^(1/2)) + (32*(b^(3/2)*(a*b^2 + 2*a^2*b + a^3)^(1/2) + 4*a*
b^(1/2)*(a*b^2 + 2*a^2*b + a^3)^(1/2)))/(a^2*b^(5/2)*(a + b)*(a*b + a^2)*(a
*b^2 + 2*a^2*b + a^3)^(1/2))) + (32*exp(3*x)*(b^(3/2)*(a*b^2 + 2*a^2*b + a^
3)^(1/2) + 4*a*b^(1/2)*(a*b^2 + 2*a^2*b + a^3)^(1/2)))/(a^2*b^(5/2)*(a + b)
*(a*b + a^2)*(a*b^2 + 2*a^2*b + a^3)^(1/2))))/(256*a + 64*b))))/(2*(a*b^2 +
 2*a^2*b + a^3)^(1/2))
```

3.11 $\int \frac{\mathbf{csch}^3(x)}{a+b\cosh^2(x)}\,dx$

Optimal. Leaf size=61

$$\frac{b^{3/2}\text{ArcTan}\left(\frac{\sqrt{b}\,\cosh(x)}{\sqrt{a}}\right)}{\sqrt{a}\,(a+b)^2}+\frac{(a+3b)\tanh^{-1}(\cosh(x))}{2(a+b)^2}-\frac{\coth(x)\text{csch}(x)}{2(a+b)}$$

```
[Out] 1/2*(a+3*b)*arctanh(cosh(x))/(a+b)^2-1/2*coth(x)*csch(x)/(a+b)+b^(3/2)*arct
an(cosh(x)*b^(1/2)/a^(1/2))/(a+b)^2/a^(1/2)
```

Rubi [A]
time = 0.07, antiderivative size = 61, normalized size of antiderivative = 1.00, number of steps used = 5, number of rules used = 5, integrand size = 15, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.333, Rules used = {3269, 425, 536, 212, 211}

$$\frac{b^{3/2}\text{ArcTan}\left(\frac{\sqrt{b}\,\cosh(x)}{\sqrt{a}}\right)}{\sqrt{a}\,(a+b)^2}+\frac{(a+3b)\tanh^{-1}(\cosh(x))}{2(a+b)^2}-\frac{\coth(x)\text{csch}(x)}{2(a+b)}$$

Antiderivative was successfully verified.

```
[In] Int[Csch[x]^3/(a + b*Cosh[x]^2),x]
```

```
[Out] (b^(3/2)*ArcTan[(Sqrt[b]*Cosh[x])/Sqrt[a]])/(Sqrt[a]*(a + b)^2) + ((a + 3*b
)*ArcTanh[Cosh[x]])/(2*(a + b)^2) - (Coth[x]*Csch[x])/(2*(a + b))
```

Rule 211

```
Int[((a_) + (b_.)*(x_)^2)^(-1), x_Symbol] :> Simp[(Rt[a/b, 2]/a)*ArcTan[x/R
t[a/b, 2]], x] /; FreeQ[{a, b}, x] && PosQ[a/b]
```

Rule 212

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

Rule 425

```
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[1/(a*n*(p + 1)*(b*c - a*d)), Int[(a + b*x^n)^(p + 1)*(c
+ d*x^n)^q*Simp[b*c + n*(p + 1)*(b*c - a*d) + d*b*(n*(p + q + 2) + 1)*x^n,
x], x], x] /; FreeQ[{a, b, c, d, n, q}, x] && NeQ[b*c - a*d, 0] && LtQ[p, -
1] &&  !( !IntegerQ[p] && IntegerQ[q] && LtQ[q, -1]) && IntBinomialQ[a, b,
```

```
c, d, n, p, q, x]
```

Rule 536

```
Int[((e_) + (f_.)*(x_)^(n_))/(((a_) + (b_.)*(x_)^(n_))*((c_) + (d_.)*(x_)^(
n_))), x_Symbol] :> Dist[(b*e - a*f)/(b*c - a*d), Int[1/(a + b*x^n), x], x]
 - Dist[(d*e - c*f)/(b*c - a*d), Int[1/(c + d*x^n), x], x] /; FreeQ[{a, b,
c, d, e, f, n}, x]
```

Rule 3269

```
Int[cos[(e_.) + (f_.)*(x_)]^(m_.)*((a_) + (b_.)*sin[(e_.) + (f_.)*(x_)]^2)^
(p_.), x_Symbol] :> With[{ff = FreeFactors[Sin[e + f*x], x]}, Dist[ff/f, Su
bst[Int[(1 - ff^2*x^2)^((m - 1)/2)*(a + b*ff^2*x^2)^p, x], x, Sin[e + f*x]/
ff], x]] /; FreeQ[{a, b, e, f, p}, x] && IntegerQ[(m - 1)/2]
```

Rubi steps

$$\begin{aligned}\int \frac{\operatorname{csch}^3(x)}{a+b\cosh^2(x)}\,dx &= \operatorname{Subst}\left(\int \frac{1}{(1-x^2)^2\,(a+bx^2)}\,dx, x, \cosh(x)\right)\\ &= -\frac{\coth(x)\operatorname{csch}(x)}{2(a+b)}+\frac{\operatorname{Subst}\left(\int \frac{a+2b+bx^2}{(1-x^2)(a+bx^2)}\,dx, x, \cosh(x)\right)}{2(a+b)}\\ &= -\frac{\coth(x)\operatorname{csch}(x)}{2(a+b)}+\frac{b^2\operatorname{Subst}\left(\int \frac{1}{a+bx^2}\,dx, x, \cosh(x)\right)}{(a+b)^2}+\frac{(a+3b)\operatorname{Subst}\left(\int \frac{1}{1-x^2}\,dx, x, \text{co}\right.}{2(a+b)^2}\\ &= \frac{b^{3/2}\tan^{-1}\left(\frac{\sqrt{b}\,\cosh(x)}{\sqrt{a}}\right)}{\sqrt{a}\,(a+b)^2}+\frac{(a+3b)\tanh^{-1}(\cosh(x))}{2(a+b)^2}-\frac{\coth(x)\operatorname{csch}(x)}{2(a+b)}\end{aligned}$$

Mathematica [C] Result contains complex when optimal does not.
time = 0.20, size = 154, normalized size = 2.52

$$\frac{8b^{3/2}\operatorname{ArcTan}\left(\frac{\sqrt{b}-i\sqrt{a+b}\,\tanh\left(\frac{x}{2}\right)}{\sqrt{a}}\right)+8b^{3/2}\operatorname{ArcTan}\left(\frac{\sqrt{b}+i\sqrt{a+b}\,\tanh\left(\frac{x}{2}\right)}{\sqrt{a}}\right)-\sqrt{a}\,(a+b)\operatorname{csch}^2\left(\frac{x}{2}\right)-4a^{3/2}\log\left(\tanh\left(\frac{x}{2}\right)\right)-12\sqrt{a}\,b\log\left(\tanh\left(\frac{x}{2}\right)\right)-\sqrt{a}\,(a+b)\operatorname{sech}^2\left(\frac{x}{2}\right)}{8\sqrt{a}\,(a+b)^2}$$

Antiderivative was successfully verified.

```
[In] Integrate[Csch[x]^3/(a + b*Cosh[x]^2),x]
```

```
[Out] (8*b^(3/2)*ArcTan[(Sqrt[b] - I*Sqrt[a + b]*Tanh[x/2])/Sqrt[a]] + 8*b^(3/2)*
ArcTan[(Sqrt[b] + I*Sqrt[a + b]*Tanh[x/2])/Sqrt[a]] - Sqrt[a]*(a + b)*Csch[
x/2]^2 - 4*a^(3/2)*Log[Tanh[x/2]] - 12*Sqrt[a]*b*Log[Tanh[x/2]] - Sqrt[a]*(
a + b)*Sech[x/2]^2)/(8*Sqrt[a]*(a + b)^2)
```

Maple [A]
time = 0.80, size = 87, normalized size = 1.43

method	result
default	$\frac{\tanh^2\left(\frac{x}{2}\right)}{8a+8b}+\frac{b^2\arctan\left(\frac{2(a+b)\left(\tanh^2\left(\frac{x}{2}\right)\right)-2a+2b}{4\sqrt{ab}}\right)}{(a+b)^2\sqrt{ab}}-\frac{1}{8(a+b)\tanh\left(\frac{x}{2}\right)^2}+\frac{(-2a-6b)\ln\left(\tanh\left(\frac{x}{2}\right)\right)}{4(a+b)^2}$
risch	$-\frac{e^x\left(1+e^{2x}\right)}{\left(e^{2x}-1\right)^2(a+b)}-\frac{\ln(e^x-1)a}{2(a^2+2ab+b^2)}-\frac{3\ln(e^x-1)b}{2(a^2+2ab+b^2)}+\frac{\ln(e^x+1)a}{2a^2+4ab+2b^2}+\frac{3\ln(e^x+1)b}{2(a^2+2ab+b^2)}+\frac{\sqrt{-ab}\,b\ln\left(e^{2x}+\frac{2\sqrt{-ab}\,e}{b}\right.}{2a(a+b)^2}$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(csch(x)^3/(a+b*cosh(x)^2),x,method=_RETURNVERBOSE)
```

```
[Out] 1/8*tanh(1/2*x)^2/(a+b)+b^2/(a+b)^2/(a*b)^(1/2)*arctan(1/4*(2*(a+b)*tanh(1/
2*x)^2-2*a+2*b)/(a*b)^(1/2))-1/8/(a+b)/tanh(1/2*x)^2+1/4/(a+b)^2*(-2*a-6*b)
*ln(tanh(1/2*x))
```

Maxima [F]
time = 0.00, size = 0, normalized size = 0.00

Failed to integrate

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(csch(x)^3/(a+b*cosh(x)^2),x, algorithm="maxima")
```

```
[Out] 1/2*(a + 3*b)*log(e^x + 1)/(a^2 + 2*a*b + b^2) - 1/2*(a + 3*b)*log(e^x - 1)
/(a^2 + 2*a*b + b^2) - (e^(3*x) + e^x)/((a + b)*e^(4*x) - 2*(a + b)*e^(2*x)
 + a + b) + 8*integrate(1/4*(b^2*e^(3*x) - b^2*e^x)/(a^2*b + 2*a*b^2 + b^3
+ (a^2*b + 2*a*b^2 + b^3)*e^(4*x) + 2*(2*a^3 + 5*a^2*b + 4*a*b^2 + b^3)*e^(
2*x)), x)
```

Fricas [B] Leaf count of result is larger than twice the leaf count of optimal. 638 vs. $2(49) = 98$.
time = 0.42, size = 1332, normalized size = 21.84

Too large to display

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] [-1/2*(2*(a + b)*cosh(x)^3 + 6*(a + b)*cosh(x)*sinh(x)^2 + 2*(a + b)*sinh(x
)^3 - (b*cosh(x)^4 + 4*b*cosh(x)*sinh(x)^3 + b*sinh(x)^4 - 2*b*cosh(x)^2 +
2*(3*b*cosh(x)^2 - b)*sinh(x)^2 + 4*(b*cosh(x)^3 - b*cosh(x))*sinh(x) + b)*
sqrt(-b/a)*log((b*cosh(x)^4 + 4*b*cosh(x)*sinh(x)^3 + b*sinh(x)^4 - 2*(2*a
```

```
- b)*cosh(x)^2 + 2*(3*b*cosh(x)^2 - 2*a + b)*sinh(x)^2 + 4*(b*cosh(x)^3 - (
2*a - b)*cosh(x))*sinh(x) + 4*(a*cosh(x)^3 + 3*a*cosh(x)*sinh(x)^2 + a*sinh
(x)^3 + a*cosh(x) + (3*a*cosh(x)^2 + a)*sinh(x))*sqrt(-b/a) + b)/(b*cosh(x)
^4 + 4*b*cosh(x)*sinh(x)^3 + b*sinh(x)^4 + 2*(2*a + b)*cosh(x)^2 + 2*(3*b*c
osh(x)^2 + 2*a + b)*sinh(x)^2 + 4*(b*cosh(x)^3 + (2*a + b)*cosh(x))*sinh(x)
 + b)) + 2*(a + b)*cosh(x) - ((a + 3*b)*cosh(x)^4 + 4*(a + 3*b)*cosh(x)*sin
h(x)^3 + (a + 3*b)*sinh(x)^4 - 2*(a + 3*b)*cosh(x)^2 + 2*(3*(a + 3*b)*cosh(
x)^2 - a - 3*b)*sinh(x)^2 + 4*((a + 3*b)*cosh(x)^3 - (a + 3*b)*cosh(x))*sin
h(x) + a + 3*b)*log(cosh(x) + sinh(x) + 1) + ((a + 3*b)*cosh(x)^4 + 4*(a +
3*b)*cosh(x)*sinh(x)^3 + (a + 3*b)*sinh(x)^4 - 2*(a + 3*b)*cosh(x)^2 + 2*(3
*(a + 3*b)*cosh(x)^2 - a - 3*b)*sinh(x)^2 + 4*((a + 3*b)*cosh(x)^3 - (a + 3
*b)*cosh(x))*sinh(x) + a + 3*b)*log(cosh(x) + sinh(x) - 1) + 2*(3*(a + b)*c
osh(x)^2 + a + b)*sinh(x))/((a^2 + 2*a*b + b^2)*cosh(x)^4 + 4*(a^2 + 2*a*b
+ b^2)*cosh(x)*sinh(x)^3 + (a^2 + 2*a*b + b^2)*sinh(x)^4 - 2*(a^2 + 2*a*b +
 b^2)*cosh(x)^2 + 2*(3*(a^2 + 2*a*b + b^2)*cosh(x)^2 - a^2 - 2*a*b - b^2)*s
inh(x)^2 + a^2 + 2*a*b + b^2 + 4*((a^2 + 2*a*b + b^2)*cosh(x)^3 - (a^2 + 2*
a*b + b^2)*cosh(x))*sinh(x)), -1/2*(2*(a + b)*cosh(x)^3 + 6*(a + b)*cosh(x)
*sinh(x)^2 + 2*(a + b)*sinh(x)^3 - 2*(b*cosh(x)^4 + 4*b*cosh(x)*sinh(x)^3 +
 b*sinh(x)^4 - 2*b*cosh(x)^2 + 2*(3*b*cosh(x)^2 - b)*sinh(x)^2 + 4*(b*cosh(
x)^3 - b*cosh(x))*sinh(x) + b)*sqrt(b/a)*arctan(1/2*sqrt(b/a)*(cosh(x) + si
nh(x))) + 2*(b*cosh(x)^4 + 4*b*cosh(x)*sinh(x)^3 + b*sinh(x)^4 - 2*b*cosh(x
)^2 + 2*(3*b*cosh(x)^2 - b)*sinh(x)^2 + 4*(b*cosh(x)^3 - b*cosh(x))*sinh(x)
 + b)*sqrt(b/a)*arctan(1/2*(b*cosh(x)^3 + 3*b*cosh(x)*sinh(x)^2 + b*sinh(x)
^3 + (4*a + b)*cosh(x) + (3*b*cosh(x)^2 + 4*a + b)*sinh(x))*sqrt(b/a)/b) +
2*(a + b)*cosh(x) - ((a + 3*b)*cosh(x)^4 + 4*(a + 3*b)*cosh(x)*sinh(x)^3 +
(a + 3*b)*sinh(x)^4 - 2*(a + 3*b)*cosh(x)^2 + 2*(3*(a + 3*b)*cosh(x)^2 - a
- 3*b)*sinh(x)^2 + 4*((a + 3*b)*cosh(x)^3 - (a + 3*b)*cosh(x))*sinh(x) + a
+ 3*b)*log(cosh(x) + sinh(x) + 1) + ((a + 3*b)*cosh(x)^4 + 4*(a + 3*b)*cosh
(x)*sinh(x)^3 + (a + 3*b)*sinh(x)^4 - 2*(a + 3*b)*cosh(x)^2 + 2*(3*(a + 3*b
)*cosh(x)^2 - a - 3*b)*sinh(x)^2 + 4*((a + 3*b)*cosh(x)^3 - (a + 3*b)*cosh(
x))*sinh(x) + a + 3*b)*log(cosh(x) + sinh(x) - 1) + 2*(3*(a + b)*cosh(x)^2
+ a + b)*sinh(x))/((a^2 + 2*a*b + b^2)*cosh(x)^4 + 4*(a^2 + 2*a*b + b^2)*co
sh(x)*sinh(x)^3 + (a^2 + 2*a*b + b^2)*sinh(x)^4 - 2*(a^2 + 2*a*b + b^2)*cos
h(x)^2 + 2*(3*(a^2 + 2*a*b + b^2)*cosh(x)^2 - a^2 - 2*a*b - b^2)*sinh(x)^2
+ a^2 + 2*a*b + b^2 + 4*((a^2 + 2*a*b + b^2)*cosh(x)^3 - (a^2 + 2*a*b + b^2
)*cosh(x))*sinh(x))]
```

Sympy [F]
time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{csch}^3(x)}{a + b\cosh^2(x)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(csch(x)**3/(a+b*cosh(x)**2),x)
```

```
[Out] Integral(csch(x)**3/(a + b*cosh(x)**2), x)
```

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(csch(x)^3/(a+b*cosh(x)^2),x, algorithm="giac")
```

```
[Out] Exception raised: TypeError >> An error occurred running a Giac command:INP
UT:sage2:=int(sage0,sageVARx):;OUTPUT:Warning, need to choose a branch for
the root of a polynomial with parameters. This might be wrong.The choice wa
s done
```

Mupad [B]
time = 6.89, size = 2225, normalized size = 36.48

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] ((2*atan((b^2*exp(x)*(a*(a + b)^4)^(1/2))/(2*a*(a + b)^2*(b^3)^(1/2))) - 2*
atan((exp(x)*((32*(b^8*(a*b^4 + 4*a^4*b + a^5 + 4*a^2*b^3 + 6*a^3*b^2)^(1/2
) + 36*a^2*b^6*(a*b^4 + 4*a^4*b + a^5 + 4*a^2*b^3 + 6*a^3*b^2)^(1/2) + 47*a
^3*b^5*(a*b^4 + 4*a^4*b + a^5 + 4*a^2*b^3 + 6*a^3*b^2)^(1/2) + 30*a^4*b^4*(
a*b^4 + 4*a^4*b + a^5 + 4*a^2*b^3 + 6*a^3*b^2)^(1/2) + 9*a^5*b^3*(a*b^4 + 4
*a^4*b + a^5 + 4*a^2*b^3 + 6*a^3*b^2)^(1/2) + a^6*b^2*(a*b^4 + 4*a^4*b + a^
5 + 4*a^2*b^3 + 6*a^3*b^2)^(1/2) + 12*a*b^7*(a*b^4 + 4*a^4*b + a^5 + 4*a^2*
b^3 + 6*a^3*b^2)^(1/2)))/(a^2*b^2*(a + b)^7*(a*b + a^2)*(b^3)^(1/2)*(2*a*b
+ a^2 + b^2)*(3*a*b^2 + 3*a^2*b + a^3 + b^3)*(9*a*b^2 + 6*a^2*b + a^3 + b^3
)*(a*b^4 + 4*a^4*b + a^5 + 4*a^2*b^3 + 6*a^3*b^2)^(1/2)) + (64*(20*a^3*(b^3
)^(5/2) + 232*a^6*(b^3)^(3/2) + 2*a^9*(b^3)^(1/2) + 10*a^2*b^4*(b^3)^(3/2)
+ 20*a^4*b^2*(b^3)^(3/2) + 18*a^2*b^7*(b^3)^(1/2) + 102*a^3*b^6*(b^3)^(1/2)
 + 242*a^4*b^5*(b^3)^(1/2) + 310*a^5*b^4*(b^3)^(1/2) + 98*a^7*b^2*(b^3)^(1/
2) + 2*a*b^5*(b^3)^(3/2) + 10*a^5*b*(b^3)^(3/2) + 22*a^8*b*(b^3)^(1/2)))/(a
*b^4*(a + b)^5*(a*b + a^2)*(a*(a + b)^4)^(1/2)*(2*a*b + a^2 + b^2)*(3*a*b^2
 + 3*a^2*b + a^3 + b^3)*(9*a*b^2 + 6*a^2*b + a^3 + b^3)*(a*b^4 + 4*a^4*b +
a^5 + 4*a^2*b^3 + 6*a^3*b^2)^(1/2))) + (32*exp(3*x)*(b^8*(a*b^4 + 4*a^4*b +
 a^5 + 4*a^2*b^3 + 6*a^3*b^2)^(1/2) + 36*a^2*b^6*(a*b^4 + 4*a^4*b + a^5 + 4
*a^2*b^3 + 6*a^3*b^2)^(1/2) + 47*a^3*b^5*(a*b^4 + 4*a^4*b + a^5 + 4*a^2*b^3
 + 6*a^3*b^2)^(1/2) + 30*a^4*b^4*(a*b^4 + 4*a^4*b + a^5 + 4*a^2*b^3 + 6*a^3
*b^2)^(1/2) + 9*a^5*b^3*(a*b^4 + 4*a^4*b + a^5 + 4*a^2*b^3 + 6*a^3*b^2)^(1/
2) + a^6*b^2*(a*b^4 + 4*a^4*b + a^5 + 4*a^2*b^3 + 6*a^3*b^2)^(1/2) + 12*a*b
^7*(a*b^4 + 4*a^4*b + a^5 + 4*a^2*b^3 + 6*a^3*b^2)^(1/2)))/(a^2*b^2*(a + b)
```

```
^7*(a*b + a^2)*(b^3)^(1/2)*(2*a*b + a^2 + b^2)*(3*a*b^2 + 3*a^2*b + a^3 + b
^3)*(9*a*b^2 + 6*a^2*b + a^3 + b^3)*(a*b^4 + 4*a^4*b + a^5 + 4*a^2*b^3 + 6*
a^3*b^2)^(1/2)))*((a^2*b^10*(a*b^4 + 4*a^4*b + a^5 + 4*a^2*b^3 + 6*a^3*b^2)
^(1/2))/64 + (a^3*b^9*(a*b^4 + 4*a^4*b + a^5 + 4*a^2*b^3 + 6*a^3*b^2)^(1/2)
)/8 + (7*a^4*b^8*(a*b^4 + 4*a^4*b + a^5 + 4*a^2*b^3 + 6*a^3*b^2)^(1/2))/16
+ (7*a^5*b^7*(a*b^4 + 4*a^4*b + a^5 + 4*a^2*b^3 + 6*a^3*b^2)^(1/2))/8 + (35
*a^6*b^6*(a*b^4 + 4*a^4*b + a^5 + 4*a^2*b^3 + 6*a^3*b^2)^(1/2))/32 + (7*a^7
*b^5*(a*b^4 + 4*a^4*b + a^5 + 4*a^2*b^3 + 6*a^3*b^2)^(1/2))/8 + (7*a^8*b^4*
(a*b^4 + 4*a^4*b + a^5 + 4*a^2*b^3 + 6*a^3*b^2)^(1/2))/16 + (a^9*b^3*(a*b^4
 + 4*a^4*b + a^5 + 4*a^2*b^3 + 6*a^3*b^2)^(1/2))/8 + (a^10*b^2*(a*b^4 + 4*a
^4*b + a^5 + 4*a^2*b^3 + 6*a^3*b^2)^(1/2))/64)))*(b^3)^(1/2))/(2*(a*b^4 + 4
*a^4*b + a^5 + 4*a^2*b^3 + 6*a^3*b^2)^(1/2)) - (2*exp(x))/((a + b)*(exp(4*x
) - 2*exp(2*x) + 1)) - exp(x)/((a + b)*(exp(2*x) - 1)) - (atan((exp(x)*(a^7
*(- 4*a*b^3 - 4*a^3*b - a^4 - b^4 - 6*a^2*b^2)^(3/2) + 3*b^7*(- 4*a*b^3 - 4
*a^3*b - a^4 - b^4 - 6*a^2*b^2)^(3/2) + 55*a*b^6*(- 4*a*b^3 - 4*a^3*b - a^4
 - b^4 - 6*a^2*b^2)^(3/2) + 15*a^6*b*(- 4*a*b^3 - 4*a^3*b - a^4 - b^4 - 6*a
^2*b^2)^(3/2) + 297*a^2*b^5*(- 4*a*b^3 - 4*a^3*b - a^4 - b^4 - 6*a^2*b^2)^(
3/2) + 423*a^3*b^4*(- 4*a*b^3 - 4*a^3*b - a^4 - b^4 - 6*a^2*b^2)^(3/2) + 27
2*a^4*b^3*(- 4*a*b^3 - 4*a^3*b - a^4 - b^4 - 6*a^2*b^2)^(3/2) + 90*a^5*b^2*
(- 4*a*b^3 - 4*a^3*b - a^4 - b^4 - 6*a^2*b^2)^(3/2)))/(a^12*(6*a*b + a^2 +
9*b^2)^(1/2) + b^12*(6*a*b + a^2 + 9*b^2)^(1/2) + 24*a*b^11*(6*a*b + a^2 +
9*b^2)^(1/2) + 18*a^11*b*(6*a*b + a^2 + 9*b^2)^(1/2) + 216*a^2*b^10*(6*a*b
+ a^2 + 9*b^2)^(1/2) + 958*a^3*b^9*(6*a*b + a^2 + 9*b^2)^(1/2) + 2484*a^4*b
^8*(6*a*b + a^2 + 9*b^2)^(1/2) + 4122*a^5*b^7*(6*a*b + a^2 + 9*b^2)^(1/2) +
 4587*a^6*b^6*(6*a*b + a^2 + 9*b^2)^(1/2) + 3492*a^7*b^5*(6*a*b + a^2 + 9*b
^2)^(1/2) + 1818*a^8*b^4*(6*a*b + a^2 + 9*b^2)^(1/2) + 634*a^9*b^3*(6*a*b +
 a^2 + 9*b^2)^(1/2) + 141*a^10*b^2*(6*a*b + a^2 + 9*b^2)^(1/2)))*(6*a*b + a
^2 + 9*b^2)^(1/2))/(- 4*a*b^3 - 4*a^3*b - a^4 - b^4 - 6*a^2*b^2)^(1/2)
```

3.12 $\int \frac{\operatorname{csch}^5(x)}{a+b\cosh^2(x)}\,dx$

Optimal. Leaf size=94

$$-\frac{b^{5/2}\text{ArcTan}\left(\frac{\sqrt{b}\cosh(x)}{\sqrt{a}}\right)}{\sqrt{a}\,(a+b)^3}-\frac{(3a^2+10ab+15b^2)\tanh^{-1}(\cosh(x))}{8(a+b)^3}+\frac{(3a+7b)\coth(x)\operatorname{csch}(x)}{8(a+b)^2}-\frac{\coth(x)\operatorname{csch}^3(x)}{4(a+b)}$$

```
[Out] -1/8*(3*a^2+10*a*b+15*b^2)*arctanh(cosh(x))/(a+b)^3+1/8*(3*a+7*b)*coth(x)*c
sch(x)/(a+b)^2-1/4*coth(x)*csch(x)^3/(a+b)-b^(5/2)*arctan(cosh(x)*b^(1/2)/a
^(1/2))/(a+b)^3/a^(1/2)
```

Rubi [A]
time = 0.12, antiderivative size = 94, normalized size of antiderivative = 1.00, number of steps used = 6, number of rules used = 6, integrand size = 15, $\frac{\text{number of rules}}{\text{integrand size}} = 0.400$, Rules used = {3269, 425, 541, 536, 212, 211}

$$-\frac{(3a^2+10ab+15b^2)\tanh^{-1}(\cosh(x))}{8(a+b)^3}-\frac{b^{5/2}\text{ArcTan}\left(\frac{\sqrt{b}\cosh(x)}{\sqrt{a}}\right)}{\sqrt{a}\,(a+b)^3}-\frac{\coth(x)\operatorname{csch}^3(x)}{4(a+b)}+\frac{(3a+7b)\coth(x)\operatorname{csch}(x)}{8(a+b)^2}$$

Antiderivative was successfully verified.

```
[In] Int[Csch[x]^5/(a + b*Cosh[x]^2),x]
```

```
[Out] -((b^(5/2)*ArcTan[(Sqrt[b]*Cosh[x])/Sqrt[a]])/(Sqrt[a]*(a + b)^3)) - ((3*a^
2 + 10*a*b + 15*b^2)*ArcTanh[Cosh[x]])/(8*(a + b)^3) + ((3*a + 7*b)*Coth[x]
*Csch[x])/(8*(a + b)^2) - (Coth[x]*Csch[x]^3)/(4*(a + b))
```

Rule 211

```
Int[((a_) + (b_.)*(x_)^2)^(-1), x_Symbol] :> Simp[(Rt[a/b, 2]/a)*ArcTan[x/R
t[a/b, 2]], x] /; FreeQ[{a, b}, x] && PosQ[a/b]
```

Rule 212

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

Rule 425

```
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[1/(a*n*(p + 1)*(b*c - a*d)), Int[(a + b*x^n)^(p + 1)*(c
+ d*x^n)^q*Simp[b*c + n*(p + 1)*(b*c - a*d) + d*b*(n*(p + q + 2) + 1)*x^n,
x], x], x] /; FreeQ[{a, b, c, d, n, q}, x] && NeQ[b*c - a*d, 0] && LtQ[p, -
```

```
1] &&  !( !IntegerQ[p] && IntegerQ[q] && LtQ[q, -1]) && IntBinomialQ[a, b,
c, d, n, p, q, x]
```

Rule 536

```
Int[((e_) + (f_.)*(x_)^(n_))/(((a_) + (b_.)*(x_)^(n_))*((c_) + (d_.)*(x_)^(
n_))), x_Symbol] :> Dist[(b*e - a*f)/(b*c - a*d), Int[1/(a + b*x^n), x], x]
 - Dist[(d*e - c*f)/(b*c - a*d), Int[1/(c + d*x^n), x], x] /; FreeQ[{a, b,
c, d, e, f, n}, x]
```

Rule 541

```
Int[((a_) + (b_.)*(x_)^(n_))^(p_)*((c_) + (d_.)*(x_)^(n_))^(q_.)*((e_) + (f
_.)*(x_)^(n_)), x_Symbol] :> Simp[(-(b*e - a*f))*x*(a + b*x^n)^(p + 1)*((c
+ d*x^n)^(q + 1)/(a*n*(b*c - a*d)*(p + 1))), x] + Dist[1/(a*n*(b*c - a*d)*(
p + 1)), Int[(a + b*x^n)^(p + 1)*(c + d*x^n)^q*Simp[c*(b*e - a*f) + e*n*(b*
c - a*d)*(p + 1) + d*(b*e - a*f)*(n*(p + q + 2) + 1)*x^n, x], x], x] /; Fre
eQ[{a, b, c, d, e, f, n, q}, x] && LtQ[p, -1]
```

Rule 3269

```
Int[cos[(e_.) + (f_.)*(x_)]^(m_.)*((a_) + (b_.)*sin[(e_.) + (f_.)*(x_)]^2)^
(p_.), x_Symbol] :> With[{ff = FreeFactors[Sin[e + f*x], x]}, Dist[ff/f, Su
bst[Int[(1 - ff^2*x^2)^((m - 1)/2)*(a + b*ff^2*x^2)^p, x], x, Sin[e + f*x]/
ff], x]] /; FreeQ[{a, b, e, f, p}, x] && IntegerQ[(m - 1)/2]
```

Rubi steps

$$\begin{aligned}
\int \frac{\text{csch}^5(x)}{a+b\cosh^2(x)}\,dx &= -\text{Subst}\left(\int \frac{1}{(1-x^2)^3\,(a+bx^2)}\,dx, x, \cosh(x)\right) \\
&= -\frac{\coth(x)\text{csch}^3(x)}{4(a+b)} - \frac{\text{Subst}\left(\int \frac{3a+4b+3bx^2}{(1-x^2)^2(a+bx^2)}\,dx, x, \cosh(x)\right)}{4(a+b)} \\
&= \frac{(3a+7b)\coth(x)\text{csch}(x)}{8(a+b)^2} - \frac{\coth(x)\text{csch}^3(x)}{4(a+b)} - \frac{\text{Subst}\left(\int \frac{3a^2+7ab+8b^2+b(3a+7b)x^2}{(1-x^2)(a+bx^2)}\,dx, x, \text{c}\right.}{8(a+b)^2} \\
&= \frac{(3a+7b)\coth(x)\text{csch}(x)}{8(a+b)^2} - \frac{\coth(x)\text{csch}^3(x)}{4(a+b)} - \frac{b^3\text{Subst}\left(\int \frac{1}{a+bx^2}\,dx, x, \cosh(x)\right)}{(a+b)^3} - \frac{(3a}{} \\
&= -\frac{b^{5/2}\tan^{-1}\left(\frac{\sqrt{b}\,\cosh(x)}{\sqrt{a}}\right)}{\sqrt{a}\,(a+b)^3} - \frac{(3a^2+10ab+15b^2)\tanh^{-1}(\cosh(x))}{8(a+b)^3} + \frac{(3a+7b)\coth(}{8(a+b}
\end{aligned}$$

Mathematica [C] Result contains complex when optimal does not.
time = 0.43, size = 219, normalized size = 2.33

$$\frac{2\sqrt{a}\left(3a^2+10ab+7b^2\right)\operatorname{csch}^2\left(\frac{x}{2}\right)-\sqrt{a}\,(a+b)^2\operatorname{csch}^4\left(\frac{x}{2}\right)+8\left(-8b^{5/2}\operatorname{ArcTan}\left(\frac{\sqrt{b}-i\sqrt{a+b}\,\tanh\left(\frac{x}{2}\right)}{\sqrt{a}}\right)-8b^{5/2}\operatorname{ArcTan}\left(\frac{\sqrt{b}+i\sqrt{a+b}\,\tanh\left(\frac{x}{2}\right)}{\sqrt{a}}\right)+\sqrt{a}\left(3a^2+10ab+15b^2\right)\log\left(\tanh\left(\frac{x}{2}\right)\right)\right)+2\sqrt{a}\left(3a^2+10ab+7b^2\right)\operatorname{sech}^2\left(\frac{x}{2}\right)+\sqrt{a}\,(a+b)^2\operatorname{sech}^4\left(\frac{x}{2}\right)}{64\sqrt{a}\,(a+b)^3}$$

Antiderivative was successfully verified.

```
[In] Integrate[Csch[x]^5/(a + b*Cosh[x]^2),x]
```

```
[Out] (2*Sqrt[a]*(3*a^2 + 10*a*b + 7*b^2)*Csch[x/2]^2 - Sqrt[a]*(a + b)^2*Csch[x/
2]^4 + 8*(-8*b^(5/2)*ArcTan[(Sqrt[b] - I*Sqrt[a + b]*Tanh[x/2])/Sqrt[a]] -
8*b^(5/2)*ArcTan[(Sqrt[b] + I*Sqrt[a + b]*Tanh[x/2])/Sqrt[a]] + Sqrt[a]*(3*
a^2 + 10*a*b + 15*b^2)*Log[Tanh[x/2]]) + 2*Sqrt[a]*(3*a^2 + 10*a*b + 7*b^2)
*Sech[x/2]^2 + Sqrt[a]*(a + b)^2*Sech[x/2]^4)/(64*Sqrt[a]*(a + b)^3)
```

Maple [A]
time = 1.08, size = 135, normalized size = 1.44

method	result
default	$\frac{\left(a\left(\tanh^2\left(\frac{x}{2}\right)\right)+b\left(\tanh^2\left(\frac{x}{2}\right)\right)-4a-8b\right)^2}{64(a+b)^3}-\frac{1}{64(a+b)\tanh\left(\frac{x}{2}\right)^4}-\frac{-4a-8b}{32(a+b)^2\tanh\left(\frac{x}{2}\right)^2}+\frac{\left(6a^2+20ab+30b^2\right)\ln\left(\tanh\left(\frac{x}{2}\right)\right)}{16(a+b)^3}-\frac{b^3 a}{}$
risch	$\frac{e^x\left(3a\,e^{6x}+7\,e^{6x}b-11a\,e^{4x}-15\,e^{4x}b-11\,e^{2x}a-15b\,e^{2x}+3a+7b\right)}{4\left(e^{2x}-1\right)^4(a+b)^2}-\frac{3\ln\left(e^x+1\right)a^2}{8\left(a^3+3a^2b+3a\,b^2+b^3\right)}-\frac{5\ln\left(e^x+1\right)ab}{4\left(a^3+3a^2b+3a\,b^2+b^3\right)}-\frac{15\ln(}{8(a^3+3a^2}$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(csch(x)^5/(a+b*cosh(x)^2),x,method=_RETURNVERBOSE)
```

```
[Out] 1/64*(a*tanh(1/2*x)^2+b*tanh(1/2*x)^2-4*a-8*b)^2/(a+b)^3-1/64/(a+b)/tanh(1/
2*x)^4-1/32*(-4*a-8*b)/(a+b)^2/tanh(1/2*x)^2+1/16/(a+b)^3*(6*a^2+20*a*b+30*
b^2)*ln(tanh(1/2*x))-b^3/(a+b)^3/(a*b)^(1/2)*arctan(1/4*(2*(a+b)*tanh(1/2*x
)^2-2*a+2*b)/(a*b)^(1/2))
```

Maxima [F]
time = 0.00, size = 0, normalized size = 0.00

Failed to integrate

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(csch(x)^5/(a+b*cosh(x)^2),x, algorithm="maxima")
```

```
[Out] -1/8*(3*a^2 + 10*a*b + 15*b^2)*log(e^x + 1)/(a^3 + 3*a^2*b + 3*a*b^2 + b^3)
 + 1/8*(3*a^2 + 10*a*b + 15*b^2)*log(e^x - 1)/(a^3 + 3*a^2*b + 3*a*b^2 + b^
3) + 1/4*((3*a + 7*b)*e^(7*x) - (11*a + 15*b)*e^(5*x) - (11*a + 15*b)*e^(3*
x) + (3*a + 7*b)*e^x)/(a^2 + 2*a*b + b^2 + (a^2 + 2*a*b + b^2)*e^(8*x) - 4*
```

```
(a^2 + 2*a*b + b^2)*e^(6*x) + 6*(a^2 + 2*a*b + b^2)*e^(4*x) - 4*(a^2 + 2*a*
b + b^2)*e^(2*x)) - 32*integrate(1/16*(b^3*e^(3*x) - b^3*e^x)/(a^3*b + 3*a^
2*b^2 + 3*a*b^3 + b^4 + (a^3*b + 3*a^2*b^2 + 3*a*b^3 + b^4)*e^(4*x) + 2*(2*
a^4 + 7*a^3*b + 9*a^2*b^2 + 5*a*b^3 + b^4)*e^(2*x)), x)
```

Fricas [B] Leaf count of result is larger than twice the leaf count of optimal. 2724 vs. $2(80) = 160$.
time = 0.49, size = 5326, normalized size = 56.66

too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(csch(x)^5/(a+b*cosh(x)^2),x, algorithm="fricas")
```

```
[Out] [1/8*(2*(3*a^2 + 10*a*b + 7*b^2)*cosh(x)^7 + 14*(3*a^2 + 10*a*b + 7*b^2)*co
sh(x)*sinh(x)^6 + 2*(3*a^2 + 10*a*b + 7*b^2)*sinh(x)^7 - 2*(11*a^2 + 26*a*b
 + 15*b^2)*cosh(x)^5 + 2*(21*(3*a^2 + 10*a*b + 7*b^2)*cosh(x)^2 - 11*a^2 -
26*a*b - 15*b^2)*sinh(x)^5 + 10*(7*(3*a^2 + 10*a*b + 7*b^2)*cosh(x)^3 - (11
*a^2 + 26*a*b + 15*b^2)*cosh(x))*sinh(x)^4 - 2*(11*a^2 + 26*a*b + 15*b^2)*c
osh(x)^3 + 2*(35*(3*a^2 + 10*a*b + 7*b^2)*cosh(x)^4 - 10*(11*a^2 + 26*a*b +
 15*b^2)*cosh(x)^2 - 11*a^2 - 26*a*b - 15*b^2)*sinh(x)^3 + 2*(21*(3*a^2 + 1
0*a*b + 7*b^2)*cosh(x)^5 - 10*(11*a^2 + 26*a*b + 15*b^2)*cosh(x)^3 - 3*(11*
a^2 + 26*a*b + 15*b^2)*cosh(x))*sinh(x)^2 + 4*(b^2*cosh(x)^8 + 8*b^2*cosh(x
)*sinh(x)^7 + b^2*sinh(x)^8 - 4*b^2*cosh(x)^6 + 4*(7*b^2*cosh(x)^2 - b^2)*s
inh(x)^6 + 6*b^2*cosh(x)^4 + 8*(7*b^2*cosh(x)^3 - 3*b^2*cosh(x))*sinh(x)^5
+ 2*(35*b^2*cosh(x)^4 - 30*b^2*cosh(x)^2 + 3*b^2)*sinh(x)^4 - 4*b^2*cosh(x)
^2 + 8*(7*b^2*cosh(x)^5 - 10*b^2*cosh(x)^3 + 3*b^2*cosh(x))*sinh(x)^3 + 4*(
7*b^2*cosh(x)^6 - 15*b^2*cosh(x)^4 + 9*b^2*cosh(x)^2 - b^2)*sinh(x)^2 + b^2
 + 8*(b^2*cosh(x)^7 - 3*b^2*cosh(x)^5 + 3*b^2*cosh(x)^3 - b^2*cosh(x))*sinh
(x))*sqrt(-b/a)*log((b*cosh(x)^4 + 4*b*cosh(x)*sinh(x)^3 + b*sinh(x)^4 - 2*
(2*a - b)*cosh(x)^2 + 2*(3*b*cosh(x)^2 - 2*a + b)*sinh(x)^2 + 4*(b*cosh(x)^
3 - (2*a - b)*cosh(x))*sinh(x) - 4*(a*cosh(x)^3 + 3*a*cosh(x)*sinh(x)^2 + a
*sinh(x)^3 + a*cosh(x) + (3*a*cosh(x)^2 + a)*sinh(x))*sqrt(-b/a) + b)/(b*co
sh(x)^4 + 4*b*cosh(x)*sinh(x)^3 + b*sinh(x)^4 + 2*(2*a + b)*cosh(x)^2 + 2*(
3*b*cosh(x)^2 + 2*a + b)*sinh(x)^2 + 4*(b*cosh(x)^3 + (2*a + b)*cosh(x))*si
nh(x) + b)) + 2*(3*a^2 + 10*a*b + 7*b^2)*cosh(x) - ((3*a^2 + 10*a*b + 15*b^
2)*cosh(x)^8 + 8*(3*a^2 + 10*a*b + 15*b^2)*cosh(x)*sinh(x)^7 + (3*a^2 + 10*
a*b + 15*b^2)*sinh(x)^8 - 4*(3*a^2 + 10*a*b + 15*b^2)*cosh(x)^6 + 4*(7*(3*a
^2 + 10*a*b + 15*b^2)*cosh(x)^2 - 3*a^2 - 10*a*b - 15*b^2)*sinh(x)^6 + 8*(7
*(3*a^2 + 10*a*b + 15*b^2)*cosh(x)^3 - 3*(3*a^2 + 10*a*b + 15*b^2)*cosh(x))
*sinh(x)^5 + 6*(3*a^2 + 10*a*b + 15*b^2)*cosh(x)^4 + 2*(35*(3*a^2 + 10*a*b
+ 15*b^2)*cosh(x)^4 - 30*(3*a^2 + 10*a*b + 15*b^2)*cosh(x)^2 + 9*a^2 + 30*a
*b + 45*b^2)*sinh(x)^4 + 8*(7*(3*a^2 + 10*a*b + 15*b^2)*cosh(x)^5 - 10*(3*a
^2 + 10*a*b + 15*b^2)*cosh(x)^3 + 3*(3*a^2 + 10*a*b + 15*b^2)*cosh(x))*sinh
(x)^3 - 4*(3*a^2 + 10*a*b + 15*b^2)*cosh(x)^2 + 4*(7*(3*a^2 + 10*a*b + 15*b
```

```
^2)*cosh(x)^6 - 15*(3*a^2 + 10*a*b + 15*b^2)*cosh(x)^4 + 9*(3*a^2 + 10*a*b
+ 15*b^2)*cosh(x)^2 - 3*a^2 - 10*a*b - 15*b^2)*sinh(x)^2 + 3*a^2 + 10*a*b +
 15*b^2 + 8*((3*a^2 + 10*a*b + 15*b^2)*cosh(x)^7 - 3*(3*a^2 + 10*a*b + 15*b
^2)*cosh(x)^5 + 3*(3*a^2 + 10*a*b + 15*b^2)*cosh(x)^3 - (3*a^2 + 10*a*b + 1
5*b^2)*cosh(x))*sinh(x))*log(cosh(x) + sinh(x) + 1) + ((3*a^2 + 10*a*b + 15
*b^2)*cosh(x)^8 + 8*(3*a^2 + 10*a*b + 15*b^2)*cosh(x)*sinh(x)^7 + (3*a^2 +
10*a*b + 15*b^2)*sinh(x)^8 - 4*(3*a^2 + 10*a*b + 15*b^2)*cosh(x)^6 + 4*(7*(
3*a^2 + 10*a*b + 15*b^2)*cosh(x)^2 - 3*a^2 - 10*a*b - 15*b^2)*sinh(x)^6 + 8
*(7*(3*a^2 + 10*a*b + 15*b^2)*cosh(x)^3 - 3*(3*a^2 + 10*a*b + 15*b^2)*cosh(
x))*sinh(x)^5 + 6*(3*a^2 + 10*a*b + 15*b^2)*cosh(x)^4 + 2*(35*(3*a^2 + 10*a
*b + 15*b^2)*cosh(x)^4 - 30*(3*a^2 + 10*a*b + 15*b^2)*cosh(x)^2 + 9*a^2 + 3
0*a*b + 45*b^2)*sinh(x)^4 + 8*(7*(3*a^2 + 10*a*b + 15*b^2)*cosh(x)^5 - 10*(
3*a^2 + 10*a*b + 15*b^2)*cosh(x)^3 + 3*(3*a^2 + 10*a*b + 15*b^2)*cosh(x))*s
inh(x)^3 - 4*(3*a^2 + 10*a*b + 15*b^2)*cosh(x)^2 + 4*(7*(3*a^2 + 10*a*b + 1
5*b^2)*cosh(x)^6 - 15*(3*a^2 + 10*a*b + 15*b^2)*cosh(x)^4 + 9*(3*a^2 + 10*a
*b + 15*b^2)*cosh(x)^2 - 3*a^2 - 10*a*b - 15*b^2)*sinh(x)^2 + 3*a^2 + 10*a*
b + 15*b^2 + 8*((3*a^2 + 10*a*b + 15*b^2)*cosh(x)^7 - 3*(3*a^2 + 10*a*b + 1
5*b^2)*cosh(x)^5 + 3*(3*a^2 + 10*a*b + 15*b^2)*cosh(x)^3 - (3*a^2 + 10*a*b
+ 15*b^2)*cosh(x))*sinh(x))*log(cosh(x) + sinh(x) - 1) + 2*(7*(3*a^2 + 10*a
*b + 7*b^2)*cosh(x)^6 - 5*(11*a^2 + 26*a*b + 15*b^2)*cosh(x)^4 - 3*(11*a^2
+ 26*a*b + 15*b^2)*cosh(x)^2 + 3*a^2 + 10*a*b + 7*b^2)*sinh(x))/((a^3 + 3*a
^2*b + 3*a*b^2 + b^3)*cosh(x)^8 + 8*(a^3 + 3*a^2*b + 3*a*b^2 + b^3)*cosh(x)
*sinh(x)^7 + (a^3 + 3*a^2*b + 3*a*b^2 + b^3)*sinh(x)^8 - 4*(a^3 + 3*a^2*b +
 3*a*b^2 + b^3)*cosh(x)^6 - 4*(a^3 + 3*a^2*b + 3*a*b^2 + b^3 - 7*(a^3 + 3*a
^2*b + 3*a*b^2 + b^3)*cosh(x)^2)*sinh(x)^6 + 8*(7*(a^3 + 3*a^2*b + 3*a*b^2
+ b^3)*cosh(x)^3 - 3*(a^3 + 3*a^2*b + 3*a*b^2 + b^3)*cosh(x))*sinh(x)^5 + 6
*(a^3 + 3*a^2*b + 3*a*b^2 + b^3)*cosh(x)^4 + 2*(35*(a^3 + 3*a^2*b + 3*a*b^2
 + b^3)*cosh(x)^4 + 3*a^3 + 9*a^2*b + 9*a*b^2 + 3*b^3 - 30*(a^3 + 3*a^2*b +
 3*a*b^2 + b^3)*cosh(x)^2)*sinh(x)^4 + 8*(7*(a^3 + 3*a^2*b + 3*a*b^2 + b^3)
*cosh(x)^5 - 10*(a^3 + 3*a^2*b + 3*a*b^2 + b^3)*cosh(x)^3 + 3*(a^3 + 3*a^2*
b + 3*a*b^2 + b^3)*cosh(x))*sinh(x)^3 + a^3 + 3*a^2*b + 3*a*b^2 + b^3 - 4*(
a^3 + 3*a^2*b + 3*a*b^2 + b^3)*cosh(x)^2 + 4*(7*(a^3 + 3*a^2*b + 3*a*b^2 +
b^3)*cosh(x)^6 - 15*(a^3 + 3*a^2*b + 3*a*b^2 + b^3)*cosh(x)^4 - a^3 - 3*a^2
*b - 3*a*b^2 - b^3 + 9*(a^3 + 3*a^2*b + 3*a*b^2 + b^3)*cosh(x)^2)*sinh(x)^2
 + 8*((a^3 + 3*a^2*b + 3*a*b^2 + b^3)*cosh(x)^7 - 3*(a^3 + 3*a^2*b + 3*a*b^
2 + b^3)*cosh(x)^5 + 3*(a^3 + 3*a^2*b + 3*a*b^2...
```

Sympy [F]

time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{csch}^5(x)}{a + b\cosh^2(x)}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(csch(x)**5/(a+b*cosh(x)**2),x)
```

```
[Out] Integral(csch(x)**5/(a + b*cosh(x)**2), x)
```

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(csch(x)^5/(a+b*cosh(x)^2),x, algorithm="giac")
```

```
[Out] Exception raised: TypeError >> An error occurred running a Giac command:INP
UT:sage2:=int(sage0,sageVARx):;OUTPUT:Warning, need to choose a branch for
the root of a polynomial with parameters. This might be wrong.The choice wa
s done
```

Mupad [B]
time = 14.74, size = 2500, normalized size = 26.60

Too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(1/(sinh(x)^5*(a + b*cosh(x)^2)),x)
```

```
[Out] (atan((exp(x)*(243*a^12*(- 6*a*b^5 - 6*a^5*b - a^6 - b^6 - 15*a^2*b^4 - 20*
a^3*b^3 - 15*a^4*b^2)^(3/2) + 3840*b^12*(- 6*a*b^5 - 6*a^5*b - a^6 - b^6 -
15*a^2*b^4 - 20*a^3*b^3 - 15*a^4*b^2)^(3/2) + 110560*a*b^11*(- 6*a*b^5 - 6*
a^5*b - a^6 - b^6 - 15*a^2*b^4 - 20*a^3*b^3 - 15*a^4*b^2)^(3/2) + 4050*a^11
*b*(- 6*a*b^5 - 6*a^5*b - a^6 - b^6 - 15*a^2*b^4 - 20*a^3*b^3 - 15*a^4*b^2)
^(3/2) + 976143*a^2*b^10*(- 6*a*b^5 - 6*a^5*b - a^6 - b^6 - 15*a^2*b^4 - 20
*a^3*b^3 - 15*a^4*b^2)^(3/2) + 2740050*a^3*b^9*(- 6*a*b^5 - 6*a^5*b - a^6 -
 b^6 - 15*a^2*b^4 - 20*a^3*b^3 - 15*a^4*b^2)^(3/2) + 4252775*a^4*b^8*(- 6*a
*b^5 - 6*a^5*b - a^6 - b^6 - 15*a^2*b^4 - 20*a^3*b^3 - 15*a^4*b^2)^(3/2) +
4316760*a^5*b^7*(- 6*a*b^5 - 6*a^5*b - a^6 - b^6 - 15*a^2*b^4 - 20*a^3*b^3
- 15*a^4*b^2)^(3/2) + 3087390*a^6*b^6*(- 6*a*b^5 - 6*a^5*b - a^6 - b^6 - 15
*a^2*b^4 - 20*a^3*b^3 - 15*a^4*b^2)^(3/2) + 1608364*a^7*b^5*(- 6*a*b^5 - 6*
a^5*b - a^6 - b^6 - 15*a^2*b^4 - 20*a^3*b^3 - 15*a^4*b^2)^(3/2) + 615750*a^
8*b^4*(- 6*a*b^5 - 6*a^5*b - a^6 - b^6 - 15*a^2*b^4 - 20*a^3*b^3 - 15*a^4*b
^2)^(3/2) + 171000*a^9*b^3*(- 6*a*b^5 - 6*a^5*b - a^6 - b^6 - 15*a^2*b^4 -
20*a^3*b^3 - 15*a^4*b^2)^(3/2) + 33075*a^10*b^2*(- 6*a*b^5 - 6*a^5*b - a^6
- b^6 - 15*a^2*b^4 - 20*a^3*b^3 - 15*a^4*b^2)^(3/2)))/(81*a^19*(300*a*b^3 +
 60*a^3*b + 9*a^4 + 225*b^4 + 190*a^2*b^2)^(1/2) + 256*b^19*(300*a*b^3 + 60
*a^3*b + 9*a^4 + 225*b^4 + 190*a^2*b^2)^(1/2) + 9504*a*b^18*(300*a*b^3 + 60
*a^3*b + 9*a^4 + 225*b^4 + 190*a^2*b^2)^(1/2) + 1809*a^18*b*(300*a*b^3 + 60
*a^3*b + 9*a^4 + 225*b^4 + 190*a^2*b^2)^(1/2) + 134241*a^2*b^17*(300*a*b^3
+ 60*a^3*b + 9*a^4 + 225*b^4 + 190*a^2*b^2)^(1/2) + 963809*a^3*b^16*(300*a*
b^3 + 60*a^3*b + 9*a^4 + 225*b^4 + 190*a^2*b^2)^(1/2) + 4252296*a^4*b^15*(3
```

```
00*a*b^3 + 60*a^3*b + 9*a^4 + 225*b^4 + 190*a^2*b^2)^(1/2) + 12815304*a^5*b
^14*(300*a*b^3 + 60*a^3*b + 9*a^4 + 225*b^4 + 190*a^2*b^2)^(1/2) + 28102636
*a^6*b^13*(300*a*b^3 + 60*a^3*b + 9*a^4 + 225*b^4 + 190*a^2*b^2)^(1/2) + 46
681644*a^7*b^12*(300*a*b^3 + 60*a^3*b + 9*a^4 + 225*b^4 + 190*a^2*b^2)^(1/2
) + 60321816*a^8*b^11*(300*a*b^3 + 60*a^3*b + 9*a^4 + 225*b^4 + 190*a^2*b^2
)^(1/2) + 61717144*a^9*b^10*(300*a*b^3 + 60*a^3*b + 9*a^4 + 225*b^4 + 190*a
^2*b^2)^(1/2) + 50559894*a^10*b^9*(300*a*b^3 + 60*a^3*b + 9*a^4 + 225*b^4 +
 190*a^2*b^2)^(1/2) + 33362646*a^11*b^8*(300*a*b^3 + 60*a^3*b + 9*a^4 + 225
*b^4 + 190*a^2*b^2)^(1/2) + 17752184*a^12*b^7*(300*a*b^3 + 60*a^3*b + 9*a^4
 + 225*b^4 + 190*a^2*b^2)^(1/2) + 7586616*a^13*b^6*(300*a*b^3 + 60*a^3*b +
9*a^4 + 225*b^4 + 190*a^2*b^2)^(1/2) + 2577804*a^14*b^5*(300*a*b^3 + 60*a^3
*b + 9*a^4 + 225*b^4 + 190*a^2*b^2)^(1/2) + 683596*a^15*b^4*(300*a*b^3 + 60
*a^3*b + 9*a^4 + 225*b^4 + 190*a^2*b^2)^(1/2) + 137064*a^16*b^3*(300*a*b^3
+ 60*a^3*b + 9*a^4 + 225*b^4 + 190*a^2*b^2)^(1/2) + 19656*a^17*b^2*(300*a*b
^3 + 60*a^3*b + 9*a^4 + 225*b^4 + 190*a^2*b^2)^(1/2)))*(300*a*b^3 + 60*a^3*
b + 9*a^4 + 225*b^4 + 190*a^2*b^2)^(1/2))/(4*(- 6*a*b^5 - 6*a^5*b - a^6 - b
^6 - 15*a^2*b^4 - 20*a^3*b^3 - 15*a^4*b^2)^(1/2)) - (4*exp(x))/((a + b)*(6*
exp(4*x) - 4*exp(2*x) - 4*exp(6*x) + exp(8*x) + 1)) - ((b^5)^(1/2)*(2*atan(
(b^3*exp(x)*(a*(a + b)^6)^(1/2))/(2*a*(a + b)^3*(b^5)^(1/2))) - 2*atan((exp
(x)*((2*(16*b^14*(a*b^6 + 6*a^6*b + a^7 + 6*a^2*b^5 + 15*a^3*b^4 + 20*a^4*b
^3 + 15*a^5*b^2)^(1/2) + 321*a*b^13*(a*b^6 + 6*a^6*b + a^7 + 6*a^2*b^5 + 15
*a^3*b^4 + 20*a^4*b^3 + 15*a^5*b^2)^(1/2) + 1890*a^2*b^12*(a*b^6 + 6*a^6*b
+ a^7 + 6*a^2*b^5 + 15*a^3*b^4 + 20*a^4*b^3 + 15*a^5*b^2)^(1/2) + 5685*a^3*
b^11*(a*b^6 + 6*a^6*b + a^7 + 6*a^2*b^5 + 15*a^3*b^4 + 20*a^4*b^3 + 15*a^5*
b^2)^(1/2) + 10440*a^4*b^10*(a*b^6 + 6*a^6*b + a^7 + 6*a^2*b^5 + 15*a^3*b^4
 + 20*a^4*b^3 + 15*a^5*b^2)^(1/2) + 12690*a^5*b^9*(a*b^6 + 6*a^6*b + a^7 +
6*a^2*b^5 + 15*a^3*b^4 + 20*a^4*b^3 + 15*a^5*b^2)^(1/2) + 10620*a^6*b^8*(a*
b^6 + 6*a^6*b + a^7 + 6*a^2*b^5 + 15*a^3*b^4 + 20*a^4*b^3 + 15*a^5*b^2)^(1/
2) + 6210*a^7*b^7*(a*b^6 + 6*a^6*b + a^7 + 6*a^2*b^5 + 15*a^3*b^4 + 20*a^4*
b^3 + 15*a^5*b^2)^(1/2) + 2520*a^8*b^6*(a*b^6 + 6*a^6*b + a^7 + 6*a^2*b^5 +
 15*a^3*b^4 + 20*a^4*b^3 + 15*a^5*b^2)^(1/2) + 685*a^9*b^5*(a*b^6 + 6*a^6*b
 + a^7 + 6*a^2*b^5 + 15*a^3*b^4 + 20*a^4*b^3 + 15*a^5*b^2)^(1/2) + 114*a^10
*b^4*(a*b^6 + 6*a^6*b + a^7 + 6*a^2*b^5 + 15*a^3*b^4 + 20*a^4*b^3 + 15*a^5*
b^2)^(1/2) + 9*a^11*b^3*(a*b^6 + 6*a^6*b + a^7 + 6*a^2*b^5 + 15*a^3*b^4 + 2
0*a^4*b^3 + 15*a^5*b^2)^(1/2)))/(a^2*b*(a + b)^10*(a*b + a^2)*(b^5)^(1/2)*(
3*a*b^2 + 3*a^2*b + a^3 + b^3)*(4*a*b^3 + 4*a^3*b + a^4 + b^4 + 6*a^2*b^2)*
(225*a*b^4 + 60*a^4*b + 9*a^5 + 16*b^5 + 300*a^2*b^3 + 190*a^3*b^2)*(6*a*b^
5 + 6*a^5*b + a^6 + b^6 + 15*a^2*b^4 + 20*a^3*b^3 + 15*a^4*b^2)*(a*b^6 + 6*
a^6*b + a^7 + 6*a^2*b^5 + 15*a^3*b^4 + 20*a^4*b^3 + 15*a^5*b^2)^(1/2)) + (4
*(4032*a^5*(b^5)^(5/2) + 74990*a^10*(b^5)^(3/2) + 18*a^15*(b^5)^(1/2) + 288
*a^2*b^8*(b^5)^(3/2) + 1152*a^3*b^7*(b^5)^(3/2) + 2688*a^4*b^6*(b^5)^(3/2)
+ 4032*a^6*b^4*(b^5)^(3/2) + 2688*a^7*b^3*(b^5)^(3/2) + 1152*a^8*b^2*(b^5)^
(3/2) + 450*a^2*b^13*(b^5)^(1/2) + 4650*a^3*b^12*(b^5)^(1/2) + 21980*a^4*b^
11*(b^5)^(1/2) + 62940*a^5*b^10*(b^5)^(1/2) + 1...
```

3.13 $\int \frac{\sinh^6(x)}{a+b\cosh^2(x)}\,dx$

Optimal. Leaf size=88

$$\frac{(8a^2+20ab+15b^2)\,x}{8b^3}-\frac{(a+b)^{5/2}\tanh^{-1}\left(\frac{\sqrt{a}\,\tanh(x)}{\sqrt{a+b}}\right)}{\sqrt{a}\,b^3}-\frac{(4a+7b)\cosh(x)\sinh(x)}{8b^2}+\frac{\cosh(x)\sinh^3(x)}{4b}$$

```
[Out] 1/8*(8*a^2+20*a*b+15*b^2)*x/b^3-1/8*(4*a+7*b)*cosh(x)*sinh(x)/b^2+1/4*cosh(
x)*sinh(x)^3/b-(a+b)^(5/2)*arctanh(a^(1/2)*tanh(x)/(a+b)^(1/2))/b^3/a^(1/2)
```

Rubi [A]

time = 0.12, antiderivative size = 88, normalized size of antiderivative = 1.00, number of steps used = 6, number of rules used = 6, integrand size = 15, $\frac{\text{number of rules}}{\text{integrand size}} = 0.400$, Rules used = {3270, 425, 541, 536, 212, 214}

$$\frac{x(8a^2+20ab+15b^2)}{8b^3}-\frac{(a+b)^{5/2}\tanh^{-1}\left(\frac{\sqrt{a}\,\tanh(x)}{\sqrt{a+b}}\right)}{\sqrt{a}\,b^3}-\frac{(4a+7b)\sinh(x)\cosh(x)}{8b^2}+\frac{\sinh^3(x)\cosh(x)}{4b}$$

Antiderivative was successfully verified.

```
[In] Int[Sinh[x]^6/(a + b*Cosh[x]^2),x]
```

```
[Out] ((8*a^2 + 20*a*b + 15*b^2)*x)/(8*b^3) - ((a + b)^(5/2)*ArcTanh[(Sqrt[a]*Tan
h[x])/Sqrt[a + b]])/(Sqrt[a]*b^3) - ((4*a + 7*b)*Cosh[x]*Sinh[x])/(8*b^2) +
 (Cosh[x]*Sinh[x]^3)/(4*b)
```

Rule 212

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

Rule 214

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

Rule 425

```
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[1/(a*n*(p + 1)*(b*c - a*d)), Int[(a + b*x^n)^(p + 1)*(c
+ d*x^n)^q*Simp[b*c + n*(p + 1)*(b*c - a*d) + d*b*(n*(p + q + 2) + 1)*x^n,
x], x], x] /; FreeQ[{a, b, c, d, n, q}, x] && NeQ[b*c - a*d, 0] && LtQ[p, -
1] &&  !( !IntegerQ[p] && IntegerQ[q] && LtQ[q, -1]) && IntBinomialQ[a, b,
```

```
c, d, n, p, q, x]
```

Rule 536

```
Int[((e_) + (f_.)*(x_)^(n_))/(((a_) + (b_.)*(x_)^(n_))*((c_) + (d_.)*(x_)^(
n_))), x_Symbol] :> Dist[(b*e - a*f)/(b*c - a*d), Int[1/(a + b*x^n), x], x]
 - Dist[(d*e - c*f)/(b*c - a*d), Int[1/(c + d*x^n), x], x] /; FreeQ[{a, b,
c, d, e, f, n}, x]
```

Rule 541

```
Int[((a_) + (b_.)*(x_)^(n_))^(p_)*((c_) + (d_.)*(x_)^(n_))^(q_.)*((e_) + (f
_.)*(x_)^(n_)), x_Symbol] :> Simp[(-(b*e - a*f))*x*(a + b*x^n)^(p + 1)*((c
+ d*x^n)^(q + 1)/(a*n*(b*c - a*d)*(p + 1))), x] + Dist[1/(a*n*(b*c - a*d)*(
p + 1)), Int[(a + b*x^n)^(p + 1)*(c + d*x^n)^q*Simp[c*(b*e - a*f) + e*n*(b*
c - a*d)*(p + 1) + d*(b*e - a*f)*(n*(p + q + 2) + 1)*x^n, x], x], x] /; Fre
eQ[{a, b, c, d, e, f, n, q}, x] && LtQ[p, -1]
```

Rule 3270

```
Int[cos[(e_.) + (f_.)*(x_)]^(m_)*((a_) + (b_.)*sin[(e_.) + (f_.)*(x_)]^2)^(
p_.), x_Symbol] :> With[{ff = FreeFactors[Tan[e + f*x], x]}, Dist[ff/f, Sub
st[Int[(a + (a + b)*ff^2*x^2)^p/(1 + ff^2*x^2)^(m/2 + p + 1), x], x, Tan[e
+ f*x]/ff], x]] /; FreeQ[{a, b, e, f}, x] && IntegerQ[m/2] && IntegerQ[p]
```

Rubi steps

$$\begin{aligned}
\int \frac{\sinh^6(x)}{a+b\cosh^2(x)}\,dx &= -\text{Subst}\left(\int \frac{1}{(1-x^2)^3\,(a-(a+b)x^2)}\,dx, x, \coth(x)\right)\\
&= \frac{\cosh(x)\sinh^3(x)}{4b} + \frac{\text{Subst}\left(\int \frac{-a-4b-3(a+b)x^2}{(1-x^2)^2(a+(-a-b)x^2)}\,dx, x, \coth(x)\right)}{4b}\\
&= -\frac{(4a+7b)\cosh(x)\sinh(x)}{8b^2} + \frac{\cosh(x)\sinh^3(x)}{4b} - \frac{\text{Subst}\left(\int \frac{4a^2+9ab+8b^2+(a+b)(4a+7b)x^2}{(1-x^2)(a+(-a-b)x^2)}\right.}{8b^2}\\
&= -\frac{(4a+7b)\cosh(x)\sinh(x)}{8b^2} + \frac{\cosh(x)\sinh^3(x)}{4b} - \frac{(a+b)^3\text{Subst}\left(\int \frac{1}{a+(-a-b)x^2}\,dx, x,\right.}{b^3}\\
&= \frac{(8a^2+20ab+15b^2)\,x}{8b^3} - \frac{(a+b)^{5/2}\tanh^{-1}\left(\frac{\sqrt{a}\,\tanh(x)}{\sqrt{a+b}}\right)}{\sqrt{a}\,b^3} - \frac{(4a+7b)\cosh(x)\sinh(}{8b^2}
\end{aligned}$$

Mathematica [A]

time = 0.12, size = 76, normalized size = 0.86

$$\frac{4(8a^2+20ab+15b^2)\,x-\frac{32(a+b)^{5/2}\tanh^{-1}\left(\frac{\sqrt{a}\,\tanh(x)}{\sqrt{a+b}}\right)}{\sqrt{a}}-8b(a+2b)\sinh(2x)+b^2\sinh(4x)}{32b^3}$$

Antiderivative was successfully verified.

```
[In] Integrate[Sinh[x]^6/(a + b*Cosh[x]^2),x]
```

```
[Out] (4*(8*a^2 + 20*a*b + 15*b^2)*x - (32*(a + b)^(5/2)*ArcTanh[(Sqrt[a]*Tanh[x]
)/Sqrt[a + b]])/Sqrt[a] - 8*b*(a + 2*b)*Sinh[2*x] + b^2*Sinh[4*x])/(32*b^3)
```

Maple [B] Leaf count of result is larger than twice the leaf count of optimal. 291 vs. $2(74) = 148$.
time = 0.77, size = 292, normalized size = 3.32

method	result
default	$-\frac{1}{4b\left(\tanh\left(\frac{x}{2}\right)+1\right)^4}+\frac{1}{2b\left(\tanh\left(\frac{x}{2}\right)+1\right)^3}-\frac{-5b-4a}{8b^2\left(\tanh\left(\frac{x}{2}\right)+1\right)^2}-\frac{7b+4a}{8b^2\left(\tanh\left(\frac{x}{2}\right)+1\right)}+\frac{(8a^2+20ab+15b^2)\ln\left(\tanh\left(\frac{x}{2}\right)+1\right)}{8b^3}+\frac{2(a}{}$ [truncated]
risch	$\frac{x\,a^2}{b^3}+\frac{5ax}{2b^2}+\frac{15x}{8b}+\frac{e^{4x}}{64b}-\frac{e^{2x}}{4b}-\frac{e^{2x}a}{8b^2}+\frac{e^{-2x}}{4b}+\frac{e^{-2x}a}{8b^2}-\frac{e^{-4x}}{64b}+\frac{a\sqrt{a\,(a+b)}\,\ln\left(e^{2x}+\frac{2\sqrt{a\,(a+b)}+2a+b}{b}\right.}{2b^3}$ [truncated]

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(sinh(x)^6/(a+b*cosh(x)^2),x,method=_RETURNVERBOSE)
```

```
[Out] -1/4/b/(tanh(1/2*x)+1)^4+1/2/b/(tanh(1/2*x)+1)^3-1/8*(-5*b-4*a)/b^2/(tanh(1
/2*x)+1)^2-1/8*(7*b+4*a)/b^2/(tanh(1/2*x)+1)+1/8*(8*a^2+20*a*b+15*b^2)/b^3*
ln(tanh(1/2*x)+1)+2/b^3*(a^3+3*a^2*b+3*a*b^2+b^3)*(-1/4/a^(1/2)/(a+b)^(1/2)
*ln((a+b)^(1/2)*tanh(1/2*x)^2+2*tanh(1/2*x)*a^(1/2)+(a+b)^(1/2))+1/4/a^(1/2
)/(a+b)^(1/2)*ln(-(a+b)^(1/2)*tanh(1/2*x)^2+2*tanh(1/2*x)*a^(1/2)-(a+b)^(1/
2)))+1/4/b/(tanh(1/2*x)-1)^4+1/2/b/(tanh(1/2*x)-1)^3-1/8*(5*b+4*a)/b^2/(tan
h(1/2*x)-1)^2-1/8*(7*b+4*a)/b^2/(tanh(1/2*x)-1)+1/8/b^3*(-8*a^2-20*a*b-15*b
^2)*ln(tanh(1/2*x)-1)
```

Maxima [B] Leaf count of result is larger than twice the leaf count of optimal. 651 vs. $2(74) = 148$.
time = 0.50, size = 651, normalized size = 7.40

$$-\frac{15(2a+b)\log\left(\frac{be^{(2x)}+2a+b-2\sqrt{(a+b)a}}{be^{(2x)}+2a+b+2\sqrt{(a+b)a}}\right)}{64\sqrt{(a+b)a}\,b}+\frac{5\log\left(\frac{be^{(-2x)}+2a+b-2\sqrt{(a+b)a}}{be^{(-2x)}+2a+b+2\sqrt{(a+b)a}}\right)}{32\sqrt{(a+b)a}}+\frac{3(2a+b)x}{2b^2}+\frac{15x}{16b}-\frac{(4(2a+b)e^{(-2x)}-b)e^{(4x)}}{64b^2}-\frac{3e^{(2x)}}{16b}+\frac{3e^{(-2x)}}{16b}+\frac{(4(2a+b)e^{(2x)}-b)e^{(-4x)}}{64b^2}-\frac{3(2a+b)\log\left(be^{(4x)}+2(2a+b)e^{(2x)}+b\right)}{16b^2}+\frac{3(2a+b)\log\left(2(2a+b)e^{(-2x)}+be^{(-4x)}+b\right)}{16b^2}-\frac{3(8a^2+8ab+b^2)\log\left(\frac{be^{(2x)}+2a+b-2\sqrt{(a+b)a}}{be^{(2x)}+2a+b+2\sqrt{(a+b)a}}\right)}{64\sqrt{(a+b)a}\,b^2}+\frac{3(8a^2+8ab+b^2)\log\left(\frac{be^{(-2x)}+2a+b-2\sqrt{(a+b)a}}{be^{(-2x)}+2a+b+2\sqrt{(a+b)a}}\right)}{64\sqrt{(a+b)a}\,b^2}+\frac{(16a^2+16ab+3b^2)x}{8b^3}-\frac{(16a^2+16ab+3b^2)\log\left(be^{(4x)}+2(2a+b)e^{(2x)}+b\right)}{64b^3}+\frac{(16a^2+16ab+3b^2)\log\left(2(2a+b)e^{(-2x)}+be^{(-4x)}+b\right)}{64b^3}-\frac{(32a^3+48a^2b+18ab^2+b^3)\log\left(\frac{be^{(2x)}+2a+b-2\sqrt{(a+b)a}}{be^{(2x)}+2a+b+2\sqrt{(a+b)a}}\right)}{128\sqrt{(a+b)a}\,b^3}+\frac{(32a^3+48a^2b+18ab^2+b^3)\log\left(\frac{be^{(-2x)}+2a+b-2\sqrt{(a+b)a}}{be^{(-2x)}+2a+b+2\sqrt{(a+b)a}}\right)}{128\sqrt{(a+b)a}\,b^3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(sinh(x)^6/(a+b*cosh(x)^2),x, algorithm="maxima")
```

```
[Out] -15/64*(2*a + b)*log((b*e^(2*x) + 2*a + b - 2*sqrt((a + b)*a))/(b*e^(2*x) +
 2*a + b + 2*sqrt((a + b)*a)))/(sqrt((a + b)*a)*b) + 5/32*log((b*e^(-2*x) +
 2*a + b - 2*sqrt((a + b)*a))/(b*e^(-2*x) + 2*a + b + 2*sqrt((a + b)*a)))/s
qrt((a + b)*a) + 3/2*(2*a + b)*x/b^2 + 15/16*x/b - 1/64*(4*(2*a + b)*e^(-2*
x) - b)*e^(4*x)/b^2 - 3/16*e^(2*x)/b + 3/16*e^(-2*x)/b + 1/64*(4*(2*a + b)*
e^(2*x) - b)*e^(-4*x)/b^2 - 3/16*(2*a + b)*log(b*e^(4*x) + 2*(2*a + b)*e^(2
*x) + b)/b^2 + 3/16*(2*a + b)*log(2*(2*a + b)*e^(-2*x) + b*e^(-4*x) + b)/b^
2 - 3/64*(8*a^2 + 8*a*b + b^2)*log((b*e^(2*x) + 2*a + b - 2*sqrt((a + b)*a)
)/(b*e^(2*x) + 2*a + b + 2*sqrt((a + b)*a)))/(sqrt((a + b)*a)*b^2) + 3/64*(
8*a^2 + 8*a*b + b^2)*log((b*e^(-2*x) + 2*a + b - 2*sqrt((a + b)*a))/(b*e^(-
2*x) + 2*a + b + 2*sqrt((a + b)*a)))/(sqrt((a + b)*a)*b^2) + 1/8*(16*a^2 +
16*a*b + 3*b^2)*x/b^3 - 1/64*(16*a^2 + 16*a*b + 3*b^2)*log(b*e^(4*x) + 2*(2
*a + b)*e^(2*x) + b)/b^3 + 1/64*(16*a^2 + 16*a*b + 3*b^2)*log(2*(2*a + b)*e
^(-2*x) + b*e^(-4*x) + b)/b^3 - 1/128*(32*a^3 + 48*a^2*b + 18*a*b^2 + b^3)*
log((b*e^(2*x) + 2*a + b - 2*sqrt((a + b)*a))/(b*e^(2*x) + 2*a + b + 2*sqrt
((a + b)*a)))/(sqrt((a + b)*a)*b^3) + 1/128*(32*a^3 + 48*a^2*b + 18*a*b^2 +
 b^3)*log((b*e^(-2*x) + 2*a + b - 2*sqrt((a + b)*a))/(b*e^(-2*x) + 2*a + b
+ 2*sqrt((a + b)*a)))/(sqrt((a + b)*a)*b^3)
```

Fricas [B] Leaf count of result is larger than twice the leaf count of optimal. 566 vs. $2(74) = 148$.
time = 0.42, size = 1308, normalized size = 14.86

Too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(sinh(x)^6/(a+b*cosh(x)^2),x, algorithm="fricas")
```

```
[Out] [1/64*(b^2*cosh(x)^8 + 8*b^2*cosh(x)*sinh(x)^7 + b^2*sinh(x)^8 - 8*(a*b + 2
*b^2)*cosh(x)^6 + 4*(7*b^2*cosh(x)^2 - 2*a*b - 4*b^2)*sinh(x)^6 + 8*(8*a^2
+ 20*a*b + 15*b^2)*x*cosh(x)^4 + 8*(7*b^2*cosh(x)^3 - 6*(a*b + 2*b^2)*cosh(
x))*sinh(x)^5 + 2*(35*b^2*cosh(x)^4 - 60*(a*b + 2*b^2)*cosh(x)^2 + 4*(8*a^2
 + 20*a*b + 15*b^2)*x)*sinh(x)^4 + 8*(7*b^2*cosh(x)^5 - 20*(a*b + 2*b^2)*co
sh(x)^3 + 4*(8*a^2 + 20*a*b + 15*b^2)*x*cosh(x))*sinh(x)^3 + 8*(a*b + 2*b^2
)*cosh(x)^2 + 4*(7*b^2*cosh(x)^6 - 30*(a*b + 2*b^2)*cosh(x)^4 + 12*(8*a^2 +
 20*a*b + 15*b^2)*x*cosh(x)^2 + 2*a*b + 4*b^2)*sinh(x)^2 + 32*((a^2 + 2*a*b
 + b^2)*cosh(x)^4 + 4*(a^2 + 2*a*b + b^2)*cosh(x)^3*sinh(x) + 6*(a^2 + 2*a*
b + b^2)*cosh(x)^2*sinh(x)^2 + 4*(a^2 + 2*a*b + b^2)*cosh(x)*sinh(x)^3 + (a
^2 + 2*a*b + b^2)*sinh(x)^4)*sqrt((a + b)/a)*log((b^2*cosh(x)^4 + 4*b^2*cos
h(x)*sinh(x)^3 + b^2*sinh(x)^4 + 2*(2*a*b + b^2)*cosh(x)^2 + 2*(3*b^2*cosh(
x)^2 + 2*a*b + b^2)*sinh(x)^2 + 8*a^2 + 8*a*b + b^2 + 4*(b^2*cosh(x)^3 + (2
*a*b + b^2)*cosh(x))*sinh(x) + 4*(a*b*cosh(x)^2 + 2*a*b*cosh(x)*sinh(x) + a
*b*sinh(x)^2 + 2*a^2 + a*b)*sqrt((a + b)/a))/(b*cosh(x)^4 + 4*b*cosh(x)*sin
h(x)^3 + b*sinh(x)^4 + 2*(2*a + b)*cosh(x)^2 + 2*(3*b*cosh(x)^2 + 2*a + b)*
```

```
sinh(x)^2 + 4*(b*cosh(x)^3 + (2*a + b)*cosh(x))*sinh(x) + b)) - b^2 + 8*(b^
2*cosh(x)^7 - 6*(a*b + 2*b^2)*cosh(x)^5 + 4*(8*a^2 + 20*a*b + 15*b^2)*x*cos
h(x)^3 + 2*(a*b + 2*b^2)*cosh(x))*sinh(x))/(b^3*cosh(x)^4 + 4*b^3*cosh(x)^3
*sinh(x) + 6*b^3*cosh(x)^2*sinh(x)^2 + 4*b^3*cosh(x)*sinh(x)^3 + b^3*sinh(x
)^4), 1/64*(b^2*cosh(x)^8 + 8*b^2*cosh(x)*sinh(x)^7 + b^2*sinh(x)^8 - 8*(a*
b + 2*b^2)*cosh(x)^6 + 4*(7*b^2*cosh(x)^2 - 2*a*b - 4*b^2)*sinh(x)^6 + 8*(8
*a^2 + 20*a*b + 15*b^2)*x*cosh(x)^4 + 8*(7*b^2*cosh(x)^3 - 6*(a*b + 2*b^2)*
cosh(x))*sinh(x)^5 + 2*(35*b^2*cosh(x)^4 - 60*(a*b + 2*b^2)*cosh(x)^2 + 4*(
8*a^2 + 20*a*b + 15*b^2)*x)*sinh(x)^4 + 8*(7*b^2*cosh(x)^5 - 20*(a*b + 2*b^
2)*cosh(x)^3 + 4*(8*a^2 + 20*a*b + 15*b^2)*x*cosh(x))*sinh(x)^3 + 8*(a*b +
2*b^2)*cosh(x)^2 + 4*(7*b^2*cosh(x)^6 - 30*(a*b + 2*b^2)*cosh(x)^4 + 12*(8*
a^2 + 20*a*b + 15*b^2)*x*cosh(x)^2 + 2*a*b + 4*b^2)*sinh(x)^2 - 64*((a^2 +
2*a*b + b^2)*cosh(x)^4 + 4*(a^2 + 2*a*b + b^2)*cosh(x)^3*sinh(x) + 6*(a^2 +
 2*a*b + b^2)*cosh(x)^2*sinh(x)^2 + 4*(a^2 + 2*a*b + b^2)*cosh(x)*sinh(x)^3
 + (a^2 + 2*a*b + b^2)*sinh(x)^4)*sqrt(-(a + b)/a)*arctan(1/2*(b*cosh(x)^2
+ 2*b*cosh(x)*sinh(x) + b*sinh(x)^2 + 2*a + b)*sqrt(-(a + b)/a)/(a + b)) -
b^2 + 8*(b^2*cosh(x)^7 - 6*(a*b + 2*b^2)*cosh(x)^5 + 4*(8*a^2 + 20*a*b + 15
*b^2)*x*cosh(x)^3 + 2*(a*b + 2*b^2)*cosh(x))*sinh(x))/(b^3*cosh(x)^4 + 4*b^
3*cosh(x)^3*sinh(x) + 6*b^3*cosh(x)^2*sinh(x)^2 + 4*b^3*cosh(x)*sinh(x)^3 +
 b^3*sinh(x)^4)]
```

Sympy [**F(-1)**] Timed out
time = 0.00, size = 0, normalized size = 0.00

$$\text{Timed out}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(sinh(x)**6/(a+b*cosh(x)**2),x)
```

```
[Out] Timed out
```

Giac [**B**] Leaf count of result is larger than twice the leaf count of optimal. 166 vs. 2(74) = 148.
time = 0.42, size = 166, normalized size = 1.89

$$\frac{be^{(4x)} - 8ae^{(2x)} - 16be^{(2x)}}{64b^2} + \frac{(8a^2 + 20ab + 15b^2)x}{8b^3} - \frac{(48a^2e^{(4x)} + 120abe^{(4x)} + 90b^2e^{(4x)} - 8abe^{(2x)} - 16b^2e^{(2x)} + b^2)e^{(-4x)}}{64b^3} - \frac{(a^3 + 3a^2b + 3ab^2 + b^3)\arctan\left(\frac{be^{(2x)}+2a+b}{2\sqrt{-a^2 - ab}}\right)}{\sqrt{-a^2 - ab}\,b^3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(sinh(x)^6/(a+b*cosh(x)^2),x, algorithm="giac")
```

```
[Out] 1/64*(b*e^(4*x) - 8*a*e^(2*x) - 16*b*e^(2*x))/b^2 + 1/8*(8*a^2 + 20*a*b + 1
5*b^2)*x/b^3 - 1/64*(48*a^2*e^(4*x) + 120*a*b*e^(4*x) + 90*b^2*e^(4*x) - 8*
a*b*e^(2*x) - 16*b^2*e^(2*x) + b^2)*e^(-4*x)/b^3 - (a^3 + 3*a^2*b + 3*a*b^2
 + b^3)*arctan(1/2*(b*e^(2*x) + 2*a + b)/sqrt(-a^2 - a*b))/(sqrt(-a^2 - a*b
)*b^3)
```

Mupad [B]
time = 1.72, size = 248, normalized size = 2.82

$$\frac{e^{4x}}{64b}-\frac{e^{-4x}}{64b}+\frac{x\,(8a^2+20ab+15b^2)}{8b^3}+\frac{e^{-2x}\,(a+2b)}{8b^2}-\frac{e^{2x}\,(a+2b)}{8b^2}+\frac{\ln\left(\frac{4\,(a+b)^5\,(2ab+8a^2\,e^{2x}+b^2\,e^{2x}+b^2+8ab\,e^{2x})}{a\,b^8}-\frac{8\,(a+b)^{11/2}\,(b+4a\,e^{2x}+2b\,e^{2x})}{\sqrt{a}\,b^8}\right)(a+b)^{5/2}}{2\sqrt{a}\,b^3}-\frac{\ln\left(\frac{8\,(a+b)^{11/2}\,(b+4a\,e^{2x}+2b\,e^{2x})}{\sqrt{a}\,b^8}+\frac{4\,(a+b)^5\,(2ab+8a^2\,e^{2x}+b^2\,e^{2x}+b^2+8ab\,e^{2x})}{a\,b^8}\right)(a+b)^{5/2}}{2\sqrt{a}\,b^3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(sinh(x)^6/(a + b*cosh(x)^2),x)
```

```
[Out] exp(4*x)/(64*b) - exp(-4*x)/(64*b) + (x*(20*a*b + 8*a^2 + 15*b^2))/(8*b^3)
+ (exp(-2*x)*(a + 2*b))/(8*b^2) - (exp(2*x)*(a + 2*b))/(8*b^2) + (log((4*(a
 + b)^5*(2*a*b + 8*a^2*exp(2*x) + b^2*exp(2*x) + b^2 + 8*a*b*exp(2*x)))/(a*
b^8) - (8*(a + b)^(11/2)*(b + 4*a*exp(2*x) + 2*b*exp(2*x)))/(a^(1/2)*b^8))*
(a + b)^(5/2))/(2*a^(1/2)*b^3) - (log((8*(a + b)^(11/2)*(b + 4*a*exp(2*x) +
 2*b*exp(2*x)))/(a^(1/2)*b^8) + (4*(a + b)^5*(2*a*b + 8*a^2*exp(2*x) + b^2*
exp(2*x) + b^2 + 8*a*b*exp(2*x)))/(a*b^8))*(a + b)^(5/2))/(2*a^(1/2)*b^3)
```

3.14 $\int \frac{\sinh^4(x)}{a+b\cosh^2(x)}\,dx$

Optimal. Leaf size=59

$$-\frac{(2a+3b)x}{2b^2}+\frac{(a+b)^{3/2}\tanh^{-1}\left(\frac{\sqrt{a}\tanh(x)}{\sqrt{a+b}}\right)}{\sqrt{a}\,b^2}+\frac{\cosh(x)\sinh(x)}{2b}$$

```
[Out] -1/2*(2*a+3*b)*x/b^2+1/2*cosh(x)*sinh(x)/b+(a+b)^(3/2)*arctanh(a^(1/2)*tanh
(x)/(a+b)^(1/2))/b^2/a^(1/2)
```

Rubi [A]
time = 0.08, antiderivative size = 59, normalized size of antiderivative = 1.00, number of steps used = 5, number of rules used = 5, integrand size = 15, $\frac{\text{number of rules}}{\text{integrand size}} = 0.333$, Rules used = {3270, 425, 536, 212, 214}

$$-\frac{x(2a+3b)}{2b^2}+\frac{(a+b)^{3/2}\tanh^{-1}\left(\frac{\sqrt{a}\tanh(x)}{\sqrt{a+b}}\right)}{\sqrt{a}\,b^2}+\frac{\sinh(x)\cosh(x)}{2b}$$

Antiderivative was successfully verified.

```
[In] Int[Sinh[x]^4/(a + b*Cosh[x]^2),x]
```

```
[Out] -1/2*((2*a + 3*b)*x)/b^2 + ((a + b)^(3/2)*ArcTanh[(Sqrt[a]*Tanh[x])/Sqrt[a
+ b]])/(Sqrt[a]*b^2) + (Cosh[x]*Sinh[x])/(2*b)
```

Rule 212

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

Rule 214

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

Rule 425

```
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[1/(a*n*(p + 1)*(b*c - a*d)), Int[(a + b*x^n)^(p + 1)*(c
+ d*x^n)^q*Simp[b*c + n*(p + 1)*(b*c - a*d) + d*b*(n*(p + q + 2) + 1)*x^n,
x], x], x] /; FreeQ[{a, b, c, d, n, q}, x] && NeQ[b*c - a*d, 0] && LtQ[p, -
1] &&  !( !IntegerQ[p] && IntegerQ[q] && LtQ[q, -1]) && IntBinomialQ[a, b,
```

```
c, d, n, p, q, x]
```

Rule 536

```
Int[((e_) + (f_.)*(x_)^(n_))/(((a_) + (b_.)*(x_)^(n_))*((c_) + (d_.)*(x_)^(
n_))), x_Symbol] :> Dist[(b*e - a*f)/(b*c - a*d), Int[1/(a + b*x^n), x], x]
 - Dist[(d*e - c*f)/(b*c - a*d), Int[1/(c + d*x^n), x], x] /; FreeQ[{a, b,
c, d, e, f, n}, x]
```

Rule 3270

```
Int[cos[(e_.) + (f_.)*(x_)]^(m_)*((a_) + (b_.)*sin[(e_.) + (f_.)*(x_)]^2)^(
p_.), x_Symbol] :> With[{ff = FreeFactors[Tan[e + f*x], x]}, Dist[ff/f, Sub
st[Int[(a + (a + b)*ff^2*x^2)^p/(1 + ff^2*x^2)^(m/2 + p + 1), x], x, Tan[e
+ f*x]/ff], x]] /; FreeQ[{a, b, e, f}, x] && IntegerQ[m/2] && IntegerQ[p]
```

Rubi steps

$$\begin{aligned}\int \frac{\sinh^4(x)}{a+b\cosh^2(x)}\,dx &= \text{Subst}\left(\int \frac{1}{(1-x^2)^2\,(a-(a+b)x^2)}\,dx, x, \coth(x)\right)\\ &= \frac{\cosh(x)\sinh(x)}{2b} - \frac{\text{Subst}\left(\int \frac{-a-2b+(-a-b)x^2}{(1-x^2)(a+(-a-b)x^2)}\,dx, x, \coth(x)\right)}{2b}\\ &= \frac{\cosh(x)\sinh(x)}{2b} + \frac{(a+b)^2\text{Subst}\left(\int \frac{1}{a+(-a-b)x^2}\,dx, x, \coth(x)\right)}{b^2} - \frac{(2a+3b)\text{Subst}\left(\int\right.}{2}\\ &= -\frac{(2a+3b)x}{2b^2} + \frac{(a+b)^{3/2}\tanh^{-1}\left(\frac{\sqrt{a}\,\tanh(x)}{\sqrt{a+b}}\right)}{\sqrt{a}\,b^2} + \frac{\cosh(x)\sinh(x)}{2b}\end{aligned}$$

Mathematica [A]
time = 0.07, size = 52, normalized size = 0.88

$$\frac{-4ax-6bx+\frac{4(a+b)^{3/2}\tanh^{-1}\left(\frac{\sqrt{a}\,\tanh(x)}{\sqrt{a+b}}\right)}{\sqrt{a}}+b\sinh(2x)}{4b^2}$$

Antiderivative was successfully verified.

```
[In] Integrate[Sinh[x]^4/(a + b*Cosh[x]^2),x]
```

```
[Out] (-4*a*x - 6*b*x + (4*(a + b)^(3/2)*ArcTanh[(Sqrt[a]*Tanh[x])/Sqrt[a + b]])/
Sqrt[a] + b*Sinh[2*x])/(4*b^2)
```

Maple [B] Leaf count of result is larger than twice the leaf count of optimal. 184 vs. $2(47) = 94$.
time = 0.74, size = 185, normalized size = 3.14

method	result
default	$\frac{2(a^2+2ab+b^2)\left(\frac{\ln\left(\sqrt{a+b}\,\left(\tanh^2\left(\frac{x}{2}\right)\right)+2\tanh\left(\frac{x}{2}\right)\sqrt{a}+\sqrt{a+b}\right)}{4\sqrt{a}\,\sqrt{a+b}}-\frac{\ln\left(\sqrt{a+b}\,\left(\tanh^2\left(\frac{x}{2}\right)\right)-2\tanh\left(\frac{x}{2}\right)\sqrt{a}+\sqrt{a+b}\right)}{4\sqrt{a}\,\sqrt{a+b}}\right.}{b^2}$
risch	$-\frac{ax}{b^2}-\frac{3x}{2b}+\frac{e^{2x}}{8b}-\frac{e^{-2x}}{8b}+\frac{\sqrt{a\left(a+b\right)}\,\ln\left(e^{2x}-\frac{2\sqrt{a\left(a+b\right)}-2a-b}{b}\right)}{2b^2}+\frac{\sqrt{a\left(a+b\right)}\,\ln\left(e^{2x}-\frac{2\sqrt{a\left(a+b\right.}}{b}\right.}{2ab}$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(sinh(x)^4/(a+b*cosh(x)^2),x,method=_RETURNVERBOSE)
```

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

Maxima [B] Leaf count of result is larger than twice the leaf count of optimal. 348 vs. $2(47) = 94$.
time = 0.49, size = 348, normalized size = 5.90

$$\frac{(2a+b)\log\left(\frac{be^{(2x)}+2a+b-2\sqrt{(a+b)a}}{be^{(2x)}+2a+b+2\sqrt{(a+b)a}}\right)}{4\sqrt{(a+b)a}\,b}-\frac{3\log\left(\frac{be^{(-2x)}+2a+b-2\sqrt{(a+b)a}}{be^{(-2x)}+2a+b+2\sqrt{(a+b)a}}\right)}{16\sqrt{(a+b)a}}-\frac{(2a+b)x}{b^2}-\frac{x}{b}+\frac{e^{(2x)}}{8b}-\frac{e^{(-2x)}}{8b}+\frac{(2a+b)\log\left(be^{(4x)}+2(2a+b)e^{(2x)}+b\right)}{8b^2}-\frac{(2a+b)\log\left(2(2a+b)e^{(-2x)}+be^{(-4x)}+b\right)}{8b^2}+\frac{(8a^2+8ab+b^2)\log\left(\frac{be^{(2x)}+2a+b-2\sqrt{(a+b)a}}{be^{(2x)}+2a+b+2\sqrt{(a+b)a}}\right)}{32\sqrt{(a+b)a}\,b^2}-\frac{(8a^2+8ab+b^2)\log\left(\frac{be^{(-2x)}+2a+b-2\sqrt{(a+b)a}}{be^{(-2x)}+2a+b+2\sqrt{(a+b)a}}\right)}{32\sqrt{(a+b)a}\,b^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(sinh(x)^4/(a+b*cosh(x)^2),x, algorithm="maxima")
```

```
[Out] 1/4*(2*a + b)*log((b*e^(2*x) + 2*a + b - 2*sqrt((a + b)*a))/(b*e^(2*x) + 2*
a + b + 2*sqrt((a + b)*a)))/(sqrt((a + b)*a)*b) - 3/16*log((b*e^(-2*x) + 2*
a + b - 2*sqrt((a + b)*a))/(b*e^(-2*x) + 2*a + b + 2*sqrt((a + b)*a)))/sqrt
((a + b)*a) - (2*a + b)*x/b^2 - x/b + 1/8*e^(2*x)/b - 1/8*e^(-2*x)/b + 1/8*
(2*a + b)*log(b*e^(4*x) + 2*(2*a + b)*e^(2*x) + b)/b^2 - 1/8*(2*a + b)*log(
2*(2*a + b)*e^(-2*x) + b*e^(-4*x) + b)/b^2 + 1/32*(8*a^2 + 8*a*b + b^2)*log
((b*e^(2*x) + 2*a + b - 2*sqrt((a + b)*a))/(b*e^(2*x) + 2*a + b + 2*sqrt((a
 + b)*a)))/(sqrt((a + b)*a)*b^2) - 1/32*(8*a^2 + 8*a*b + b^2)*log((b*e^(-2*
x) + 2*a + b - 2*sqrt((a + b)*a))/(b*e^(-2*x) + 2*a + b + 2*sqrt((a + b)*a)
))/(sqrt((a + b)*a)*b^2)
```

Fricas [B] Leaf count of result is larger than twice the leaf count of optimal. 196 vs. $2(47) = 94$.
time = 0.40, size = 568, normalized size = 9.63

[illegible]

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(sinh(x)^4/(a+b*cosh(x)^2),x, algorithm="fricas")
```

```
[Out] [1/8*(b*cosh(x)^4 + 4*b*cosh(x)*sinh(x)^3 + b*sinh(x)^4 - 4*(2*a + 3*b)*x*c
osh(x)^2 + 2*(3*b*cosh(x)^2 - 2*(2*a + 3*b)*x)*sinh(x)^2 + 4*((a + b)*cosh(
x)^2 + 2*(a + b)*cosh(x)*sinh(x) + (a + b)*sinh(x)^2)*sqrt((a + b)/a)*log((
b^2*cosh(x)^4 + 4*b^2*cosh(x)*sinh(x)^3 + b^2*sinh(x)^4 + 2*(2*a*b + b^2)*c
osh(x)^2 + 2*(3*b^2*cosh(x)^2 + 2*a*b + b^2)*sinh(x)^2 + 8*a^2 + 8*a*b + b^
2 + 4*(b^2*cosh(x)^3 + (2*a*b + b^2)*cosh(x))*sinh(x) - 4*(a*b*cosh(x)^2 +
2*a*b*cosh(x)*sinh(x) + a*b*sinh(x)^2 + 2*a^2 + a*b)*sqrt((a + b)/a))/(b*co
sh(x)^4 + 4*b*cosh(x)*sinh(x)^3 + b*sinh(x)^4 + 2*(2*a + b)*cosh(x)^2 + 2*(
3*b*cosh(x)^2 + 2*a + b)*sinh(x)^2 + 4*(b*cosh(x)^3 + (2*a + b)*cosh(x))*si
nh(x) + b)) + 4*(b*cosh(x)^3 - 2*(2*a + 3*b)*x*cosh(x))*sinh(x) - b)/(b^2*c
osh(x)^2 + 2*b^2*cosh(x)*sinh(x) + b^2*sinh(x)^2), 1/8*(b*cosh(x)^4 + 4*b*c
osh(x)*sinh(x)^3 + b*sinh(x)^4 - 4*(2*a + 3*b)*x*cosh(x)^2 + 2*(3*b*cosh(x)
^2 - 2*(2*a + 3*b)*x)*sinh(x)^2 + 8*((a + b)*cosh(x)^2 + 2*(a + b)*cosh(x)*
sinh(x) + (a + b)*sinh(x)^2)*sqrt(-(a + b)/a)*arctan(1/2*(b*cosh(x)^2 + 2*b
*cosh(x)*sinh(x) + b*sinh(x)^2 + 2*a + b)*sqrt(-(a + b)/a)/(a + b)) + 4*(b*
cosh(x)^3 - 2*(2*a + 3*b)*x*cosh(x))*sinh(x) - b)/(b^2*cosh(x)^2 + 2*b^2*co
sh(x)*sinh(x) + b^2*sinh(x)^2)]
```

Sympy [**F(-1)**] Timed out
time = 0.00, size = 0, normalized size = 0.00

$$\text{Timed out}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(sinh(x)**4/(a+b*cosh(x)**2),x)
```

```
[Out] Timed out
```

Giac [**B**] Leaf count of result is larger than twice the leaf count of optimal. 103 vs. 2(47) = 94.
time = 0.40, size = 103, normalized size = 1.75

$$-\frac{(2\,a+3\,b)x}{2\,b^2}+\frac{e^{(2\,x)}}{8\,b}+\frac{\left(4\,ae^{(2\,x)}+6\,be^{(2\,x)}-b\right)e^{(-2\,x)}}{8\,b^2}+\frac{(a^2+2\,ab+b^2)\arctan\left(\frac{be^{(2\,x)}+2\,a+b}{2\,\sqrt{-a^2-ab}}\right)}{\sqrt{-a^2-ab}\,b^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(sinh(x)^4/(a+b*cosh(x)^2),x, algorithm="giac")
```

```
[Out] -1/2*(2*a + 3*b)*x/b^2 + 1/8*e^(2*x)/b + 1/8*(4*a*e^(2*x) + 6*b*e^(2*x) - b
)*e^(-2*x)/b^2 + (a^2 + 2*a*b + b^2)*arctan(1/2*(b*e^(2*x) + 2*a + b)/sqrt(
-a^2 - a*b))/(sqrt(-a^2 - a*b)*b^2)
```

Mupad [B]
time = 1.27, size = 146, normalized size = 2.47

$$\frac{e^{2x}}{8b}-\frac{e^{-2x}}{8b}-\frac{x\,(2\,a+3\,b)}{2\,b^2}+\frac{\ln\left(-\frac{4\,e^{2\,x}\,(a+b)^2}{b^3}-\frac{2\,(a+b)^{3/2}\,(b+2\,a\,e^{2\,x}+b\,e^{2\,x})}{\sqrt{a}\,b^3}\right)\,(a+b)^{3/2}}{2\,\sqrt{a}\,b^2}-\frac{\ln\left(\frac{2\,(a+b)^{3/2}\,(b+2\,a\,e^{2\,x}+b\,e^{2\,x})}{\sqrt{a}\,b^3}-\frac{4\,e^{2\,x}\,(a+b)^2}{b^3}\right)\,(a+b)^{3/2}}{2\,\sqrt{a}\,b^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(sinh(x)^4/(a + b*cosh(x)^2),x)
```

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

3.15 $\int \frac{\sinh^2(x)}{a+b\cosh^2(x)}\,dx$

Optimal. Leaf size=39

$$\frac{x}{b}-\frac{\sqrt{a+b}\,\tanh^{-1}\left(\frac{\sqrt{a}\,\tanh(x)}{\sqrt{a+b}}\right)}{\sqrt{a}\,b}$$

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

Rubi [A]
time = 0.04, antiderivative size = 39, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 4, integrand size = 15, $\frac{\text{number of rules}}{\text{integrand size}} = 0.267$, Rules used = {3270, 400, 212, 214}

$$\frac{x}{b}-\frac{\sqrt{a+b}\,\tanh^{-1}\left(\frac{\sqrt{a}\,\tanh(x)}{\sqrt{a+b}}\right)}{\sqrt{a}\,b}$$

Antiderivative was successfully verified.

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

```
[Out] x/b - (Sqrt[a + b]*ArcTanh[(Sqrt[a]*Tanh[x])/Sqrt[a + b]])/(Sqrt[a]*b)
```

Rule 212

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

Rule 214

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

Rule 400

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

Rule 3270

```
Int[cos[(e_.) + (f_.)*(x_)]^(m_)*((a_) + (b_.)*sin[(e_.) + (f_.)*(x_)]^2)^(
p_.), x_Symbol] :> With[{ff = FreeFactors[Tan[e + f*x], x]}, Dist[ff/f, Sub
st[Int[(a + (a + b)*ff^2*x^2)^p/(1 + ff^2*x^2)^(m/2 + p + 1), x], x, Tan[e
```

```
+ f*x]/ff], x]] /; FreeQ[{a, b, e, f}, x] && IntegerQ[m/2] && IntegerQ[p]
```

Rubi steps

$$\begin{aligned}\int \frac{\sinh^2(x)}{a+b\cosh^2(x)}\,dx &= -\text{Subst}\left(\int \frac{1}{(1-x^2)\,(a-(a+b)x^2)}\,dx,x,\coth(x)\right)\\ &= \frac{\text{Subst}\left(\int \frac{1}{1-x^2}\,dx,x,\coth(x)\right)}{b}-\frac{(a+b)\text{Subst}\left(\int \frac{1}{a+(-a-b)x^2}\,dx,x,\coth(x)\right)}{b}\\ &= \frac{x}{b}-\frac{\sqrt{a+b}\,\tanh^{-1}\left(\frac{\sqrt{a}\,\tanh(x)}{\sqrt{a+b}}\right)}{\sqrt{a}\,b}\end{aligned}$$

Mathematica [**A**]
time = 0.04, size = 36, normalized size = 0.92

$$\frac{x-\frac{\sqrt{a+b}\,\tanh^{-1}\left(\frac{\sqrt{a}\,\tanh(x)}{\sqrt{a+b}}\right)}{\sqrt{a}}}{b}$$

Antiderivative was successfully verified.

```
[In] Integrate[Sinh[x]^2/(a + b*Cosh[x]^2),x]
[Out] (x - (Sqrt[a + b]*ArcTanh[(Sqrt[a]*Tanh[x])/Sqrt[a + b]])/Sqrt[a])/b
```

Maple [**B**] Leaf count of result is larger than twice the leaf count of optimal. 109 vs. $2(31) = 62$.
time = 0.68, size = 110, normalized size = 2.82

method	result
risch	$\frac{x}{b}+\frac{\sqrt{a\,(a+b)}\,\ln\left(\mathrm{e}^{2x}+\frac{2\sqrt{a\,(a+b)}+2a+b}{b}\right)}{2ab}-\frac{\sqrt{a\,(a+b)}\,\ln\left(\mathrm{e}^{2x}-\frac{2\sqrt{a\,(a+b)}-2a-b}{b}\right)}{2ab}$
default	$\frac{\ln\left(\tanh\left(\frac{x}{2}\right)+1\right)}{b}-\frac{\ln\left(\tanh\left(\frac{x}{2}\right)-1\right)}{b}+\frac{2(a+b)\left(-\frac{\ln\left(\sqrt{a+b}\,\left(\tanh^2\left(\frac{x}{2}\right)\right)+2\tanh\left(\frac{x}{2}\right)\sqrt{a}+\sqrt{a+b}\right)}{4\sqrt{a}\,\sqrt{a+b}}+\frac{\ln\left(\sqrt{a+b}\,\left(\tanh^2\left(\right.\right.\right.}{4\sqrt{}}\right.}{b}$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(sinh(x)^2/(a+b*cosh(x)^2),x,method=_RETURNVERBOSE)
```

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

Maxima [**B**] Leaf count of result is larger than twice the leaf count of optimal. 120 vs. $2(31) = 62$.
time = 0.48, size = 120, normalized size = 3.08

$$-\frac{(2a+b)\log\left(\frac{be^{(2x)}+2a+b-2\sqrt{(a+b)a}}{be^{(2x)}+2a+b+2\sqrt{(a+b)a}}\right)}{4\sqrt{(a+b)a}\,b}+\frac{\log\left(\frac{be^{(-2x)}+2a+b-2\sqrt{(a+b)a}}{be^{(-2x)}+2a+b+2\sqrt{(a+b)a}}\right)}{4\sqrt{(a+b)a}}+\frac{x}{b}$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

Fricas [**A**]
time = 0.41, size = 300, normalized size = 7.69

$$\left[\frac{\sqrt{\frac{a+b}{a}}\log\left(\frac{b^2\cosh(x)^4+4b^2\cosh(x)\sinh(x)^3+b^2\sinh(x)^4+2(2ab+b^2)\cosh(x)^2+2\left(3b^2\cosh(x)^2+2ab+b^2\right)\sinh(x)^2+8a^2+8ab+b^2+4\left(b^2\cosh(x)^3+(2ab+b^2)\cosh(x)\right)\sinh(x)+4\left(ab\cosh(x)^2+2ab\cosh(x)\sinh(x)+ab\sinh(x)^2+2a^2+ab\right)\sqrt{\frac{a+b}{a}}}{b\cosh(x)^4+4b\cosh(x)\sinh(x)^3+b\sinh(x)^4+2(2a+b)\cosh(x)^2+2\left(3b\cosh(x)^2+2a+b\right)\sinh(x)^2+4\left(b\cosh(x)^3+(2a+b)\cosh(x)\right)\sinh(x)+b}\right)+2x}{2b},\ -\frac{\sqrt{-\frac{a+b}{a}}\arctan\left(\frac{\left(b\cosh(x)^2+2b\cosh(x)\sinh(x)+b\sinh(x)^2+2a+b\right)\sqrt{-\frac{a+b}{a}}}{2(a+b)}\right)-x}{b}\right]$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] [1/2*(sqrt((a + b)/a)*log((b^2*cosh(x)^4 + 4*b^2*cosh(x)*sinh(x)^3 + b^2*si
nh(x)^4 + 2*(2*a*b + b^2)*cosh(x)^2 + 2*(3*b^2*cosh(x)^2 + 2*a*b + b^2)*sin
h(x)^2 + 8*a^2 + 8*a*b + b^2 + 4*(b^2*cosh(x)^3 + (2*a*b + b^2)*cosh(x))*si
nh(x) + 4*(a*b*cosh(x)^2 + 2*a*b*cosh(x)*sinh(x) + a*b*sinh(x)^2 + 2*a^2 +
a*b)*sqrt((a + b)/a))/(b*cosh(x)^4 + 4*b*cosh(x)*sinh(x)^3 + b*sinh(x)^4 +
2*(2*a + b)*cosh(x)^2 + 2*(3*b*cosh(x)^2 + 2*a + b)*sinh(x)^2 + 4*(b*cosh(x
)^3 + (2*a + b)*cosh(x))*sinh(x) + b)) + 2*x)/b, -(sqrt(-(a + b)/a)*arctan(
1/2*(b*cosh(x)^2 + 2*b*cosh(x)*sinh(x) + b*sinh(x)^2 + 2*a + b)*sqrt(-(a +
b)/a)/(a + b)) - x)/b]
```

Sympy [**F(-1)**] Timed out
time = 0.00, size = 0, normalized size = 0.00

Timed out

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(sinh(x)**2/(a+b*cosh(x)**2),x)
```

```
[Out] Timed out
```

Giac [A]
time = 0.42, size = 52, normalized size = 1.33

$$-\frac{(a+b)\arctan\left(\frac{be^{(2x)}+2a+b}{2\sqrt{-a^2-ab}}\right)}{\sqrt{-a^2-ab}\,b}+\frac{x}{b}$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

Mupad [B]
time = 0.22, size = 79, normalized size = 2.03

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

Verification of antiderivative is not currently implemented for this CAS.

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

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

3.16 $\int \frac{1}{a+b\cosh^2(x)}\,dx$

Optimal. Leaf size=29

$$\frac{\tanh^{-1}\left(\frac{\sqrt{a}\,\tanh(x)}{\sqrt{a+b}}\right)}{\sqrt{a}\,\sqrt{a+b}}$$

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

Rubi [A]
time = 0.02, antiderivative size = 29, 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 = {3260, 214}

$$\frac{\tanh^{-1}\left(\frac{\sqrt{a}\,\tanh(x)}{\sqrt{a+b}}\right)}{\sqrt{a}\,\sqrt{a+b}}$$

Antiderivative was successfully verified.

```
[In] Int[(a + b*Cosh[x]^2)^(-1),x]
```

```
[Out] ArcTanh[(Sqrt[a]*Tanh[x])/Sqrt[a + b]]/(Sqrt[a]*Sqrt[a + b])
```

Rule 214

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

Rule 3260

```
Int[((a_) + (b_.)*sin[(e_.) + (f_.)*(x_)]^2)^(-1), x_Symbol] :> With[{ff =
FreeFactors[Tan[e + f*x], x]}, Dist[ff/f, Subst[Int[1/(a + (a + b)*ff^2*x^2
), x], x, Tan[e + f*x]/ff], x]] /; FreeQ[{a, b, e, f}, x]
```

Rubi steps

$$\begin{aligned}\int \frac{1}{a+b\cosh^2(x)}\,dx &= \text{Subst}\left(\int \frac{1}{a-(a+b)x^2}\,dx, x, \coth(x)\right)\\ &= \frac{\tanh^{-1}\left(\frac{\sqrt{a}\,\tanh(x)}{\sqrt{a+b}}\right)}{\sqrt{a}\,\sqrt{a+b}}\end{aligned}$$

Mathematica [A]
time = 0.05, size = 29, normalized size = 1.00

$$\frac{\tanh^{-1}\left(\frac{\sqrt{a}\tanh(x)}{\sqrt{a+b}}\right)}{\sqrt{a}\sqrt{a+b}}$$

Antiderivative was successfully verified.

```
[In] Integrate[(a + b*Cosh[x]^2)^(-1),x]
```

```
[Out] ArcTanh[(Sqrt[a]*Tanh[x])/Sqrt[a + b]]/(Sqrt[a]*Sqrt[a + b])
```

Maple [B] Leaf count of result is larger than twice the leaf count of optimal. 80 vs. 2(21) = 42.
time = 0.45, size = 81, normalized size = 2.79

method	result	size
default	$\frac{\ln\left(\sqrt{a+b}\,(\tanh^2(\frac{x}{2}))+2\tanh(\frac{x}{2})\sqrt{a}+\sqrt{a+b}\right)}{2\sqrt{a}\,\sqrt{a+b}}-\frac{\ln\left(-\sqrt{a+b}\,(\tanh^2(\frac{x}{2}))+2\tanh(\frac{x}{2})\sqrt{a}-\sqrt{a+b}\right)}{2\sqrt{a}\,\sqrt{a+b}}$	81
risch	$\frac{\ln\left(e^{2x}+\frac{2a\sqrt{a^2+ab}+b\sqrt{a^2+ab}-2a^2-2ab}{b\sqrt{a^2+ab}}\right)}{2\sqrt{a^2+ab}}-\frac{\ln\left(e^{2x}+\frac{2a\sqrt{a^2+ab}+b\sqrt{a^2+ab}+2a^2+2ab}{b\sqrt{a^2+ab}}\right)}{2\sqrt{a^2+ab}}$	128

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(1/(a+b*cosh(x)^2),x,method=_RETURNVERBOSE)
```

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

Maxima [B] Leaf count of result is larger than twice the leaf count of optimal. 53 vs. 2(21) = 42.
time = 0.48, size = 53, normalized size = 1.83

$$-\frac{\log\left(\frac{be^{(-2x)}+2a+b-2\sqrt{(a+b)a}}{be^{(-2x)}+2a+b+2\sqrt{(a+b)a}}\right)}{2\sqrt{(a+b)a}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(a+b*cosh(x)^2),x, algorithm="maxima")
```

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

Fricas [B] Leaf count of result is larger than twice the leaf count of optimal. 70 vs. $2(21) = 42$.
time = 0.38, size = 293, normalized size = 10.10

$$\left[\frac{\log\left(\frac{b^2\cosh(x)^4+4\,b^2\cosh(x)\sinh(x)^3+b^2\sinh(x)^4+2\,(2\,ab+b^2)\cosh(x)^2+2\,\left(3\,b^2\cosh(x)^2+2\,ab+b^2\right)\sinh(x)^2+8\,a^2+8\,ab+b^2+4\,\left(b^2\cosh(x)^3+(2\,ab+b^2)\cosh(x)\right)\sinh(x)-4\,\left(b\cosh(x)^2+2\,b\cosh(x)\sinh(x)+b\sinh(x)^2+2\,a+b\right)\sqrt{a^2+ab}}{b\cosh(x)^4+4\,b\cosh(x)\sinh(x)^3+b\sinh(x)^4+2\,(2\,a+b)\cosh(x)^2+2\,\left(3\,b\cosh(x)^2+2\,a+b\right)\sinh(x)^2+4\,\left(b\cosh(x)^3+(2\,a+b)\cosh(x)\right)\sinh(x)+b}\right)}{2\,\sqrt{a^2+ab}}, \frac{\sqrt{-a^2-ab}\arctan\left(\frac{\left(b\cosh(x)^2+2\,b\cosh(x)\sinh(x)+b\sinh(x)^2+2\,a+b\right)\sqrt{-a^2-ab}}{2\,(a^2+ab)}\right)}{a^2+ab}\right]$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(a+b*cosh(x)^2),x, algorithm="fricas")
```

```
[Out] [1/2*log((b^2*cosh(x)^4 + 4*b^2*cosh(x)*sinh(x)^3 + b^2*sinh(x)^4 + 2*(2*a*
b + b^2)*cosh(x)^2 + 2*(3*b^2*cosh(x)^2 + 2*a*b + b^2)*sinh(x)^2 + 8*a^2 +
8*a*b + b^2 + 4*(b^2*cosh(x)^3 + (2*a*b + b^2)*cosh(x))*sinh(x) - 4*(b*cosh
(x)^2 + 2*b*cosh(x)*sinh(x) + b*sinh(x)^2 + 2*a + b)*sqrt(a^2 + a*b))/(b*co
sh(x)^4 + 4*b*cosh(x)*sinh(x)^3 + b*sinh(x)^4 + 2*(2*a + b)*cosh(x)^2 + 2*(
3*b*cosh(x)^2 + 2*a + b)*sinh(x)^2 + 4*(b*cosh(x)^3 + (2*a + b)*cosh(x))*si
nh(x) + b))/sqrt(a^2 + a*b), sqrt(-a^2 - a*b)*arctan(1/2*(b*cosh(x)^2 + 2*b
*cosh(x)*sinh(x) + b*sinh(x)^2 + 2*a + b)*sqrt(-a^2 - a*b)/(a^2 + a*b))/(a^
2 + a*b)]
```

Sympy [B] Leaf count of result is larger than twice the leaf count of optimal. 10924 vs. $2(27) = 54$.
time = 30.58, size = 10924, normalized size = 376.69

Too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(a+b*cosh(x)**2),x)
```

```
[Out] Piecewise((zoo*tanh(x/2)/(tanh(x/2)**2 + 1), Eq(a, 0) & Eq(b, 0)), (2*tanh(
x/2)/(b*(tanh(x/2)**2 + 1)), Eq(a, 0)), (-tanh(x/2)/(2*b) - 1/(2*b*tanh(x/2
)), Eq(a, -b)), (-a**3*sqrt(a/(a + b) - b/(a + b) - 2*sqrt(-a*b)/(a + b))*l
og(-sqrt(a/(a + b) - b/(a + b) + 2*sqrt(-a*b)/(a + b)) + tanh(x/2))/(2*a**4
*sqrt(a/(a + b) - b/(a + b) - 2*sqrt(-a*b)/(a + b))*sqrt(a/(a + b) - b/(a +
 b) + 2*sqrt(-a*b)/(a + b)) - 10*a**3*b*sqrt(a/(a + b) - b/(a + b) - 2*sqrt
(-a*b)/(a + b))*sqrt(a/(a + b) - b/(a + b) + 2*sqrt(-a*b)/(a + b)) + 8*a**3
*sqrt(-a*b)*sqrt(a/(a + b) - b/(a + b) - 2*sqrt(-a*b)/(a + b))*sqrt(a/(a +
b) - b/(a + b) + 2*sqrt(-a*b)/(a + b)) - 10*a**2*b**2*sqrt(a/(a + b) - b/(a
 + b) - 2*sqrt(-a*b)/(a + b))*sqrt(a/(a + b) - b/(a + b) + 2*sqrt(-a*b)/(a
+ b)) + 2*a*b**3*sqrt(a/(a + b) - b/(a + b) - 2*sqrt(-a*b)/(a + b))*sqrt(a/
(a + b) - b/(a + b) + 2*sqrt(-a*b)/(a + b)) - 8*a*b**2*sqrt(-a*b)*sqrt(a/(a
 + b) - b/(a + b) - 2*sqrt(-a*b)/(a + b))*sqrt(a/(a + b) - b/(a + b) + 2*sq
rt(-a*b)/(a + b))) + a**3*sqrt(a/(a + b) - b/(a + b) - 2*sqrt(-a*b)/(a + b)
)*log(sqrt(a/(a + b) - b/(a + b) + 2*sqrt(-a*b)/(a + b)) + tanh(x/2))/(2*a*
*4*sqrt(a/(a + b) - b/(a + b) - 2*sqrt(-a*b)/(a + b))*sqrt(a/(a + b) - b/(a
```

```
 + b) + 2*sqrt(-a*b)/(a + b)) - 10*a**3*b*sqrt(a/(a + b) - b/(a + b) - 2*sq
rt(-a*b)/(a + b))*sqrt(a/(a + b) - b/(a + b) + 2*sqrt(-a*b)/(a + b)) + 8*a*
*3*sqrt(-a*b)*sqrt(a/(a + b) - b/(a + b) - 2*sqrt(-a*b)/(a + b))*sqrt(a/(a
+ b) - b/(a + b) + 2*sqrt(-a*b)/(a + b)) - 10*a**2*b**2*sqrt(a/(a + b) - b/
(a + b) - 2*sqrt(-a*b)/(a + b))*sqrt(a/(a + b) - b/(a + b) + 2*sqrt(-a*b)/(
a + b)) + 2*a*b**3*sqrt(a/(a + b) - b/(a + b) - 2*sqrt(-a*b)/(a + b))*sqrt(
a/(a + b) - b/(a + b) + 2*sqrt(-a*b)/(a + b)) - 8*a*b**2*sqrt(-a*b)*sqrt(a/
(a + b) - b/(a + b) - 2*sqrt(-a*b)/(a + b))*sqrt(a/(a + b) - b/(a + b) + 2*
sqrt(-a*b)/(a + b))) - a**3*sqrt(a/(a + b) - b/(a + b) + 2*sqrt(-a*b)/(a +
b))*log(-sqrt(a/(a + b) - b/(a + b) - 2*sqrt(-a*b)/(a + b)) + tanh(x/2))/(2
*a**4*sqrt(a/(a + b) - b/(a + b) - 2*sqrt(-a*b)/(a + b))*sqrt(a/(a + b) - b
/(a + b) + 2*sqrt(-a*b)/(a + b)) - 10*a**3*b*sqrt(a/(a + b) - b/(a + b) - 2
*sqrt(-a*b)/(a + b))*sqrt(a/(a + b) - b/(a + b) + 2*sqrt(-a*b)/(a + b)) + 8
*a**3*sqrt(-a*b)*sqrt(a/(a + b) - b/(a + b) - 2*sqrt(-a*b)/(a + b))*sqrt(a/
(a + b) - b/(a + b) + 2*sqrt(-a*b)/(a + b)) - 10*a**2*b**2*sqrt(a/(a + b) -
 b/(a + b) - 2*sqrt(-a*b)/(a + b))*sqrt(a/(a + b) - b/(a + b) + 2*sqrt(-a*b
)/(a + b)) + 2*a*b**3*sqrt(a/(a + b) - b/(a + b) - 2*sqrt(-a*b)/(a + b))*sq
rt(a/(a + b) - b/(a + b) + 2*sqrt(-a*b)/(a + b)) - 8*a*b**2*sqrt(-a*b)*sqrt
(a/(a + b) - b/(a + b) - 2*sqrt(-a*b)/(a + b))*sqrt(a/(a + b) - b/(a + b) +
 2*sqrt(-a*b)/(a + b))) + a**3*sqrt(a/(a + b) - b/(a + b) + 2*sqrt(-a*b)/(a
 + b))*log(sqrt(a/(a + b) - b/(a + b) - 2*sqrt(-a*b)/(a + b)) + tanh(x/2))/
(2*a**4*sqrt(a/(a + b) - b/(a + b) - 2*sqrt(-a*b)/(a + b))*sqrt(a/(a + b) -
 b/(a + b) + 2*sqrt(-a*b)/(a + b)) - 10*a**3*b*sqrt(a/(a + b) - b/(a + b) -
 2*sqrt(-a*b)/(a + b))*sqrt(a/(a + b) - b/(a + b) + 2*sqrt(-a*b)/(a + b)) +
 8*a**3*sqrt(-a*b)*sqrt(a/(a + b) - b/(a + b) - 2*sqrt(-a*b)/(a + b))*sqrt(
a/(a + b) - b/(a + b) + 2*sqrt(-a*b)/(a + b)) - 10*a**2*b**2*sqrt(a/(a + b)
 - b/(a + b) - 2*sqrt(-a*b)/(a + b))*sqrt(a/(a + b) - b/(a + b) + 2*sqrt(-a
*b)/(a + b)) + 2*a*b**3*sqrt(a/(a + b) - b/(a + b) - 2*sqrt(-a*b)/(a + b))*
sqrt(a/(a + b) - b/(a + b) + 2*sqrt(-a*b)/(a + b)) - 8*a*b**2*sqrt(-a*b)*sq
rt(a/(a + b) - b/(a + b) - 2*sqrt(-a*b)/(a + b))*sqrt(a/(a + b) - b/(a + b)
 + 2*sqrt(-a*b)/(a + b))) + 10*a**2*b*sqrt(a/(a + b) - b/(a + b) - 2*sqrt(-
a*b)/(a + b))*log(-sqrt(a/(a + b) - b/(a + b) + 2*sqrt(-a*b)/(a + b)) + tan
h(x/2))/(2*a**4*sqrt(a/(a + b) - b/(a + b) - 2*sqrt(-a*b)/(a + b))*sqrt(a/(
a + b) - b/(a + b) + 2*sqrt(-a*b)/(a + b)) - 10*a**3*b*sqrt(a/(a + b) - b/(
a + b) - 2*sqrt(-a*b)/(a + b))*sqrt(a/(a + b) - b/(a + b) + 2*sqrt(-a*b)/(a
 + b)) + 8*a**3*sqrt(-a*b)*sqrt(a/(a + b) - b/(a + b) - 2*sqrt(-a*b)/(a + b
))*sqrt(a/(a + b) - b/(a + b) + 2*sqrt(-a*b)/(a + b)) - 10*a**2*b**2*sqrt(a
/(a + b) - b/(a + b) - 2*sqrt(-a*b)/(a + b))*sqrt(a/(a + b) - b/(a + b) + 2
*sqrt(-a*b)/(a + b)) + 2*a*b**3*sqrt(a/(a + b) - b/(a + b) - 2*sqrt(-a*b)/(
a + b))*sqrt(a/(a + b) - b/(a + b) + 2*sqrt(-a*b)/(a + b)) - 8*a*b**2*sqrt(
-a*b)*sqrt(a/(a + b) - b/(a + b) - 2*sqrt(-a*b)/(a + b))*sqrt(a/(a + b) - b
/(a + b) + 2*sqrt(-a*b)/(a + b))) - 10*a**2*b*sqrt(a/(a + b) - b/(a + b) -
2*sqrt(-a*b)/(a + b))*log(sqrt(a/(a + b) - b/(a + b) + 2*sqrt(-a*b)/(a + b)
) + tanh(x/2))/(2*a**4*sqrt(a/(a + b) - b/(a + b) - 2*sqrt(-a*b)/(a + b))*s
qrt(a/(a + b) - b/(a + b) + 2*sqrt(-a*b)/(a + b)) - 10*a**3*b*sqrt(a/(a + b
```

```
) - b/(a + b) - 2*sqrt(-a*b)/(a + b))*sqrt(a/(a + b) - b/(a + b) + 2*sqrt(-
a*b)/(a + b)) + 8*a**3*sqrt(-a*b)*sqrt(a/(a + b) - b/(a + b) - 2*sqrt(-a*b)
/(a + b))*sqrt(a/(a + b) - b/(a + b) + 2*sqrt(-a*b)/(a + b)) - 10*a**2*b**2
*sqrt(a/(a + b) - b/(a + b) - 2*sqrt(-a*b)/(a + b))*sqrt(a/(a + b) - b/(a +
 b) + 2*sqrt(-a*b)/(a + b)) + 2*a*b**3*sqrt(a/(a + b) - b/(a + b) - 2*sqrt(
-a*b)/(a + b))*sqrt(a/(a + b) - b/(a + b) + 2*s...
```

Giac [A]
time = 0.41, size = 39, normalized size = 1.34

$$\frac{\arctan\left(\frac{be^{(2x)}+2a+b}{2\sqrt{-a^2-ab}}\right)}{\sqrt{-a^2-ab}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(a+b*cosh(x)^2),x, algorithm="giac")
```

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

Mupad [B]
time = 0.35, size = 267, normalized size = 9.21

$$-\frac{\mathrm{atan}\left(\frac{b^2\,e^{2\,x}\,{\left(-a^2-b\,a\right)}^{3/2}\,\left(\frac{4\,\left(4\,a+2\,b\right)\,\left(8\,a^3+12\,a^2\,b+4\,a\,b^2\right)}{b^5\,{\left(-a^2-b\,a\right)}^{3/2}\,\sqrt{-a\,\left(a+b\right)}}+\frac{2\,\left(8\,a^2+8\,a\,b+b^2\right)\,\left(8\,a^2\,\sqrt{-a^2-b\,a}+b^2\,\sqrt{-a^2-b\,a}+8\,a\,b\,\sqrt{-a^2-b\,a}\right)}{a\,b^5\,\left(a+b\right)\,{\left(-a^2-b\,a\right)}^{3/2}}\right)}{4}+\frac{\left(2\,a^2\,b+2\,a\,b^2\right)\,\left(4\,a+2\,b\right)}{b^3\,\sqrt{-a\,\left(a+b\right)}}+\frac{\left(b^2\,\sqrt{-a^2-b\,a}+2\,a\,b\,\sqrt{-a^2-b\,a}\right)\,\left(8\,a^2+8\,a\,b+b^2\right)}{2\,a\,b^3\,\left(a+b\right)}\right)}{\sqrt{-a^2-b\,a}}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] -atan((b^2*exp(2*x)*(- a*b - a^2)^(3/2)*((4*(4*a + 2*b)*(4*a*b^2 + 12*a^2*b
 + 8*a^3))/(b^5*(- a*b - a^2)^(3/2)*(-a*(a + b))^(1/2)) + (2*(8*a*b + 8*a^2
 + b^2)*(8*a^2*(- a*b - a^2)^(1/2) + b^2*(- a*b - a^2)^(1/2) + 8*a*b*(- a*b
 - a^2)^(1/2)))/(a*b^5*(a + b)*(- a*b - a^2)^(3/2))))/4 + ((2*a*b^2 + 2*a^2
*b)*(4*a + 2*b))/(b^3*(-a*(a + b))^(1/2)) + ((b^2*(- a*b - a^2)^(1/2) + 2*a
*b*(- a*b - a^2)^(1/2))*(8*a*b + 8*a^2 + b^2))/(2*a*b^3*(a + b)))/(- a*b -
a^2)^(1/2)
```

3.17 $\int \frac{\operatorname{csch}^4(x)}{a+b\cosh^2(x)}\,dx$

Optimal. Leaf size=59

$$\frac{b^2\tanh^{-1}\left(\frac{\sqrt{a}\,\tanh(x)}{\sqrt{a+b}}\right)}{\sqrt{a}\,(a+b)^{5/2}}+\frac{(a+2b)\coth(x)}{(a+b)^2}-\frac{\coth^3(x)}{3(a+b)}$$

```
[Out] (a+2*b)*coth(x)/(a+b)^2-1/3*coth(x)^3/(a+b)+b^2*arctanh(a^(1/2)*tanh(x)/(a+
b)^(1/2))/(a+b)^(5/2)/a^(1/2)
```

Rubi [A]
time = 0.06, antiderivative size = 59, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 3, integrand size = 15, $\frac{\text{number of rules}}{\text{integrand size}} = 0.200$, Rules used = {3270, 398, 214}

$$\frac{b^2\tanh^{-1}\left(\frac{\sqrt{a}\,\tanh(x)}{\sqrt{a+b}}\right)}{\sqrt{a}\,(a+b)^{5/2}}-\frac{\coth^3(x)}{3(a+b)}+\frac{(a+2b)\coth(x)}{(a+b)^2}$$

Antiderivative was successfully verified.

```
[In] Int[Csch[x]^4/(a + b*Cosh[x]^2),x]
```

```
[Out] (b^2*ArcTanh[(Sqrt[a]*Tanh[x])/Sqrt[a + b]])/(Sqrt[a]*(a + b)^(5/2)) + ((a
+ 2*b)*Coth[x])/(a + b)^2 - Coth[x]^3/(3*(a + b))
```

Rule 214

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

Rule 398

```
Int[((a_) + (b_.)*(x_)^(n_))^(p_)*((c_) + (d_.)*(x_)^(n_))^(q_), x_Symbol]
:> Int[PolynomialDivide[(a + b*x^n)^p, (c + d*x^n)^(-q), x], x] /; FreeQ[{a
, b, c, d}, x] && NeQ[b*c - a*d, 0] && IGtQ[n, 0] && IGtQ[p, 0] && ILtQ[q,
0] && GeQ[p, -q]
```

Rule 3270

```
Int[cos[(e_.) + (f_.)*(x_)]^(m_)*((a_) + (b_.)*sin[(e_.) + (f_.)*(x_)]^2)^(
p_.), x_Symbol] :> With[{ff = FreeFactors[Tan[e + f*x], x]}, Dist[ff/f, Sub
st[Int[(a + (a + b)*ff^2*x^2)^p/(1 + ff^2*x^2)^(m/2 + p + 1), x], x, Tan[e
+ f*x]/ff], x]] /; FreeQ[{a, b, e, f}, x] && IntegerQ[m/2] && IntegerQ[p]
```

Rubi steps

$$
\begin{aligned}
\int \frac{\operatorname{csch}^4(x)}{a+b\cosh^2(x)}\,dx &= \operatorname{Subst}\left(\int \frac{(1-x^2)^2}{a-(a+b)x^2}\,dx, x, \coth(x)\right)\\
&= \operatorname{Subst}\left(\int \left(\frac{a+2b}{(a+b)^2}-\frac{x^2}{a+b}+\frac{b^2}{(a+b)^2\,(a-(a+b)x^2)}\right)dx, x, \coth(x)\right)\\
&= \frac{(a+2b)\coth(x)}{(a+b)^2}-\frac{\coth^3(x)}{3(a+b)}+\frac{b^2\operatorname{Subst}\left(\int \frac{1}{a-(a+b)x^2}\,dx, x, \coth(x)\right)}{(a+b)^2}\\
&= \frac{b^2\tanh^{-1}\left(\frac{\sqrt{a}\,\tanh(x)}{\sqrt{a+b}}\right)}{\sqrt{a}\,(a+b)^{5/2}}+\frac{(a+2b)\coth(x)}{(a+b)^2}-\frac{\coth^3(x)}{3(a+b)}
\end{aligned}
$$

Mathematica [A]
time = 0.15, size = 59, normalized size = 1.00

$$
\frac{b^2\tanh^{-1}\left(\frac{\sqrt{a}\,\tanh(x)}{\sqrt{a+b}}\right)}{\sqrt{a}\,(a+b)^{5/2}}-\frac{\coth(x)\left(-2a-5b+(a+b)\operatorname{csch}^2(x)\right)}{3(a+b)^2}
$$

Antiderivative was successfully verified.

```
[In] Integrate[Csch[x]^4/(a + b*Cosh[x]^2),x]
```

```
[Out] (b^2*ArcTanh[(Sqrt[a]*Tanh[x])/Sqrt[a + b]])/(Sqrt[a]*(a + b)^(5/2)) - (Cot
h[x]*(-2*a - 5*b + (a + b)*Csch[x]^2))/(3*(a + b)^2)
```

Maple [B] Leaf count of result is larger than twice the leaf count of optimal. 161 vs. $2(49) = 98$.
time = 0.83, size = 162, normalized size = 2.75

method	result
default	$-\frac{\frac{a\left(\tanh^3\left(\frac{x}{2}\right)\right)}{3}+\frac{b\left(\tanh^3\left(\frac{x}{2}\right)\right)}{3}-3a\tanh\left(\frac{x}{2}\right)-7b\tanh\left(\frac{x}{2}\right)}{8(a+b)^2}-\frac{1}{24(a+b)\tanh\left(\frac{x}{2}\right)^3}-\frac{-3a-7b}{8(a+b)^2\tanh\left(\frac{x}{2}\right)}-\frac{2b^2\left(-\frac{\ln\left(\sqrt{a+b}\,(\cdots\right.}{\cdots}\right.}{\cdots}$
risch	$-\frac{2\left(-3\,e^{4x}b+6\,e^{2x}a+12b\,e^{2x}-2a-5b\right)}{3\left(e^{2x}-1\right)^3(a+b)^2}+\frac{b^2\ln\left(e^{2x}+\frac{2a\sqrt{a^2+ab}+b\sqrt{a^2+ab}-2a^2-2ab}{b\sqrt{a^2+ab}}\right)}{2\sqrt{a^2+ab}\,(a+b)^2}-\frac{b^2\ln\left(e^{2x}+\frac{2a\sqrt{a^2+ab}\cdots}{b\cdots}\right.}{2\sqrt{a^2+\cdots}}$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(csch(x)^4/(a+b*cosh(x)^2),x,method=_RETURNVERBOSE)
```

```
[Out] -1/8/(a+b)^2*(1/3*a*tanh(1/2*x)^3+1/3*b*tanh(1/2*x)^3-3*a*tanh(1/2*x)-7*b*t
anh(1/2*x))-1/24/(a+b)/tanh(1/2*x)^3-1/8/(a+b)^2*(-3*a-7*b)/tanh(1/2*x)-2*b
^2/(a+b)^2*(-1/4/a^(1/2)/(a+b)^(1/2)*ln((a+b)^(1/2)*tanh(1/2*x)^2+2*tanh(1/
2*x)*a^(1/2)+(a+b)^(1/2))+1/4/a^(1/2)/(a+b)^(1/2)*ln((a+b)^(1/2)*tanh(1/2*x
)^2-2*tanh(1/2*x)*a^(1/2)+(a+b)^(1/2)))
```

Maxima [B] Leaf count of result is larger than twice the leaf count of optimal. 161 vs. $2(49) = 98$.
time = 0.49, size = 161, normalized size = 2.73

$$-\frac{b^2 \log\left(\frac{be^{(-2x)}+2a+b-2\sqrt{(a+b)a}}{be^{(-2x)}+2a+b+2\sqrt{(a+b)a}}\right)}{2\sqrt{(a+b)a}\,(a^2+2ab+b^2)} - \frac{2\left(6(a+2b)e^{(-2x)}-3be^{(-4x)}-2a-5b\right)}{3\left(a^2+2ab+b^2-3(a^2+2ab+b^2)e^{(-2x)}+3(a^2+2ab+b^2)e^{(-4x)}-(a^2+2ab+b^2)e^{(-6x)}\right)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(csch(x)^4/(a+b*cosh(x)^2),x, algorithm="maxima")
```

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

Fricas [B] Leaf count of result is larger than twice the leaf count of optimal. 857 vs. $2(49) = 98$.
time = 0.62, size = 1875, normalized size = 31.78

Too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(csch(x)^4/(a+b*cosh(x)^2),x, algorithm="fricas")
```

```
[Out] [1/6*(12*(a^2*b + a*b^2)*cosh(x)^4 + 48*(a^2*b + a*b^2)*cosh(x)*sinh(x)^3 +
 12*(a^2*b + a*b^2)*sinh(x)^4 + 8*a^3 + 28*a^2*b + 20*a*b^2 - 24*(a^3 + 3*a
^2*b + 2*a*b^2)*cosh(x)^2 - 24*(a^3 + 3*a^2*b + 2*a*b^2 - 3*(a^2*b + a*b^2)
*cosh(x)^2)*sinh(x)^2 + 3*(b^2*cosh(x)^6 + 6*b^2*cosh(x)*sinh(x)^5 + b^2*si
nh(x)^6 - 3*b^2*cosh(x)^4 + 3*(5*b^2*cosh(x)^2 - b^2)*sinh(x)^4 + 3*b^2*cos
h(x)^2 + 4*(5*b^2*cosh(x)^3 - 3*b^2*cosh(x))*sinh(x)^3 + 3*(5*b^2*cosh(x)^4
 - 6*b^2*cosh(x)^2 + b^2)*sinh(x)^2 - b^2 + 6*(b^2*cosh(x)^5 - 2*b^2*cosh(x
)^3 + b^2*cosh(x))*sinh(x))*sqrt(a^2 + a*b)*log((b^2*cosh(x)^4 + 4*b^2*cosh
(x)*sinh(x)^3 + b^2*sinh(x)^4 + 2*(2*a*b + b^2)*cosh(x)^2 + 2*(3*b^2*cosh(x
)^2 + 2*a*b + b^2)*sinh(x)^2 + 8*a^2 + 8*a*b + b^2 + 4*(b^2*cosh(x)^3 + (2*
a*b + b^2)*cosh(x))*sinh(x) - 4*(b*cosh(x)^2 + 2*b*cosh(x)*sinh(x) + b*sinh
(x)^2 + 2*a + b)*sqrt(a^2 + a*b))/(b*cosh(x)^4 + 4*b*cosh(x)*sinh(x)^3 + b*
sinh(x)^4 + 2*(2*a + b)*cosh(x)^2 + 2*(3*b*cosh(x)^2 + 2*a + b)*sinh(x)^2 +
 4*(b*cosh(x)^3 + (2*a + b)*cosh(x))*sinh(x) + b)) + 48*((a^2*b + a*b^2)*co
```

```
sh(x)^3 - (a^3 + 3*a^2*b + 2*a*b^2)*cosh(x))*sinh(x))/((a^4 + 3*a^3*b + 3*a
^2*b^2 + a*b^3)*cosh(x)^6 + 6*(a^4 + 3*a^3*b + 3*a^2*b^2 + a*b^3)*cosh(x)*s
inh(x)^5 + (a^4 + 3*a^3*b + 3*a^2*b^2 + a*b^3)*sinh(x)^6 - 3*(a^4 + 3*a^3*b
 + 3*a^2*b^2 + a*b^3)*cosh(x)^4 - 3*(a^4 + 3*a^3*b + 3*a^2*b^2 + a*b^3 - 5*
(a^4 + 3*a^3*b + 3*a^2*b^2 + a*b^3)*cosh(x)^2)*sinh(x)^4 - a^4 - 3*a^3*b -
3*a^2*b^2 - a*b^3 + 4*(5*(a^4 + 3*a^3*b + 3*a^2*b^2 + a*b^3)*cosh(x)^3 - 3*
(a^4 + 3*a^3*b + 3*a^2*b^2 + a*b^3)*cosh(x))*sinh(x)^3 + 3*(a^4 + 3*a^3*b +
 3*a^2*b^2 + a*b^3)*cosh(x)^2 + 3*(5*(a^4 + 3*a^3*b + 3*a^2*b^2 + a*b^3)*co
sh(x)^4 + a^4 + 3*a^3*b + 3*a^2*b^2 + a*b^3 - 6*(a^4 + 3*a^3*b + 3*a^2*b^2
+ a*b^3)*cosh(x)^2)*sinh(x)^2 + 6*((a^4 + 3*a^3*b + 3*a^2*b^2 + a*b^3)*cosh
(x)^5 - 2*(a^4 + 3*a^3*b + 3*a^2*b^2 + a*b^3)*cosh(x)^3 + (a^4 + 3*a^3*b +
3*a^2*b^2 + a*b^3)*cosh(x))*sinh(x)), 1/3*(6*(a^2*b + a*b^2)*cosh(x)^4 + 24
*(a^2*b + a*b^2)*cosh(x)*sinh(x)^3 + 6*(a^2*b + a*b^2)*sinh(x)^4 + 4*a^3 +
14*a^2*b + 10*a*b^2 - 12*(a^3 + 3*a^2*b + 2*a*b^2)*cosh(x)^2 - 12*(a^3 + 3*
a^2*b + 2*a*b^2 - 3*(a^2*b + a*b^2)*cosh(x)^2)*sinh(x)^2 + 3*(b^2*cosh(x)^6
 + 6*b^2*cosh(x)*sinh(x)^5 + b^2*sinh(x)^6 - 3*b^2*cosh(x)^4 + 3*(5*b^2*cos
h(x)^2 - b^2)*sinh(x)^4 + 3*b^2*cosh(x)^2 + 4*(5*b^2*cosh(x)^3 - 3*b^2*cosh
(x))*sinh(x)^3 + 3*(5*b^2*cosh(x)^4 - 6*b^2*cosh(x)^2 + b^2)*sinh(x)^2 - b^
2 + 6*(b^2*cosh(x)^5 - 2*b^2*cosh(x)^3 + b^2*cosh(x))*sinh(x))*sqrt(-a^2 -
a*b)*arctan(1/2*(b*cosh(x)^2 + 2*b*cosh(x)*sinh(x) + b*sinh(x)^2 + 2*a + b)
*sqrt(-a^2 - a*b)/(a^2 + a*b)) + 24*((a^2*b + a*b^2)*cosh(x)^3 - (a^3 + 3*a
^2*b + 2*a*b^2)*cosh(x))*sinh(x))/((a^4 + 3*a^3*b + 3*a^2*b^2 + a*b^3)*cosh
(x)^6 + 6*(a^4 + 3*a^3*b + 3*a^2*b^2 + a*b^3)*cosh(x)*sinh(x)^5 + (a^4 + 3*
a^3*b + 3*a^2*b^2 + a*b^3)*sinh(x)^6 - 3*(a^4 + 3*a^3*b + 3*a^2*b^2 + a*b^3
)*cosh(x)^4 - 3*(a^4 + 3*a^3*b + 3*a^2*b^2 + a*b^3 - 5*(a^4 + 3*a^3*b + 3*a
^2*b^2 + a*b^3)*cosh(x)^2)*sinh(x)^4 - a^4 - 3*a^3*b - 3*a^2*b^2 - a*b^3 +
4*(5*(a^4 + 3*a^3*b + 3*a^2*b^2 + a*b^3)*cosh(x)^3 - 3*(a^4 + 3*a^3*b + 3*a
^2*b^2 + a*b^3)*cosh(x))*sinh(x)^3 + 3*(a^4 + 3*a^3*b + 3*a^2*b^2 + a*b^3)*
cosh(x)^2 + 3*(5*(a^4 + 3*a^3*b + 3*a^2*b^2 + a*b^3)*cosh(x)^4 + a^4 + 3*a^
3*b + 3*a^2*b^2 + a*b^3 - 6*(a^4 + 3*a^3*b + 3*a^2*b^2 + a*b^3)*cosh(x)^2)*
sinh(x)^2 + 6*((a^4 + 3*a^3*b + 3*a^2*b^2 + a*b^3)*cosh(x)^5 - 2*(a^4 + 3*a
^3*b + 3*a^2*b^2 + a*b^3)*cosh(x)^3 + (a^4 + 3*a^3*b + 3*a^2*b^2 + a*b^3)*c
osh(x))*sinh(x))]
```

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

$$\int \frac{\operatorname{csch}^4(x)}{a + b\cosh^2(x)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(csch(x)**4/(a+b*cosh(x)**2),x)
```

```
[Out] Integral(csch(x)**4/(a + b*cosh(x)**2), x)
```

Giac [**B**] Leaf count of result is larger than twice the leaf count of optimal. 107 vs. 2(49) = 98.

time = 0.49, size = 107, normalized size = 1.81

$$\frac{b^2 \arctan\left(\frac{be^{(2x)}+2a+b}{2\sqrt{-a^2-ab}}\right)}{(a^2+2ab+b^2)\sqrt{-a^2-ab}} + \frac{2\left(3be^{(4x)}-6ae^{(2x)}-12be^{(2x)}+2a+5b\right)}{3(a^2+2ab+b^2)(e^{(2x)}-1)^3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(csch(x)^4/(a+b*cosh(x)^2),x, algorithm="giac")
```

```
[Out] b^2*arctan(1/2*(b*e^(2*x) + 2*a + b)/sqrt(-a^2 - a*b))/((a^2 + 2*a*b + b^2)
*sqrt(-a^2 - a*b)) + 2/3*(3*b*e^(4*x) - 6*a*e^(2*x) - 12*b*e^(2*x) + 2*a +
5*b)/((a^2 + 2*a*b + b^2)*(e^(2*x) - 1)^3)
```

Mupad [B]
time = 1.45, size = 245, normalized size = 4.15

$$\frac{2b}{(a+b)^2\,(\mathrm{e}^{2x}-1)} - \frac{4}{(a+b)\,(\mathrm{e}^{4x}-2\,\mathrm{e}^{2x}+1)} - \frac{8}{3\,(a+b)\,(3\,\mathrm{e}^{2x}-3\,\mathrm{e}^{4x}+\mathrm{e}^{6x}-1)} - \frac{b^2\,\ln\left(\frac{4b^2\,(2ab+8a^2\,\mathrm{e}^{2x}+b^2\,\mathrm{e}^{2x}+b^2+8ab\,\mathrm{e}^{2x})}{a\,(a+b)^5} - \frac{8b^2\,(b+4a\,\mathrm{e}^{2x}+2b\,\mathrm{e}^{2x})}{\sqrt{a}\,(a+b)^{9/2}}\right)}{2\sqrt{a}\,(a+b)^{5/2}} + \frac{b^2\,\ln\left(\frac{8b^2\,(b+4a\,\mathrm{e}^{2x}+2b\,\mathrm{e}^{2x})}{\sqrt{a}\,(a+b)^{9/2}} + \frac{4b^2\,(2ab+8a^2\,\mathrm{e}^{2x}+b^2\,\mathrm{e}^{2x}+b^2+8ab\,\mathrm{e}^{2x})}{a\,(a+b)^5}\right)}{2\sqrt{a}\,(a+b)^{5/2}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(1/(sinh(x)^4*(a + b*cosh(x)^2)),x)
```

```
[Out] (2*b)/((a + b)^2*(exp(2*x) - 1)) - 4/((a + b)*(exp(4*x) - 2*exp(2*x) + 1))
- 8/(3*(a + b)*(3*exp(2*x) - 3*exp(4*x) + exp(6*x) - 1)) - (b^2*log((4*b^2*
(2*a*b + 8*a^2*exp(2*x) + b^2*exp(2*x) + b^2 + 8*a*b*exp(2*x)))/(a*(a + b)^
5) - (8*b^2*(b + 4*a*exp(2*x) + 2*b*exp(2*x)))/(a^(1/2)*(a + b)^(9/2))))/(2
*a^(1/2)*(a + b)^(5/2)) + (b^2*log((8*b^2*(b + 4*a*exp(2*x) + 2*b*exp(2*x))
)/(a^(1/2)*(a + b)^(9/2)) + (4*b^2*(2*a*b + 8*a^2*exp(2*x) + b^2*exp(2*x) +
 b^2 + 8*a*b*exp(2*x)))/(a*(a + b)^5)))/(2*a^(1/2)*(a + b)^(5/2))
```

3.18 $\int \frac{\operatorname{csch}^6(x)}{a+b\cosh^2(x)}\,dx$

Optimal. Leaf size=89

$$-\frac{b^3\tanh^{-1}\left(\frac{\sqrt{a}\tanh(x)}{\sqrt{a+b}}\right)}{\sqrt{a}\,(a+b)^{7/2}}-\frac{(a^2+3ab+3b^2)\coth(x)}{(a+b)^3}+\frac{(2a+3b)\coth^3(x)}{3(a+b)^2}-\frac{\coth^5(x)}{5(a+b)}$$

```
[Out] -(a^2+3*a*b+3*b^2)*coth(x)/(a+b)^3+1/3*(2*a+3*b)*coth(x)^3/(a+b)^2-1/5*coth
(x)^5/(a+b)-b^3*arctanh(a^(1/2)*tanh(x)/(a+b)^(1/2))/(a+b)^(7/2)/a^(1/2)
```

Rubi [A]
time = 0.08, antiderivative size = 89, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 3, integrand size = 15, $\frac{\text{number of rules}}{\text{integrand size}} = 0.200$, Rules used = {3270, 398, 214}

$$-\frac{(a^2+3ab+3b^2)\coth(x)}{(a+b)^3}-\frac{b^3\tanh^{-1}\left(\frac{\sqrt{a}\tanh(x)}{\sqrt{a+b}}\right)}{\sqrt{a}\,(a+b)^{7/2}}-\frac{\coth^5(x)}{5(a+b)}+\frac{(2a+3b)\coth^3(x)}{3(a+b)^2}$$

Antiderivative was successfully verified.

```
[In] Int[Csch[x]^6/(a + b*Cosh[x]^2),x]
```

```
[Out] -((b^3*ArcTanh[(Sqrt[a]*Tanh[x])/Sqrt[a + b]])/(Sqrt[a]*(a + b)^(7/2))) - (
(a^2 + 3*a*b + 3*b^2)*Coth[x])/(a + b)^3 + ((2*a + 3*b)*Coth[x]^3)/(3*(a +
b)^2) - Coth[x]^5/(5*(a + b))
```

Rule 214

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

Rule 398

```
Int[((a_) + (b_.)*(x_)^(n_))^(p_)*((c_) + (d_.)*(x_)^(n_))^(q_), x_Symbol]
:> Int[PolynomialDivide[(a + b*x^n)^p, (c + d*x^n)^(-q), x], x] /; FreeQ[{a
, b, c, d}, x] && NeQ[b*c - a*d, 0] && IGtQ[n, 0] && IGtQ[p, 0] && ILtQ[q,
0] && GeQ[p, -q]
```

Rule 3270

```
Int[cos[(e_.) + (f_.)*(x_)]^(m_)*((a_) + (b_.)*sin[(e_.) + (f_.)*(x_)]^2)^(
p_.), x_Symbol] :> With[{ff = FreeFactors[Tan[e + f*x], x]}, Dist[ff/f, Sub
st[Int[(a + (a + b)*ff^2*x^2)^p/(1 + ff^2*x^2)^(m/2 + p + 1), x], x, Tan[e
+ f*x]/ff], x]] /; FreeQ[{a, b, e, f}, x] && IntegerQ[m/2] && IntegerQ[p]
```

Rubi steps

$$\int \frac{\operatorname{csch}^6(x)}{a+b\cosh^2(x)}\,dx = -\text{Subst}\left(\int \frac{(1-x^2)^3}{a-(a+b)x^2}\,dx, x, \coth(x)\right)$$
$$= -\text{Subst}\left(\int \left(\frac{a^2+3ab+3b^2}{(a+b)^3} - \frac{(2a+3b)x^2}{(a+b)^2} + \frac{x^4}{a+b} + \frac{b^3}{(a+b)^3\,(a-(a+b)x^2)}\right) dx,$$
$$= -\frac{(a^2+3ab+3b^2)\coth(x)}{(a+b)^3} + \frac{(2a+3b)\coth^3(x)}{3(a+b)^2} - \frac{\coth^5(x)}{5(a+b)} - \frac{b^3\text{Subst}\left(\int \frac{1}{a-(a+b)x^2}\,d\right.}{(a+b)^3}$$
$$= -\frac{b^3\tanh^{-1}\left(\frac{\sqrt{a}\,\tanh(x)}{\sqrt{a+b}}\right)}{\sqrt{a}\,(a+b)^{7/2}} - \frac{(a^2+3ab+3b^2)\coth(x)}{(a+b)^3} + \frac{(2a+3b)\coth^3(x)}{3(a+b)^2} - \frac{\coth^5(}{5(a+}$$

Mathematica [A]
time = 0.24, size = 92, normalized size = 1.03

$$-\frac{b^3\tanh^{-1}\left(\frac{\sqrt{a}\,\tanh(x)}{\sqrt{a+b}}\right)}{\sqrt{a}\,(a+b)^{7/2}} - \frac{\coth(x)\left(8a^2+26ab+33b^2-(4a^2+13ab+9b^2)\operatorname{csch}^2(x)+3(a+b)^2\operatorname{csch}^4(x)\right)}{15(a+b)^3}$$

Antiderivative was successfully verified.

```
[In] Integrate[Csch[x]^6/(a + b*Cosh[x]^2),x]
```

```
[Out] -((b^3*ArcTanh[(Sqrt[a]*Tanh[x])/Sqrt[a + b]])/(Sqrt[a]*(a + b)^(7/2))) - (
Coth[x]*(8*a^2 + 26*a*b + 33*b^2 - (4*a^2 + 13*a*b + 9*b^2)*Csch[x]^2 + 3*(
a + b)^2*Csch[x]^4))/(15*(a + b)^3)
```

Maple [B] Leaf count of result is larger than twice the leaf count of optimal. 247 vs. 2(77) = 154.
time = 0.86, size = 248, normalized size = 2.79

method	result
default	$-\frac{\frac{a^2\left(\tanh^5\left(\frac{x}{2}\right)\right)}{5}+\frac{2ab\left(\tanh^5\left(\frac{x}{2}\right)\right)}{5}+\frac{b^2\left(\tanh^5\left(\frac{x}{2}\right)\right)}{5}-\frac{5a^2\left(\tanh^3\left(\frac{x}{2}\right)\right)}{3}-\frac{14ab\left(\tanh^3\left(\frac{x}{2}\right)\right)}{3}-3b^2\left(\tanh^3\left(\frac{x}{2}\right)\right)+10a^2\tanh\left(\frac{x}{2}\right)+32ab\tanh\left(\frac{x}{2}\right.}{32(a+b)^3}$
risch	$-\frac{2\left(15b^2e^{8x}-30ab\,e^{6x}-90b^2e^{6x}+80a^2e^{4x}+230ab\,e^{4x}+240b^2e^{4x}-40a^2e^{2x}-130ab\,e^{2x}-150b^2e^{2x}+8a^2+26ab+33b^2\right)}{15\left(e^{2x}-1\right)^5(a+b)^3}+\frac{b^3\ln\left(e^{2x}+2\right.}{}$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(csch(x)^6/(a+b*cosh(x)^2),x,method=_RETURNVERBOSE)
```

```
[Out] -1/32/(a+b)^3*(1/5*a^2*tanh(1/2*x)^5+2/5*a*b*tanh(1/2*x)^5+1/5*b^2*tanh(1/2
*x)^5-5/3*a^2*tanh(1/2*x)^3-14/3*a*b*tanh(1/2*x)^3-3*b^2*tanh(1/2*x)^3+10*a
^2*tanh(1/2*x)+32*a*b*tanh(1/2*x)+38*b^2*tanh(1/2*x))-1/160/(a+b)/tanh(1/2*
x)^5-1/96*(-5*a-9*b)/(a+b)^2/tanh(1/2*x)^3-1/32/(a+b)^3*(10*a^2+32*a*b+38*b
^2)/tanh(1/2*x)+2*b^3/(a+b)^3*(-1/4/a^(1/2)/(a+b)^(1/2)*ln((a+b)^(1/2)*tanh
(1/2*x)^2+2*tanh(1/2*x)*a^(1/2)+(a+b)^(1/2))+1/4/a^(1/2)/(a+b)^(1/2)*ln((a+
b)^(1/2)*tanh(1/2*x)^2-2*tanh(1/2*x)*a^(1/2)+(a+b)^(1/2)))
```

Maxima [**B**] Leaf count of result is larger than twice the leaf count of optimal. 307 vs. $2(77) = 154$.
time = 0.52, size = 307, normalized size = 3.45

$$\frac{b^3 \log\left(\frac{be^{(-2x)}+2a+b-2\sqrt{(a+b)a}}{be^{(-2x)}+2a+b+2\sqrt{(a+b)a}}\right)}{2\,(a^3+3\,a^2b+3\,ab^2+b^3)\sqrt{(a+b)a}} - \frac{2\,(15\,b^2e^{(-8x)}+8\,a^2+26\,ab+33\,b^2-10\,(4\,a^2+13\,ab+15\,b^2)e^{(-2x)}+10\,(8\,a^2+23\,ab+24\,b^2)e^{(-4x)}-30\,(ab+3\,b^2)e^{(-6x)})}{15\,(a^3+3\,a^2b+3\,ab^2+b^3-5\,(a^3+3\,a^2b+3\,ab^2+b^3)e^{(-2x)}+10\,(a^3+3\,a^2b+3\,ab^2+b^3)e^{(-4x)}-10\,(a^3+3\,a^2b+3\,ab^2+b^3)e^{(-6x)}+5\,(a^3+3\,a^2b+3\,ab^2+b^3)e^{(-8x)}-(a^3+3\,a^2b+3\,ab^2+b^3)e^{(-10x)})}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(csch(x)^6/(a+b*cosh(x)^2),x, algorithm="maxima")
```

```
[Out] 1/2*b^3*log((b*e^(-2*x) + 2*a + b - 2*sqrt((a + b)*a))/(b*e^(-2*x) + 2*a +
b + 2*sqrt((a + b)*a)))/((a^3 + 3*a^2*b + 3*a*b^2 + b^3)*sqrt((a + b)*a)) -
 2/15*(15*b^2*e^(-8*x) + 8*a^2 + 26*a*b + 33*b^2 - 10*(4*a^2 + 13*a*b + 15*
b^2)*e^(-2*x) + 10*(8*a^2 + 23*a*b + 24*b^2)*e^(-4*x) - 30*(a*b + 3*b^2)*e^
(-6*x))/(a^3 + 3*a^2*b + 3*a*b^2 + b^3 - 5*(a^3 + 3*a^2*b + 3*a*b^2 + b^3)*
e^(-2*x) + 10*(a^3 + 3*a^2*b + 3*a*b^2 + b^3)*e^(-4*x) - 10*(a^3 + 3*a^2*b
+ 3*a*b^2 + b^3)*e^(-6*x) + 5*(a^3 + 3*a^2*b + 3*a*b^2 + b^3)*e^(-8*x) - (a
^3 + 3*a^2*b + 3*a*b^2 + b^3)*e^(-10*x))
```

Fricas [**B**] Leaf count of result is larger than twice the leaf count of optimal. 2408 vs. $2(77) = 154$.
time = 0.44, size = 4977, normalized size = 55.92

Too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(csch(x)^6/(a+b*cosh(x)^2),x, algorithm="fricas")
```

```
[Out] [-1/30*(60*(a^2*b^2 + a*b^3)*cosh(x)^8 + 480*(a^2*b^2 + a*b^3)*cosh(x)*sinh
(x)^7 + 60*(a^2*b^2 + a*b^3)*sinh(x)^8 - 120*(a^3*b + 4*a^2*b^2 + 3*a*b^3)*
cosh(x)^6 - 120*(a^3*b + 4*a^2*b^2 + 3*a*b^3 - 14*(a^2*b^2 + a*b^3)*cosh(x)
^2)*sinh(x)^6 + 240*(14*(a^2*b^2 + a*b^3)*cosh(x)^3 - 3*(a^3*b + 4*a^2*b^2
+ 3*a*b^3)*cosh(x))*sinh(x)^5 + 40*(8*a^4 + 31*a^3*b + 47*a^2*b^2 + 24*a*b^
3)*cosh(x)^4 + 40*(105*(a^2*b^2 + a*b^3)*cosh(x)^4 + 8*a^4 + 31*a^3*b + 47*
a^2*b^2 + 24*a*b^3 - 45*(a^3*b + 4*a^2*b^2 + 3*a*b^3)*cosh(x)^2)*sinh(x)^4
+ 32*a^4 + 136*a^3*b + 236*a^2*b^2 + 132*a*b^3 + 160*(21*(a^2*b^2 + a*b^3)*
cosh(x)^5 - 15*(a^3*b + 4*a^2*b^2 + 3*a*b^3)*cosh(x)^3 + (8*a^4 + 31*a^3*b
+ 47*a^2*b^2 + 24*a*b^3)*cosh(x))*sinh(x)^3 - 40*(4*a^4 + 17*a^3*b + 28*a^2
```

```
*b^2 + 15*a*b^3)*cosh(x)^2 + 40*(42*(a^2*b^2 + a*b^3)*cosh(x)^6 - 45*(a^3*b
 + 4*a^2*b^2 + 3*a*b^3)*cosh(x)^4 - 4*a^4 - 17*a^3*b - 28*a^2*b^2 - 15*a*b^
3 + 6*(8*a^4 + 31*a^3*b + 47*a^2*b^2 + 24*a*b^3)*cosh(x)^2)*sinh(x)^2 - 15*
(b^3*cosh(x)^10 + 10*b^3*cosh(x)*sinh(x)^9 + b^3*sinh(x)^10 - 5*b^3*cosh(x)
^8 + 10*b^3*cosh(x)^6 + 5*(9*b^3*cosh(x)^2 - b^3)*sinh(x)^8 + 40*(3*b^3*cos
h(x)^3 - b^3*cosh(x))*sinh(x)^7 - 10*b^3*cosh(x)^4 + 10*(21*b^3*cosh(x)^4 -
 14*b^3*cosh(x)^2 + b^3)*sinh(x)^6 + 4*(63*b^3*cosh(x)^5 - 70*b^3*cosh(x)^3
 + 15*b^3*cosh(x))*sinh(x)^5 + 5*b^3*cosh(x)^2 + 10*(21*b^3*cosh(x)^6 - 35*
b^3*cosh(x)^4 + 15*b^3*cosh(x)^2 - b^3)*sinh(x)^4 + 40*(3*b^3*cosh(x)^7 - 7
*b^3*cosh(x)^5 + 5*b^3*cosh(x)^3 - b^3*cosh(x))*sinh(x)^3 - b^3 + 5*(9*b^3*
cosh(x)^8 - 28*b^3*cosh(x)^6 + 30*b^3*cosh(x)^4 - 12*b^3*cosh(x)^2 + b^3)*s
inh(x)^2 + 10*(b^3*cosh(x)^9 - 4*b^3*cosh(x)^7 + 6*b^3*cosh(x)^5 - 4*b^3*co
sh(x)^3 + b^3*cosh(x))*sinh(x))*sqrt(a^2 + a*b)*log((b^2*cosh(x)^4 + 4*b^2*
cosh(x)*sinh(x)^3 + b^2*sinh(x)^4 + 2*(2*a*b + b^2)*cosh(x)^2 + 2*(3*b^2*co
sh(x)^2 + 2*a*b + b^2)*sinh(x)^2 + 8*a^2 + 8*a*b + b^2 + 4*(b^2*cosh(x)^3 +
 (2*a*b + b^2)*cosh(x))*sinh(x) + 4*(b*cosh(x)^2 + 2*b*cosh(x)*sinh(x) + b*
sinh(x)^2 + 2*a + b)*sqrt(a^2 + a*b))/(b*cosh(x)^4 + 4*b*cosh(x)*sinh(x)^3
 + b*sinh(x)^4 + 2*(2*a + b)*cosh(x)^2 + 2*(3*b*cosh(x)^2 + 2*a + b)*sinh(x)
^2 + 4*(b*cosh(x)^3 + (2*a + b)*cosh(x))*sinh(x) + b)) + 80*(6*(a^2*b^2 + a
*b^3)*cosh(x)^7 - 9*(a^3*b + 4*a^2*b^2 + 3*a*b^3)*cosh(x)^5 + 2*(8*a^4 + 31
*a^3*b + 47*a^2*b^2 + 24*a*b^3)*cosh(x)^3 - (4*a^4 + 17*a^3*b + 28*a^2*b^2
 + 15*a*b^3)*cosh(x))*sinh(x))/((a^5 + 4*a^4*b + 6*a^3*b^2 + 4*a^2*b^3 + a*b
^4)*cosh(x)^10 + 10*(a^5 + 4*a^4*b + 6*a^3*b^2 + 4*a^2*b^3 + a*b^4)*cosh(x)
*sinh(x)^9 + (a^5 + 4*a^4*b + 6*a^3*b^2 + 4*a^2*b^3 + a*b^4)*sinh(x)^10 - 5
*(a^5 + 4*a^4*b + 6*a^3*b^2 + 4*a^2*b^3 + a*b^4)*cosh(x)^8 - 5*(a^5 + 4*a^4
*b + 6*a^3*b^2 + 4*a^2*b^3 + a*b^4 - 9*(a^5 + 4*a^4*b + 6*a^3*b^2 + 4*a^2*b
^3 + a*b^4)*cosh(x)^2)*sinh(x)^8 + 40*(3*(a^5 + 4*a^4*b + 6*a^3*b^2 + 4*a^2
*b^3 + a*b^4)*cosh(x)^3 - (a^5 + 4*a^4*b + 6*a^3*b^2 + 4*a^2*b^3 + a*b^4)*c
osh(x))*sinh(x)^7 + 10*(a^5 + 4*a^4*b + 6*a^3*b^2 + 4*a^2*b^3 + a*b^4)*cosh
(x)^6 + 10*(a^5 + 4*a^4*b + 6*a^3*b^2 + 4*a^2*b^3 + a*b^4 + 21*(a^5 + 4*a^4
*b + 6*a^3*b^2 + 4*a^2*b^3 + a*b^4)*cosh(x)^4 - 14*(a^5 + 4*a^4*b + 6*a^3*b
^2 + 4*a^2*b^3 + a*b^4)*cosh(x)^2)*sinh(x)^6 + 4*(63*(a^5 + 4*a^4*b + 6*a^3
*b^2 + 4*a^2*b^3 + a*b^4)*cosh(x)^5 - 70*(a^5 + 4*a^4*b + 6*a^3*b^2 + 4*a^2
*b^3 + a*b^4)*cosh(x)^3 + 15*(a^5 + 4*a^4*b + 6*a^3*b^2 + 4*a^2*b^3 + a*b^4
)*cosh(x))*sinh(x)^5 - a^5 - 4*a^4*b - 6*a^3*b^2 - 4*a^2*b^3 - a*b^4 - 10*(
a^5 + 4*a^4*b + 6*a^3*b^2 + 4*a^2*b^3 + a*b^4)*cosh(x)^4 + 10*(21*(a^5 + 4*
a^4*b + 6*a^3*b^2 + 4*a^2*b^3 + a*b^4)*cosh(x)^6 - a^5 - 4*a^4*b - 6*a^3*b^
2 - 4*a^2*b^3 - a*b^4 - 35*(a^5 + 4*a^4*b + 6*a^3*b^2 + 4*a^2*b^3 + a*b^4)*
cosh(x)^4 + 15*(a^5 + 4*a^4*b + 6*a^3*b^2 + 4*a^2*b^3 + a*b^4)*cosh(x)^2)*s
inh(x)^4 + 40*(3*(a^5 + 4*a^4*b + 6*a^3*b^2 + 4*a^2*b^3 + a*b^4)*cosh(x)^7
 - 7*(a^5 + 4*a^4*b + 6*a^3*b^2 + 4*a^2*b^3 + a*b^4)*cosh(x)^5 + 5*(a^5 + 4*
a^4*b + 6*a^3*b^2 + 4*a^2*b^3 + a*b^4)*cosh(x)^3 - (a^5 + 4*a^4*b + 6*a^3*b
^2 + 4*a^2*b^3 + a*b^4)*cosh(x))*sinh(x)^3 + 5*(a^5 + 4*a^4*b + 6*a^3*b^2 +
 4*a^2*b^3 + a*b^4)*cosh(x)^2 + 5*(9*(a^5 + 4*a^4*b + 6*a^3*b^2 + 4*a^2*b^3
 + a*b^4)*cosh(x)^8 - 28*(a^5 + 4*a^4*b + 6*a^3*b^2 + 4*a^2*b^3 + a*b^4)*co
```

```
sh(x)^6 + a^5 + 4*a^4*b + 6*a^3*b^2 + 4*a^2*b^3 + a*b^4 + 30*(a^5 + 4*a^4*b
 + 6*a^3*b^2 + 4*a^2*b^3 + a*b^4)*cosh(x)^4 - 12*(a^5 + 4*a^4*b + 6*a^3*b^2
 + 4*a^2*b^3 + a*b^4)*cosh(x)^2)*sinh(x)^2 + 10*((a^5 + 4*a^4*b + 6*a^3*b^2
 + 4*a^2*b^3 + a*b^4)*cosh(x)^9 - 4*(a^5 + 4*a^4*b + 6*a^3*b^2 + 4*a^2*b^3
+ a*b^4)*cosh(x)^7 + 6*(a^5 + 4*a^4*b + 6*a^3*b^2 + 4*a^2*b^3 + a*b^4)*cosh
(x)^5 - 4*(a^5 + 4*a^4*b + 6*a^3*b^2 + 4*a^2*b^3 + a*b^4)*cosh(x)^3 + (a^5
+ 4*a^4*b + 6*a^3*b^2 + 4*a^2*b^3 + a*b^4)*cosh(x))*sinh(x)), -1/15*(30*(a^
2*b^2 + a*b^3)*cosh(x)^8 + 240*(a^2*b^2 + a*b^3)*cosh(x)*sinh(x)^7 + 30*(a^
2*b^2 + a*b^3)*sinh(x)^8 - 60*(a^3*b + 4*a^2*b^2 + 3*a*b^3)*cosh(x)^6 - 60*
(a^3*b + 4*a^2*b^2 + 3*a*b^3 - 14*(a^2*b^2 + a*b^3)*cosh(x)^2)*sinh(x)^6 +
120*(14*(a^2*b^2 + a*b^3)*cosh(x)^3 - 3*(a^3*b + 4*a^2*b^2 + 3*a*b^3)*cosh(
x))*sinh(x)^5 + 20*(8*a^4 + 31*a^3*b + 47*a^2*b...
```

Sympy [F(-1)] Timed out
time = 0.00, size = 0, normalized size = 0.00

Timed out

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(csch(x)**6/(a+b*cosh(x)**2),x)
```

```
[Out] Timed out
```

Giac [B] Leaf count of result is larger than twice the leaf count of optimal. 189 vs. 2(77) = 154.
time = 0.55, size = 189, normalized size = 2.12

$$-\frac{b^{3} \arctan\left(\frac{be^{(2x)}+2a+b}{2\sqrt{-a^{2}-ab}}\right)}{(a^{3}+3a^{2}b+3ab^{2}+b^{3})\sqrt{-a^{2}-ab}}-\frac{2\left(15b^{2}e^{(8x)}-30abe^{(6x)}-90b^{2}e^{(6x)}+80a^{2}e^{(4x)}+230abe^{(4x)}+240b^{2}e^{(4x)}-40a^{2}e^{(2x)}-130abe^{(2x)}-150b^{2}e^{(2x)}+8a^{2}+26ab+33b^{2}\right)}{15(a^{3}+3a^{2}b+3ab^{2}+b^{3})(e^{(2x)}-1)^{5}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(csch(x)^6/(a+b*cosh(x)^2),x, algorithm="giac")
```

```
[Out] -b^3*arctan(1/2*(b*e^(2*x) + 2*a + b)/sqrt(-a^2 - a*b))/((a^3 + 3*a^2*b + 3
*a*b^2 + b^3)*sqrt(-a^2 - a*b)) - 2/15*(15*b^2*e^(8*x) - 30*a*b*e^(6*x) - 9
0*b^2*e^(6*x) + 80*a^2*e^(4*x) + 230*a*b*e^(4*x) + 240*b^2*e^(4*x) - 40*a^2
*e^(2*x) - 130*a*b*e^(2*x) - 150*b^2*e^(2*x) + 8*a^2 + 26*a*b + 33*b^2)/((a
^3 + 3*a^2*b + 3*a*b^2 + b^3)*(e^(2*x) - 1)^5)
```

Mupad [B]
time = 1.55, size = 333, normalized size = 3.74

$$\frac{4(b^{2}+ab)}{(a+b)^{3}(e^{4x}-2e^{2x}+1)}-\frac{16}{(a+b)(6e^{4x}-4e^{2x}-4e^{6x}+e^{8x}+1)}-\frac{2b^{2}}{(a+b)^{3}(e^{2x}-1)}-\frac{32}{5(a+b)(5e^{2x}-10e^{4x}+10e^{6x}-5e^{8x}+e^{10x}-1)}-\frac{8(4a+3b)}{3(a+b)^{2}(3e^{2x}-3e^{4x}+e^{6x}-1)}+\frac{b^{3}\ln\left(\frac{4b^{4}(2ab+8a^{2}e^{2x}+b^{2}e^{2x}+b^{2}+8abe^{2x})}{a(a+b)^{7}}-\frac{8b^{4}(b+4ae^{2x}+2be^{2x})}{\sqrt{a}(a+b)^{13/2}}\right)}{2\sqrt{a}(a+b)^{7/2}}-\frac{b^{3}\ln\left(\frac{8b^{4}(b+4ae^{2x}+2be^{2x})}{\sqrt{a}(a+b)^{13/2}}+\frac{4b^{4}(2ab+8a^{2}e^{2x}+b^{2}e^{2x}+b^{2}+8abe^{2x})}{a(a+b)^{7}}\right)}{2\sqrt{a}(a+b)^{7/2}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(1/(sinh(x)^6*(a + b*cosh(x)^2)),x)
```

```
[Out] (4*(a*b + b^2))/((a + b)^3*(exp(4*x) - 2*exp(2*x) + 1)) - 16/((a + b)*(6*ex
p(4*x) - 4*exp(2*x) - 4*exp(6*x) + exp(8*x) + 1)) - (2*b^2)/((a + b)^3*(exp
(2*x) - 1)) - 32/(5*(a + b)*(5*exp(2*x) - 10*exp(4*x) + 10*exp(6*x) - 5*exp
(8*x) + exp(10*x) - 1)) - (8*(4*a + 3*b))/(3*(a + b)^2*(3*exp(2*x) - 3*exp(
4*x) + exp(6*x) - 1)) + (b^3*log((4*b^4*(2*a*b + 8*a^2*exp(2*x) + b^2*exp(2
*x) + b^2 + 8*a*b*exp(2*x)))/(a*(a + b)^7) - (8*b^4*(b + 4*a*exp(2*x) + 2*b
*exp(2*x)))/(a^(1/2)*(a + b)^(13/2))))/(2*a^(1/2)*(a + b)^(7/2)) - (b^3*log
((8*b^4*(b + 4*a*exp(2*x) + 2*b*exp(2*x)))/(a^(1/2)*(a + b)^(13/2)) + (4*b^
4*(2*a*b + 8*a^2*exp(2*x) + b^2*exp(2*x) + b^2 + 8*a*b*exp(2*x)))/(a*(a + b
)^7)))/(2*a^(1/2)*(a + b)^(7/2))
```

3.19 $\int \frac{\sinh(x)}{4-3\cosh^3(x)}\,dx$

Optimal. Leaf size=98

$$\frac{\text{ArcTan}\left(\frac{1+\sqrt[3]{6}\cosh(x)}{\sqrt{3}}\right)}{2\sqrt[3]{2}\,3^{5/6}}-\frac{\log\left(2^{2/3}-\sqrt[3]{3}\cosh(x)\right)}{6\sqrt[3]{6}}+\frac{\log\left(2\sqrt[3]{2}+2^{2/3}\sqrt[3]{3}\cosh(x)+3^{2/3}\cosh^2(x)\right)}{12\sqrt[3]{6}}$$

```
[Out] 1/12*arctan(1/3*(1+6^(1/3)*cosh(x))*3^(1/2))*2^(2/3)*3^(1/6)-1/36*ln(2^(2/3
)-3^(1/3)*cosh(x))*6^(2/3)+1/72*ln(2*2^(1/3)+2^(2/3)*3^(1/3)*cosh(x)+3^(2/3
)*cosh(x)^2)*6^(2/3)
```

Rubi [A]
time = 0.08, antiderivative size = 98, normalized size of antiderivative = 1.00, number of steps used = 7, number of rules used = 7, integrand size = 13, $\frac{\text{number of rules}}{\text{integrand size}} = 0.538$, Rules used = {3302, 206, 31, 648, 631, 210, 642}

$$\frac{\text{ArcTan}\left(\frac{\sqrt[3]{6}\cosh(x)+1}{\sqrt{3}}\right)}{2\sqrt[3]{2}\,3^{5/6}}+\frac{\log\left(3^{2/3}\cosh^2(x)+2^{2/3}\sqrt[3]{3}\cosh(x)+2\sqrt[3]{2}\right)}{12\sqrt[3]{6}}-\frac{\log\left(2^{2/3}-\sqrt[3]{3}\cosh(x)\right)}{6\sqrt[3]{6}}$$

Antiderivative was successfully verified.

```
[In] Int[Sinh[x]/(4 - 3*Cosh[x]^3),x]
```

```
[Out] ArcTan[(1 + 6^(1/3)*Cosh[x])/Sqrt[3]]/(2*2^(1/3)*3^(5/6)) - Log[2^(2/3) - 3
^(1/3)*Cosh[x]]/(6*6^(1/3)) + Log[2*2^(1/3) + 2^(2/3)*3^(1/3)*Cosh[x] + 3^(
2/3)*Cosh[x]^2]/(12*6^(1/3))
```

Rule 31

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

Rule 206

```
Int[((a_) + (b_.)*(x_)^3)^(-1), x_Symbol] :> Dist[1/(3*Rt[a, 3]^2), Int[1/(
Rt[a, 3] + Rt[b, 3]*x), x], x] + Dist[1/(3*Rt[a, 3]^2), Int[(2*Rt[a, 3] - R
t[b, 3]*x)/(Rt[a, 3]^2 - Rt[a, 3]*Rt[b, 3]*x + Rt[b, 3]^2*x^2), x], x] /; F
reeQ[{a, b}, x]
```

Rule 210

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

Rule 631

```
Int[((a_) + (b_.)*(x_) + (c_.)*(x_)^2)^(-1), x_Symbol] :> With[{q = 1 - 4*S
implify[a*(c/b^2)]}, Dist[-2/b, Subst[Int[1/(q - x^2), x], x, 1 + 2*c*(x/b)
], x] /; RationalQ[q] && (EqQ[q^2, 1] ||  !RationalQ[b^2 - 4*a*c])] /; Free
Q[{a, b, c}, x] && NeQ[b^2 - 4*a*c, 0]
```

Rule 642

```
Int[((d_) + (e_.)*(x_))/((a_.) + (b_.)*(x_) + (c_.)*(x_)^2), x_Symbol] :> S
imp[d*(Log[RemoveContent[a + b*x + c*x^2, x]]/b), x] /; FreeQ[{a, b, c, d,
e}, x] && EqQ[2*c*d - b*e, 0]
```

Rule 648

```
Int[((d_.) + (e_.)*(x_))/((a_) + (b_.)*(x_) + (c_.)*(x_)^2), x_Symbol] :> D
ist[(2*c*d - b*e)/(2*c), Int[1/(a + b*x + c*x^2), x], x] + Dist[e/(2*c), In
t[(b + 2*c*x)/(a + b*x + c*x^2), x], x] /; FreeQ[{a, b, c, d, e}, x] && NeQ
[2*c*d - b*e, 0] && NeQ[b^2 - 4*a*c, 0] &&  !NiceSqrtQ[b^2 - 4*a*c]
```

Rule 3302

```
Int[cos[(e_.) + (f_.)*(x_)]^(m_.)*((a_) + (b_.)*((c_.)*sin[(e_.) + (f_.)*(x
_)])^(n_))^(p_.), x_Symbol] :> With[{ff = FreeFactors[Sin[e + f*x], x]}, Di
st[ff/f, Subst[Int[(1 - ff^2*x^2)^((m - 1)/2)*(a + b*(c*ff*x)^n)^p, x], x,
Sin[e + f*x]/ff], x]] /; FreeQ[{a, b, c, e, f, n, p}, x] && IntegerQ[(m - 1
)/2] && (EqQ[n, 4] || GtQ[m, 0] || IGtQ[p, 0] || IntegersQ[m, p])
```

Rubi steps

$$\begin{aligned}
\int \frac{\sinh(x)}{4-3\cosh^3(x)}\,dx &= \text{Subst}\left(\int \frac{1}{4-3x^3}\,dx, x, \cosh(x)\right)\\
&= \frac{\text{Subst}\left(\int \frac{1}{2^{2/3}-\sqrt[3]{3}\,x}\,dx, x, \cosh(x)\right)}{6\sqrt[3]{2}} + \frac{\text{Subst}\left(\int \frac{2\ 2^{2/3}+\sqrt[3]{3}\,x}{2\sqrt[3]{2}+2^{2/3}\sqrt[3]{3}\,x+3^{2/3}x^2}\,dx, x, \cosh(x)\right)}{6\sqrt[3]{2}}\\
&= -\frac{\log\left(2^{2/3}-\sqrt[3]{3}\,\cosh(x)\right)}{6\sqrt[3]{6}} + \frac{\text{Subst}\left(\int \frac{1}{2\sqrt[3]{2}+2^{2/3}\sqrt[3]{3}\,x+3^{2/3}x^2}\,dx, x, \cosh(x)\right)}{2\ 2^{2/3}} + \text{Subs}\ldots\\
&= -\frac{\log\left(2^{2/3}-\sqrt[3]{3}\,\cosh(x)\right)}{6\sqrt[3]{6}} + \frac{\log\left(2\sqrt[3]{2}+2^{2/3}\sqrt[3]{3}\,\cosh(x)+3^{2/3}\cosh^2(x)\right)}{12\sqrt[3]{6}} - \text{Subs}\ldots\\
&= \frac{\tan^{-1}\left(\frac{1+\sqrt[3]{6}\,\cosh(x)}{\sqrt{3}}\right)}{2\sqrt[3]{2}\,3^{5/6}} - \frac{\log\left(2^{2/3}-\sqrt[3]{3}\,\cosh(x)\right)}{6\sqrt[3]{6}} + \frac{\log\left(2\sqrt[3]{2}+2^{2/3}\sqrt[3]{3}\,\cosh(x)+\ldots\right)}{12\sqrt[3]{6}}
\end{aligned}$$

Mathematica [A]
time = 0.06, size = 77, normalized size = 0.79

$$\frac{1}{72}\left(6\ 2^{2/3}\sqrt[6]{3}\ \text{ArcTan}\left(\frac{1+\sqrt[3]{6}\ \cosh(x)}{\sqrt{3}}\right)+6^{2/3}\left(-2\log\left(2-\sqrt[3]{6}\ \cosh(x)\right)+\log\left(4+2\sqrt[3]{6}\ \cosh(x)+6^{2/3}\cosh^2(x)\right)\right)\right)$$

Antiderivative was successfully verified.

```
[In] Integrate[Sinh[x]/(4 - 3*Cosh[x]^3),x]
```

```
[Out] (6*2^(2/3)*3^(1/6)*ArcTan[(1 + 6^(1/3)*Cosh[x])/Sqrt[3]] + 6^(2/3)*(-2*Log[
2 - 6^(1/3)*Cosh[x]] + Log[4 + 2*6^(1/3)*Cosh[x] + 6^(2/3)*Cosh[x]^2]))/72
```

Maple [A]
time = 0.46, size = 80, normalized size = 0.82

method	result
risch	$\sum_{\_R=\text{RootOf}\left(1296\_Z^3+1\right)} \_R\ln\left(24\_R\,\mathrm{e}^{x}+\mathrm{e}^{2x}+1\right)$
derivativedivides	$-\frac{4^{\frac{1}{3}}3^{\frac{2}{3}}\ln\left(\cosh(x)-\frac{4^{\frac{1}{3}}3^{\frac{2}{3}}}{3}\right)}{36}+\frac{4^{\frac{1}{3}}3^{\frac{2}{3}}\ln\left(\cosh^2(x)+\frac{4^{\frac{1}{3}}3^{\frac{2}{3}}\cosh(x)}{3}+\frac{4^{\frac{2}{3}}3^{\frac{1}{3}}}{3}\right)}{72}+\frac{4^{\frac{1}{3}}3^{\frac{1}{6}}\arctan\left(\frac{\sqrt{3}\left(\frac{4^{\frac{2}{3}}3^{\frac{1}{3}}\cosh(x}{2}\right.}{3}\right.}{12}$
default	$-\frac{4^{\frac{1}{3}}3^{\frac{2}{3}}\ln\left(\cosh(x)-\frac{4^{\frac{1}{3}}3^{\frac{2}{3}}}{3}\right)}{36}+\frac{4^{\frac{1}{3}}3^{\frac{2}{3}}\ln\left(\cosh^2(x)+\frac{4^{\frac{1}{3}}3^{\frac{2}{3}}\cosh(x)}{3}+\frac{4^{\frac{2}{3}}3^{\frac{1}{3}}}{3}\right)}{72}+\frac{4^{\frac{1}{3}}3^{\frac{1}{6}}\arctan\left(\frac{\sqrt{3}\left(\frac{4^{\frac{2}{3}}3^{\frac{1}{3}}\cosh(x}{2}\right.}{3}\right.}{12}$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(sinh(x)/(4-3*cosh(x)^3),x,method=_RETURNVERBOSE)
```

```
[Out] -1/36*4^(1/3)*3^(2/3)*ln(cosh(x)-1/3*4^(1/3)*3^(2/3))+1/72*4^(1/3)*3^(2/3)*
ln(cosh(x)^2+1/3*4^(1/3)*3^(2/3)*cosh(x)+1/3*4^(2/3)*3^(1/3))+1/12*4^(1/3)*
3^(1/6)*arctan(1/3*3^(1/2)*(1/2*4^(2/3)*3^(1/3)*cosh(x)+1))
```

Maxima [F]
time = 0.00, size = 0, normalized size = 0.00

Failed to integrate

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(sinh(x)/(4-3*cosh(x)^3),x, algorithm="maxima")
```

```
[Out] -integrate(sinh(x)/(3*cosh(x)^3 - 4), x)
```

Fricas [B] Leaf count of result is larger than twice the leaf count of optimal. 305 vs. $2(69) = 138$.
time = 0.39, size = 305, normalized size = 3.11

$$\frac{1}{12}\cdot 6^{\frac{1}{6}}\sqrt{2}(-1)^{\frac{1}{3}}\arctan\left(\frac{1}{12}\cdot 6^{\frac{1}{6}}\left(6^{\frac{2}{3}}\sqrt{2}(-1)^{\frac{2}{3}}\cosh(x)^3+6^{\frac{2}{3}}\sqrt{2}(-1)^{\frac{2}{3}}\sinh(x)^3+\left(3\cdot 6^{\frac{2}{3}}\sqrt{2}(-1)^{\frac{2}{3}}\cosh(x)+4\cdot 6^{\frac{1}{3}}\sqrt{2}\right)\sinh(x)^2+4\cdot 6^{\frac{1}{3}}\sqrt{2}\cosh(x)^2+\left(6^{\frac{2}{3}}\sqrt{2}(-1)^{\frac{2}{3}}-16\sqrt{2}(-1)^{\frac{1}{3}}\right)\cosh(x)+\left(3\cdot 6^{\frac{2}{3}}\sqrt{2}(-1)^{\frac{2}{3}}\cosh(x)^2+6^{\frac{2}{3}}\sqrt{2}(-1)^{\frac{2}{3}}+8\cdot 6^{\frac{1}{3}}\sqrt{2}\cosh(x)-16\sqrt{2}(-1)^{\frac{1}{3}}\right)\sinh(x)+2\cdot 6^{\frac{1}{3}}\sqrt{2}\right)\right)-\frac{1}{12}\cdot 6^{\frac{1}{6}}\sqrt{2}(-1)^{\frac{1}{3}}\arctan\left(\frac{1}{12}\cdot 6^{\frac{1}{6}}\left(6^{\frac{2}{3}}\sqrt{2}(-1)^{\frac{2}{3}}\cosh(x)+6^{\frac{2}{3}}\sqrt{2}(-1)^{\frac{2}{3}}\sinh(x)+2\cdot 6^{\frac{1}{3}}\sqrt{2}\right)\right)-\frac{1}{72}\cdot 6^{\frac{2}{3}}(-1)^{\frac{1}{3}}\log\left(-\frac{2\left(2\cdot 6^{\frac{2}{3}}(-1)^{\frac{1}{3}}\cosh(x)-3\cosh(x)^2-3\sinh(x)^2-4\cdot 6^{\frac{1}{3}}(-1)^{\frac{2}{3}}-3\right)}{\cosh(x)^2-2\cosh(x)\sinh(x)+\sinh(x)^2}\right)+\frac{1}{36}\cdot 6^{\frac{2}{3}}(-1)^{\frac{1}{3}}\log\left(\frac{2\left(6^{\frac{2}{3}}(-1)^{\frac{1}{3}}+3\cosh(x)\right)}{\cosh(x)-\sinh(x)}\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(sinh(x)/(4-3*cosh(x)^3),x, algorithm="fricas")
```

```
[Out] 1/12*6^(1/6)*sqrt(2)*(-1)^(1/3)*arctan(1/12*6^(1/6)*(6^(2/3)*sqrt(2)*(-1)^(
2/3)*cosh(x)^3 + 6^(2/3)*sqrt(2)*(-1)^(2/3)*sinh(x)^3 + (3*6^(2/3)*sqrt(2)*
(-1)^(2/3)*cosh(x) + 4*6^(1/3)*sqrt(2))*sinh(x)^2 + 4*6^(1/3)*sqrt(2)*cosh(
x)^2 + (6^(2/3)*sqrt(2)*(-1)^(2/3) - 16*sqrt(2)*(-1)^(1/3))*cosh(x) + (3*6^
(2/3)*sqrt(2)*(-1)^(2/3)*cosh(x)^2 + 6^(2/3)*sqrt(2)*(-1)^(2/3) + 8*6^(1/3)
*sqrt(2)*cosh(x) - 16*sqrt(2)*(-1)^(1/3))*sinh(x) + 2*6^(1/3)*sqrt(2))) - 1
/12*6^(1/6)*sqrt(2)*(-1)^(1/3)*arctan(1/12*6^(1/6)*(6^(2/3)*sqrt(2)*(-1)^(2
/3)*cosh(x) + 6^(2/3)*sqrt(2)*(-1)^(2/3)*sinh(x) + 2*6^(1/3)*sqrt(2))) - 1/
72*6^(2/3)*(-1)^(1/3)*log(-2*(2*6^(2/3)*(-1)^(1/3)*cosh(x) - 3*cosh(x)^2 -
3*sinh(x)^2 - 4*6^(1/3)*(-1)^(2/3) - 3)/(cosh(x)^2 - 2*cosh(x)*sinh(x) + si
nh(x)^2)) + 1/36*6^(2/3)*(-1)^(1/3)*log(2*(6^(2/3)*(-1)^(1/3) + 3*cosh(x))/
(cosh(x) - sinh(x)))
```

Sympy [A]
time = 0.53, size = 85, normalized size = 0.87

$$-\frac{6^{\frac{2}{3}}\log\left(\cosh(x)-\frac{6^{\frac{2}{3}}}{3}\right)}{36}+\frac{6^{\frac{2}{3}}\log\left(36\cosh^2(x)+12\cdot 6^{\frac{2}{3}}\cosh(x)+24\cdot\sqrt[3]{6}\right)}{72}+\frac{2^{\frac{2}{3}}\cdot\sqrt[6]{3}\operatorname{atan}\left(\frac{\sqrt[3]{2}\cdot 3^{\frac{5}{6}}\cosh(x)}{3}+\frac{\sqrt{3}}{3}\right)}{12}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(sinh(x)/(4-3*cosh(x)**3),x)
```

```
[Out] -6**(2/3)*log(cosh(x) - 6**(2/3)/3)/36 + 6**(2/3)*log(36*cosh(x)**2 + 12*6*
*(2/3)*cosh(x) + 24*6**(1/3))/72 + 2**(2/3)*3**(1/6)*atan(2**(1/3)*3**(5/6)
*cosh(x)/3 + sqrt(3)/3)/12
```

Giac [A]
time = 0.42, size = 80, normalized size = 0.82

$$\frac{1}{12}\sqrt{3}\left(\frac{4}{3}\right)^{\frac{1}{3}}\arctan\left(\frac{1}{4}\sqrt{3}\left(\frac{4}{3}\right)^{\frac{2}{3}}\left(\left(\frac{4}{3}\right)^{\frac{1}{3}}+e^{(-x)}+e^{x}\right)\right)+\frac{1}{72}\cdot 36^{\frac{1}{3}}\log\left(\left(e^{(-x)}+e^{x}\right)^2+2\left(\frac{4}{3}\right)^{\frac{1}{3}}\left(e^{(-x)}+e^{x}\right)+4\left(\frac{4}{3}\right)^{\frac{2}{3}}\right)-\frac{1}{12}\left(\frac{4}{3}\right)^{\frac{1}{3}}\log\left(\left|-2\left(\frac{4}{3}\right)^{\frac{1}{3}}+e^{(-x)}+e^{x}\right|\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(sinh(x)/(4-3*cosh(x)^3),x, algorithm="giac")
```

```
[Out] 1/12*sqrt(3)*(4/3)^(1/3)*arctan(1/4*sqrt(3)*(4/3)^(2/3)*((4/3)^(1/3) + e^(-
x) + e^x)) + 1/72*36^(1/3)*log((e^(-x) + e^x)^2 + 2*(4/3)^(1/3)*(e^(-x) + e
```

```
^x) + 4*(4/3)^(2/3)) - 1/12*(4/3)^(1/3)*log(abs(-2*(4/3)^(1/3) + e^(-x) + e
^x))
```

Mupad [B]
time = 3.51, size = 205, normalized size = 2.09

$$-\frac{6^{2/3}\ln\left(\frac{256\,e^{2x}}{81}-\frac{128\,e^{x}}{27}+\frac{6^{2/3}\left(\frac{256\,e^{2x}}{9}-\frac{2048\,e^{x}}{27}+\frac{6^{2/3}\left(256\,e^{2x}-\frac{2048\,e^{x}}{3}+256\right)}{36}+\frac{256}{9}\right)}{36}+\frac{256}{81}\right)}{36}-\frac{6^{2/3}\ln\left(\frac{256\,e^{2x}}{81}-\frac{128\,e^{x}}{27}+\frac{6^{2/3}\left(-\frac{1}{2}+\frac{\sqrt{3}\,1i}{2}\right)\left(\frac{256\,e^{2x}}{9}-\frac{2048\,e^{x}}{27}+\frac{6^{2/3}\left(-\frac{1}{2}+\frac{\sqrt{3}\,1i}{2}\right)\left(256\,e^{2x}-\frac{2048\,e^{x}}{3}+256\right)}{36}+\frac{256}{9}\right)}{36}+\frac{256}{81}\right)\left(-\frac{1}{2}+\frac{\sqrt{3}\,1i}{2}\right)}{36}+\frac{6^{2/3}\ln\left(\frac{256\,e^{2x}}{81}-\frac{128\,e^{x}}{27}-\frac{6^{2/3}\left(\frac{1}{2}+\frac{\sqrt{3}\,1i}{2}\right)\left(\frac{256\,e^{2x}}{9}-\frac{2048\,e^{x}}{27}-\frac{6^{2/3}\left(\frac{1}{2}+\frac{\sqrt{3}\,1i}{2}\right)\left(256\,e^{2x}-\frac{2048\,e^{x}}{3}+256\right)}{36}+\frac{256}{9}\right)}{36}+\frac{256}{81}\right)\left(\frac{1}{2}+\frac{\sqrt{3}\,1i}{2}\right)}{36}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(-sinh(x)/(3*cosh(x)^3 - 4),x)
```

```
[Out] (6^(2/3)*log((256*exp(2*x))/81 - (128*exp(x))/27 - (6^(2/3)*((3^(1/2)*1i)/2
 + 1/2)*((256*exp(2*x))/9 - (2048*exp(x))/27 - (6^(2/3)*((3^(1/2)*1i)/2 + 1
/2)*(256*exp(2*x) - (2048*exp(x))/3 + 256))/36 + 256/9))/36 + 256/81)*((3^(
1/2)*1i)/2 + 1/2))/36 - (6^(2/3)*log((256*exp(2*x))/81 - (128*exp(x))/27 +
(6^(2/3)*((3^(1/2)*1i)/2 - 1/2)*((256*exp(2*x))/9 - (2048*exp(x))/27 + (6^(
2/3)*((3^(1/2)*1i)/2 - 1/2)*(256*exp(2*x) - (2048*exp(x))/3 + 256))/36 + 25
6/9))/36 + 256/81)*((3^(1/2)*1i)/2 - 1/2))/36 - (6^(2/3)*log((256*exp(2*x))
/81 - (128*exp(x))/27 + (6^(2/3)*((256*exp(2*x))/9 - (2048*exp(x))/27 + (6^
(2/3)*(256*exp(2*x) - (2048*exp(x))/3 + 256))/36 + 256/9))/36 + 256/81))/36
```

3.20 $\int \frac{\cosh^7(x)}{a+b\cosh^2(x)}\,dx$

Optimal. Leaf size=78

$$-\frac{a^3\text{ArcTan}\left(\frac{\sqrt{b}\,\sinh(x)}{\sqrt{a+b}}\right)}{b^{7/2}\sqrt{a+b}}+\frac{(a^2-ab+b^2)\sinh(x)}{b^3}-\frac{(a-2b)\sinh^3(x)}{3b^2}+\frac{\sinh^5(x)}{5b}$$

```
[Out] (a^2-a*b+b^2)*sinh(x)/b^3-1/3*(a-2*b)*sinh(x)^3/b^2+1/5*sinh(x)^5/b-a^3*arc
tan(sinh(x)*b^(1/2)/(a+b)^(1/2))/b^(7/2)/(a+b)^(1/2)
```

Rubi [A]
time = 0.06, antiderivative size = 78, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 3, integrand size = 15, $\frac{\text{number of rules}}{\text{integrand size}} = 0.200$, Rules used = {3265, 398, 211}

$$-\frac{a^3\text{ArcTan}\left(\frac{\sqrt{b}\,\sinh(x)}{\sqrt{a+b}}\right)}{b^{7/2}\sqrt{a+b}}+\frac{(a^2-ab+b^2)\sinh(x)}{b^3}-\frac{(a-2b)\sinh^3(x)}{3b^2}+\frac{\sinh^5(x)}{5b}$$

Antiderivative was successfully verified.

```
[In] Int[Cosh[x]^7/(a + b*Cosh[x]^2),x]
```

```
[Out] -((a^3*ArcTan[(Sqrt[b]*Sinh[x])/Sqrt[a + b]])/(b^(7/2)*Sqrt[a + b])) + ((a^
2 - a*b + b^2)*Sinh[x])/b^3 - ((a - 2*b)*Sinh[x]^3)/(3*b^2) + Sinh[x]^5/(5*
b)
```

Rule 211

```
Int[((a_) + (b_.)*(x_)^2)^(-1), x_Symbol] :> Simp[(Rt[a/b, 2]/a)*ArcTan[x/R
t[a/b, 2]], x] /; FreeQ[{a, b}, x] && PosQ[a/b]
```

Rule 398

```
Int[((a_) + (b_.)*(x_)^(n_))^(p_)*((c_) + (d_.)*(x_)^(n_))^(q_), x_Symbol]
:> Int[PolynomialDivide[(a + b*x^n)^p, (c + d*x^n)^(-q), x], x] /; FreeQ[{a
, b, c, d}, x] && NeQ[b*c - a*d, 0] && IGtQ[n, 0] && IGtQ[p, 0] && ILtQ[q,
0] && GeQ[p, -q]
```

Rule 3265

```
Int[sin[(e_.) + (f_.)*(x_)]^(m_.)*((a_) + (b_.)*sin[(e_.) + (f_.)*(x_)]^2)^
(p_.), x_Symbol] :> With[{ff = FreeFactors[Cos[e + f*x], x]}, Dist[-ff/f, S
ubst[Int[(1 - ff^2*x^2)^((m - 1)/2)*(a + b - b*ff^2*x^2)^p, x], x, Cos[e +
f*x]/ff], x]] /; FreeQ[{a, b, e, f, p}, x] && IntegerQ[(m - 1)/2]
```

Rubi steps

$$\int \frac{\cosh^7(x)}{a+b\cosh^2(x)}\,dx = \text{Subst}\left(\int \frac{(1+x^2)^3}{a+b+bx^2}\,dx, x, \sinh(x)\right)$$
$$= \text{Subst}\left(\int \left(\frac{a^2-ab+b^2}{b^3} - \frac{(a-2b)x^2}{b^2} + \frac{x^4}{b} - \frac{a^3}{b^3(a+b+bx^2)}\right)dx, x, \sinh(x)\right)$$
$$= \frac{(a^2-ab+b^2)\sinh(x)}{b^3} - \frac{(a-2b)\sinh^3(x)}{3b^2} + \frac{\sinh^5(x)}{5b} - \frac{a^3\text{Subst}\left(\int \frac{1}{a+b+bx^2}\,dx, x, \text{si}\right.}{b^3}$$
$$= -\frac{a^3\tan^{-1}\left(\frac{\sqrt{b}\sinh(x)}{\sqrt{a+b}}\right)}{b^{7/2}\sqrt{a+b}} + \frac{(a^2-ab+b^2)\sinh(x)}{b^3} - \frac{(a-2b)\sinh^3(x)}{3b^2} + \frac{\sinh^5(x)}{5b}$$

Mathematica [**A**]
time = 0.20, size = 86, normalized size = 1.10

$$\frac{a^3\text{ArcTan}\left(\frac{\sqrt{a+b}\,\text{csch}(x)}{\sqrt{b}}\right)}{b^{7/2}\sqrt{a+b}} + \frac{(8a^2-6ab+5b^2)\sinh(x)}{8b^3} - \frac{(4a-5b)\sinh(3x)}{48b^2} + \frac{\sinh(5x)}{80b}$$

Antiderivative was successfully verified.

```
[In] Integrate[Cosh[x]^7/(a + b*Cosh[x]^2),x]
```

```
[Out] (a^3*ArcTan[(Sqrt[a + b]*Csch[x])/Sqrt[b]])/(b^(7/2)*Sqrt[a + b]) + ((8*a^2
 - 6*a*b + 5*b^2)*Sinh[x])/(8*b^3) - ((4*a - 5*b)*Sinh[3*x])/(48*b^2) + Sin
h[5*x]/(80*b)
```

Maple [**B**] Leaf count of result is larger than twice the leaf count of optimal. 256 vs. 2(66) = 132.
time = 0.54, size = 257, normalized size = 3.29

method	result
risch	$\frac{e^{5x}}{160b} - \frac{e^{3x}a}{24b^2} + \frac{5e^{3x}}{96b} + \frac{e^{x}a^2}{2b^3} - \frac{3a\,e^{x}}{8b^2} + \frac{5e^{x}}{16b} - \frac{e^{-x}a^2}{2b^3} + \frac{3e^{-x}a}{8b^2} - \frac{5e^{-x}}{16b} + \frac{e^{-3x}a}{24b^2} - \frac{5e^{-3x}}{96b} - \frac{e^{-5x}}{160b} - \frac{a^3\ln\left(e^{2x}+\right.}{2\sqrt{}}$
default	$-\frac{2a^3\left(\frac{\arctan\left(\frac{2\sqrt{a+b}\tanh\left(\frac{x}{2}\right)+2\sqrt{a}}{2\sqrt{b}}\right)}{2\sqrt{a+b}\sqrt{b}} + \frac{\arctan\left(\frac{2\sqrt{a+b}\tanh\left(\frac{x}{2}\right)-2\sqrt{a}}{2\sqrt{b}}\right)}{2\sqrt{a+b}\sqrt{b}}\right)}{b^3} - \frac{1}{5b\left(\tanh\left(\frac{x}{2}\right)+1\right)^5} + \frac{1}{2b\left(\tanh\left(\frac{x}{2}\right)+\right.}$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(cosh(x)^7/(a+b*cosh(x)^2),x,method=_RETURNVERBOSE)
```

```
[Out] -2*a^3/b^3*(1/2/(a+b)^(1/2)/b^(1/2)*arctan(1/2*(2*(a+b)^(1/2)*tanh(1/2*x)+2
*a^(1/2))/b^(1/2))+1/2/(a+b)^(1/2)/b^(1/2)*arctan(1/2*(2*(a+b)^(1/2)*tanh(1
/2*x)-2*a^(1/2))/b^(1/2)))-1/5/b/(tanh(1/2*x)+1)^5+1/2/b/(tanh(1/2*x)+1)^4-
1/8*(4*a-7*b)/b^2/(tanh(1/2*x)+1)^2-1/12*(11*b-4*a)/b^2/(tanh(1/2*x)+1)^3-(
a^2-a*b+b^2)/b^3/(tanh(1/2*x)+1)-1/2/b/(tanh(1/2*x)-1)^4-1/5/b/(tanh(1/2*x)
-1)^5-1/8*(-4*a+7*b)/b^2/(tanh(1/2*x)-1)^2-1/12*(11*b-4*a)/b^2/(tanh(1/2*x)
-1)^3-(a^2-a*b+b^2)/b^3/(tanh(1/2*x)-1)
```

<u>Maxima</u> [**F**]
time = 0.00, size = 0, normalized size = 0.00

Failed to integrate

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(cosh(x)^7/(a+b*cosh(x)^2),x, algorithm="maxima")
```

```
[Out] 1/480*(3*b^2*e^(10*x) - 3*b^2 - 5*(4*a*b - 5*b^2)*e^(8*x) + 30*(8*a^2 - 6*a
*b + 5*b^2)*e^(6*x) - 30*(8*a^2 - 6*a*b + 5*b^2)*e^(4*x) + 5*(4*a*b - 5*b^2
)*e^(2*x))*e^(-5*x)/b^3 - 1/128*integrate(256*(a^3*e^(3*x) + a^3*e^x)/(b^4*
e^(4*x) + b^4 + 2*(2*a*b^3 + b^4)*e^(2*x)), x)
```

<u>Fricas</u> [**B**] Leaf count of result is larger than twice the leaf count of optimal. 1232 vs. $2(66) = 132$.
time = 0.40, size = 2508, normalized size = 32.15

Too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(cosh(x)^7/(a+b*cosh(x)^2),x, algorithm="fricas")
```

```
[Out] [1/480*(3*(a*b^3 + b^4)*cosh(x)^10 + 30*(a*b^3 + b^4)*cosh(x)*sinh(x)^9 + 3
*(a*b^3 + b^4)*sinh(x)^10 - 5*(4*a^2*b^2 - a*b^3 - 5*b^4)*cosh(x)^8 - 5*(4*
a^2*b^2 - a*b^3 - 5*b^4 - 27*(a*b^3 + b^4)*cosh(x)^2)*sinh(x)^8 + 40*(9*(a*
b^3 + b^4)*cosh(x)^3 - (4*a^2*b^2 - a*b^3 - 5*b^4)*cosh(x))*sinh(x)^7 + 30*
(8*a^3*b + 2*a^2*b^2 - a*b^3 + 5*b^4)*cosh(x)^6 + 10*(63*(a*b^3 + b^4)*cosh
(x)^4 + 24*a^3*b + 6*a^2*b^2 - 3*a*b^3 + 15*b^4 - 14*(4*a^2*b^2 - a*b^3 - 5
*b^4)*cosh(x)^2)*sinh(x)^6 + 4*(189*(a*b^3 + b^4)*cosh(x)^5 - 70*(4*a^2*b^2
 - a*b^3 - 5*b^4)*cosh(x)^3 + 45*(8*a^3*b + 2*a^2*b^2 - a*b^3 + 5*b^4)*cosh
(x))*sinh(x)^5 - 30*(8*a^3*b + 2*a^2*b^2 - a*b^3 + 5*b^4)*cosh(x)^4 + 10*(6
3*(a*b^3 + b^4)*cosh(x)^6 - 35*(4*a^2*b^2 - a*b^3 - 5*b^4)*cosh(x)^4 - 24*a
^3*b - 6*a^2*b^2 + 3*a*b^3 - 15*b^4 + 45*(8*a^3*b + 2*a^2*b^2 - a*b^3 + 5*b
^4)*cosh(x)^2)*sinh(x)^4 - 3*a*b^3 - 3*b^4 + 40*(9*(a*b^3 + b^4)*cosh(x)^7
- 7*(4*a^2*b^2 - a*b^3 - 5*b^4)*cosh(x)^5 + 15*(8*a^3*b + 2*a^2*b^2 - a*b^3
 + 5*b^4)*cosh(x)^3 - 3*(8*a^3*b + 2*a^2*b^2 - a*b^3 + 5*b^4)*cosh(x))*sinh
```

```
(x)^3 + 5*(4*a^2*b^2 - a*b^3 - 5*b^4)*cosh(x)^2 + 5*(27*(a*b^3 + b^4)*cosh(
x)^8 - 28*(4*a^2*b^2 - a*b^3 - 5*b^4)*cosh(x)^6 + 90*(8*a^3*b + 2*a^2*b^2 -
 a*b^3 + 5*b^4)*cosh(x)^4 + 4*a^2*b^2 - a*b^3 - 5*b^4 - 36*(8*a^3*b + 2*a^2
*b^2 - a*b^3 + 5*b^4)*cosh(x)^2)*sinh(x)^2 - 240*(a^3*cosh(x)^5 + 5*a^3*cos
h(x)^4*sinh(x) + 10*a^3*cosh(x)^3*sinh(x)^2 + 10*a^3*cosh(x)^2*sinh(x)^3 +
5*a^3*cosh(x)*sinh(x)^4 + a^3*sinh(x)^5)*sqrt(-a*b - b^2)*log((b*cosh(x)^4
+ 4*b*cosh(x)*sinh(x)^3 + b*sinh(x)^4 - 2*(2*a + 3*b)*cosh(x)^2 + 2*(3*b*co
sh(x)^2 - 2*a - 3*b)*sinh(x)^2 + 4*(b*cosh(x)^3 - (2*a + 3*b)*cosh(x))*sinh
(x) + 4*(cosh(x)^3 + 3*cosh(x)*sinh(x)^2 + sinh(x)^3 + (3*cosh(x)^2 - 1)*si
nh(x) - cosh(x))*sqrt(-a*b - b^2) + b)/(b*cosh(x)^4 + 4*b*cosh(x)*sinh(x)^3
 + b*sinh(x)^4 + 2*(2*a + b)*cosh(x)^2 + 2*(3*b*cosh(x)^2 + 2*a + b)*sinh(x
)^2 + 4*(b*cosh(x)^3 + (2*a + b)*cosh(x))*sinh(x) + b)) + 10*(3*(a*b^3 + b^
4)*cosh(x)^9 - 4*(4*a^2*b^2 - a*b^3 - 5*b^4)*cosh(x)^7 + 18*(8*a^3*b + 2*a^
2*b^2 - a*b^3 + 5*b^4)*cosh(x)^5 - 12*(8*a^3*b + 2*a^2*b^2 - a*b^3 + 5*b^4)
*cosh(x)^3 + (4*a^2*b^2 - a*b^3 - 5*b^4)*cosh(x))*sinh(x))/((a*b^4 + b^5)*c
osh(x)^5 + 5*(a*b^4 + b^5)*cosh(x)^4*sinh(x) + 10*(a*b^4 + b^5)*cosh(x)^3*s
inh(x)^2 + 10*(a*b^4 + b^5)*cosh(x)^2*sinh(x)^3 + 5*(a*b^4 + b^5)*cosh(x)*s
inh(x)^4 + (a*b^4 + b^5)*sinh(x)^5), 1/480*(3*(a*b^3 + b^4)*cosh(x)^10 + 30
*(a*b^3 + b^4)*cosh(x)*sinh(x)^9 + 3*(a*b^3 + b^4)*sinh(x)^10 - 5*(4*a^2*b^
2 - a*b^3 - 5*b^4)*cosh(x)^8 - 5*(4*a^2*b^2 - a*b^3 - 5*b^4 - 27*(a*b^3 + b
^4)*cosh(x)^2)*sinh(x)^8 + 40*(9*(a*b^3 + b^4)*cosh(x)^3 - (4*a^2*b^2 - a*b
^3 - 5*b^4)*cosh(x))*sinh(x)^7 + 30*(8*a^3*b + 2*a^2*b^2 - a*b^3 + 5*b^4)*c
osh(x)^6 + 10*(63*(a*b^3 + b^4)*cosh(x)^4 + 24*a^3*b + 6*a^2*b^2 - 3*a*b^3
+ 15*b^4 - 14*(4*a^2*b^2 - a*b^3 - 5*b^4)*cosh(x)^2)*sinh(x)^6 + 4*(189*(a*
b^3 + b^4)*cosh(x)^5 - 70*(4*a^2*b^2 - a*b^3 - 5*b^4)*cosh(x)^3 + 45*(8*a^3
*b + 2*a^2*b^2 - a*b^3 + 5*b^4)*cosh(x))*sinh(x)^5 - 30*(8*a^3*b + 2*a^2*b^
2 - a*b^3 + 5*b^4)*cosh(x)^4 + 10*(63*(a*b^3 + b^4)*cosh(x)^6 - 35*(4*a^2*b
^2 - a*b^3 - 5*b^4)*cosh(x)^4 - 24*a^3*b - 6*a^2*b^2 + 3*a*b^3 - 15*b^4 + 4
5*(8*a^3*b + 2*a^2*b^2 - a*b^3 + 5*b^4)*cosh(x)^2)*sinh(x)^4 - 3*a*b^3 - 3*
b^4 + 40*(9*(a*b^3 + b^4)*cosh(x)^7 - 7*(4*a^2*b^2 - a*b^3 - 5*b^4)*cosh(x)
^5 + 15*(8*a^3*b + 2*a^2*b^2 - a*b^3 + 5*b^4)*cosh(x)^3 - 3*(8*a^3*b + 2*a^
2*b^2 - a*b^3 + 5*b^4)*cosh(x))*sinh(x)^3 + 5*(4*a^2*b^2 - a*b^3 - 5*b^4)*c
osh(x)^2 + 5*(27*(a*b^3 + b^4)*cosh(x)^8 - 28*(4*a^2*b^2 - a*b^3 - 5*b^4)*c
osh(x)^6 + 90*(8*a^3*b + 2*a^2*b^2 - a*b^3 + 5*b^4)*cosh(x)^4 + 4*a^2*b^2 -
 a*b^3 - 5*b^4 - 36*(8*a^3*b + 2*a^2*b^2 - a*b^3 + 5*b^4)*cosh(x)^2)*sinh(x
)^2 - 480*(a^3*cosh(x)^5 + 5*a^3*cosh(x)^4*sinh(x) + 10*a^3*cosh(x)^3*sinh(
x)^2 + 10*a^3*cosh(x)^2*sinh(x)^3 + 5*a^3*cosh(x)*sinh(x)^4 + a^3*sinh(x)^5
)*sqrt(a*b + b^2)*arctan(1/2*(b*cosh(x)^3 + 3*b*cosh(x)*sinh(x)^2 + b*sinh(
x)^3 + (4*a + 3*b)*cosh(x) + (3*b*cosh(x)^2 + 4*a + 3*b)*sinh(x))/sqrt(a*b
+ b^2)) - 480*(a^3*cosh(x)^5 + 5*a^3*cosh(x)^4*sinh(x) + 10*a^3*cosh(x)^3*s
inh(x)^2 + 10*a^3*cosh(x)^2*sinh(x)^3 + 5*a^3*cosh(x)*sinh(x)^4 + a^3*sinh(
x)^5)*sqrt(a*b + b^2)*arctan(1/2*sqrt(a*b + b^2)*(cosh(x) + sinh(x))/(a + b
)) + 10*(3*(a*b^3 + b^4)*cosh(x)^9 - 4*(4*a^2*b^2 - a*b^3 - 5*b^4)*cosh(x)^
7 + 18*(8*a^3*b + 2*a^2*b^2 - a*b^3 + 5*b^4)*cosh(x)^5 - 12*(8*a^3*b + 2*a^
2*b^2 - a*b^3 + 5*b^4)*cosh(x)^3 + (4*a^2*b^2 - a*b^3 - 5*b^4)*cosh(x))*sin
```

```
h(x))/((a*b^4 + b^5)*cosh(x)^5 + 5*(a*b^4 + b^5)*cosh(x)^4*sinh(x) + 10*(a*
b^4 + b^5)*cosh(x)^3*sinh(x)^2 + 10*(a*b^4 + b^5)*cosh(x)^2*sinh(x)^3 + 5*(
a*b^4 + b^5)*cosh(x)*sinh(x)^4 + (a*b^4 + b^5)*sinh(x)^5)]
```

Sympy [**F(-1)**] Timed out
time = 0.00, size = 0, normalized size = 0.00

Timed out

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(cosh(x)**7/(a+b*cosh(x)**2),x)
```

```
[Out] Timed out
```

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(cosh(x)^7/(a+b*cosh(x)^2),x, algorithm="giac")
```

```
[Out] Exception raised: TypeError >> An error occurred running a Giac command:INP
UT:sage2:=int(sage0,sageVARx):;OUTPUT:Warning, need to choose a branch for
the root of a polynomial with parameters. This might be wrong.The choice wa
s done
```

Mupad [**B**]
time = 1.39, size = 293, normalized size = 3.76

$$\frac{e^{5x}}{160\,b}-\frac{e^{-5x}}{160\,b}-\frac{e^{-x}\,\left(8\,a^2-6\,a\,b+5\,b^2\right)}{16\,b^3}+\frac{\left(2\,\mathrm{atan}\left(\frac{\left(b^9\,\sqrt{b^8+a\,b^7}+a\,b^8\,\sqrt{b^8+a\,b^7}\right)\,\left(e^x\,\left(\frac{2\,a^7}{b^{11}\,{\left(a+b\right)}^2\,\sqrt{a^6}}-\frac{4\,\left(2\,a^4\,b^4\,\sqrt{a^6}+2\,a^5\,b^3\,\sqrt{a^6}\right)}{a^3\,b^8\,\left(a+b\right)\,\sqrt{b^7\,\left(a+b\right)}\,\sqrt{b^8+a\,b^7}}\right)-\frac{2\,a^7\,e^{3x}}{b^{11}\,{\left(a+b\right)}^2\,\sqrt{a^6}}\right)}{4\,a^4}\right)-2\,\mathrm{atan}\left(\frac{a^3\,e^x\,\sqrt{b^7\,\left(a+b\right)}}{2\,b^3\,\left(a+b\right)\,\sqrt{a^6}}\right)\right)\,\sqrt{a^6}}{2\,\sqrt{b^8+a\,b^7}}+\frac{e^{-3x}\,\left(4\,a-5\,b\right)}{96\,b^2}-\frac{e^{3x}\,\left(4\,a-5\,b\right)}{96\,b^2}+\frac{e^x\,\left(8\,a^2-6\,a\,b+5\,b^2\right)}{16\,b^3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(cosh(x)^7/(a + b*cosh(x)^2),x)
```

```
[Out] exp(5*x)/(160*b) - exp(-5*x)/(160*b) - (exp(-x)*(8*a^2 - 6*a*b + 5*b^2))/(1
6*b^3) + ((2*atan(((b^9*(a*b^7 + b^8)^(1/2) + a*b^8*(a*b^7 + b^8)^(1/2))*(e
xp(x)*((2*a^7)/(b^11*(a + b)^2*(a^6)^(1/2)) - (4*(2*a^4*b^4*(a^6)^(1/2) + 2
*a^5*b^3*(a^6)^(1/2)))/(a^3*b^8*(a + b)*(b^7*(a + b))^(1/2)*(a*b^7 + b^8)^(
1/2))) - (2*a^7*exp(3*x))/(b^11*(a + b)^2*(a^6)^(1/2))))/(4*a^4)) - 2*atan(
(a^3*exp(x)*(b^7*(a + b))^(1/2))/(2*b^3*(a + b)*(a^6)^(1/2))))*(a^6)^(1/2))
/(2*(a*b^7 + b^8)^(1/2)) + (exp(-3*x)*(4*a - 5*b))/(96*b^2) - (exp(3*x)*(4*
a - 5*b))/(96*b^2) + (exp(x)*(8*a^2 - 6*a*b + 5*b^2))/(16*b^3)
```

3.21 $\int \frac{\cosh^6(x)}{a+b\cosh^2(x)}\,dx$

Optimal. Leaf size=88

$$\frac{(8a^2-4ab+3b^2)\,x}{8b^3}-\frac{a^{5/2}\tanh^{-1}\left(\frac{\sqrt{a}\,\tanh(x)}{\sqrt{a+b}}\right)}{b^3\sqrt{a+b}}-\frac{(4a-3b)\cosh(x)\sinh(x)}{8b^2}+\frac{\cosh^3(x)\sinh(x)}{4b}$$

```
[Out] 1/8*(8*a^2-4*a*b+3*b^2)*x/b^3-1/8*(4*a-3*b)*cosh(x)*sinh(x)/b^2+1/4*cosh(x)
^3*sinh(x)/b-a^(5/2)*arctanh(a^(1/2)*tanh(x)/(a+b)^(1/2))/b^3/(a+b)^(1/2)
```

Rubi [A]
time = 0.14, antiderivative size = 88, normalized size of antiderivative = 1.00, number of steps used = 6, number of rules used = 6, integrand size = 15, $\frac{\text{number of rules}}{\text{integrand size}} = 0.400$, Rules used = {3266, 481, 592, 536, 212, 214}

$$-\frac{a^{5/2}\tanh^{-1}\left(\frac{\sqrt{a}\,\tanh(x)}{\sqrt{a+b}}\right)}{b^3\sqrt{a+b}}+\frac{x(8a^2-4ab+3b^2)}{8b^3}-\frac{(4a-3b)\sinh(x)\cosh(x)}{8b^2}+\frac{\sinh(x)\cosh^3(x)}{4b}$$

Antiderivative was successfully verified.

```
[In] Int[Cosh[x]^6/(a + b*Cosh[x]^2),x]
```

```
[Out] ((8*a^2 - 4*a*b + 3*b^2)*x)/(8*b^3) - (a^(5/2)*ArcTanh[(Sqrt[a]*Tanh[x])/Sq
rt[a + b]])/(b^3*Sqrt[a + b]) - ((4*a - 3*b)*Cosh[x]*Sinh[x])/(8*b^2) + (Co
sh[x]^3*Sinh[x])/(4*b)
```

Rule 212

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

Rule 214

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

Rule 481

```
Int[((e_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_)*((c_) + (d_.)*(x_)^(n_
))^(q_), x_Symbol] :> Simp[(-a)*e^(2*n - 1)*(e*x)^(m - 2*n + 1)*(a + b*x^n)
^(p + 1)*((c + d*x^n)^(q + 1)/(b*n*(b*c - a*d)*(p + 1))), x] + Dist[e^(2*n)
/(b*n*(b*c - a*d)*(p + 1)), Int[(e*x)^(m - 2*n)*(a + b*x^n)^(p + 1)*(c + d*
x^n)^q*Simp[a*c*(m - 2*n + 1) + (a*d*(m - n + n*q + 1) + b*c*n*(p + 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] && GtQ[m - n + 1, n] && IntBinomialQ[a, b, c, d, e, m, n
, p, q, x]
```

Rule 536

```
Int[((e_) + (f_.)*(x_)^(n_))/(((a_) + (b_.)*(x_)^(n_))*((c_) + (d_.)*(x_)^(
n_))), x_Symbol] :> Dist[(b*e - a*f)/(b*c - a*d), Int[1/(a + b*x^n), x], x]
 - Dist[(d*e - c*f)/(b*c - a*d), Int[1/(c + d*x^n), x], x] /; FreeQ[{a, b,
c, d, e, f, n}, x]
```

Rule 592

```
Int[((g_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_)*((c_) + (d_.)*(x_)^(n_
))^(q_)*((e_) + (f_.)*(x_)^(n_)), x_Symbol] :> Simp[g^(n - 1)*(b*e - a*f)*(
g*x)^(m - n + 1)*(a + b*x^n)^(p + 1)*((c + d*x^n)^(q + 1)/(b*n*(b*c - a*d)*
(p + 1))), x] - Dist[g^n/(b*n*(b*c - a*d)*(p + 1)), Int[(g*x)^(m - n)*(a +
b*x^n)^(p + 1)*(c + d*x^n)^q*Simp[c*(b*e - a*f)*(m - n + 1) + (d*(b*e - a*f
)*(m + n*q + 1) - b*n*(c*f - d*e)*(p + 1))*x^n, x], x], x] /; FreeQ[{a, b,
c, d, e, f, g, q}, x] && IGtQ[n, 0] && LtQ[p, -1] && GtQ[m - n + 1, 0]
```

Rule 3266

```
Int[sin[(e_.) + (f_.)*(x_)]^(m_)*((a_) + (b_.)*sin[(e_.) + (f_.)*(x_)]^2)^(
p_.), x_Symbol] :> With[{ff = FreeFactors[Tan[e + f*x], x]}, Dist[ff^(m + 1
)/f, Subst[Int[x^m*((a + (a + b)*ff^2*x^2)^p/(1 + ff^2*x^2)^(m/2 + p + 1)),
 x], x, Tan[e + f*x]/ff], x]] /; FreeQ[{a, b, e, f}, x] && IntegerQ[m/2] &&
 IntegerQ[p]
```

Rubi steps

$$\int \frac{\cosh^6(x)}{a+b\cosh^2(x)}\,dx = -\text{Subst}\left(\int \frac{x^6}{(1-x^2)^3\,(a-(a+b)x^2)}\,dx, x, \coth(x)\right)$$

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

$$= -\frac{(4a-3b)\cosh(x)\sinh(x)}{8b^2} + \frac{\cosh^3(x)\sinh(x)}{4b} + \frac{\text{Subst}\left(\int \frac{-a(4a-3b)+(-4a^2+ab-3b^2)x^2}{(1-x^2)(a+(-a-b)x^2)}\,d\right.}{8b^2}$$

$$= -\frac{(4a-3b)\cosh(x)\sinh(x)}{8b^2} + \frac{\cosh^3(x)\sinh(x)}{4b} - \frac{a^3\text{Subst}\left(\int \frac{1}{a+(-a-b)x^2}\,dx, x, \coth(x\right.}{b^3}$$

$$= \frac{(8a^2-4ab+3b^2)\,x}{8b^3} - \frac{a^{5/2}\tanh^{-1}\left(\frac{\sqrt{a}\,\tanh(x)}{\sqrt{a+b}}\right)}{b^3\sqrt{a+b}} - \frac{(4a-3b)\cosh(x)\sinh(x)}{8b^2} + \text{cosh}$$

Mathematica [**A**]
time = 0.15, size = 76, normalized size = 0.86

$$\frac{4\left(8a^2-4ab+3b^2\right)x-\frac{32a^{5/2}\tanh^{-1}\left(\frac{\sqrt{a}\tanh(x)}{\sqrt{a+b}}\right)}{\sqrt{a+b}}-8(a-b)b\sinh(2x)+b^2\sinh(4x)}{32b^3}$$

Antiderivative was successfully verified.

```
[In] Integrate[Cosh[x]^6/(a + b*Cosh[x]^2),x]
```

```
[Out] (4*(8*a^2 - 4*a*b + 3*b^2)*x - (32*a^(5/2)*ArcTanh[(Sqrt[a]*Tanh[x])/Sqrt[a
 + b]])/Sqrt[a + b] - 8*(a - b)*b*Sinh[2*x] + b^2*Sinh[4*x])/(32*b^3)
```

Maple [**B**] Leaf count of result is larger than twice the leaf count of optimal. 272 vs. $2(74) = 148$.
time = 0.59, size = 273, normalized size = 3.10

method	result
risch	$\frac{x a^2}{b^3}-\frac{ax}{2b^2}+\frac{3x}{8b}+\frac{e^{4x}}{64b}-\frac{e^{2x}a}{8b^2}+\frac{e^{2x}}{8b}+\frac{e^{-2x}a}{8b^2}-\frac{e^{-2x}}{8b}-\frac{e^{-4x}}{64b}+\frac{\sqrt{a(a+b)}\,a^2\ln\left(e^{2x}+\frac{2\sqrt{a(a+b)}+2a+}{b}\right.}{2(a+b)b^3}$
default	$\frac{2a^3\left(-\frac{\ln\left(\sqrt{a+b}\left(\tanh^2\left(\frac{x}{2}\right)\right)+2\tanh\left(\frac{x}{2}\right)\sqrt{a}+\sqrt{a+b}\right)}{4\sqrt{a}\sqrt{a+b}}+\frac{\ln\left(\sqrt{a+b}\left(\tanh^2\left(\frac{x}{2}\right)\right)-2\tanh\left(\frac{x}{2}\right)\sqrt{a}+\sqrt{a+b}\right)}{4\sqrt{a}\sqrt{a+b}}\right)}{b^3}+$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(cosh(x)^6/(a+b*cosh(x)^2),x,method=_RETURNVERBOSE)
```

```
[Out] 2*a^3/b^3*(-1/4/a^(1/2)/(a+b)^(1/2)*ln((a+b)^(1/2)*tanh(1/2*x)^2+2*tanh(1/2
*x)*a^(1/2)+(a+b)^(1/2))+1/4/a^(1/2)/(a+b)^(1/2)*ln((a+b)^(1/2)*tanh(1/2*x)
^2-2*tanh(1/2*x)*a^(1/2)+(a+b)^(1/2)))+1/4/b/(tanh(1/2*x)-1)^4+1/2/b/(tanh(
1/2*x)-1)^3-1/8*(4*a-7*b)/b^2/(tanh(1/2*x)-1)^2-1/8*(4*a-5*b)/b^2/(tanh(1/2
*x)-1)+1/8/b^3*(-8*a^2+4*a*b-3*b^2)*ln(tanh(1/2*x)-1)-1/4/b/(tanh(1/2*x)+1)
^4+1/2/b/(tanh(1/2*x)+1)^3-1/8*(-4*a+7*b)/b^2/(tanh(1/2*x)+1)^2-1/8*(4*a-5*
b)/b^2/(tanh(1/2*x)+1)+1/8*(8*a^2-4*a*b+3*b^2)/b^3*ln(tanh(1/2*x)+1)
```

Maxima [**B**] Leaf count of result is larger than twice the leaf count of optimal. 651 vs. $2(74) = 148$.
time = 0.50, size = 651, normalized size = 7.40

$$-\frac{15(2a+b)\log\left(\frac{be^{(2x)}+2a+b-2\sqrt{(a+b)a}}{be^{(2x)}+2a+b+2\sqrt{(a+b)a}}\right)}{64\sqrt{(a+b)a}\,b}-\frac{5\log\left(\frac{be^{(-2x)}+2a+b-2\sqrt{(a+b)a}}{be^{(-2x)}+2a+b+2\sqrt{(a+b)a}}\right)}{32\sqrt{(a+b)a}}-\frac{3(2a+b)x}{2b^2}+\frac{15x}{16b}-\frac{(4(2a+b)e^{(-2x)}-b)e^{(4x)}}{64b^2}+\frac{3e^{(2x)}}{16b}-\frac{3e^{(-2x)}}{16b}+\frac{(4(2a+b)e^{(2x)}-b)e^{(-4x)}}{64b^2}+\frac{3(2a+b)\log\left(be^{(4x)}+2(2a+b)e^{(2x)}+b\right)}{16b^2}-\frac{3(2a+b)\log\left(2(2a+b)e^{(-2x)}+be^{(-4x)}+b\right)}{16b^2}+\frac{3(8a^2+8ab+b^2)\log\left(\frac{be^{(2x)}+2a+b-2\sqrt{(a+b)a}}{be^{(2x)}+2a+b+2\sqrt{(a+b)a}}\right)}{64\sqrt{(a+b)a}\,b^2}-\frac{3(8a^2+8ab+b^2)\log\left(\frac{be^{(-2x)}+2a+b-2\sqrt{(a+b)a}}{be^{(-2x)}+2a+b+2\sqrt{(a+b)a}}\right)}{64\sqrt{(a+b)a}\,b^2}+\frac{(16a^2+16ab+3b^2)x}{8b^3}-\frac{(16a^2+16ab+3b^2)\log\left(be^{(4x)}+2(2a+b)e^{(2x)}+b\right)}{64b^3}+\frac{(16a^2+16ab+3b^2)\log\left(2(2a+b)e^{(-2x)}+be^{(-4x)}+b\right)}{64b^3}-\frac{(32a^3+48a^2b+18ab^2+b^3)\log\left(\frac{be^{(2x)}+2a+b-2\sqrt{(a+b)a}}{be^{(2x)}+2a+b+2\sqrt{(a+b)a}}\right)}{128\sqrt{(a+b)a}\,b^3}+\frac{(32a^3+48a^2b+18ab^2+b^3)\log\left(\frac{be^{(-2x)}+2a+b-2\sqrt{(a+b)a}}{be^{(-2x)}+2a+b+2\sqrt{(a+b)a}}\right)}{128\sqrt{(a+b)a}\,b^3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(cosh(x)^6/(a+b*cosh(x)^2),x, algorithm="maxima")
```

```
[Out] -15/64*(2*a + b)*log((b*e^(2*x) + 2*a + b - 2*sqrt((a + b)*a))/(b*e^(2*x) +
 2*a + b + 2*sqrt((a + b)*a)))/(sqrt((a + b)*a)*b) - 5/32*log((b*e^(-2*x) +
 2*a + b - 2*sqrt((a + b)*a))/(b*e^(-2*x) + 2*a + b + 2*sqrt((a + b)*a)))/s
qrt((a + b)*a) - 3/2*(2*a + b)*x/b^2 + 15/16*x/b - 1/64*(4*(2*a + b)*e^(-2*
x) - b)*e^(4*x)/b^2 + 3/16*e^(2*x)/b - 3/16*e^(-2*x)/b + 1/64*(4*(2*a + b)*
e^(2*x) - b)*e^(-4*x)/b^2 + 3/16*(2*a + b)*log(b*e^(4*x) + 2*(2*a + b)*e^(2
*x) + b)/b^2 - 3/16*(2*a + b)*log(2*(2*a + b)*e^(-2*x) + b*e^(-4*x) + b)/b^
2 + 3/64*(8*a^2 + 8*a*b + b^2)*log((b*e^(2*x) + 2*a + b - 2*sqrt((a + b)*a)
)/(b*e^(2*x) + 2*a + b + 2*sqrt((a + b)*a)))/(sqrt((a + b)*a)*b^2) - 3/64*(
8*a^2 + 8*a*b + b^2)*log((b*e^(-2*x) + 2*a + b - 2*sqrt((a + b)*a))/(b*e^(-
2*x) + 2*a + b + 2*sqrt((a + b)*a)))/(sqrt((a + b)*a)*b^2) + 1/8*(16*a^2 +
16*a*b + 3*b^2)*x/b^3 - 1/64*(16*a^2 + 16*a*b + 3*b^2)*log(b*e^(4*x) + 2*(2
*a + b)*e^(2*x) + b)/b^3 + 1/64*(16*a^2 + 16*a*b + 3*b^2)*log(2*(2*a + b)*e
^(-2*x) + b*e^(-4*x) + b)/b^3 - 1/128*(32*a^3 + 48*a^2*b + 18*a*b^2 + b^3)*
log((b*e^(2*x) + 2*a + b - 2*sqrt((a + b)*a))/(b*e^(2*x) + 2*a + b + 2*sqrt
((a + b)*a)))/(sqrt((a + b)*a)*b^3) + 1/128*(32*a^3 + 48*a^2*b + 18*a*b^2 +
 b^3)*log((b*e^(-2*x) + 2*a + b - 2*sqrt((a + b)*a))/(b*e^(-2*x) + 2*a + b
+ 2*sqrt((a + b)*a)))/(sqrt((a + b)*a)*b^3)
```

Fricas [B] Leaf count of result is larger than twice the leaf count of optimal. 524 vs. $2(74) = 148$.
time = 0.40, size = 1245, normalized size = 14.15

Too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(cosh(x)^6/(a+b*cosh(x)^2),x, algorithm="fricas")
```

```
[Out] [1/64*(b^2*cosh(x)^8 + 8*b^2*cosh(x)*sinh(x)^7 + b^2*sinh(x)^8 - 8*(a*b - b
^2)*cosh(x)^6 + 4*(7*b^2*cosh(x)^2 - 2*a*b + 2*b^2)*sinh(x)^6 + 8*(8*a^2 -
4*a*b + 3*b^2)*x*cosh(x)^4 + 8*(7*b^2*cosh(x)^3 - 6*(a*b - b^2)*cosh(x))*si
nh(x)^5 + 2*(35*b^2*cosh(x)^4 - 60*(a*b - b^2)*cosh(x)^2 + 4*(8*a^2 - 4*a*b
 + 3*b^2)*x)*sinh(x)^4 + 8*(7*b^2*cosh(x)^5 - 20*(a*b - b^2)*cosh(x)^3 + 4*
(8*a^2 - 4*a*b + 3*b^2)*x*cosh(x))*sinh(x)^3 + 8*(a*b - b^2)*cosh(x)^2 + 4*
(7*b^2*cosh(x)^6 - 30*(a*b - b^2)*cosh(x)^4 + 12*(8*a^2 - 4*a*b + 3*b^2)*x*
cosh(x)^2 + 2*a*b - 2*b^2)*sinh(x)^2 + 32*(a^2*cosh(x)^4 + 4*a^2*cosh(x)^3*
sinh(x) + 6*a^2*cosh(x)^2*sinh(x)^2 + 4*a^2*cosh(x)*sinh(x)^3 + a^2*sinh(x)
^4)*sqrt(a/(a + b))*log((b^2*cosh(x)^4 + 4*b^2*cosh(x)*sinh(x)^3 + b^2*sinh
(x)^4 + 2*(2*a*b + b^2)*cosh(x)^2 + 2*(3*b^2*cosh(x)^2 + 2*a*b + b^2)*sinh(
x)^2 + 8*a^2 + 8*a*b + b^2 + 4*(b^2*cosh(x)^3 + (2*a*b + b^2)*cosh(x))*sinh
(x) + 4*((a*b + b^2)*cosh(x)^2 + 2*(a*b + b^2)*cosh(x)*sinh(x) + (a*b + b^2
)*sinh(x)^2 + 2*a^2 + 3*a*b + b^2)*sqrt(a/(a + b)))/(b*cosh(x)^4 + 4*b*cosh
(x)*sinh(x)^3 + b*sinh(x)^4 + 2*(2*a + b)*cosh(x)^2 + 2*(3*b*cosh(x)^2 + 2*
a + b)*sinh(x)^2 + 4*(b*cosh(x)^3 + (2*a + b)*cosh(x))*sinh(x) + b)) - b^2
```

```
+ 8*(b^2*cosh(x)^7 - 6*(a*b - b^2)*cosh(x)^5 + 4*(8*a^2 - 4*a*b + 3*b^2)*x*
cosh(x)^3 + 2*(a*b - b^2)*cosh(x))*sinh(x))/(b^3*cosh(x)^4 + 4*b^3*cosh(x)^
3*sinh(x) + 6*b^3*cosh(x)^2*sinh(x)^2 + 4*b^3*cosh(x)*sinh(x)^3 + b^3*sinh(
x)^4), 1/64*(b^2*cosh(x)^8 + 8*b^2*cosh(x)*sinh(x)^7 + b^2*sinh(x)^8 - 8*(a
*b - b^2)*cosh(x)^6 + 4*(7*b^2*cosh(x)^2 - 2*a*b + 2*b^2)*sinh(x)^6 + 8*(8*
a^2 - 4*a*b + 3*b^2)*x*cosh(x)^4 + 8*(7*b^2*cosh(x)^3 - 6*(a*b - b^2)*cosh(
x))*sinh(x)^5 + 2*(35*b^2*cosh(x)^4 - 60*(a*b - b^2)*cosh(x)^2 + 4*(8*a^2 -
 4*a*b + 3*b^2)*x)*sinh(x)^4 + 8*(7*b^2*cosh(x)^5 - 20*(a*b - b^2)*cosh(x)^
3 + 4*(8*a^2 - 4*a*b + 3*b^2)*x*cosh(x))*sinh(x)^3 + 8*(a*b - b^2)*cosh(x)^
2 + 4*(7*b^2*cosh(x)^6 - 30*(a*b - b^2)*cosh(x)^4 + 12*(8*a^2 - 4*a*b + 3*b
^2)*x*cosh(x)^2 + 2*a*b - 2*b^2)*sinh(x)^2 - 64*(a^2*cosh(x)^4 + 4*a^2*cosh
(x)^3*sinh(x) + 6*a^2*cosh(x)^2*sinh(x)^2 + 4*a^2*cosh(x)*sinh(x)^3 + a^2*s
inh(x)^4)*sqrt(-a/(a + b))*arctan(1/2*(b*cosh(x)^2 + 2*b*cosh(x)*sinh(x) +
b*sinh(x)^2 + 2*a + b)*sqrt(-a/(a + b))/a) - b^2 + 8*(b^2*cosh(x)^7 - 6*(a*
b - b^2)*cosh(x)^5 + 4*(8*a^2 - 4*a*b + 3*b^2)*x*cosh(x)^3 + 2*(a*b - b^2)*
cosh(x))*sinh(x))/(b^3*cosh(x)^4 + 4*b^3*cosh(x)^3*sinh(x) + 6*b^3*cosh(x)^
2*sinh(x)^2 + 4*b^3*cosh(x)*sinh(x)^3 + b^3*sinh(x)^4)]
```

Sympy [**F(-1)**] Timed out
time = 0.00, size = 0, normalized size = 0.00

Timed out

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(cosh(x)**6/(a+b*cosh(x)**2),x)
```

```
[Out] Timed out
```

Giac [**B**] Leaf count of result is larger than twice the leaf count of optimal. 150 vs. 2(74) = 148.
time = 0.42, size = 150, normalized size = 1.70

$$-\frac{a^{3} \arctan\left(\frac{b e^{(2 x)}+2 a+b}{2 \sqrt{-a^{2}-a b}}\right)}{\sqrt{-a^{2}-a b}\, b^{3}}+\frac{b e^{(4 x)}-8 a e^{(2 x)}+8 b e^{(2 x)}}{64 b^{2}}+\frac{(8 a^{2}-4 a b+3 b^{2}) x}{8 b^{3}}-\frac{\left(48 a^{2} e^{(4 x)}-24 a b e^{(4 x)}+18 b^{2} e^{(4 x)}-8 a b e^{(2 x)}+8 b^{2} e^{(2 x)}+b^{2}\right) e^{(-4 x)}}{64 b^{3}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(cosh(x)^6/(a+b*cosh(x)^2),x, algorithm="giac")
```

```
[Out] -a^3*arctan(1/2*(b*e^(2*x) + 2*a + b)/sqrt(-a^2 - a*b))/(sqrt(-a^2 - a*b)*b
^3) + 1/64*(b*e^(4*x) - 8*a*e^(2*x) + 8*b*e^(2*x))/b^2 + 1/8*(8*a^2 - 4*a*b
 + 3*b^2)*x/b^3 - 1/64*(48*a^2*e^(4*x) - 24*a*b*e^(4*x) + 18*b^2*e^(4*x) -
8*a*b*e^(2*x) + 8*b^2*e^(2*x) + b^2)*e^(-4*x)/b^3
```

Mupad [**B**]
time = 1.33, size = 178, normalized size = 2.02

$$\frac{e^{4 x}}{64 b}-\frac{e^{-4 x}}{64 b}+\frac{x\,(8 a^{2}-4 a b+3 b^{2})}{8 b^{3}}+\frac{e^{-2 x}\,(a-b)}{8 b^{2}}-\frac{e^{2 x}\,(a-b)}{8 b^{2}}+\frac{a^{5/2} \ln\left(\frac{4 a^{3} e^{2 x}}{b^{4}}-\frac{2 a^{5/2}\,(b+2 a e^{2 x}+b e^{2 x})}{b^{4} \sqrt{a+b}}\right)}{2 b^{3} \sqrt{a+b}}-\frac{a^{5/2} \ln\left(\frac{4 a^{3} e^{2 x}}{b^{4}}+\frac{2 a^{5/2}\,(b+2 a e^{2 x}+b e^{2 x})}{b^{4} \sqrt{a+b}}\right)}{2 b^{3} \sqrt{a+b}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(cosh(x)^6/(a + b*cosh(x)^2),x)
```

```
[Out] exp(4*x)/(64*b) - exp(-4*x)/(64*b) + (x*(8*a^2 - 4*a*b + 3*b^2))/(8*b^3) +
(exp(-2*x)*(a - b))/(8*b^2) - (exp(2*x)*(a - b))/(8*b^2) + (a^(5/2)*log((4*
a^3*exp(2*x))/b^4 - (2*a^(5/2)*(b + 2*a*exp(2*x) + b*exp(2*x)))/(b^4*(a + b
)^(1/2))))/(2*b^3*(a + b)^(1/2)) - (a^(5/2)*log((4*a^3*exp(2*x))/b^4 + (2*a
^(5/2)*(b + 2*a*exp(2*x) + b*exp(2*x)))/(b^4*(a + b)^(1/2))))/(2*b^3*(a + b
)^(1/2))
```

3.22 $\int \frac{\cosh^5(x)}{a+b\cosh^2(x)}\,dx$

Optimal. Leaf size=56

$$\frac{a^2 \text{ArcTan}\left(\frac{\sqrt{b}\,\sinh(x)}{\sqrt{a+b}}\right)}{b^{5/2}\sqrt{a+b}} - \frac{(a-b)\sinh(x)}{b^2} + \frac{\sinh^3(x)}{3b}$$

```
[Out] -(a-b)*sinh(x)/b^2+1/3*sinh(x)^3/b+a^2*arctan(sinh(x)*b^(1/2)/(a+b)^(1/2))/
b^(5/2)/(a+b)^(1/2)
```

Rubi [A]
time = 0.05, antiderivative size = 56, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 3, integrand size = 15, $\frac{\text{number of rules}}{\text{integrand size}} = 0.200$, Rules used = {3265, 398, 211}

$$\frac{a^2 \text{ArcTan}\left(\frac{\sqrt{b}\,\sinh(x)}{\sqrt{a+b}}\right)}{b^{5/2}\sqrt{a+b}} - \frac{(a-b)\sinh(x)}{b^2} + \frac{\sinh^3(x)}{3b}$$

Antiderivative was successfully verified.

```
[In] Int[Cosh[x]^5/(a + b*Cosh[x]^2),x]
```

```
[Out] (a^2*ArcTan[(Sqrt[b]*Sinh[x])/Sqrt[a + b]])/(b^(5/2)*Sqrt[a + b]) - ((a - b
)*Sinh[x])/b^2 + Sinh[x]^3/(3*b)
```

Rule 211

```
Int[((a_) + (b_.)*(x_)^2)^(-1), x_Symbol] :> Simp[(Rt[a/b, 2]/a)*ArcTan[x/R
t[a/b, 2]], x] /; FreeQ[{a, b}, x] && PosQ[a/b]
```

Rule 398

```
Int[((a_) + (b_.)*(x_)^(n_))^(p_)*((c_) + (d_.)*(x_)^(n_))^(q_), x_Symbol]
:> Int[PolynomialDivide[(a + b*x^n)^p, (c + d*x^n)^(-q), x], x] /; FreeQ[{a
, b, c, d}, x] && NeQ[b*c - a*d, 0] && IGtQ[n, 0] && IGtQ[p, 0] && ILtQ[q,
0] && GeQ[p, -q]
```

Rule 3265

```
Int[sin[(e_.) + (f_.)*(x_)]^(m_.)*((a_) + (b_.)*sin[(e_.) + (f_.)*(x_)]^2)^
(p_.), x_Symbol] :> With[{ff = FreeFactors[Cos[e + f*x], x]}, Dist[-ff/f, S
ubst[Int[(1 - ff^2*x^2)^((m - 1)/2)*(a + b - b*ff^2*x^2)^p, x], x, Cos[e +
f*x]/ff], x]] /; FreeQ[{a, b, e, f, p}, x] && IntegerQ[(m - 1)/2]
```

Rubi steps

$$\begin{aligned}\int \frac{\cosh^5(x)}{a+b\cosh^2(x)}\,dx &= \text{Subst}\left(\int \frac{(1+x^2)^2}{a+b+bx^2}\,dx, x, \sinh(x)\right)\\ &= \text{Subst}\left(\int \left(-\frac{a-b}{b^2}+\frac{x^2}{b}+\frac{a^2}{b^2(a+b+bx^2)}\right)dx, x, \sinh(x)\right)\\ &= -\frac{(a-b)\sinh(x)}{b^2}+\frac{\sinh^3(x)}{3b}+\frac{a^2\text{Subst}\left(\int \frac{1}{a+b+bx^2}\,dx, x, \sinh(x)\right)}{b^2}\\ &= \frac{a^2\tan^{-1}\left(\frac{\sqrt{b}\,\sinh(x)}{\sqrt{a+b}}\right)}{b^{5/2}\sqrt{a+b}}-\frac{(a-b)\sinh(x)}{b^2}+\frac{\sinh^3(x)}{3b}\end{aligned}$$

Mathematica [**A**]
time = 0.12, size = 61, normalized size = 1.09

$$-\frac{a^2\text{ArcTan}\left(\frac{\sqrt{a+b}\,\text{csch}(x)}{\sqrt{b}}\right)}{b^{5/2}\sqrt{a+b}}-\frac{(4a-3b)\sinh(x)}{4b^2}+\frac{\sinh(3x)}{12b}$$

Antiderivative was successfully verified.

```
[In] Integrate[Cosh[x]^5/(a + b*Cosh[x]^2),x]
```

```
[Out] -((a^2*ArcTan[(Sqrt[a + b]*Csch[x])/Sqrt[b]])/(b^(5/2)*Sqrt[a + b])) - ((4*
a - 3*b)*Sinh[x])/(4*b^2) + Sinh[3*x]/(12*b)
```

Maple [**B**] Leaf count of result is larger than twice the leaf count of optimal. 164 vs. $2(46) = 92$.
time = 0.52, size = 165, normalized size = 2.95

method	result
risch	$\frac{e^{3x}}{24b}-\frac{a\,e^{x}}{2b^2}+\frac{3\,e^{x}}{8b}+\frac{e^{-x}a}{2b^2}-\frac{3\,e^{-x}}{8b}-\frac{e^{-3x}}{24b}-\frac{a^2\ln\left(e^{2x}-\frac{2(a+b)e^{x}}{\sqrt{-ab-b^2}}-1\right)}{2\sqrt{-ab-b^2}\,b^2}+\frac{a^2\ln\left(e^{2x}+\frac{2(a+b)e^{x}}{\sqrt{-ab-b^2}}-1\right)}{2\sqrt{-ab-b^2}\,b^2}$
default	$-\frac{1}{3b\left(\tanh\left(\frac{x}{2}\right)-1\right)^3}-\frac{1}{2b\left(\tanh\left(\frac{x}{2}\right)-1\right)^2}-\frac{-a+b}{b^2\left(\tanh\left(\frac{x}{2}\right)-1\right)}+\frac{2a^2\left(\frac{\arctan\left(\frac{2\sqrt{a+b}\,\tanh\left(\frac{x}{2}\right)+2\sqrt{a}}{2\sqrt{b}}\right)}{2\sqrt{a+b}\,\sqrt{b}}+\frac{\arctan\left(\frac{2\sqrt{a+b}\cdots}{\cdots}\right)}{2\sqrt{a+\cdots}}\right.}{b^2}$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(cosh(x)^5/(a+b*cosh(x)^2),x,method=_RETURNVERBOSE)
```

```
[Out] -1/3/b/(tanh(1/2*x)-1)^3-1/2/b/(tanh(1/2*x)-1)^2-1/b^2*(-a+b)/(tanh(1/2*x)-
1)+2*a^2/b^2*(1/2/(a+b)^(1/2)/b^(1/2)*arctan(1/2*(2*(a+b)^(1/2)*tanh(1/2*x)
+2*a^(1/2))/b^(1/2))+1/2/(a+b)^(1/2)/b^(1/2)*arctan(1/2*(2*(a+b)^(1/2)*tanh
(1/2*x)-2*a^(1/2))/b^(1/2)))-1/3/b/(tanh(1/2*x)+1)^3+1/2/b/(tanh(1/2*x)+1)^
2-1/b^2*(-a+b)/(tanh(1/2*x)+1)
```

Maxima [F]
time = 0.00, size = 0, normalized size = 0.00

Failed to integrate

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(cosh(x)^5/(a+b*cosh(x)^2),x, algorithm="maxima")
```

```
[Out] 1/24*(b*e^(6*x) - 3*(4*a - 3*b)*e^(4*x) + 3*(4*a - 3*b)*e^(2*x) - b)*e^(-3*
x)/b^2 + 1/32*integrate(64*(a^2*e^(3*x) + a^2*e^x)/(b^3*e^(4*x) + b^3 + 2*(
2*a*b^2 + b^3)*e^(2*x)), x)
```

Fricas [B] Leaf count of result is larger than twice the leaf count of optimal. 557 vs. $2(46) = 92$.
time = 0.39, size = 1184, normalized size = 21.14

Too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(cosh(x)^5/(a+b*cosh(x)^2),x, algorithm="fricas")
```

```
[Out] [1/24*((a*b^2 + b^3)*cosh(x)^6 + 6*(a*b^2 + b^3)*cosh(x)*sinh(x)^5 + (a*b^2
 + b^3)*sinh(x)^6 - 3*(4*a^2*b + a*b^2 - 3*b^3)*cosh(x)^4 - 3*(4*a^2*b + a*
b^2 - 3*b^3 - 5*(a*b^2 + b^3)*cosh(x)^2)*sinh(x)^4 + 4*(5*(a*b^2 + b^3)*cos
h(x)^3 - 3*(4*a^2*b + a*b^2 - 3*b^3)*cosh(x))*sinh(x)^3 - a*b^2 - b^3 + 3*(
4*a^2*b + a*b^2 - 3*b^3)*cosh(x)^2 + 3*(5*(a*b^2 + b^3)*cosh(x)^4 + 4*a^2*b
 + a*b^2 - 3*b^3 - 6*(4*a^2*b + a*b^2 - 3*b^3)*cosh(x)^2)*sinh(x)^2 - 12*(a
^2*cosh(x)^3 + 3*a^2*cosh(x)^2*sinh(x) + 3*a^2*cosh(x)*sinh(x)^2 + a^2*sinh
(x)^3)*sqrt(-a*b - b^2)*log((b*cosh(x)^4 + 4*b*cosh(x)*sinh(x)^3 + b*sinh(x
)^4 - 2*(2*a + 3*b)*cosh(x)^2 + 2*(3*b*cosh(x)^2 - 2*a - 3*b)*sinh(x)^2 + 4
*(b*cosh(x)^3 - (2*a + 3*b)*cosh(x))*sinh(x) - 4*(cosh(x)^3 + 3*cosh(x)*sin
h(x)^2 + sinh(x)^3 + (3*cosh(x)^2 - 1)*sinh(x) - cosh(x))*sqrt(-a*b - b^2)
+ b)/(b*cosh(x)^4 + 4*b*cosh(x)*sinh(x)^3 + b*sinh(x)^4 + 2*(2*a + b)*cosh(
x)^2 + 2*(3*b*cosh(x)^2 + 2*a + b)*sinh(x)^2 + 4*(b*cosh(x)^3 + (2*a + b)*c
osh(x))*sinh(x) + b)) + 6*((a*b^2 + b^3)*cosh(x)^5 - 2*(4*a^2*b + a*b^2 - 3
*b^3)*cosh(x)^3 + (4*a^2*b + a*b^2 - 3*b^3)*cosh(x))*sinh(x))/((a*b^3 + b^4
)*cosh(x)^3 + 3*(a*b^3 + b^4)*cosh(x)^2*sinh(x) + 3*(a*b^3 + b^4)*cosh(x)*s
inh(x)^2 + (a*b^3 + b^4)*sinh(x)^3), 1/24*((a*b^2 + b^3)*cosh(x)^6 + 6*(a*b
^2 + b^3)*cosh(x)*sinh(x)^5 + (a*b^2 + b^3)*sinh(x)^6 - 3*(4*a^2*b + a*b^2
- 3*b^3)*cosh(x)^4 - 3*(4*a^2*b + a*b^2 - 3*b^3 - 5*(a*b^2 + b^3)*cosh(x)^2
```

```
)*sinh(x)^4 + 4*(5*(a*b^2 + b^3)*cosh(x)^3 - 3*(4*a^2*b + a*b^2 - 3*b^3)*co
sh(x))*sinh(x)^3 - a*b^2 - b^3 + 3*(4*a^2*b + a*b^2 - 3*b^3)*cosh(x)^2 + 3*
(5*(a*b^2 + b^3)*cosh(x)^4 + 4*a^2*b + a*b^2 - 3*b^3 - 6*(4*a^2*b + a*b^2 -
 3*b^3)*cosh(x)^2)*sinh(x)^2 + 24*(a^2*cosh(x)^3 + 3*a^2*cosh(x)^2*sinh(x)
+ 3*a^2*cosh(x)*sinh(x)^2 + a^2*sinh(x)^3)*sqrt(a*b + b^2)*arctan(1/2*(b*co
sh(x)^3 + 3*b*cosh(x)*sinh(x)^2 + b*sinh(x)^3 + (4*a + 3*b)*cosh(x) + (3*b*
cosh(x)^2 + 4*a + 3*b)*sinh(x))/sqrt(a*b + b^2)) + 24*(a^2*cosh(x)^3 + 3*a^
2*cosh(x)^2*sinh(x) + 3*a^2*cosh(x)*sinh(x)^2 + a^2*sinh(x)^3)*sqrt(a*b + b
^2)*arctan(1/2*sqrt(a*b + b^2)*(cosh(x) + sinh(x))/(a + b)) + 6*((a*b^2 + b
^3)*cosh(x)^5 - 2*(4*a^2*b + a*b^2 - 3*b^3)*cosh(x)^3 + (4*a^2*b + a*b^2 -
3*b^3)*cosh(x))*sinh(x))/((a*b^3 + b^4)*cosh(x)^3 + 3*(a*b^3 + b^4)*cosh(x)
^2*sinh(x) + 3*(a*b^3 + b^4)*cosh(x)*sinh(x)^2 + (a*b^3 + b^4)*sinh(x)^3)]
```

Sympy [F(-1)] Timed out
time = 0.00, size = 0, normalized size = 0.00

$$\text{Timed out}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(cosh(x)**5/(a+b*cosh(x)**2),x)
```

```
[Out] Timed out
```

Giac [F(-2)]
time = 0.00, size = 0, normalized size = 0.00

$$\text{Exception raised: TypeError}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(cosh(x)^5/(a+b*cosh(x)^2),x, algorithm="giac")
```

```
[Out] Exception raised: TypeError >> An error occurred running a Giac command:INP
UT:sage2:=int(sage0,sageVARx):;OUTPUT:Warning, need to choose a branch for
the root of a polynomial with parameters. This might be wrong.The choice wa
s done
```

Mupad [B]
time = 1.25, size = 243, normalized size = 4.34

$$\frac{e^{3x}}{24b}-\frac{e^{-3x}}{24b}+\frac{e^{-x}(4a-3b)}{8b^2}+\frac{\sqrt{a^4}\left(2\,\mathrm{atan}\left(\frac{a^2e^x\sqrt{b^5(a+b)}}{2b^2(a+b)\sqrt{a^4}}\right)-2\,\mathrm{atan}\left(\left(\frac{b^7\sqrt{b^6+ab^5}}{4}+\frac{ab^6\sqrt{b^6+ab^5}}{4}\right)\left(e^x\left(\frac{2a^2}{b^8(a+b)^2\sqrt{a^4}}-\frac{4\left(2a^3b^3\sqrt{a^4}+2a^4b^2\sqrt{a^4}\right)}{a^5b^6(a+b)\sqrt{b^5(a+b)}\sqrt{b^6+ab^5}}\right)-\frac{2a^2e^{3x}}{b^8(a+b)^2\sqrt{a^4}}\right)\right)\right)}{2\sqrt{b^6+ab^5}}-\frac{e^x(4a-3b)}{8b^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(cosh(x)^5/(a + b*cosh(x)^2),x)
```

```
[Out] exp(3*x)/(24*b) - exp(-3*x)/(24*b) + (exp(-x)*(4*a - 3*b))/(8*b^2) + ((a^4)
^(1/2)*(2*atan((a^2*exp(x)*(b^5*(a + b))^(1/2))/(2*b^2*(a + b)*(a^4)^(1/2))
```

```
) - 2*atan(((b^7*(a*b^5 + b^6)^(1/2))/4 + (a*b^6*(a*b^5 + b^6)^(1/2))/4)*(e
xp(x)*((2*a^2)/(b^8*(a + b)^2*(a^4)^(1/2)) - (4*(2*a^3*b^3*(a^4)^(1/2) + 2*
a^4*b^2*(a^4)^(1/2)))/(a^5*b^6*(a + b)*(b^5*(a + b))^(1/2)*(a*b^5 + b^6)^(1
/2))) - (2*a^2*exp(3*x))/(b^8*(a + b)^2*(a^4)^(1/2)))))/(2*(a*b^5 + b^6)^(
1/2)) - (exp(x)*(4*a - 3*b))/(8*b^2)
```

3.23 $\int \frac{\cosh^4(x)}{a+b\cosh^2(x)}\,dx$

Optimal. Leaf size=59

$$-\frac{(2a-b)x}{2b^2}+\frac{a^{3/2}\tanh^{-1}\left(\frac{\sqrt{a}\,\tanh(x)}{\sqrt{a+b}}\right)}{b^2\sqrt{a+b}}+\frac{\cosh(x)\sinh(x)}{2b}$$

```
[Out] -1/2*(2*a-b)*x/b^2+1/2*cosh(x)*sinh(x)/b+a^(3/2)*arctanh(a^(1/2)*tanh(x)/(a
+b)^(1/2))/b^2/(a+b)^(1/2)
```

Rubi [A]
time = 0.07, antiderivative size = 59, normalized size of antiderivative = 1.00, number of steps used = 5, number of rules used = 5, integrand size = 15, $\frac{\text{number of rules}}{\text{integrand size}} = 0.333$, Rules used = {3266, 481, 536, 212, 214}

$$\frac{a^{3/2}\tanh^{-1}\left(\frac{\sqrt{a}\,\tanh(x)}{\sqrt{a+b}}\right)}{b^2\sqrt{a+b}}-\frac{x(2a-b)}{2b^2}+\frac{\sinh(x)\cosh(x)}{2b}$$

Antiderivative was successfully verified.

```
[In] Int[Cosh[x]^4/(a + b*Cosh[x]^2),x]
```

```
[Out] -1/2*((2*a - b)*x)/b^2 + (a^(3/2)*ArcTanh[(Sqrt[a]*Tanh[x])/Sqrt[a + b]])/(
b^2*Sqrt[a + b]) + (Cosh[x]*Sinh[x])/(2*b)
```

Rule 212

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

Rule 214

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

Rule 481

```
Int[((e_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_)*((c_) + (d_.)*(x_)^(n_
))^(q_), x_Symbol] :> Simp[(-a)*e^(2*n - 1)*(e*x)^(m - 2*n + 1)*(a + b*x^n)
^(p + 1)*((c + d*x^n)^(q + 1)/(b*n*(b*c - a*d)*(p + 1))), x] + Dist[e^(2*n)
/(b*n*(b*c - a*d)*(p + 1)), Int[(e*x)^(m - 2*n)*(a + b*x^n)^(p + 1)*(c + d*
x^n)^q*Simp[a*c*(m - 2*n + 1) + (a*d*(m - n + n*q + 1) + b*c*n*(p + 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] && GtQ[m - n + 1, n] && IntBinomialQ[a, b, c, d, e, m, n
```

```
, p, q, x]
```

Rule 536

```
Int[((e_) + (f_.)*(x_)^(n_))/(((a_) + (b_.)*(x_)^(n_))*((c_) + (d_.)*(x_)^(
n_))), x_Symbol] :> Dist[(b*e - a*f)/(b*c - a*d), Int[1/(a + b*x^n), x], x]
 - Dist[(d*e - c*f)/(b*c - a*d), Int[1/(c + d*x^n), x], x] /; FreeQ[{a, b,
c, d, e, f, n}, x]
```

Rule 3266

```
Int[sin[(e_.) + (f_.)*(x_)]^(m_)*((a_) + (b_.)*sin[(e_.) + (f_.)*(x_)]^2)^(
p_.), x_Symbol] :> With[{ff = FreeFactors[Tan[e + f*x], x]}, Dist[ff^(m + 1
)/f, Subst[Int[x^m*((a + (a + b)*ff^2*x^2)^p/(1 + ff^2*x^2)^(m/2 + p + 1)),
 x], x, Tan[e + f*x]/ff], x]] /; FreeQ[{a, b, e, f}, x] && IntegerQ[m/2] &&
 IntegerQ[p]
```

Rubi steps

$$\begin{aligned}\int \frac{\cosh^4(x)}{a+b\cosh^2(x)}\,dx &= \text{Subst}\left(\int \frac{x^4}{(1-x^2)^2\,(a-(a+b)x^2)}\,dx, x, \coth(x)\right)\\ &= \frac{\cosh(x)\sinh(x)}{2b} + \frac{\text{Subst}\left(\int \frac{a+(a-b)x^2}{(1-x^2)(a+(-a-b)x^2)}\,dx, x, \coth(x)\right)}{2b}\\ &= \frac{\cosh(x)\sinh(x)}{2b} + \frac{a^2\text{Subst}\left(\int \frac{1}{a+(-a-b)x^2}\,dx, x, \coth(x)\right)}{b^2} - \frac{(2a-b)\text{Subst}\left(\int \frac{1}{1-x^2}\,dx\right.}{2b^2}\\ &= -\frac{(2a-b)x}{2b^2} + \frac{a^{3/2}\tanh^{-1}\left(\frac{\sqrt{a}\,\tanh(x)}{\sqrt{a+b}}\right)}{b^2\sqrt{a+b}} + \frac{\cosh(x)\sinh(x)}{2b}\end{aligned}$$

Mathematica [A]
time = 0.09, size = 52, normalized size = 0.88

$$\frac{2(-2a+b)x + \frac{4a^{3/2}\tanh^{-1}\left(\frac{\sqrt{a}\,\tanh(x)}{\sqrt{a+b}}\right)}{\sqrt{a+b}} + b\sinh(2x)}{4b^2}$$

Antiderivative was successfully verified.

```
[In] Integrate[Cosh[x]^4/(a + b*Cosh[x]^2),x]
[Out] (2*(-2*a + b)*x + (4*a^(3/2)*ArcTanh[(Sqrt[a]*Tanh[x])/Sqrt[a + b]])/Sqrt[a
 + b] + b*Sinh[2*x])/(4*b^2)
```

Maple [B] Leaf count of result is larger than twice the leaf count of optimal. 174 vs. 2(47) = 94.
time = 0.56, size = 175, normalized size = 2.97

method	result
risch	$-\frac{ax}{b^2}+\frac{x}{2b}+\frac{e^{2x}}{8b}-\frac{e^{-2x}}{8b}+\frac{\sqrt{a(a+b)}\, a\ln\left(e^{2x}-\frac{2\sqrt{a(a+b)}-2a-b}{b}\right)}{2(a+b)b^2}-\frac{\sqrt{a(a+b)}\, a\ln\left(e^{2x}+\frac{2\sqrt{a(a+}\right.}{b}}{2(a+b)b^2}$
default	$\frac{1}{2b(\tanh(\frac{x}{2})-1)^2}+\frac{1}{2b(\tanh(\frac{x}{2})-1)}+\frac{(-b+2a)\ln(\tanh(\frac{x}{2})-1)}{2b^2}-\frac{2a^2\left(-\frac{\ln\left(\sqrt{a+b}\,(\tanh^2(\frac{x}{2}))+2\tanh(\frac{x}{2})\sqrt{a}+\sqrt{a+}\right.}{4\sqrt{a}\,\sqrt{a+b}}\right.}{}$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(cosh(x)^4/(a+b*cosh(x)^2),x,method=_RETURNVERBOSE)
```

```
[Out] 1/2/b/(tanh(1/2*x)-1)^2+1/2/b/(tanh(1/2*x)-1)+1/2*(-b+2*a)/b^2*ln(tanh(1/2*
x)-1)-2*a^2/b^2*(-1/4/a^(1/2)/(a+b)^(1/2)*ln((a+b)^(1/2)*tanh(1/2*x)^2+2*ta
nh(1/2*x)*a^(1/2)+(a+b)^(1/2))+1/4/a^(1/2)/(a+b)^(1/2)*ln((a+b)^(1/2)*tanh(
1/2*x)^2-2*tanh(1/2*x)*a^(1/2)+(a+b)^(1/2)))-1/2/b/(tanh(1/2*x)+1)^2+1/2/b/
(tanh(1/2*x)+1)+1/2/b^2*(-2*a+b)*ln(tanh(1/2*x)+1)
```

Maxima [B] Leaf count of result is larger than twice the leaf count of optimal. 347 vs. 2(47) = 94.
time = 0.50, size = 347, normalized size = 5.88

$$-\frac{(2a+b)\log\left(\frac{be^{(2x)}+2a+b-2\sqrt{(a+b)a}}{be^{(2x)}+2a+b+2\sqrt{(a+b)a}}\right)}{4\sqrt{(a+b)a}\,b}-\frac{3\log\left(\frac{be^{(-2x)}+2a+b-2\sqrt{(a+b)a}}{be^{(-2x)}+2a+b+2\sqrt{(a+b)a}}\right)}{16\sqrt{(a+b)a}}-\frac{(2a+b)x}{b^2}+\frac{x}{b}+\frac{e^{(2x)}}{8b}-\frac{e^{(-2x)}}{8b}+\frac{(2a+b)\log\left(be^{(4x)}+2(2a+b)e^{(2x)}+b\right)}{8b^2}-\frac{(2a+b)\log\left(2(2a+b)e^{(-2x)}+be^{(-4x)}+b\right)}{8b^2}+\frac{(8a^2+8ab+b^2)\log\left(\frac{be^{(2x)}+2a+b-2\sqrt{(a+b)a}}{be^{(2x)}+2a+b+2\sqrt{(a+b)a}}\right)}{32\sqrt{(a+b)a}\,b^2}-\frac{(8a^2+8ab+b^2)\log\left(\frac{be^{(-2x)}+2a+b-2\sqrt{(a+b)a}}{be^{(-2x)}+2a+b+2\sqrt{(a+b)a}}\right)}{32\sqrt{(a+b)a}\,b^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(cosh(x)^4/(a+b*cosh(x)^2),x, algorithm="maxima")
```

```
[Out] -1/4*(2*a + b)*log((b*e^(2*x) + 2*a + b - 2*sqrt((a + b)*a))/(b*e^(2*x) + 2
*a + b + 2*sqrt((a + b)*a)))/(sqrt((a + b)*a)*b) - 3/16*log((b*e^(-2*x) + 2
*a + b - 2*sqrt((a + b)*a))/(b*e^(-2*x) + 2*a + b + 2*sqrt((a + b)*a)))/sqr
t((a + b)*a) - (2*a + b)*x/b^2 + x/b + 1/8*e^(2*x)/b - 1/8*e^(-2*x)/b + 1/8
*(2*a + b)*log(b*e^(4*x) + 2*(2*a + b)*e^(2*x) + b)/b^2 - 1/8*(2*a + b)*log
(2*(2*a + b)*e^(-2*x) + b*e^(-4*x) + b)/b^2 + 1/32*(8*a^2 + 8*a*b + b^2)*lo
g((b*e^(2*x) + 2*a + b - 2*sqrt((a + b)*a))/(b*e^(2*x) + 2*a + b + 2*sqrt((
a + b)*a)))/(sqrt((a + b)*a)*b^2) - 1/32*(8*a^2 + 8*a*b + b^2)*log((b*e^(-2
*x) + 2*a + b - 2*sqrt((a + b)*a))/(b*e^(-2*x) + 2*a + b + 2*sqrt((a + b)*a
)))/(sqrt((a + b)*a)*b^2)
```

Fricas [B] Leaf count of result is larger than twice the leaf count of optimal. 188 vs. 2(47) = 94.
time = 0.41, size = 573, normalized size = 9.71

$$\left[\frac{b\cosh(x)^4+4b\cosh(x)\sinh(x)^3+b\sinh(x)^4-4(2a-b)x\cosh(x)^2+2\left(3b\cosh(x)^2-2(2a-b)x\right)\sinh(x)^2+4\left(a\cosh(x)^2+2a\cosh(x)\sinh(x)+a\sinh(x)^2\right)\sqrt{\frac{a}{a+b}}\log\left(\text{[illegible]}\right)+4\left(b\cosh(x)^3-2(2a-b)x\cosh(x)\right)\sinh(x)-b}{8\left(b^2\cosh(x)^2+2b^2\cosh(x)\sinh(x)+b^2\sinh(x)^2\right)},\ \frac{b\cosh(x)^4+4b\cosh(x)\sinh(x)^3+b\sinh(x)^4-4(2a-b)x\cosh(x)^2+2\left(3b\cosh(x)^2-2(2a-b)x\right)\sinh(x)^2+8\left(a\cosh(x)^2+2a\cosh(x)\sinh(x)+a\sinh(x)^2\right)\sqrt{-\frac{a}{a+b}}\arctan\left(\text{[illegible]}\right)+4\left(b\cosh(x)^3-2(2a-b)x\cosh(x)\right)\sinh(x)-b}{8\left(b^2\cosh(x)^2+2b^2\cosh(x)\sinh(x)+b^2\sinh(x)^2\right)}\right]$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(cosh(x)^4/(a+b*cosh(x)^2),x, algorithm="fricas")
```

```
[Out] [1/8*(b*cosh(x)^4 + 4*b*cosh(x)*sinh(x)^3 + b*sinh(x)^4 - 4*(2*a - b)*x*cos
h(x)^2 + 2*(3*b*cosh(x)^2 - 2*(2*a - b)*x)*sinh(x)^2 + 4*(a*cosh(x)^2 + 2*a
*cosh(x)*sinh(x) + a*sinh(x)^2)*sqrt(a/(a + b))*log((b^2*cosh(x)^4 + 4*b^2*
cosh(x)*sinh(x)^3 + b^2*sinh(x)^4 + 2*(2*a*b + b^2)*cosh(x)^2 + 2*(3*b^2*co
sh(x)^2 + 2*a*b + b^2)*sinh(x)^2 + 8*a^2 + 8*a*b + b^2 + 4*(b^2*cosh(x)^3 +
 (2*a*b + b^2)*cosh(x))*sinh(x) - 4*((a*b + b^2)*cosh(x)^2 + 2*(a*b + b^2)*
cosh(x)*sinh(x) + (a*b + b^2)*sinh(x)^2 + 2*a^2 + 3*a*b + b^2)*sqrt(a/(a +
b)))/(b*cosh(x)^4 + 4*b*cosh(x)*sinh(x)^3 + b*sinh(x)^4 + 2*(2*a + b)*cosh(
x)^2 + 2*(3*b*cosh(x)^2 + 2*a + b)*sinh(x)^2 + 4*(b*cosh(x)^3 + (2*a + b)*c
osh(x))*sinh(x) + b)) + 4*(b*cosh(x)^3 - 2*(2*a - b)*x*cosh(x))*sinh(x) - b
)/(b^2*cosh(x)^2 + 2*b^2*cosh(x)*sinh(x) + b^2*sinh(x)^2), 1/8*(b*cosh(x)^4
 + 4*b*cosh(x)*sinh(x)^3 + b*sinh(x)^4 - 4*(2*a - b)*x*cosh(x)^2 + 2*(3*b*c
osh(x)^2 - 2*(2*a - b)*x)*sinh(x)^2 + 8*(a*cosh(x)^2 + 2*a*cosh(x)*sinh(x)
+ a*sinh(x)^2)*sqrt(-a/(a + b))*arctan(1/2*(b*cosh(x)^2 + 2*b*cosh(x)*sinh(
x) + b*sinh(x)^2 + 2*a + b)*sqrt(-a/(a + b))/a) + 4*(b*cosh(x)^3 - 2*(2*a -
 b)*x*cosh(x))*sinh(x) - b)/(b^2*cosh(x)^2 + 2*b^2*cosh(x)*sinh(x) + b^2*si
nh(x)^2)]
```

Sympy [**F(-1)**] Timed out
time = 0.00, size = 0, normalized size = 0.00

$$\text{Timed out}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(cosh(x)**4/(a+b*cosh(x)**2),x)
```

```
[Out] Timed out
```

Giac [**B**] Leaf count of result is larger than twice the leaf count of optimal. 95 vs. $2(47) = 94$.
time = 0.44, size = 95, normalized size = 1.61

$$\frac{a^2 \arctan\left(\frac{be^{(2\,x)}+2\,a+b}{2\,\sqrt{-a^2-ab}}\right)}{\sqrt{-a^2-ab}\,b^2}-\frac{(2\,a-b)x}{2\,b^2}+\frac{e^{(2\,x)}}{8\,b}+\frac{\left(4\,ae^{(2\,x)}-2\,be^{(2\,x)}-b\right)e^{(-2\,x)}}{8\,b^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(cosh(x)^4/(a+b*cosh(x)^2),x, algorithm="giac")
```

```
[Out] a^2*arctan(1/2*(b*e^(2*x) + 2*a + b)/sqrt(-a^2 - a*b))/(sqrt(-a^2 - a*b)*b^
2) - 1/2*(2*a - b)*x/b^2 + 1/8*e^(2*x)/b + 1/8*(4*a*e^(2*x) - 2*b*e^(2*x) -
 b)*e^(-2*x)/b^2
```

Mupad [B]
time = 1.17, size = 142, normalized size = 2.41

$$\frac{e^{2x}}{8b}-\frac{e^{-2x}}{8b}-\frac{x\,(2a-b)}{2b^2}+\frac{a^{3/2}\,\ln\left(-\frac{4a^2\,e^{2x}}{b^3}-\frac{2a^{3/2}\,(b+2a\,e^{2x}+b\,e^{2x})}{b^3\,\sqrt{a+b}}\right)}{2b^2\,\sqrt{a+b}}-\frac{a^{3/2}\,\ln\left(\frac{2a^{3/2}\,(b+2a\,e^{2x}+b\,e^{2x})}{b^3\,\sqrt{a+b}}-\frac{4a^2\,e^{2x}}{b^3}\right)}{2b^2\,\sqrt{a+b}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(cosh(x)^4/(a + b*cosh(x)^2),x)
```

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

3.24 $\int \frac{\cosh^3(x)}{a+b\cosh^2(x)}\,dx$

Optimal. Leaf size=38

$$-\frac{a\text{ArcTan}\left(\frac{\sqrt{b}\sinh(x)}{\sqrt{a+b}}\right)}{b^{3/2}\sqrt{a+b}}+\frac{\sinh(x)}{b}$$

```
[Out] sinh(x)/b-a*arctan(sinh(x)*b^(1/2)/(a+b)^(1/2))/b^(3/2)/(a+b)^(1/2)
```

Rubi [A]
time = 0.04, antiderivative size = 38, normalized size of antiderivative = 1.00, number of steps used = 3, number of rules used = 3, integrand size = 15, $\frac{\text{number of rules}}{\text{integrand size}} = 0.200$, Rules used = {3265, 396, 211}

$$\frac{\sinh(x)}{b}-\frac{a\text{ArcTan}\left(\frac{\sqrt{b}\sinh(x)}{\sqrt{a+b}}\right)}{b^{3/2}\sqrt{a+b}}$$

Antiderivative was successfully verified.

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

```
[Out] -((a*ArcTan[(Sqrt[b]*Sinh[x])/Sqrt[a + b]])/(b^(3/2)*Sqrt[a + b])) + Sinh[x
]/b
```

Rule 211

```
Int[((a_) + (b_.)*(x_)^2)^(-1), x_Symbol] :> Simp[(Rt[a/b, 2]/a)*ArcTan[x/R
t[a/b, 2]], x] /; FreeQ[{a, b}, x] && PosQ[a/b]
```

Rule 396

```
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 3265

```
Int[sin[(e_.) + (f_.)*(x_)]^(m_.)*((a_) + (b_.)*sin[(e_.) + (f_.)*(x_)]^2)^
(p_.), x_Symbol] :> With[{ff = FreeFactors[Cos[e + f*x], x]}, Dist[-ff/f, S
ubst[Int[(1 - ff^2*x^2)^((m - 1)/2)*(a + b - b*ff^2*x^2)^p, x], x, Cos[e +
f*x]/ff], x]] /; FreeQ[{a, b, e, f, p}, x] && IntegerQ[(m - 1)/2]
```

Rubi steps

$$\int \frac{\cosh^3(x)}{a+b\cosh^2(x)}\,dx = \text{Subst}\left(\int \frac{1+x^2}{a+b+bx^2}\,dx, x, \sinh(x)\right)$$
$$= \frac{\sinh(x)}{b} - \frac{a\text{Subst}\left(\int \frac{1}{a+b+bx^2}\,dx, x, \sinh(x)\right)}{b}$$
$$= -\frac{a\tan^{-1}\left(\frac{\sqrt{b}\sinh(x)}{\sqrt{a+b}}\right)}{b^{3/2}\sqrt{a+b}} + \frac{\sinh(x)}{b}$$

<u>**Mathematica**</u> [**A**]
time = 0.02, size = 38, normalized size = 1.00

$$-\frac{a\text{ArcTan}\left(\frac{\sqrt{b}\sinh(x)}{\sqrt{a+b}}\right)}{b^{3/2}\sqrt{a+b}} + \frac{\sinh(x)}{b}$$

Antiderivative was successfully verified.

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

```
[Out] -((a*ArcTan[(Sqrt[b]*Sinh[x])/Sqrt[a + b]])/(b^(3/2)*Sqrt[a + b])) + Sinh[x
]/b
```

<u>**Maple**</u> [**B**] Leaf count of result is larger than twice the leaf count of optimal. 100 vs. 2(30) = 60.
time = 0.52, size = 101, normalized size = 2.66

method	result	s
default	$-\frac{1}{b\left(\tanh\left(\frac{x}{2}\right)+1\right)}-\frac{2a\left(\frac{\arctan\left(\frac{2\sqrt{a+b}\,\tanh\left(\frac{x}{2}\right)+2\sqrt{a}}{2\sqrt{b}}\right)}{2\sqrt{a+b}\,\sqrt{b}}+\frac{\arctan\left(\frac{2\sqrt{a+b}\,\tanh\left(\frac{x}{2}\right)-2\sqrt{a}}{2\sqrt{b}}\right)}{2\sqrt{a+b}\,\sqrt{b}}\right)}{b}-\frac{1}{b\left(\tanh\left(\frac{x}{2}\right)-1\right)}$	1
risch	$\frac{e^{x}}{2b}-\frac{e^{-x}}{2b}-\frac{a\ln\left(e^{2x}+\frac{2(a+b)e^{x}}{\sqrt{-ab-b^2}}-1\right)}{2\sqrt{-ab-b^2}\,b}+\frac{a\ln\left(e^{2x}-\frac{2(a+b)e^{x}}{\sqrt{-ab-b^2}}-1\right)}{2\sqrt{-ab-b^2}\,b}$	1

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(cosh(x)^3/(a+b*cosh(x)^2),x,method=_RETURNVERBOSE)
```

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

Maxima [F]
time = 0.00, size = 0, normalized size = 0.00

Failed to integrate

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(cosh(x)^3/(a+b*cosh(x)^2),x, algorithm="maxima")
```

```
[Out] 1/2*(e^(2*x) - 1)*e^(-x)/b - 1/8*integrate(16*(a*e^(3*x) + a*e^x)/(b^2*e^(4
*x) + b^2 + 2*(2*a*b + b^2)*e^(2*x)), x)
```

Fricas [B] Leaf count of result is larger than twice the leaf count of optimal. 199 vs. $2(30) = 60$.
time = 0.40, size = 498, normalized size = 13.11

$$\left[\frac{(ab+b^2)\cosh(x)^2 + 2(ab+b^2)\cosh(x)\sinh(x) + (ab+b^2)\sinh(x)^2 - \sqrt{-ab-b^2}\,(a\cosh(x)+a\sinh(x))\log\left(\frac{b\cosh(x)^4+4b\cosh(x)\sinh(x)^3+b\sinh(x)^4-2(2a+3b)\cosh(x)^2+2(3b\cosh(x)^2-2a-3b)\sinh(x)^2+4(b\cosh(x)^3-(2a+3b)\cosh(x))\sinh(x)+4(\cosh(x)^3+3\cosh(x)\sinh(x)^2+\sinh(x)^3+(3\cosh(x)^2-1)\sinh(x)-\cosh(x))\sqrt{-ab-b^2}+b}{b\cosh(x)^4+4b\cosh(x)\sinh(x)^3+b\sinh(x)^4+2(2a+b)\cosh(x)^2+2(3b\cosh(x)^2+2a+b)\sinh(x)^2+4(b\cosh(x)^3+(2a+b)\cosh(x))\sinh(x)+b}\right) - ab - b^2}{2\left((ab^2+b^3)\cosh(x)+(ab^2+b^3)\sinh(x)\right)}, \frac{(ab+b^2)\cosh(x)^2 + 2(ab+b^2)\cosh(x)\sinh(x) + (ab+b^2)\sinh(x)^2 - 2\sqrt{ab+b^2}\,(a\cosh(x)+a\sinh(x))\arctan\left(\frac{b\cosh(x)^3+3b\cosh(x)\sinh(x)^2+b\sinh(x)^3+(4a+3b)\cosh(x)+(3b\cosh(x)^2+4a+3b)\sinh(x)}{2\sqrt{ab+b^2}}\right) - 2\sqrt{ab+b^2}\,(a\cosh(x)+a\sinh(x))\arctan\left(\frac{\sqrt{ab+b^2}\,(\cosh(x)+\sinh(x))}{2(a+b)}\right) - ab - b^2}{2\left((ab^2+b^3)\cosh(x)+(ab^2+b^3)\sinh(x)\right)}\right]$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] [1/2*((a*b + b^2)*cosh(x)^2 + 2*(a*b + b^2)*cosh(x)*sinh(x) + (a*b + b^2)*s
inh(x)^2 - sqrt(-a*b - b^2)*(a*cosh(x) + a*sinh(x))*log((b*cosh(x)^4 + 4*b*
cosh(x)*sinh(x)^3 + b*sinh(x)^4 - 2*(2*a + 3*b)*cosh(x)^2 + 2*(3*b*cosh(x)^
2 - 2*a - 3*b)*sinh(x)^2 + 4*(b*cosh(x)^3 - (2*a + 3*b)*cosh(x))*sinh(x) +
4*(cosh(x)^3 + 3*cosh(x)*sinh(x)^2 + sinh(x)^3 + (3*cosh(x)^2 - 1)*sinh(x)
- cosh(x))*sqrt(-a*b - b^2) + b)/(b*cosh(x)^4 + 4*b*cosh(x)*sinh(x)^3 + b*s
inh(x)^4 + 2*(2*a + b)*cosh(x)^2 + 2*(3*b*cosh(x)^2 + 2*a + b)*sinh(x)^2 +
4*(b*cosh(x)^3 + (2*a + b)*cosh(x))*sinh(x) + b)) - a*b - b^2)/((a*b^2 + b^
3)*cosh(x) + (a*b^2 + b^3)*sinh(x)), 1/2*((a*b + b^2)*cosh(x)^2 + 2*(a*b +
b^2)*cosh(x)*sinh(x) + (a*b + b^2)*sinh(x)^2 - 2*sqrt(a*b + b^2)*(a*cosh(x)
 + a*sinh(x))*arctan(1/2*(b*cosh(x)^3 + 3*b*cosh(x)*sinh(x)^2 + b*sinh(x)^3
 + (4*a + 3*b)*cosh(x) + (3*b*cosh(x)^2 + 4*a + 3*b)*sinh(x))/sqrt(a*b + b^
2)) - 2*sqrt(a*b + b^2)*(a*cosh(x) + a*sinh(x))*arctan(1/2*sqrt(a*b + b^2)*
(cosh(x) + sinh(x))/(a + b)) - a*b - b^2)/((a*b^2 + b^3)*cosh(x) + (a*b^2 +
 b^3)*sinh(x))]
```

Sympy [F(-1)] Timed out
time = 0.00, size = 0, normalized size = 0.00

Timed out

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(cosh(x)**3/(a+b*cosh(x)**2),x)
```

```
[Out] Timed out
```

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(cosh(x)^3/(a+b*cosh(x)^2),x, algorithm="giac")
```

```
[Out] Exception raised: TypeError >> An error occurred running a Giac command:INP
UT:sage2:=int(sage0,sageVARx):;OUTPUT:Warning, need to choose a branch for
the root of a polynomial with parameters. This might be wrong.The choice wa
s done
```

Mupad [B]
time = 1.16, size = 204, normalized size = 5.37

$$\frac{e^x}{2\,b}-\frac{e^{-x}}{2\,b}-\frac{\left(2\,\mathrm{atan}\left(\frac{a^3\,e^x\,\sqrt{b^3\,\left(a+b\right)}}{2\,b\,\left(a+b\right)\,{\left(a^2\right)}^{3/2}}\right)-2\,\mathrm{atan}\left(\left(\frac{b^5\,\sqrt{b^4+a\,b^3}}{4}+\frac{a\,b^4\,\sqrt{b^4+a\,b^3}}{4}\right)\,\left(e^x\,\left(\frac{2\,a^3}{b^5\,{\left(a+b\right)}^2\,{\left(a^2\right)}^{3/2}}-\frac{4\,\left(2\,b^2\,{\left(a^2\right)}^{3/2}+2\,a\,b\,{\left(a^2\right)}^{3/2}\right)}{a^3\,b^4\,\left(a+b\right)\,\sqrt{b^3\,\left(a+b\right)}\,\sqrt{b^4+a\,b^3}}\right)-\frac{2\,a^3\,e^{3\,x}}{b^5\,{\left(a+b\right)}^2\,{\left(a^2\right)}^{3/2}}\right)\right)\right)\,\sqrt{a^2}}{2\,\sqrt{b^4+a\,b^3}}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] exp(x)/(2*b) - exp(-x)/(2*b) - ((2*atan((a^3*exp(x)*(b^3*(a + b))^(1/2))/(2
*b*(a + b)*(a^2)^(3/2))) - 2*atan(((b^5*(a*b^3 + b^4)^(1/2))/4 + (a*b^4*(a*
b^3 + b^4)^(1/2))/4)*(exp(x)*((2*a^3)/(b^5*(a + b)^2*(a^2)^(3/2)) - (4*(2*b
^2*(a^2)^(3/2) + 2*a*b*(a^2)^(3/2)))/(a^3*b^4*(a + b)*(b^3*(a + b))^(1/2)*(
a*b^3 + b^4)^(1/2))) - (2*a^3*exp(3*x))/(b^5*(a + b)^2*(a^2)^(3/2)))))*(a^2
)^(1/2))/(2*(a*b^3 + b^4)^(1/2))
```

3.25 $\int \frac{\cosh^2(x)}{a+b\cosh^2(x)}\,dx$

Optimal. Leaf size=39

$$\frac{x}{b}-\frac{\sqrt{a}\tanh^{-1}\left(\frac{\sqrt{a}\tanh(x)}{\sqrt{a+b}}\right)}{b\sqrt{a+b}}$$

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

Rubi [A]
time = 0.05, antiderivative size = 39, normalized size of antiderivative = 1.00, number of steps used = 3, number of rules used = 3, integrand size = 15, $\frac{\text{number of rules}}{\text{integrand size}} = 0.200$, Rules used = {3250, 3260, 214}

$$\frac{x}{b}-\frac{\sqrt{a}\tanh^{-1}\left(\frac{\sqrt{a}\tanh(x)}{\sqrt{a+b}}\right)}{b\sqrt{a+b}}$$

Antiderivative was successfully verified.

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

```
[Out] x/b - (Sqrt[a]*ArcTanh[(Sqrt[a]*Tanh[x])/Sqrt[a + b]])/(b*Sqrt[a + b])
```

Rule 214

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

Rule 3250

```
Int[((A_.) + (B_.)*sin[(e_.) + (f_.)*(x_)]^2)/((a_) + (b_.)*sin[(e_.) + (f_
.)*(x_)]^2), x_Symbol] :> Simp[B*(x/b), x] + Dist[(A*b - a*B)/b, Int[1/(a +
 b*Sin[e + f*x]^2), x], x] /; FreeQ[{a, b, e, f, A, B}, x]
```

Rule 3260

```
Int[((a_) + (b_.)*sin[(e_.) + (f_.)*(x_)]^2)^(-1), x_Symbol] :> With[{ff =
FreeFactors[Tan[e + f*x], x]}, Dist[ff/f, Subst[Int[1/(a + (a + b)*ff^2*x^2
), x], x, Tan[e + f*x]/ff], x]] /; FreeQ[{a, b, e, f}, x]
```

Rubi steps

$$\int \frac{\cosh^2(x)}{a+b\cosh^2(x)}\,dx = \frac{x}{b} - \frac{a\int \frac{1}{a+b\cosh^2(x)}\,dx}{b}$$
$$= \frac{x}{b} - \frac{a\text{Subst}\left(\int \frac{1}{a-(a+b)x^2}\,dx, x, \coth(x)\right)}{b}$$
$$= \frac{x}{b} - \frac{\sqrt{a}\,\tanh^{-1}\left(\frac{\sqrt{a}\,\tanh(x)}{\sqrt{a+b}}\right)}{b\sqrt{a+b}}$$

Mathematica [A]
time = 0.06, size = 36, normalized size = 0.92

$$\frac{x - \frac{\sqrt{a}\,\tanh^{-1}\left(\frac{\sqrt{a}\,\tanh(x)}{\sqrt{a+b}}\right)}{\sqrt{a+b}}}{b}$$

Antiderivative was successfully verified.

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

```
[Out] (x - (Sqrt[a]*ArcTanh[(Sqrt[a]*Tanh[x])/Sqrt[a + b]])/Sqrt[a + b])/b
```

Maple [B] Leaf count of result is larger than twice the leaf count of optimal. 107 vs. 2(31) = 62.
time = 0.50, size = 108, normalized size = 2.77

method	result
risch	$\frac{x}{b}+\frac{\sqrt{a(a+b)}\,\ln\left(e^{2x}+\frac{2\sqrt{a(a+b)}+2a+b}{b}\right)}{2(a+b)b}-\frac{\sqrt{a(a+b)}\,\ln\left(e^{2x}-\frac{2\sqrt{a(a+b)}-2a-b}{b}\right)}{2(a+b)b}$
default	$\frac{2a\left(-\frac{\ln\left(\sqrt{a+b}\,\left(\tanh^2\left(\frac{x}{2}\right)\right)+2\tanh\left(\frac{x}{2}\right)\sqrt{a}+\sqrt{a+b}\right)}{4\sqrt{a}\,\sqrt{a+b}}+\frac{\ln\left(\sqrt{a+b}\,\left(\tanh^2\left(\frac{x}{2}\right)\right)-2\tanh\left(\frac{x}{2}\right)\sqrt{a}+\sqrt{a+b}\right)}{4\sqrt{a}\,\sqrt{a+b}}\right)}{b}-\frac{\ln(}{}$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(cosh(x)^2/(a+b*cosh(x)^2),x,method=_RETURNVERBOSE)
```

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

Maxima [B] Leaf count of result is larger than twice the leaf count of optimal. 120 vs. $2(31) = 62$.
time = 0.47, size = 120, normalized size = 3.08

$$-\frac{(2\,a+b)\log\left(\frac{be^{(2\,x)}+2\,a+b-2\,\sqrt{(a+b)a}}{be^{(2\,x)}+2\,a+b+2\,\sqrt{(a+b)a}}\right)}{4\,\sqrt{(a+b)a}\,b}-\frac{\log\left(\frac{be^{(-2\,x)}+2\,a+b-2\,\sqrt{(a+b)a}}{be^{(-2\,x)}+2\,a+b+2\,\sqrt{(a+b)a}}\right)}{4\,\sqrt{(a+b)a}}+\frac{x}{b}$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

Fricas [A]
time = 0.40, size = 317, normalized size = 8.13

$$\left[\frac{\sqrt{\frac{a}{a+b}}\log\left(\frac{b^2\cosh(x)^4+4\,b^2\cosh(x)\sinh(x)^3+b^2\sinh(x)^4+2\,(2\,ab+b^2)\cosh(x)^2+2\,(3\,b^2\cosh(x)^2+2\,ab+b^2)\sinh(x)^2+8\,a^2+8\,ab+b^2+4\,(b^2\cosh(x)^3+(2\,ab+b^2)\cosh(x))\sinh(x)+4\,((ab+b^2)\cosh(x)^2+2\,(ab+b^2)\cosh(x)\sinh(x)+(ab+b^2)\sinh(x)^2+2\,a^2+3\,ab+b^2)\sqrt{\frac{a}{a+b}}}{b\cosh(x)^4+4\,b\cosh(x)\sinh(x)^3+b\sinh(x)^4+2\,(2\,a+b)\cosh(x)^2+2\,(3\,b\cosh(x)^2+2\,a+b)\sinh(x)^2+4\,(b\cosh(x)^3+(2\,a+b)\cosh(x))\sinh(x)+b}\right)+2\,x}{2\,b},\ -\frac{\sqrt{-\frac{a}{a+b}}\arctan\left(\frac{(b\cosh(x)^2+2\,b\cosh(x)\sinh(x)+b\sinh(x)^2+2\,a+b)\sqrt{-\frac{a}{a+b}}}{2\,a}\right)-x}{b}\right]$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] [1/2*(sqrt(a/(a + b))*log((b^2*cosh(x)^4 + 4*b^2*cosh(x)*sinh(x)^3 + b^2*si
nh(x)^4 + 2*(2*a*b + b^2)*cosh(x)^2 + 2*(3*b^2*cosh(x)^2 + 2*a*b + b^2)*sin
h(x)^2 + 8*a^2 + 8*a*b + b^2 + 4*(b^2*cosh(x)^3 + (2*a*b + b^2)*cosh(x))*si
nh(x) + 4*((a*b + b^2)*cosh(x)^2 + 2*(a*b + b^2)*cosh(x)*sinh(x) + (a*b + b
^2)*sinh(x)^2 + 2*a^2 + 3*a*b + b^2)*sqrt(a/(a + b)))/(b*cosh(x)^4 + 4*b*co
sh(x)*sinh(x)^3 + b*sinh(x)^4 + 2*(2*a + b)*cosh(x)^2 + 2*(3*b*cosh(x)^2 +
2*a + b)*sinh(x)^2 + 4*(b*cosh(x)^3 + (2*a + b)*cosh(x))*sinh(x) + b)) + 2*
x)/b, -(sqrt(-a/(a + b))*arctan(1/2*(b*cosh(x)^2 + 2*b*cosh(x)*sinh(x) + b*
sinh(x)^2 + 2*a + b)*sqrt(-a/(a + b))/a) - x)/b]
```

Sympy [F(-1)] Timed out
time = 0.00, size = 0, normalized size = 0.00

Timed out

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] Timed out
```

Giac [A]
time = 0.41, size = 50, normalized size = 1.28

$$-\frac{a \arctan\left(\frac{be^{(2x)}+2a+b}{2\sqrt{-a^2-ab}}\right)}{\sqrt{-a^2-ab}\,b}+\frac{x}{b}$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

Mupad [B]
time = 1.38, size = 376, normalized size = 9.64

$$\frac{x}{b}+\frac{\sqrt{a}\,\mathrm{atan}\left(\frac{\left(b^5\sqrt{-b^3-a\,b^2}+a\,b^4\sqrt{-b^3-a\,b^2}\right)\left(e^{2x}\left(\frac{2\left(8\,a^{5/2}\sqrt{-b^3-a\,b^2}+\sqrt{a}\,b^2\sqrt{-b^3-a\,b^2}+8\,a^{3/2}\,b\sqrt{-b^3-a\,b^2}\right)\left(8\,a^2+8\,a\,b+b^2\right)}{b^8\,(a+b)^2\sqrt{-b^3-a\,b^2}}+\frac{4\sqrt{a}\,(4\,a+2\,b)\left(8\,a^3\,b+12\,a^2\,b^2+4\,a\,b^3\right)}{b^7\,(a+b)\sqrt{-b^2\,(a+b)}\sqrt{-b^3-a\,b^2}}\right)+\frac{2\left(\sqrt{a}\,b^2\sqrt{-b^3-a\,b^2}+2\,a^{3/2}\,b\sqrt{-b^3-a\,b^2}\right)\left(8\,a^2+8\,a\,b+b^2\right)}{b^8\,(a+b)^2\sqrt{-b^3-a\,b^2}}+\frac{4\sqrt{a}\left(2\,a^2\,b^2+2\,a\,b^3\right)(4\,a+2\,b)}{b^7\,(a+b)\sqrt{-b^2\,(a+b)}\sqrt{-b^3-a\,b^2}}\right)}{4\,a}\right)}{\sqrt{-b^3-a\,b^2}}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] x/b + (a^(1/2)*atan(((b^5*(- a*b^2 - b^3)^(1/2) + a*b^4*(- a*b^2 - b^3)^(1/
2))*(exp(2*x)*((2*(8*a^(5/2)*(- a*b^2 - b^3)^(1/2) + a^(1/2)*b^2*(- a*b^2 -
 b^3)^(1/2) + 8*a^(3/2)*b*(- a*b^2 - b^3)^(1/2))*(8*a*b + 8*a^2 + b^2))/(b^
8*(a + b)^2*(- a*b^2 - b^3)^(1/2)) + (4*a^(1/2)*(4*a + 2*b)*(4*a*b^3 + 8*a^
3*b + 12*a^2*b^2))/(b^7*(a + b)*(-b^2*(a + b))^(1/2)*(- a*b^2 - b^3)^(1/2))
) + (2*(a^(1/2)*b^2*(- a*b^2 - b^3)^(1/2) + 2*a^(3/2)*b*(- a*b^2 - b^3)^(1/
2))*(8*a*b + 8*a^2 + b^2))/(b^8*(a + b)^2*(- a*b^2 - b^3)^(1/2)) + (4*a^(1/
2)*(2*a*b^3 + 2*a^2*b^2)*(4*a + 2*b))/(b^7*(a + b)*(-b^2*(a + b))^(1/2)*(-
a*b^2 - b^3)^(1/2))))/(4*a)))/(- a*b^2 - b^3)^(1/2)
```

3.26 $\int \frac{\cosh(x)}{a+b\cosh^2(x)}\,dx$

Optimal. Leaf size=29

$$\frac{\text{ArcTan}\left(\frac{\sqrt{b}\,\sinh(x)}{\sqrt{a+b}}\right)}{\sqrt{b}\,\sqrt{a+b}}$$

```
[Out] arctan(sinh(x)*b^(1/2)/(a+b)^(1/2))/b^(1/2)/(a+b)^(1/2)
```

Rubi [A]
time = 0.02, antiderivative size = 29, normalized size of antiderivative = 1.00, number of steps used = 2, number of rules used = 2, integrand size = 13, $\frac{\text{number of rules}}{\text{integrand size}} = 0.154$, Rules used = {3265, 211}

$$\frac{\text{ArcTan}\left(\frac{\sqrt{b}\,\sinh(x)}{\sqrt{a+b}}\right)}{\sqrt{b}\,\sqrt{a+b}}$$

Antiderivative was successfully verified.

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

```
[Out] ArcTan[(Sqrt[b]*Sinh[x])/Sqrt[a + b]]/(Sqrt[b]*Sqrt[a + b])
```

Rule 211

```
Int[((a_) + (b_.)*(x_)^2)^(-1), x_Symbol] :> Simp[(Rt[a/b, 2]/a)*ArcTan[x/R
t[a/b, 2]], x] /; FreeQ[{a, b}, x] && PosQ[a/b]
```

Rule 3265

```
Int[sin[(e_.) + (f_.)*(x_)]^(m_.)*((a_) + (b_.)*sin[(e_.) + (f_.)*(x_)]^2)^
(p_.), x_Symbol] :> With[{ff = FreeFactors[Cos[e + f*x], x]}, Dist[-ff/f, S
ubst[Int[(1 - ff^2*x^2)^((m - 1)/2)*(a + b - b*ff^2*x^2)^p, x], x, Cos[e +
f*x]/ff], x]] /; FreeQ[{a, b, e, f, p}, x] && IntegerQ[(m - 1)/2]
```

Rubi steps

$$\begin{aligned}\int \frac{\cosh(x)}{a+b\cosh^2(x)}\,dx &= \text{Subst}\left(\int \frac{1}{a+b+bx^2}\,dx, x, \sinh(x)\right)\\ &= \frac{\tan^{-1}\left(\frac{\sqrt{b}\,\sinh(x)}{\sqrt{a+b}}\right)}{\sqrt{b}\,\sqrt{a+b}}\end{aligned}$$

Mathematica [A]
time = 0.01, size = 29, normalized size = 1.00

$$\frac{\operatorname{ArcTan}\left(\frac{\sqrt{b}\,\sinh(x)}{\sqrt{a+b}}\right)}{\sqrt{b}\,\sqrt{a+b}}$$

Antiderivative was successfully verified.

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

```
[Out] ArcTan[(Sqrt[b]*Sinh[x])/Sqrt[a + b]]/(Sqrt[b]*Sqrt[a + b])
```

Maple [B] Leaf count of result is larger than twice the leaf count of optimal. 65 vs. $2(21) = 42$.
time = 0.41, size = 66, normalized size = 2.28

method	result	size
default	$\frac{\arctan\left(\frac{2\sqrt{a+b}\,\tanh\left(\frac{x}{2}\right)+2\sqrt{a}}{2\sqrt{b}}\right)}{\sqrt{a+b}\,\sqrt{b}}+\frac{\arctan\left(\frac{2\sqrt{a+b}\,\tanh\left(\frac{x}{2}\right)-2\sqrt{a}}{2\sqrt{b}}\right)}{\sqrt{a+b}\,\sqrt{b}}$	66
risch	$-\frac{\ln\left(e^{2x}-\frac{2(a+b)e^{x}}{\sqrt{-ab-b^{2}}}-1\right)}{2\sqrt{-ab-b^{2}}}+\frac{\ln\left(e^{2x}+\frac{2(a+b)e^{x}}{\sqrt{-ab-b^{2}}}-1\right)}{2\sqrt{-ab-b^{2}}}$	82

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(cosh(x)/(a+b*cosh(x)^2),x,method=_RETURNVERBOSE)
```

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

Maxima [F]
time = 0.00, size = 0, normalized size = 0.00

Failed to integrate

Verification of antiderivative is not currently implemented for this CAS.

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

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

Fricas [B] Leaf count of result is larger than twice the leaf count of optimal. 114 vs. $2(21) = 42$.
time = 0.38, size = 337, normalized size = 11.62

$$\left[-\frac{\sqrt{-ab-b^{2}}\log\left(\frac{b\cosh(x)^{4}+4\,b\cosh(x)\sinh(x)^{3}+b\sinh(x)^{4}-2\,(2\,a+3\,b)\cosh(x)^{2}+2\left(3\,b\cosh(x)^{2}-2\,a-3\,b\right)\sinh(x)^{2}+4\left(b\cosh(x)^{3}-(2\,a+3\,b)\cosh(x)\right)\sinh(x)-4\left(\cosh(x)^{3}+3\cosh(x)\sinh(x)^{2}+\sinh(x)^{3}+\left(3\cosh(x)^{2}-1\right)\sinh(x)-\cosh(x)\right)\sqrt{-ab-b^{2}}+b}{b\cosh(x)^{4}+4\,b\cosh(x)\sinh(x)^{3}+b\sinh(x)^{4}+2\,(2\,a+b)\cosh(x)^{2}+2\left(3\,b\cosh(x)^{2}+2\,a+b\right)\sinh(x)^{2}+4\left(b\cosh(x)^{3}+(2\,a+b)\cosh(x)\right)\sinh(x)+b}\right)}{2\,(ab+b^{2})},\ \frac{\sqrt{ab+b^{2}}\arctan\left(\frac{b\cosh(x)^{3}+3\,b\cosh(x)\sinh(x)^{2}+b\sinh(x)^{3}+(4\,a+3\,b)\cosh(x)+\left(3\,b\cosh(x)^{2}+4\,a+3\,b\right)\sinh(x)}{2\sqrt{ab+b^{2}}}\right)+\sqrt{ab+b^{2}}\arctan\left(\frac{\sqrt{ab+b^{2}}\,(\cosh(x)+\sinh(x))}{2\,(a+b)}\right)}{ab+b^{2}}\right]$$

Verification of antiderivative is not currently implemented for this CAS.

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

[Out] [-1/2*sqrt(-a*b - b^2)*log((b*cosh(x)^4 + 4*b*cosh(x)*sinh(x)^3 + b*sinh(x)^4 - 2*(2*a + 3*b)*cosh(x)^2 + 2*(3*b*cosh(x)^2 - 2*a - 3*b)*sinh(x)^2 + 4*(b*cosh(x)^3 - (2*a + 3*b)*cosh(x))*sinh(x) - 4*(cosh(x)^3 + 3*cosh(x)*sinh(x)^2 + sinh(x)^3 + (3*cosh(x)^2 - 1)*sinh(x) - cosh(x))*sqrt(-a*b - b^2) + b)/(b*cosh(x)^4 + 4*b*cosh(x)*sinh(x)^3 + b*sinh(x)^4 + 2*(2*a + b)*cosh(x)^2 + 2*(3*b*cosh(x)^2 + 2*a + b)*sinh(x)^2 + 4*(b*cosh(x)^3 + (2*a + b)*cosh(x))*sinh(x) + b))/(a*b + b^2), (sqrt(a*b + b^2)*arctan(1/2*(b*cosh(x)^3 + 3*b*cosh(x)*sinh(x)^2 + b*sinh(x)^3 + (4*a + 3*b)*cosh(x) + (3*b*cosh(x)^2 + 4*a + 3*b)*sinh(x))/sqrt(a*b + b^2)) + sqrt(a*b + b^2)*arctan(1/2*sqrt(a*b + b^2)*(cosh(x) + sinh(x))/(a + b)))/(a*b + b^2)]

Sympy [**B**] Leaf count of result is larger than twice the leaf count of optimal. 55498 vs. $2(27) = 54$.
time = 134.73, size = 55498, normalized size = 1913.72

Too large to display

Verification of antiderivative is not currently implemented for this CAS.

[In] integrate(cosh(x)/(a+b*cosh(x)**2),x)

[Out] Piecewise((zoo*atan(tanh(x/2)), Eq(a, 0) & Eq(b, 0)), (tanh(x/2)/(2*b) - 1/(2*b*tanh(x/2)), Eq(a, -b)), (sinh(x)/a, Eq(b, 0)), (13*a**6*b*sqrt(a/(a + b) - b/(a + b) - 2*sqrt(-a*b)/(a + b))*log(-sqrt(a/(a + b) - b/(a + b) + 2*sqrt(-a*b)/(a + b)) + tanh(x/2))/(2*a**7*b*sqrt(a/(a + b) - b/(a + b) - 2*sqrt(-a*b)/(a + b))*sqrt(a/(a + b) - b/(a + b) + 2*sqrt(-a*b)/(a + b)) - 130*a**6*b**2*sqrt(a/(a + b) - b/(a + b) - 2*sqrt(-a*b)/(a + b))*sqrt(a/(a + b) - b/(a + b) + 2*sqrt(-a*b)/(a + b)) + 24*a**6*b*sqrt(-a*b)*sqrt(a/(a + b) - b/(a + b) - 2*sqrt(-a*b)/(a + b))*sqrt(a/(a + b) - b/(a + b) + 2*sqrt(-a*b)/(a + b)) + 858*a**5*b**3*sqrt(a/(a + b) - b/(a + b) - 2*sqrt(-a*b)/(a + b))*sqrt(a/(a + b) - b/(a + b) + 2*sqrt(-a*b)/(a + b)) - 416*a**5*b**2*sqrt(-a*b)*sqrt(a/(a + b) - b/(a + b) - 2*sqrt(-a*b)/(a + b))*sqrt(a/(a + b) - b/(a + b) + 2*sqrt(-a*b)/(a + b)) - 858*a**4*b**4*sqrt(a/(a + b) - b/(a + b) - 2*sqrt(-a*b)/(a + b))*sqrt(a/(a + b) - b/(a + b) + 2*sqrt(-a*b)/(a + b)) + 1144*a**4*b**3*sqrt(-a*b)*sqrt(a/(a + b) - b/(a + b) - 2*sqrt(-a*b)/(a + b))*sqrt(a/(a + b) - b/(a + b) + 2*sqrt(-a*b)/(a + b)) - 858*a**3*b**5*sqrt(a/(a + b) - b/(a + b) - 2*sqrt(-a*b)/(a + b))*sqrt(a/(a + b) - b/(a + b) + 2*sqrt(-a*b)/(a + b)) + 858*a**2*b**6*sqrt(a/(a + b) - b/(a + b) - 2*sqrt(-a*b)/(a + b))*sqrt(a/(a + b) - b/(a + b) + 2*sqrt(-a*b)/(a + b)) - 1144*a**2*b**5*sqrt(-a*b)*sqrt(a/(a + b) - b/(a + b) - 2*sqrt(-a*b)/(a + b))*sqrt(a/(a + b) - b/(a + b) + 2*sqrt(-a*b)/(a + b)) - 130*a*b**7*sqrt(a/(a + b) - b/(a + b) - 2*sqrt(-a*b)/(a + b))*sqrt(a/(a + b) - b/(a + b) + 2*sqrt(-a*b)/(a + b)) + 416*a*b**6*sqrt(-a*b)*sqrt(a/(a + b) - b/(a + b) - 2*sqrt(-

```
a*b)/(a + b))*sqrt(a/(a + b) - b/(a + b) + 2*sqrt(-a*b)/(a + b)) + 2*b**8*s
qrt(a/(a + b) - b/(a + b) - 2*sqrt(-a*b)/(a + b))*sqrt(a/(a + b) - b/(a + b
) + 2*sqrt(-a*b)/(a + b)) - 24*b**7*sqrt(-a*b)*sqrt(a/(a + b) - b/(a + b) -
 2*sqrt(-a*b)/(a + b))*sqrt(a/(a + b) - b/(a + b) + 2*sqrt(-a*b)/(a + b)))
- 13*a**6*b*sqrt(a/(a + b) - b/(a + b) - 2*sqrt(-a*b)/(a + b))*log(sqrt(a/(
a + b) - b/(a + b) + 2*sqrt(-a*b)/(a + b)) + tanh(x/2))/(2*a**7*b*sqrt(a/(a
 + b) - b/(a + b) - 2*sqrt(-a*b)/(a + b))*sqrt(a/(a + b) - b/(a + b) + 2*sq
rt(-a*b)/(a + b)) - 130*a**6*b**2*sqrt(a/(a + b) - b/(a + b) - 2*sqrt(-a*b)
/(a + b))*sqrt(a/(a + b) - b/(a + b) + 2*sqrt(-a*b)/(a + b)) + 24*a**6*b*sq
rt(-a*b)*sqrt(a/(a + b) - b/(a + b) - 2*sqrt(-a*b)/(a + b))*sqrt(a/(a + b)
- b/(a + b) + 2*sqrt(-a*b)/(a + b)) + 858*a**5*b**3*sqrt(a/(a + b) - b/(a +
 b) - 2*sqrt(-a*b)/(a + b))*sqrt(a/(a + b) - b/(a + b) + 2*sqrt(-a*b)/(a +
b)) - 416*a**5*b**2*sqrt(-a*b)*sqrt(a/(a + b) - b/(a + b) - 2*sqrt(-a*b)/(a
 + b))*sqrt(a/(a + b) - b/(a + b) + 2*sqrt(-a*b)/(a + b)) - 858*a**4*b**4*s
qrt(a/(a + b) - b/(a + b) - 2*sqrt(-a*b)/(a + b))*sqrt(a/(a + b) - b/(a + b
) + 2*sqrt(-a*b)/(a + b)) + 1144*a**4*b**3*sqrt(-a*b)*sqrt(a/(a + b) - b/(a
 + b) - 2*sqrt(-a*b)/(a + b))*sqrt(a/(a + b) - b/(a + b) + 2*sqrt(-a*b)/(a
+ b)) - 858*a**3*b**5*sqrt(a/(a + b) - b/(a + b) - 2*sqrt(-a*b)/(a + b))*sq
rt(a/(a + b) - b/(a + b) + 2*sqrt(-a*b)/(a + b)) + 858*a**2*b**6*sqrt(a/(a
+ b) - b/(a + b) - 2*sqrt(-a*b)/(a + b))*sqrt(a/(a + b) - b/(a + b) + 2*sqr
t(-a*b)/(a + b)) - 1144*a**2*b**5*sqrt(-a*b)*sqrt(a/(a + b) - b/(a + b) - 2
*sqrt(-a*b)/(a + b))*sqrt(a/(a + b) - b/(a + b) + 2*sqrt(-a*b)/(a + b)) - 1
30*a*b**7*sqrt(a/(a + b) - b/(a + b) - 2*sqrt(-a*b)/(a + b))*sqrt(a/(a + b)
 - b/(a + b) + 2*sqrt(-a*b)/(a + b)) + 416*a*b**6*sqrt(-a*b)*sqrt(a/(a + b)
 - b/(a + b) - 2*sqrt(-a*b)/(a + b))*sqrt(a/(a + b) - b/(a + b) + 2*sqrt(-a
*b)/(a + b)) + 2*b**8*sqrt(a/(a + b) - b/(a + b) - 2*sqrt(-a*b)/(a + b))*sq
rt(a/(a + b) - b/(a + b) + 2*sqrt(-a*b)/(a + b)) - 24*b**7*sqrt(-a*b)*sqrt(
a/(a + b) - b/(a + b) - 2*sqrt(-a*b)/(a + b))*sqrt(a/(a + b) - b/(a + b) +
2*sqrt(-a*b)/(a + b))) - 11*a**6*b*sqrt(a/(a + b) - b/(a + b) + 2*sqrt(-a*b
)/(a + b))*log(-sqrt(a/(a + b) - b/(a + b) - 2*sqrt(-a*b)/(a + b)) + tanh(x
/2))/(2*a**7*b*sqrt(a/(a + b) - b/(a + b) - 2*sqrt(-a*b)/(a + b))*sqrt(a/(a
 + b) - b/(a + b) + 2*sqrt(-a*b)/(a + b)) - 130*a**6*b**2*sqrt(a/(a + b) -
b/(a + b) - 2*sqrt(-a*b)/(a + b))*sqrt(a/(a + b) - b/(a + b) + 2*sqrt(-a*b)
/(a + b)) + 24*a**6*b*sqrt(-a*b)*sqrt(a/(a + b) - b/(a + b) - 2*sqrt(-a*b)/
(a + b))*sqrt(a/(a + b) - b/(a + b) + 2*sqrt(-a*b)/(a + b)) + 858*a**5*b**3
*sqrt(a/(a + b) - b/(a + b) - 2*sqrt(-a*b)/(a + b))*sqrt(a/(a + b) - b/(a +
 b) + 2*sqrt(-a*b)/(a + b)) - 416*a**5*b**2*sqrt(-a*b)*sqrt(a/(a + b) - b/(
a + b) - 2*sqrt(-a*b)/(a + b))*sqrt(a/(a + b) - b/(a + b) + 2*sqrt(-a*b)/(a
 + b)) - 858*a**4*b**4*sqrt(a/(a + b) - b/(a + b) - 2*sqrt(-a*b)/(a + b))*s
qrt(a/(a + b) - b/(a + b) + 2*sqrt(-a*b)/(a + b)) + 1144*a**4*b**3*sqrt(-a*
b)*sqrt(a/(a + b) - b/(a + b) - 2*sqrt(-a*b)/(a + b))*sqrt(a/(a + b) - b/(a
 + b) + 2*sqrt(-a*b)/(a + b)) - 858*a**3*b**5*sqrt(a/(a + b) - b/(a + b) -
2*sqrt(-a*b)/(a + b))*sqrt(a/(a + b) - b/(a + b) + 2*sqrt(-a*b)/(a + b)) +
858*a**2*b**6*sqrt(a/(a + b) - b/(a + b) - 2*sqrt(-a*b)/(a + b))*sqrt(a/(a
+ b) - b/(a + b) + 2*sqrt(-a*b)/(a + b)) - 1144...
```

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(cosh(x)/(a+b*cosh(x)^2),x, algorithm="giac")
```

```
[Out] Exception raised: TypeError >> An error occurred running a Giac command:INP
UT:sage2:=int(sage0,sageVARx):;OUTPUT:Warning, need to choose a branch for
the root of a polynomial with parameters. This might be wrong.The choice wa
s done
```

Mupad [B]
time = 1.19, size = 87, normalized size = 3.00

$$-\frac{\ln\left(-\frac{4\,\left(a-a\,\mathrm{e}^{2\,x}\right)}{b^2\,\left(a+b\right)}-\frac{8\,a\,\mathrm{e}^x}{{\left(-b\right)}^{5/2}\,\sqrt{a+b}}\right)-\ln\left(\frac{8\,a\,\mathrm{e}^x}{{\left(-b\right)}^{5/2}\,\sqrt{a+b}}-\frac{4\,\left(a-a\,\mathrm{e}^{2\,x}\right)}{b^2\,\left(a+b\right)}\right)}{2\,\sqrt{-b}\,\sqrt{a+b}}$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

3.27 $\int \frac{1}{a+b\cosh^2(x)}\,dx$

Optimal. Leaf size=29

$$\frac{\tanh^{-1}\left(\frac{\sqrt{a}\tanh(x)}{\sqrt{a+b}}\right)}{\sqrt{a}\sqrt{a+b}}$$

[Out] arctanh(a^(1/2)*tanh(x)/(a+b)^(1/2))/a^(1/2)/(a+b)^(1/2)

Rubi [A]
time = 0.01, antiderivative size = 29, 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 = {3260, 214}

$$\frac{\tanh^{-1}\left(\frac{\sqrt{a}\tanh(x)}{\sqrt{a+b}}\right)}{\sqrt{a}\sqrt{a+b}}$$

Antiderivative was successfully verified.

[In] Int[(a + b*Cosh[x]^2)^(-1),x]

[Out] ArcTanh[(Sqrt[a]*Tanh[x])/Sqrt[a + b]]/(Sqrt[a]*Sqrt[a + b])

Rule 214

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

Rule 3260

```
Int[((a_) + (b_.)*sin[(e_.) + (f_.)*(x_)]^2)^(-1), x_Symbol] :> With[{ff =
FreeFactors[Tan[e + f*x], x]}, Dist[ff/f, Subst[Int[1/(a + (a + b)*ff^2*x^2
), x], x, Tan[e + f*x]/ff], x]] /; FreeQ[{a, b, e, f}, x]
```

Rubi steps

$$\begin{aligned}\int \frac{1}{a+b\cosh^2(x)}\,dx &= \text{Subst}\left(\int \frac{1}{a-(a+b)x^2}\,dx, x, \coth(x)\right)\\ &= \frac{\tanh^{-1}\left(\frac{\sqrt{a}\tanh(x)}{\sqrt{a+b}}\right)}{\sqrt{a}\sqrt{a+b}}\end{aligned}$$

Mathematica [A]
time = 0.04, size = 29, normalized size = 1.00

$$\frac{\tanh^{-1}\left(\frac{\sqrt{a}\,\tanh(x)}{\sqrt{a+b}}\right)}{\sqrt{a}\,\sqrt{a+b}}$$

Antiderivative was successfully verified.

```
[In] Integrate[(a + b*Cosh[x]^2)^(-1),x]
```

```
[Out] ArcTanh[(Sqrt[a]*Tanh[x])/Sqrt[a + b]]/(Sqrt[a]*Sqrt[a + b])
```

Maple [B] Leaf count of result is larger than twice the leaf count of optimal. 80 vs. 2(21) = 42.
time = 0.36, size = 81, normalized size = 2.79

method	result	si
default	$\frac{\ln\left(\sqrt{a+b}\,(\tanh^2(\frac{x}{2}))+2\tanh(\frac{x}{2})\sqrt{a}+\sqrt{a+b}\right)}{2\sqrt{a}\,\sqrt{a+b}}-\frac{\ln\left(-\sqrt{a+b}\,(\tanh^2(\frac{x}{2}))+2\tanh(\frac{x}{2})\sqrt{a}-\sqrt{a+b}\right)}{2\sqrt{a}\,\sqrt{a+b}}$	81
risch	$\frac{\ln\left(e^{2x}+\frac{2a\sqrt{a^2+ab}+b\sqrt{a^2+ab}-2a^2-2ab}{b\sqrt{a^2+ab}}\right)}{2\sqrt{a^2+ab}}-\frac{\ln\left(e^{2x}+\frac{2a\sqrt{a^2+ab}+b\sqrt{a^2+ab}+2a^2+2ab}{b\sqrt{a^2+ab}}\right)}{2\sqrt{a^2+ab}}$	12

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(1/(a+b*cosh(x)^2),x,method=_RETURNVERBOSE)
```

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

Maxima [B] Leaf count of result is larger than twice the leaf count of optimal. 53 vs. 2(21) = 42.
time = 0.48, size = 53, normalized size = 1.83

$$-\frac{\log\left(\frac{be^{(-2x)}+2a+b-2\sqrt{(a+b)a}}{be^{(-2x)}+2a+b+2\sqrt{(a+b)a}}\right)}{2\sqrt{(a+b)a}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(a+b*cosh(x)^2),x, algorithm="maxima")
```

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

Fricas [B] Leaf count of result is larger than twice the leaf count of optimal. 70 vs. $2(21) = 42$.
time = 0.55, size = 293, normalized size = 10.10

$$\left[\frac{\log\left(\frac{b^{2}\cosh(x)^{4}+4\,b^{2}\cosh(x)\sinh(x)^{3}+b^{2}\sinh(x)^{4}+2\,(2\,ab+b^{2})\cosh(x)^{2}+2\left(3\,b^{2}\cosh(x)^{2}+2\,ab+b^{2}\right)\sinh(x)^{2}+8\,a^{2}+8\,ab+b^{2}+4\left(b^{2}\cosh(x)^{3}+(2\,ab+b^{2})\cosh(x)\right)\sinh(x)-4\left(b\cosh(x)^{2}+2\,b\cosh(x)\sinh(x)+b\sinh(x)^{2}+2\,a+b\right)\sqrt{a^{2}+ab}}{b\cosh(x)^{4}+4\,b\cosh(x)\sinh(x)^{3}+b\sinh(x)^{4}+2\,(2\,a+b)\cosh(x)^{2}+2\left(3\,b\cosh(x)^{2}+2\,a+b\right)\sinh(x)^{2}+4\left(b\cosh(x)^{3}+(2\,a+b)\cosh(x)\right)\sinh(x)+b}\right)}{2\,\sqrt{a^{2}+ab}},\ \frac{\sqrt{-a^{2}-ab}\,\arctan\left(\frac{\left(b\cosh(x)^{2}+2\,b\cosh(x)\sinh(x)+b\sinh(x)^{2}+2\,a+b\right)\sqrt{-a^{2}-ab}}{2\,(a^{2}+ab)}\right)}{a^{2}+ab}\right]$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(a+b*cosh(x)^2),x, algorithm="fricas")
```

```
[Out] [1/2*log((b^2*cosh(x)^4 + 4*b^2*cosh(x)*sinh(x)^3 + b^2*sinh(x)^4 + 2*(2*a*
b + b^2)*cosh(x)^2 + 2*(3*b^2*cosh(x)^2 + 2*a*b + b^2)*sinh(x)^2 + 8*a^2 +
8*a*b + b^2 + 4*(b^2*cosh(x)^3 + (2*a*b + b^2)*cosh(x))*sinh(x) - 4*(b*cosh
(x)^2 + 2*b*cosh(x)*sinh(x) + b*sinh(x)^2 + 2*a + b)*sqrt(a^2 + a*b))/(b*co
sh(x)^4 + 4*b*cosh(x)*sinh(x)^3 + b*sinh(x)^4 + 2*(2*a + b)*cosh(x)^2 + 2*(
3*b*cosh(x)^2 + 2*a + b)*sinh(x)^2 + 4*(b*cosh(x)^3 + (2*a + b)*cosh(x))*si
nh(x) + b))/sqrt(a^2 + a*b), sqrt(-a^2 - a*b)*arctan(1/2*(b*cosh(x)^2 + 2*b
*cosh(x)*sinh(x) + b*sinh(x)^2 + 2*a + b)*sqrt(-a^2 - a*b)/(a^2 + a*b))/(a^
2 + a*b)]
```

Sympy [B] Leaf count of result is larger than twice the leaf count of optimal. 10924 vs. $2(27) = 54$.
time = 29.88, size = 10924, normalized size = 376.69

Too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(a+b*cosh(x)**2),x)
```

```
[Out] Piecewise((zoo*tanh(x/2)/(tanh(x/2)**2 + 1), Eq(a, 0) & Eq(b, 0)), (2*tanh(
x/2)/(b*(tanh(x/2)**2 + 1)), Eq(a, 0)), (-tanh(x/2)/(2*b) - 1/(2*b*tanh(x/2
)), Eq(a, -b)), (-a**3*sqrt(a/(a + b) - b/(a + b) - 2*sqrt(-a*b)/(a + b))*l
og(-sqrt(a/(a + b) - b/(a + b) + 2*sqrt(-a*b)/(a + b)) + tanh(x/2))/(2*a**4
*sqrt(a/(a + b) - b/(a + b) - 2*sqrt(-a*b)/(a + b))*sqrt(a/(a + b) - b/(a +
 b) + 2*sqrt(-a*b)/(a + b)) - 10*a**3*b*sqrt(a/(a + b) - b/(a + b) - 2*sqrt
(-a*b)/(a + b))*sqrt(a/(a + b) - b/(a + b) + 2*sqrt(-a*b)/(a + b)) + 8*a**3
*sqrt(-a*b)*sqrt(a/(a + b) - b/(a + b) - 2*sqrt(-a*b)/(a + b))*sqrt(a/(a +
b) - b/(a + b) + 2*sqrt(-a*b)/(a + b)) - 10*a**2*b**2*sqrt(a/(a + b) - b/(a
 + b) - 2*sqrt(-a*b)/(a + b))*sqrt(a/(a + b) - b/(a + b) + 2*sqrt(-a*b)/(a
+ b)) + 2*a*b**3*sqrt(a/(a + b) - b/(a + b) - 2*sqrt(-a*b)/(a + b))*sqrt(a/
(a + b) - b/(a + b) + 2*sqrt(-a*b)/(a + b)) - 8*a*b**2*sqrt(-a*b)*sqrt(a/(a
 + b) - b/(a + b) - 2*sqrt(-a*b)/(a + b))*sqrt(a/(a + b) - b/(a + b) + 2*sq
rt(-a*b)/(a + b))) + a**3*sqrt(a/(a + b) - b/(a + b) - 2*sqrt(-a*b)/(a + b)
)*log(sqrt(a/(a + b) - b/(a + b) + 2*sqrt(-a*b)/(a + b)) + tanh(x/2))/(2*a*
*4*sqrt(a/(a + b) - b/(a + b) - 2*sqrt(-a*b)/(a + b))*sqrt(a/(a + b) - b/(a
```

```
 + b) + 2*sqrt(-a*b)/(a + b)) - 10*a**3*b*sqrt(a/(a + b) - b/(a + b) - 2*sq
rt(-a*b)/(a + b))*sqrt(a/(a + b) - b/(a + b) + 2*sqrt(-a*b)/(a + b)) + 8*a*
*3*sqrt(-a*b)*sqrt(a/(a + b) - b/(a + b) - 2*sqrt(-a*b)/(a + b))*sqrt(a/(a
+ b) - b/(a + b) + 2*sqrt(-a*b)/(a + b)) - 10*a**2*b**2*sqrt(a/(a + b) - b/
(a + b) - 2*sqrt(-a*b)/(a + b))*sqrt(a/(a + b) - b/(a + b) + 2*sqrt(-a*b)/(
a + b)) + 2*a*b**3*sqrt(a/(a + b) - b/(a + b) - 2*sqrt(-a*b)/(a + b))*sqrt(
a/(a + b) - b/(a + b) + 2*sqrt(-a*b)/(a + b)) - 8*a*b**2*sqrt(-a*b)*sqrt(a/
(a + b) - b/(a + b) - 2*sqrt(-a*b)/(a + b))*sqrt(a/(a + b) - b/(a + b) + 2*
sqrt(-a*b)/(a + b))) - a**3*sqrt(a/(a + b) - b/(a + b) + 2*sqrt(-a*b)/(a +
b))*log(-sqrt(a/(a + b) - b/(a + b) - 2*sqrt(-a*b)/(a + b)) + tanh(x/2))/(2
*a**4*sqrt(a/(a + b) - b/(a + b) - 2*sqrt(-a*b)/(a + b))*sqrt(a/(a + b) - b
/(a + b) + 2*sqrt(-a*b)/(a + b)) - 10*a**3*b*sqrt(a/(a + b) - b/(a + b) - 2
*sqrt(-a*b)/(a + b))*sqrt(a/(a + b) - b/(a + b) + 2*sqrt(-a*b)/(a + b)) + 8
*a**3*sqrt(-a*b)*sqrt(a/(a + b) - b/(a + b) - 2*sqrt(-a*b)/(a + b))*sqrt(a/
(a + b) - b/(a + b) + 2*sqrt(-a*b)/(a + b)) - 10*a**2*b**2*sqrt(a/(a + b) -
 b/(a + b) - 2*sqrt(-a*b)/(a + b))*sqrt(a/(a + b) - b/(a + b) + 2*sqrt(-a*b
)/(a + b)) + 2*a*b**3*sqrt(a/(a + b) - b/(a + b) - 2*sqrt(-a*b)/(a + b))*sq
rt(a/(a + b) - b/(a + b) + 2*sqrt(-a*b)/(a + b)) - 8*a*b**2*sqrt(-a*b)*sqrt
(a/(a + b) - b/(a + b) - 2*sqrt(-a*b)/(a + b))*sqrt(a/(a + b) - b/(a + b) +
 2*sqrt(-a*b)/(a + b))) + a**3*sqrt(a/(a + b) - b/(a + b) + 2*sqrt(-a*b)/(a
 + b))*log(sqrt(a/(a + b) - b/(a + b) - 2*sqrt(-a*b)/(a + b)) + tanh(x/2))/
(2*a**4*sqrt(a/(a + b) - b/(a + b) - 2*sqrt(-a*b)/(a + b))*sqrt(a/(a + b) -
 b/(a + b) + 2*sqrt(-a*b)/(a + b)) - 10*a**3*b*sqrt(a/(a + b) - b/(a + b) -
 2*sqrt(-a*b)/(a + b))*sqrt(a/(a + b) - b/(a + b) + 2*sqrt(-a*b)/(a + b)) +
 8*a**3*sqrt(-a*b)*sqrt(a/(a + b) - b/(a + b) - 2*sqrt(-a*b)/(a + b))*sqrt(
a/(a + b) - b/(a + b) + 2*sqrt(-a*b)/(a + b)) - 10*a**2*b**2*sqrt(a/(a + b)
 - b/(a + b) - 2*sqrt(-a*b)/(a + b))*sqrt(a/(a + b) - b/(a + b) + 2*sqrt(-a
*b)/(a + b)) + 2*a*b**3*sqrt(a/(a + b) - b/(a + b) - 2*sqrt(-a*b)/(a + b))*
sqrt(a/(a + b) - b/(a + b) + 2*sqrt(-a*b)/(a + b)) - 8*a*b**2*sqrt(-a*b)*sq
rt(a/(a + b) - b/(a + b) - 2*sqrt(-a*b)/(a + b))*sqrt(a/(a + b) - b/(a + b)
 + 2*sqrt(-a*b)/(a + b))) + 10*a**2*b*sqrt(a/(a + b) - b/(a + b) - 2*sqrt(-
a*b)/(a + b))*log(-sqrt(a/(a + b) - b/(a + b) + 2*sqrt(-a*b)/(a + b)) + tan
h(x/2))/(2*a**4*sqrt(a/(a + b) - b/(a + b) - 2*sqrt(-a*b)/(a + b))*sqrt(a/(
a + b) - b/(a + b) + 2*sqrt(-a*b)/(a + b)) - 10*a**3*b*sqrt(a/(a + b) - b/(
a + b) - 2*sqrt(-a*b)/(a + b))*sqrt(a/(a + b) - b/(a + b) + 2*sqrt(-a*b)/(a
 + b)) + 8*a**3*sqrt(-a*b)*sqrt(a/(a + b) - b/(a + b) - 2*sqrt(-a*b)/(a + b
))*sqrt(a/(a + b) - b/(a + b) + 2*sqrt(-a*b)/(a + b)) - 10*a**2*b**2*sqrt(a
/(a + b) - b/(a + b) - 2*sqrt(-a*b)/(a + b))*sqrt(a/(a + b) - b/(a + b) + 2
*sqrt(-a*b)/(a + b)) + 2*a*b**3*sqrt(a/(a + b) - b/(a + b) - 2*sqrt(-a*b)/(
a + b))*sqrt(a/(a + b) - b/(a + b) + 2*sqrt(-a*b)/(a + b)) - 8*a*b**2*sqrt(
-a*b)*sqrt(a/(a + b) - b/(a + b) - 2*sqrt(-a*b)/(a + b))*sqrt(a/(a + b) - b
/(a + b) + 2*sqrt(-a*b)/(a + b))) - 10*a**2*b*sqrt(a/(a + b) - b/(a + b) -
2*sqrt(-a*b)/(a + b))*log(sqrt(a/(a + b) - b/(a + b) + 2*sqrt(-a*b)/(a + b)
) + tanh(x/2))/(2*a**4*sqrt(a/(a + b) - b/(a + b) - 2*sqrt(-a*b)/(a + b))*s
qrt(a/(a + b) - b/(a + b) + 2*sqrt(-a*b)/(a + b)) - 10*a**3*b*sqrt(a/(a + b
```

```
) - b/(a + b) - 2*sqrt(-a*b)/(a + b))*sqrt(a/(a + b) - b/(a + b) + 2*sqrt(-
a*b)/(a + b)) + 8*a**3*sqrt(-a*b)*sqrt(a/(a + b) - b/(a + b) - 2*sqrt(-a*b)
/(a + b))*sqrt(a/(a + b) - b/(a + b) + 2*sqrt(-a*b)/(a + b)) - 10*a**2*b**2
*sqrt(a/(a + b) - b/(a + b) - 2*sqrt(-a*b)/(a + b))*sqrt(a/(a + b) - b/(a +
 b) + 2*sqrt(-a*b)/(a + b)) + 2*a*b**3*sqrt(a/(a + b) - b/(a + b) - 2*sqrt(
-a*b)/(a + b))*sqrt(a/(a + b) - b/(a + b) + 2*s...
```

Giac [A]
time = 0.40, size = 39, normalized size = 1.34

$$\frac{\arctan\left(\frac{be^{(2x)}+2a+b}{2\sqrt{-a^2-ab}}\right)}{\sqrt{-a^2-ab}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(a+b*cosh(x)^2),x, algorithm="giac")
```

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

Mupad [B]
time = 0.00, size = 267, normalized size = 9.21

$$-\frac{\mathrm{atan}\left(\frac{b^2\,e^{2\,x}\,{\left(-a^2-b\,a\right)}^{3/2}\,\left(\frac{4\,\left(4\,a+2\,b\right)\,\left(8\,a^3+12\,a^2\,b+4\,a\,b^2\right)}{b^5\,{\left(-a^2-b\,a\right)}^{3/2}\,\sqrt{-a\,\left(a+b\right)}}+\frac{2\,\left(8\,a^2+8\,a\,b+b^2\right)\,\left(8\,a^2\,\sqrt{-a^2-b\,a}+b^2\,\sqrt{-a^2-b\,a}+8\,a\,b\,\sqrt{-a^2-b\,a}\right)}{a\,b^5\,\left(a+b\right)\,{\left(-a^2-b\,a\right)}^{3/2}}\right)}{4}+\frac{\left(2\,a^2\,b+2\,a\,b^2\right)\,\left(4\,a+2\,b\right)}{b^3\,\sqrt{-a\,\left(a+b\right)}}+\frac{\left(b^2\,\sqrt{-a^2-b\,a}+2\,a\,b\,\sqrt{-a^2-b\,a}\right)\,\left(8\,a^2+8\,a\,b+b^2\right)}{2\,a\,b^3\,\left(a+b\right)}\right)}{\sqrt{-a^2-b\,a}}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] -atan((b^2*exp(2*x)*(- a*b - a^2)^(3/2)*((4*(4*a + 2*b)*(4*a*b^2 + 12*a^2*b
 + 8*a^3))/(b^5*(- a*b - a^2)^(3/2)*(-a*(a + b))^(1/2)) + (2*(8*a*b + 8*a^2
 + b^2)*(8*a^2*(- a*b - a^2)^(1/2) + b^2*(- a*b - a^2)^(1/2) + 8*a*b*(- a*b
 - a^2)^(1/2)))/(a*b^5*(a + b)*(- a*b - a^2)^(3/2))))/4 + ((2*a*b^2 + 2*a^2
*b)*(4*a + 2*b))/(b^3*(-a*(a + b))^(1/2)) + ((b^2*(- a*b - a^2)^(1/2) + 2*a
*b*(- a*b - a^2)^(1/2))*(8*a*b + 8*a^2 + b^2))/(2*a*b^3*(a + b)))/(- a*b -
a^2)^(1/2)
```

3.28 $\int \frac{\operatorname{sech}(x)}{a+b\cosh^2(x)}\,dx$

Optimal. Leaf size=41

$$\frac{\operatorname{ArcTan}(\sinh(x))}{a}-\frac{\sqrt{b}\operatorname{ArcTan}\left(\frac{\sqrt{b}\sinh(x)}{\sqrt{a+b}}\right)}{a\sqrt{a+b}}$$

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

Rubi [A]
time = 0.04, antiderivative size = 41, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 4, integrand size = 13, $\frac{\text{number of rules}}{\text{integrand size}} = 0.308$, Rules used = {3265, 400, 209, 211}

$$\frac{\operatorname{ArcTan}(\sinh(x))}{a}-\frac{\sqrt{b}\operatorname{ArcTan}\left(\frac{\sqrt{b}\sinh(x)}{\sqrt{a+b}}\right)}{a\sqrt{a+b}}$$

Antiderivative was successfully verified.

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

```
[Out] ArcTan[Sinh[x]]/a - (Sqrt[b]*ArcTan[(Sqrt[b]*Sinh[x])/Sqrt[a + b]])/(a*Sqrt
[a + b])
```

Rule 209

```
Int[((a_) + (b_.)*(x_)^2)^(-1), x_Symbol] :> Simp[(1/(Rt[a, 2]*Rt[b, 2]))*A
rcTan[Rt[b, 2]*(x/Rt[a, 2])], x] /; FreeQ[{a, b}, x] && PosQ[a/b] && (GtQ[a
, 0] || GtQ[b, 0])
```

Rule 211

```
Int[((a_) + (b_.)*(x_)^2)^(-1), x_Symbol] :> Simp[(Rt[a/b, 2]/a)*ArcTan[x/R
t[a/b, 2]], x] /; FreeQ[{a, b}, x] && PosQ[a/b]
```

Rule 400

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

Rule 3265

```
Int[sin[(e_.) + (f_.)*(x_)]^(m_.)*((a_) + (b_.)*sin[(e_.) + (f_.)*(x_)]^2)^
(p_.), x_Symbol] :> With[{ff = FreeFactors[Cos[e + f*x], x]}, Dist[-ff/f, S
```

```
ubst[Int[(1 - ff^2*x^2)^((m - 1)/2)*(a + b - b*ff^2*x^2)^p, x], x, Cos[e +
f*x]/ff], x]] /; FreeQ[{a, b, e, f, p}, x] && IntegerQ[(m - 1)/2]
```

Rubi steps

$$\int \frac{\operatorname{sech}(x)}{a+b\cosh^2(x)}\,dx = \operatorname{Subst}\left(\int \frac{1}{(1+x^2)\,(a+b+bx^2)}\,dx, x, \sinh(x)\right)$$
$$= \frac{\operatorname{Subst}\left(\int \frac{1}{1+x^2}\,dx, x, \sinh(x)\right)}{a} - \frac{b\operatorname{Subst}\left(\int \frac{1}{a+b+bx^2}\,dx, x, \sinh(x)\right)}{a}$$
$$= \frac{\tan^{-1}(\sinh(x))}{a} - \frac{\sqrt{b}\,\tan^{-1}\left(\frac{\sqrt{b}\,\sinh(x)}{\sqrt{a+b}}\right)}{a\sqrt{a+b}}$$

Mathematica [A]
time = 0.07, size = 45, normalized size = 1.10

$$\frac{\sqrt{b}\,\operatorname{ArcTan}\left(\frac{\sqrt{a+b}\,\operatorname{csch}(x)}{\sqrt{b}}\right)}{a\sqrt{a+b}} + \frac{2\operatorname{ArcTan}\left(\tanh\left(\frac{x}{2}\right)\right)}{a}$$

Antiderivative was successfully verified.

```
[In] Integrate[Sech[x]/(a + b*Cosh[x]^2),x]
[Out] (Sqrt[b]*ArcTan[(Sqrt[a + b]*Csch[x])/Sqrt[b]])/(a*Sqrt[a + b]) + (2*ArcTan
[Tanh[x/2]])/a
```

Maple [B] Leaf count of result is larger than twice the leaf count of optimal. 84 vs. $2(33) = 66$.
time = 0.73, size = 85, normalized size = 2.07

method	result
default	$\frac{2\arctan\left(\tanh\left(\frac{x}{2}\right)\right)}{a} - \frac{2b\left(\frac{\arctan\left(\frac{2\sqrt{a+b}\,\tanh\left(\frac{x}{2}\right)+2\sqrt{a}}{2\sqrt{b}}\right)}{2\sqrt{a+b}\,\sqrt{b}} + \frac{\arctan\left(\frac{2\sqrt{a+b}\,\tanh\left(\frac{x}{2}\right)-2\sqrt{a}}{2\sqrt{b}}\right)}{2\sqrt{a+b}\,\sqrt{b}}\right)}{a}$
risch	$\frac{i\ln(e^{x}+i)}{a} - \frac{i\ln(e^{x}-i)}{a} + \frac{\sqrt{-b\,(a+b)}\,\ln\left(e^{2x}-\frac{2\sqrt{-b\,(a+b)}\,e^{x}}{b}-1\right)}{2(a+b)a} - \frac{\sqrt{-b\,(a+b)}\,\ln\left(e^{2x}+\frac{2\sqrt{-b\,(a+}}{b}\right.}{2(a+b)a}$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(sech(x)/(a+b*cosh(x)^2),x,method=_RETURNVERBOSE)
```

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

Maxima [F]
time = 0.00, size = 0, normalized size = 0.00

Failed to integrate

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] 2*arctan(e^x)/a - 2*integrate((b*e^(3*x) + b*e^x)/(a*b*e^(4*x) + a*b + 2*(2
*a^2 + a*b)*e^(2*x)), x)
```

Fricas [B] Leaf count of result is larger than twice the leaf count of optimal. 115 vs. 2(33) = 66.
time = 0.40, size = 360, normalized size = 8.78

$$\left[\frac{\sqrt{-\frac{b}{a+b}}\log\left(\frac{b\cosh(x)^4+4b\cosh(x)\sinh(x)^3+b\sinh(x)^4-2(2a+3b)\cosh(x)^2+2\left(3b\cosh(x)^2-2a-3b\right)\sinh(x)^2+4\left(b\cosh(x)^3-(2a+3b)\cosh(x)\right)\sinh(x)-4\left((a+b)\cosh(x)^3+3(a+b)\cosh(x)\sinh(x)^2+(a+b)\sinh(x)^3-(a+b)\cosh(x)+\left(3(a+b)\cosh(x)^2-a-b\right)\sinh(x)\right)\sqrt{-\frac{b}{a+b}}+b}{b\cosh(x)^4+4b\cosh(x)\sinh(x)^3+b\sinh(x)^4+2(2a+b)\cosh(x)^2+2\left(3b\cosh(x)^2+2a+b\right)\sinh(x)^2+4\left(b\cosh(x)^3+(2a+b)\cosh(x)\right)\sinh(x)+b}\right)+4\arctan\left(\cosh(x)+\sinh(x)\right)}{2a}, -\frac{\sqrt{\frac{b}{a+b}}\arctan\left(\frac{1}{2}\sqrt{\frac{b}{a+b}}\left(\cosh(x)+\sinh(x)\right)\right)+\sqrt{\frac{b}{a+b}}\arctan\left(\frac{\left(b\cosh(x)^3+3b\cosh(x)\sinh(x)^2+b\sinh(x)^3+(4a+3b)\cosh(x)+\left(3b\cosh(x)^2+4a+3b\right)\sinh(x)\right)\sqrt{\frac{b}{a+b}}}{2b}\right)-2\arctan\left(\cosh(x)+\sinh(x)\right)}{a}\right]$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] [1/2*(sqrt(-b/(a + b))*log((b*cosh(x)^4 + 4*b*cosh(x)*sinh(x)^3 + b*sinh(x)
^4 - 2*(2*a + 3*b)*cosh(x)^2 + 2*(3*b*cosh(x)^2 - 2*a - 3*b)*sinh(x)^2 + 4*
(b*cosh(x)^3 - (2*a + 3*b)*cosh(x))*sinh(x) - 4*((a + b)*cosh(x)^3 + 3*(a +
 b)*cosh(x)*sinh(x)^2 + (a + b)*sinh(x)^3 - (a + b)*cosh(x) + (3*(a + b)*co
sh(x)^2 - a - b)*sinh(x))*sqrt(-b/(a + b)) + b)/(b*cosh(x)^4 + 4*b*cosh(x)*
sinh(x)^3 + b*sinh(x)^4 + 2*(2*a + b)*cosh(x)^2 + 2*(3*b*cosh(x)^2 + 2*a +
b)*sinh(x)^2 + 4*(b*cosh(x)^3 + (2*a + b)*cosh(x))*sinh(x) + b)) + 4*arctan
(cosh(x) + sinh(x)))/a, -(sqrt(b/(a + b))*arctan(1/2*sqrt(b/(a + b))*(cosh(
x) + sinh(x))) + sqrt(b/(a + b))*arctan(1/2*(b*cosh(x)^3 + 3*b*cosh(x)*sinh
(x)^2 + b*sinh(x)^3 + (4*a + 3*b)*cosh(x) + (3*b*cosh(x)^2 + 4*a + 3*b)*sin
h(x))*sqrt(b/(a + b))/b) - 2*arctan(cosh(x) + sinh(x)))/a]
```

Sympy [F]
time = 0.00, size = 0, normalized size = 0.00

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

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(sech(x)/(a+b*cosh(x)**2),x)
```

```
[Out] Integral(sech(x)/(a + b*cosh(x)**2), x)
```

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(sech(x)/(a+b*cosh(x)^2),x, algorithm="giac")
```

```
[Out] Exception raised: TypeError >> An error occurred running a Giac command:INP
UT:sage2:=int(sage0,sageVARx):;OUTPUT:Warning, need to choose a branch for
the root of a polynomial with parameters. This might be wrong.The choice wa
s done
```

Mupad [B]
time = 1.30, size = 208, normalized size = 5.07

$$\frac{2\,\mathrm{atan}\left(\frac{e^x\,\left(16\,{\left(a^2\right)}^{3/2}+9\,b^2\,\sqrt{a^2}+24\,a\,b\,\sqrt{a^2}\right)}{16\,a^3+24\,a^2\,b+9\,a\,b^2}\right)}{\sqrt{a^2}}-\frac{\sqrt{b}\,\left(2\,\mathrm{atan}\left(\frac{\sqrt{b}\,e^x\,\sqrt{a^2\,\left(a+b\right)}}{2\,a\,\left(a+b\right)}\right)+2\,\mathrm{atan}\left(\frac{4\,a^4\,e^x+8\,a^3\,b\,e^x+4\,a^2\,b^2\,e^x-b\,e^x\,\sqrt{a^2\,\left(a+b\right)}\,\sqrt{a^3+b\,a^2}+b\,e^{3\,x}\,\sqrt{a^2\,\left(a+b\right)}\,\sqrt{a^3+b\,a^2}}{\sqrt{b}\,\sqrt{a^2\,\left(a+b\right)}\,\left(2\,a^2+2\,b\,a\right)}\right)\right)}{2\,\sqrt{a^3+b\,a^2}}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] (2*atan((exp(x)*(16*(a^2)^(3/2) + 9*b^2*(a^2)^(1/2) + 24*a*b*(a^2)^(1/2)))/
(9*a*b^2 + 24*a^2*b + 16*a^3)))/(a^2)^(1/2) - (b^(1/2)*(2*atan((b^(1/2)*exp
(x)*(a^2*(a + b))^(1/2))/(2*a*(a + b))) + 2*atan((4*a^4*exp(x) + 8*a^3*b*ex
p(x) + 4*a^2*b^2*exp(x) - b*exp(x)*(a^2*(a + b))^(1/2)*(a^2*b + a^3)^(1/2)
+ b*exp(3*x)*(a^2*(a + b))^(1/2)*(a^2*b + a^3)^(1/2))/(b^(1/2)*(a^2*(a + b)
)^(1/2)*(2*a*b + 2*a^2)))))/(2*(a^2*b + a^3)^(1/2))
```

3.29 $\int \frac{\operatorname{sech}^2(x)}{a+b\cosh^2(x)}\,dx$

Optimal. Leaf size=38

$$-\frac{b\tanh^{-1}\left(\frac{\sqrt{a}\tanh(x)}{\sqrt{a+b}}\right)}{a^{3/2}\sqrt{a+b}}+\frac{\tanh(x)}{a}$$

[Out] -b*arctanh(a^(1/2)*tanh(x)/(a+b)^(1/2))/a^(3/2)/(a+b)^(1/2)+tanh(x)/a

Rubi [A]
time = 0.05, antiderivative size = 38, normalized size of antiderivative = 1.00, number of steps used = 3, number of rules used = 3, integrand size = 15, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.200, Rules used = {3266, 464, 214}

$$\frac{\tanh(x)}{a}-\frac{b\tanh^{-1}\left(\frac{\sqrt{a}\tanh(x)}{\sqrt{a+b}}\right)}{a^{3/2}\sqrt{a+b}}$$

Antiderivative was successfully verified.

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

```
[Out] -((b*ArcTanh[(Sqrt[a]*Tanh[x])/Sqrt[a + b]])/(a^(3/2)*Sqrt[a + b])) + Tanh[
x]/a
```

Rule 214

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

Rule 464

```
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 3266

```
Int[sin[(e_.) + (f_.)*(x_)]^(m_)*((a_) + (b_.)*sin[(e_.) + (f_.)*(x_)]^2)^(
p_.), x_Symbol] :> With[{ff = FreeFactors[Tan[e + f*x], x]}, Dist[ff^(m + 1
)/f, Subst[Int[x^m*((a + (a + b)*ff^2*x^2)^p/(1 + ff^2*x^2)^(m/2 + p + 1)),
 x], x, Tan[e + f*x]/ff], x]] /; FreeQ[{a, b, e, f}, x] && IntegerQ[m/2] &&
```

```
IntegerQ[p]
```

Rubi steps

$$\int \frac{\operatorname{sech}^2(x)}{a+b\cosh^2(x)}\,dx = -\text{Subst}\left(\int \frac{1-x^2}{x^2\left(a-(a+b)x^2\right)}\,dx, x, \coth(x)\right)$$
$$= \frac{\tanh(x)}{a} - \frac{b\text{Subst}\left(\int \frac{1}{a+(-a-b)x^2}\,dx, x, \coth(x)\right)}{a}$$
$$= -\frac{b\tanh^{-1}\left(\frac{\sqrt{a}\tanh(x)}{\sqrt{a+b}}\right)}{a^{3/2}\sqrt{a+b}} + \frac{\tanh(x)}{a}$$

Mathematica [A]
time = 0.06, size = 38, normalized size = 1.00

$$-\frac{b\tanh^{-1}\left(\frac{\sqrt{a}\tanh(x)}{\sqrt{a+b}}\right)}{a^{3/2}\sqrt{a+b}} + \frac{\tanh(x)}{a}$$

Antiderivative was successfully verified.

```
[In] Integrate[Sech[x]^2/(a + b*Cosh[x]^2),x]
[Out] -((b*ArcTanh[(Sqrt[a]*Tanh[x])/Sqrt[a + b]])/(a^(3/2)*Sqrt[a + b])) + Tanh[
x]/a
```

Maple [B] Leaf count of result is larger than twice the leaf count of optimal. 103 vs. $2(30) = 60$.
time = 0.75, size = 104, normalized size = 2.74

method	result
default	$\frac{2b\left(-\frac{\ln\left(\sqrt{a+b}\,\left(\tanh^2\left(\frac{x}{2}\right)\right)+2\tanh\left(\frac{x}{2}\right)\sqrt{a}+\sqrt{a+b}\right)}{4\sqrt{a}\,\sqrt{a+b}}+\frac{\ln\left(\sqrt{a+b}\,\left(\tanh^2\left(\frac{x}{2}\right)\right)-2\tanh\left(\frac{x}{2}\right)\sqrt{a}+\sqrt{a+b}\right)}{4\sqrt{a}\,\sqrt{a+b}}\right)}{a}+\frac{2}{a(\mathrm{t}$
risch	$-\frac{2}{a(1+e^{2x})}+\frac{b\ln\left(e^{2x}+\frac{2a\sqrt{a^2+ab}+b\sqrt{a^2+ab}+2a^2+2ab}{b\sqrt{a^2+ab}}\right)}{2\sqrt{a^2+ab}\,a}-\frac{b\ln\left(e^{2x}+\frac{2a\sqrt{a^2+ab}+b\sqrt{a^2+ab}-2a^2-2ab}{b\sqrt{a^2+ab}}\right)}{2\sqrt{a^2+ab}\,a}$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(sech(x)^2/(a+b*cosh(x)^2),x,method=_RETURNVERBOSE)
```

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

Maxima [B] Leaf count of result is larger than twice the leaf count of optimal. 70 vs. $2(30) = 60$.
time = 0.48, size = 70, normalized size = 1.84

$$\frac{b\log\left(\frac{be^{(-2x)}+2a+b-2\sqrt{(a+b)a}}{be^{(-2x)}+2a+b+2\sqrt{(a+b)a}}\right)}{2\sqrt{(a+b)a}\,a}+\frac{2}{ae^{(-2x)}+a}$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

Fricas [B] Leaf count of result is larger than twice the leaf count of optimal. 148 vs. $2(30) = 60$.
time = 0.40, size = 457, normalized size = 12.03

$$\left[\frac{\left(b\cosh(x)^2+2b\cosh(x)\sinh(x)+b\sinh(x)^2+b\right)\sqrt{a^2+ab}\log\left(\frac{b^2\cosh(x)^4+4b^2\cosh(x)\sinh(x)^3+b^2\sinh(x)^4+2(2ab+b^2)\cosh(x)^2+2\left(3b^2\cosh(x)^2+2ab+b^2\right)\sinh(x)^2+8a^2+8ab+b^2+4\left(b^2\cosh(x)^3+(2ab+b^2)\cosh(x)\right)\sinh(x)+4\left(b\cosh(x)^2+2b\cosh(x)\sinh(x)+b\sinh(x)^2+2a+b\right)\sqrt{a^2+ab}}{b\cosh(x)^4+4b\cosh(x)\sinh(x)^3+b\sinh(x)^4+2(2a+b)\cosh(x)^2+2\left(3b\cosh(x)^2+2a+b\right)\sinh(x)^2+4\left(b\cosh(x)^3+(2a+b)\cosh(x)\right)\sinh(x)+b}\right)-4a^2-4ab}{2\left(a^3+a^2b+(a^3+a^2b)\cosh(x)^2+2(a^3+a^2b)\cosh(x)\sinh(x)+(a^3+a^2b)\sinh(x)^2\right)}, -\frac{\left(b\cosh(x)^2+2b\cosh(x)\sinh(x)+b\sinh(x)^2+b\right)\sqrt{-a^2-ab}\arctan\left(\frac{\left(b\cosh(x)^2+2b\cosh(x)\sinh(x)+b\sinh(x)^2+2a+b\right)\sqrt{-a^2-ab}}{2(a^2+ab)}\right)+2a^2+2ab}{a^3+a^2b+(a^3+a^2b)\cosh(x)^2+2(a^3+a^2b)\cosh(x)\sinh(x)+(a^3+a^2b)\sinh(x)^2}\right]$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] [1/2*((b*cosh(x)^2 + 2*b*cosh(x)*sinh(x) + b*sinh(x)^2 + b)*sqrt(a^2 + a*b)
*log((b^2*cosh(x)^4 + 4*b^2*cosh(x)*sinh(x)^3 + b^2*sinh(x)^4 + 2*(2*a*b +
b^2)*cosh(x)^2 + 2*(3*b^2*cosh(x)^2 + 2*a*b + b^2)*sinh(x)^2 + 8*a^2 + 8*a*
b + b^2 + 4*(b^2*cosh(x)^3 + (2*a*b + b^2)*cosh(x))*sinh(x) + 4*(b*cosh(x)^
2 + 2*b*cosh(x)*sinh(x) + b*sinh(x)^2 + 2*a + b)*sqrt(a^2 + a*b))/(b*cosh(x
)^4 + 4*b*cosh(x)*sinh(x)^3 + b*sinh(x)^4 + 2*(2*a + b)*cosh(x)^2 + 2*(3*b*
cosh(x)^2 + 2*a + b)*sinh(x)^2 + 4*(b*cosh(x)^3 + (2*a + b)*cosh(x))*sinh(x
) + b)) - 4*a^2 - 4*a*b)/(a^3 + a^2*b + (a^3 + a^2*b)*cosh(x)^2 + 2*(a^3 +
a^2*b)*cosh(x)*sinh(x) + (a^3 + a^2*b)*sinh(x)^2), -((b*cosh(x)^2 + 2*b*cos
h(x)*sinh(x) + b*sinh(x)^2 + b)*sqrt(-a^2 - a*b)*arctan(1/2*(b*cosh(x)^2 +
2*b*cosh(x)*sinh(x) + b*sinh(x)^2 + 2*a + b)*sqrt(-a^2 - a*b)/(a^2 + a*b))
+ 2*a^2 + 2*a*b)/(a^3 + a^2*b + (a^3 + a^2*b)*cosh(x)^2 + 2*(a^3 + a^2*b)*c
osh(x)*sinh(x) + (a^3 + a^2*b)*sinh(x)^2)]
```

Sympy [F]
time = 0.00, size = 0, normalized size = 0.00

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

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(sech(x)**2/(a+b*cosh(x)**2),x)
```

```
[Out] Integral(sech(x)**2/(a + b*cosh(x)**2), x)
```

Giac [A]
time = 0.41, size = 58, normalized size = 1.53

$$-\frac{b\arctan\left(\frac{be^{(2x)}+2a+b}{2\sqrt{-a^2-ab}}\right)}{\sqrt{-a^2-ab}\,a}-\frac{2}{a(e^{(2x)}+1)}$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

Mupad [B]
time = 0.28, size = 108, normalized size = 2.84

$$\frac{b\,\ln\left(\frac{4\,\mathrm{e}^{2\,x}}{a}-\frac{2\,\left(b+2\,a\,\mathrm{e}^{2\,x}+b\,\mathrm{e}^{2\,x}\right)}{a^{3/2}\,\sqrt{a+b}}\right)}{2\,a^{3/2}\,\sqrt{a+b}}-\frac{2}{a\,\left(\mathrm{e}^{2\,x}+1\right)}-\frac{b\,\ln\left(\frac{4\,\mathrm{e}^{2\,x}}{a}+\frac{2\,\left(b+2\,a\,\mathrm{e}^{2\,x}+b\,\mathrm{e}^{2\,x}\right)}{a^{3/2}\,\sqrt{a+b}}\right)}{2\,a^{3/2}\,\sqrt{a+b}}$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

3.30 $\int \frac{\text{sech}^3(x)}{a+b\cosh^2(x)}\,dx$

Optimal. Leaf size=59

$$\frac{(a-2b)\text{ArcTan}(\sinh(x))}{2a^2}+\frac{b^{3/2}\text{ArcTan}\left(\frac{\sqrt{b}\,\sinh(x)}{\sqrt{a+b}}\right)}{a^2\sqrt{a+b}}+\frac{\text{sech}(x)\tanh(x)}{2a}$$

```
[Out] 1/2*(a-2*b)*arctan(sinh(x))/a^2+b^(3/2)*arctan(sinh(x)*b^(1/2)/(a+b)^(1/2))
/a^2/(a+b)^(1/2)+1/2*sech(x)*tanh(x)/a
```

Rubi [A]
time = 0.06, antiderivative size = 59, normalized size of antiderivative = 1.00, number of steps used = 5, number of rules used = 5, integrand size = 15, $\frac{\text{number of rules}}{\text{integrand size}} = 0.333$, Rules used = {3265, 425, 536, 209, 211}

$$\frac{b^{3/2}\text{ArcTan}\left(\frac{\sqrt{b}\,\sinh(x)}{\sqrt{a+b}}\right)}{a^2\sqrt{a+b}}+\frac{(a-2b)\text{ArcTan}(\sinh(x))}{2a^2}+\frac{\tanh(x)\text{sech}(x)}{2a}$$

Antiderivative was successfully verified.

```
[In] Int[Sech[x]^3/(a + b*Cosh[x]^2),x]
```

```
[Out] ((a - 2*b)*ArcTan[Sinh[x]])/(2*a^2) + (b^(3/2)*ArcTan[(Sqrt[b]*Sinh[x])/Sqr
t[a + b]])/(a^2*Sqrt[a + b]) + (Sech[x]*Tanh[x])/(2*a)
```

Rule 209

```
Int[((a_) + (b_.)*(x_)^2)^(-1), x_Symbol] :> Simp[(1/(Rt[a, 2]*Rt[b, 2]))*A
rcTan[Rt[b, 2]*(x/Rt[a, 2])], x] /; FreeQ[{a, b}, x] && PosQ[a/b] && (GtQ[a
, 0] || GtQ[b, 0])
```

Rule 211

```
Int[((a_) + (b_.)*(x_)^2)^(-1), x_Symbol] :> Simp[(Rt[a/b, 2]/a)*ArcTan[x/R
t[a/b, 2]], x] /; FreeQ[{a, b}, x] && PosQ[a/b]
```

Rule 425

```
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[1/(a*n*(p + 1)*(b*c - a*d)), Int[(a + b*x^n)^(p + 1)*(c
+ d*x^n)^q*Simp[b*c + n*(p + 1)*(b*c - a*d) + d*b*(n*(p + q + 2) + 1)*x^n,
x], x], x] /; FreeQ[{a, b, c, d, n, q}, x] && NeQ[b*c - a*d, 0] && LtQ[p, -
1] &&  !( !IntegerQ[p] && IntegerQ[q] && LtQ[q, -1]) && IntBinomialQ[a, b,
```

```
c, d, n, p, q, x]
```

Rule 536

```
Int[((e_) + (f_.)*(x_)^(n_))/(((a_) + (b_.)*(x_)^(n_))*((c_) + (d_.)*(x_)^(
n_))), x_Symbol] :> Dist[(b*e - a*f)/(b*c - a*d), Int[1/(a + b*x^n), x], x]
 - Dist[(d*e - c*f)/(b*c - a*d), Int[1/(c + d*x^n), x], x] /; FreeQ[{a, b,
c, d, e, f, n}, x]
```

Rule 3265

```
Int[sin[(e_.) + (f_.)*(x_)]^(m_.)*((a_) + (b_.)*sin[(e_.) + (f_.)*(x_)]^2)^
(p_.), x_Symbol] :> With[{ff = FreeFactors[Cos[e + f*x], x]}, Dist[-ff/f, S
ubst[Int[(1 - ff^2*x^2)^((m - 1)/2)*(a + b - b*ff^2*x^2)^p, x], x, Cos[e +
f*x]/ff], x]] /; FreeQ[{a, b, e, f, p}, x] && IntegerQ[(m - 1)/2]
```

Rubi steps

$$\begin{aligned}\int \frac{\operatorname{sech}^3(x)}{a+b\cosh^2(x)}\,dx &= \operatorname{Subst}\left(\int \frac{1}{(1+x^2)^2\,(a+b+bx^2)}\,dx, x, \sinh(x)\right)\\ &= \frac{\operatorname{sech}(x)\tanh(x)}{2a} - \frac{\operatorname{Subst}\left(\int \frac{-a+b-bx^2}{(1+x^2)(a+b+bx^2)}\,dx, x, \sinh(x)\right)}{2a}\\ &= \frac{\operatorname{sech}(x)\tanh(x)}{2a} + \frac{(a-2b)\operatorname{Subst}\left(\int \frac{1}{1+x^2}\,dx, x, \sinh(x)\right)}{2a^2} + \frac{b^2\operatorname{Subst}\left(\int \frac{1}{a+b+bx^2}\,dx, x, \mathrm{si}\right.}{a^2}\\ &= \frac{(a-2b)\tan^{-1}(\sinh(x))}{2a^2} + \frac{b^{3/2}\tan^{-1}\left(\frac{\sqrt{b}\,\sinh(x)}{\sqrt{a+b}}\right)}{a^2\sqrt{a+b}} + \frac{\operatorname{sech}(x)\tanh(x)}{2a}\end{aligned}$$

Mathematica [A]
time = 0.12, size = 58, normalized size = 0.98

$$\frac{-\frac{2b^{3/2}\operatorname{ArcTan}\left(\frac{\sqrt{a+b}\,\operatorname{csch}(x)}{\sqrt{b}}\right)}{\sqrt{a+b}} + 2(a-2b)\operatorname{ArcTan}\left(\tanh\left(\frac{x}{2}\right)\right) + a\operatorname{sech}(x)\tanh(x)}{2a^2}$$

Antiderivative was successfully verified.

```
[In] Integrate[Sech[x]^3/(a + b*Cosh[x]^2),x]
```

```
[Out] ((-2*b^(3/2)*ArcTan[(Sqrt[a + b]*Csch[x])/Sqrt[b]])/Sqrt[a + b] + 2*(a - 2*
b)*ArcTan[Tanh[x/2]] + a*Sech[x]*Tanh[x])/(2*a^2)
```

Maple [B] Leaf count of result is larger than twice the leaf count of optimal. 122 vs. $2(47) = 94$.
time = 0.82, size = 123, normalized size = 2.08

method	result
default	$\frac{2\left(\frac{-\frac{a\left(\tanh^3\left(\frac{x}{2}\right)\right)}{2}+\frac{a\tanh\left(\frac{x}{2}\right)}{2}}{\left(\tanh^2\left(\frac{x}{2}\right)+1\right)^2}+(-2b+a)\arctan\left(\tanh\left(\frac{x}{2}\right)\right)\right)}{a^2}+\frac{2b^2\left(\frac{\arctan\left(\frac{2\sqrt{a+b}\,\tanh\left(\frac{x}{2}\right)+2\sqrt{a}}{2\sqrt{b}}\right)}{2\sqrt{a+b}\,\sqrt{b}}+\frac{\arctan\left(\frac{2\sqrt{a+b}}{2}\right.}{2\sqrt{a+}}\right.}{a^2}$
risch	$\frac{e^x\left(e^{2x}-1\right)}{\left(1+e^{2x}\right)^2 a}-\frac{ib\ln\left(e^x+i\right)}{a^2}+\frac{i\ln\left(e^x+i\right)}{2a}+\frac{ib\ln\left(e^x-i\right)}{a^2}-\frac{i\ln\left(e^x-i\right)}{2a}+\frac{\sqrt{-b\,(a+b)}\;b\ln\left(e^{2x}+\frac{2\sqrt{-b\,(a+b)}\;e^x}{b}-1\right.}{2(a+b)a^2}$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(sech(x)^3/(a+b*cosh(x)^2),x,method=_RETURNVERBOSE)
```

```
[Out] 2/a^2*((-1/2*a*tanh(1/2*x)^3+1/2*a*tanh(1/2*x))/(tanh(1/2*x)^2+1)^2+1/2*(-2
*b+a)*arctan(tanh(1/2*x)))+2*b^2/a^2*(1/2/(a+b)^(1/2)/b^(1/2)*arctan(1/2*(2
*(a+b)^(1/2)*tanh(1/2*x)+2*a^(1/2))/b^(1/2))+1/2/(a+b)^(1/2)/b^(1/2)*arctan
(1/2*(2*(a+b)^(1/2)*tanh(1/2*x)-2*a^(1/2))/b^(1/2)))
```

Maxima [F]
time = 0.00, size = 0, normalized size = 0.00

Failed to integrate

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(sech(x)^3/(a+b*cosh(x)^2),x, algorithm="maxima")
```

```
[Out] (e^(3*x) - e^x)/(a*e^(4*x) + 2*a*e^(2*x) + a) + (a - 2*b)*arctan(e^x)/a^2 +
 8*integrate(1/4*(b^2*e^(3*x) + b^2*e^x)/(a^2*b*e^(4*x) + a^2*b + 2*(2*a^3
+ a^2*b)*e^(2*x)), x)
```

Fricas [B] Leaf count of result is larger than twice the leaf count of optimal. 444 vs. $2(47) = 94$.
time = 0.42, size = 963, normalized size = 16.32

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] [1/2*(2*a*cosh(x)^3 + 6*a*cosh(x)*sinh(x)^2 + 2*a*sinh(x)^3 + (b*cosh(x)^4
+ 4*b*cosh(x)*sinh(x)^3 + b*sinh(x)^4 + 2*b*cosh(x)^2 + 2*(3*b*cosh(x)^2 +
```

```
b)*sinh(x)^2 + 4*(b*cosh(x)^3 + b*cosh(x))*sinh(x) + b)*sqrt(-b/(a + b))*lo
g((b*cosh(x)^4 + 4*b*cosh(x)*sinh(x)^3 + b*sinh(x)^4 - 2*(2*a + 3*b)*cosh(x
)^2 + 2*(3*b*cosh(x)^2 - 2*a - 3*b)*sinh(x)^2 + 4*(b*cosh(x)^3 - (2*a + 3*b
)*cosh(x))*sinh(x) + 4*((a + b)*cosh(x)^3 + 3*(a + b)*cosh(x)*sinh(x)^2 + (
a + b)*sinh(x)^3 - (a + b)*cosh(x) + (3*(a + b)*cosh(x)^2 - a - b)*sinh(x))
*sqrt(-b/(a + b)) + b)/(b*cosh(x)^4 + 4*b*cosh(x)*sinh(x)^3 + b*sinh(x)^4 +
 2*(2*a + b)*cosh(x)^2 + 2*(3*b*cosh(x)^2 + 2*a + b)*sinh(x)^2 + 4*(b*cosh(
x)^3 + (2*a + b)*cosh(x))*sinh(x) + b)) + 2*((a - 2*b)*cosh(x)^4 + 4*(a - 2
*b)*cosh(x)*sinh(x)^3 + (a - 2*b)*sinh(x)^4 + 2*(a - 2*b)*cosh(x)^2 + 2*(3*
(a - 2*b)*cosh(x)^2 + a - 2*b)*sinh(x)^2 + 4*((a - 2*b)*cosh(x)^3 + (a - 2*
b)*cosh(x))*sinh(x) + a - 2*b)*arctan(cosh(x) + sinh(x)) - 2*a*cosh(x) + 2*
(3*a*cosh(x)^2 - a)*sinh(x))/(a^2*cosh(x)^4 + 4*a^2*cosh(x)*sinh(x)^3 + a^2
*sinh(x)^4 + 2*a^2*cosh(x)^2 + 2*(3*a^2*cosh(x)^2 + a^2)*sinh(x)^2 + a^2 +
4*(a^2*cosh(x)^3 + a^2*cosh(x))*sinh(x)), (a*cosh(x)^3 + 3*a*cosh(x)*sinh(x
)^2 + a*sinh(x)^3 + (b*cosh(x)^4 + 4*b*cosh(x)*sinh(x)^3 + b*sinh(x)^4 + 2*
b*cosh(x)^2 + 2*(3*b*cosh(x)^2 + b)*sinh(x)^2 + 4*(b*cosh(x)^3 + b*cosh(x))
*sinh(x) + b)*sqrt(b/(a + b))*arctan(1/2*sqrt(b/(a + b))*(cosh(x) + sinh(x)
)) + (b*cosh(x)^4 + 4*b*cosh(x)*sinh(x)^3 + b*sinh(x)^4 + 2*b*cosh(x)^2 + 2
*(3*b*cosh(x)^2 + b)*sinh(x)^2 + 4*(b*cosh(x)^3 + b*cosh(x))*sinh(x) + b)*s
qrt(b/(a + b))*arctan(1/2*(b*cosh(x)^3 + 3*b*cosh(x)*sinh(x)^2 + b*sinh(x)^
3 + (4*a + 3*b)*cosh(x) + (3*b*cosh(x)^2 + 4*a + 3*b)*sinh(x))*sqrt(b/(a +
b))/b) + ((a - 2*b)*cosh(x)^4 + 4*(a - 2*b)*cosh(x)*sinh(x)^3 + (a - 2*b)*s
inh(x)^4 + 2*(a - 2*b)*cosh(x)^2 + 2*(3*(a - 2*b)*cosh(x)^2 + a - 2*b)*sinh
(x)^2 + 4*((a - 2*b)*cosh(x)^3 + (a - 2*b)*cosh(x))*sinh(x) + a - 2*b)*arct
an(cosh(x) + sinh(x)) - a*cosh(x) + (3*a*cosh(x)^2 - a)*sinh(x))/(a^2*cosh(
x)^4 + 4*a^2*cosh(x)*sinh(x)^3 + a^2*sinh(x)^4 + 2*a^2*cosh(x)^2 + 2*(3*a^2
*cosh(x)^2 + a^2)*sinh(x)^2 + a^2 + 4*(a^2*cosh(x)^3 + a^2*cosh(x))*sinh(x)
)]
```

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

$$\int \frac{\operatorname{sech}^3(x)}{a + b\cosh^2(x)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(sech(x)**3/(a+b*cosh(x)**2),x)
```

```
[Out] Integral(sech(x)**3/(a + b*cosh(x)**2), x)
```

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(sech(x)^3/(a+b*cosh(x)^2),x, algorithm="giac")
```

```
[Out] Exception raised: TypeError >> An error occurred running a Giac command:INP
UT:sage2:=int(sage0,sageVARx):;OUTPUT:Warning, need to choose a branch for
the root of a polynomial with parameters. This might be wrong.The choice wa
s done
```

Mupad [B]
time = 1.56, size = 447, normalized size = 7.58

$$\frac{\mathrm{atan}\left(\frac{{\mathrm{e}}^x\,\left(a^7\,{\left(a^4\right)}^{3/2}-12\,b^3\,{\left(a^4\right)}^{5/2}-18\,b^7\,{\left(a^4\right)}^{3/2}+36\,a^2\,b^5\,{\left(a^4\right)}^{3/2}-30\,a^3\,b^4\,{\left(a^4\right)}^{3/2}+21\,a^5\,b^2\,{\left(a^4\right)}^{3/2}+9\,a\,b^6\,{\left(a^4\right)}^{3/2}-8\,a^6\,b\,{\left(a^4\right)}^{3/2}\right)}{a^{12}\,\sqrt{a^2-4\,a\,b+4\,b^2}-6\,a^{11}\,b\,\sqrt{a^2-4\,a\,b+4\,b^2}+9\,a^6\,b^6\,\sqrt{a^2-4\,a\,b+4\,b^2}-18\,a^8\,b^4\,\sqrt{a^2-4\,a\,b+4\,b^2}+6\,a^9\,b^3\,\sqrt{a^2-4\,a\,b+4\,b^2}+9\,a^{10}\,b^2\,\sqrt{a^2-4\,a\,b+4\,b^2}}\right)\,\sqrt{a^2-4\,a\,b+4\,b^2}}{\sqrt{a^4}}-\frac{2\,{\mathrm{e}}^x}{a\,\left(2\,{\mathrm{e}}^{2\,x}+{\mathrm{e}}^{4\,x}+1\right)}+\frac{{\mathrm{e}}^x}{a\,\left({\mathrm{e}}^{2\,x}+1\right)}-\frac{{\left(-b\right)}^{3/2}\,\ln\left(\frac{64\,\left({\mathrm{e}}^{2\,x}-1\right)\,\left(a^3-3\,a^2\,b+3\,b^3\right)}{a^5\,{\left(a+b\right)}^2}-\frac{128\,{\mathrm{e}}^x\,\left(a^3-3\,a^2\,b+3\,b^3\right)}{a^5\,\sqrt{-b}\,{\left(a+b\right)}^{3/2}}\right)}{2\,a^2\,\sqrt{a+b}}+\frac{{\left(-b\right)}^{3/2}\,\ln\left(\frac{64\,\left({\mathrm{e}}^{2\,x}-1\right)\,\left(a^3-3\,a^2\,b+3\,b^3\right)}{a^5\,{\left(a+b\right)}^2}+\frac{128\,{\mathrm{e}}^x\,\left(a^3-3\,a^2\,b+3\,b^3\right)}{a^5\,\sqrt{-b}\,{\left(a+b\right)}^{3/2}}\right)}{2\,a^2\,\sqrt{a+b}}$$

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] (atan((exp(x)*(a^7*(a^4)^(3/2) - 12*b^3*(a^4)^(5/2) - 18*b^7*(a^4)^(3/2) +
36*a^2*b^5*(a^4)^(3/2) - 30*a^3*b^4*(a^4)^(3/2) + 21*a^5*b^2*(a^4)^(3/2) +
9*a*b^6*(a^4)^(3/2) - 8*a^6*b*(a^4)^(3/2)))/(a^12*(a^2 - 4*a*b + 4*b^2)^(1/
2) - 6*a^11*b*(a^2 - 4*a*b + 4*b^2)^(1/2) + 9*a^6*b^6*(a^2 - 4*a*b + 4*b^2)
^(1/2) - 18*a^8*b^4*(a^2 - 4*a*b + 4*b^2)^(1/2) + 6*a^9*b^3*(a^2 - 4*a*b +
4*b^2)^(1/2) + 9*a^10*b^2*(a^2 - 4*a*b + 4*b^2)^(1/2)))*(a^2 - 4*a*b + 4*b^
2)^(1/2))/(a^4)^(1/2) - (2*exp(x))/(a*(2*exp(2*x) + exp(4*x) + 1)) + exp(x)
/(a*(exp(2*x) + 1)) - ((-b)^(3/2)*log((64*(exp(2*x) - 1)*(a^3 - 3*a^2*b + 3
*b^3))/(a^5*(a + b)^2) - (128*exp(x)*(a^3 - 3*a^2*b + 3*b^3))/(a^5*(-b)^(1/
2)*(a + b)^(3/2))))/(2*a^2*(a + b)^(1/2)) + ((-b)^(3/2)*log((64*(exp(2*x) -
 1)*(a^3 - 3*a^2*b + 3*b^3))/(a^5*(a + b)^2) + (128*exp(x)*(a^3 - 3*a^2*b +
 3*b^3))/(a^5*(-b)^(1/2)*(a + b)^(3/2))))/(2*a^2*(a + b)^(1/2))
```

3.31 $\int \frac{\operatorname{sech}^4(x)}{a+b\cosh^2(x)}\,dx$

Optimal. Leaf size=55

$$\frac{b^2\tanh^{-1}\left(\frac{\sqrt{a}\tanh(x)}{\sqrt{a+b}}\right)}{a^{5/2}\sqrt{a+b}}+\frac{(a-b)\tanh(x)}{a^2}-\frac{\tanh^3(x)}{3a}$$

```
[Out] b^2*arctanh(a^(1/2)*tanh(x)/(a+b)^(1/2))/a^(5/2)/(a+b)^(1/2)+(a-b)*tanh(x)/
a^2-1/3*tanh(x)^3/a
```

Rubi [A]
time = 0.07, antiderivative size = 55, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 3, integrand size = 15, $\frac{\text{number of rules}}{\text{integrand size}} = 0.200$, Rules used = {3266, 472, 214}

$$\frac{b^2\tanh^{-1}\left(\frac{\sqrt{a}\tanh(x)}{\sqrt{a+b}}\right)}{a^{5/2}\sqrt{a+b}}+\frac{(a-b)\tanh(x)}{a^2}-\frac{\tanh^3(x)}{3a}$$

Antiderivative was successfully verified.

```
[In] Int[Sech[x]^4/(a + b*Cosh[x]^2),x]
```

```
[Out] (b^2*ArcTanh[(Sqrt[a]*Tanh[x])/Sqrt[a + b]])/(a^(5/2)*Sqrt[a + b]) + ((a -
b)*Tanh[x])/a^2 - Tanh[x]^3/(3*a)
```

Rule 214

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

Rule 472

```
Int[(((e_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_))/((c_) + (d_.)*(x_)^(
n_)), x_Symbol] :> Int[ExpandIntegrand[(e*x)^m*((a + b*x^n)^p/(c + d*x^n)),
 x], x] /; FreeQ[{a, b, c, d, e, m}, x] && NeQ[b*c - a*d, 0] && IGtQ[n, 0]
&& IGtQ[p, 0] && (IntegerQ[m] || IGtQ[2*(m + 1), 0] ||  !RationalQ[m])
```

Rule 3266

```
Int[sin[(e_.) + (f_.)*(x_)]^(m_)*((a_) + (b_.)*sin[(e_.) + (f_.)*(x_)]^2)^(
p_.), x_Symbol] :> With[{ff = FreeFactors[Tan[e + f*x], x]}, Dist[ff^(m + 1
)/f, Subst[Int[x^m*((a + (a + b)*ff^2*x^2)^p/(1 + ff^2*x^2)^(m/2 + p + 1)),
 x], x, Tan[e + f*x]/ff], x]] /; FreeQ[{a, b, e, f}, x] && IntegerQ[m/2] &&
 IntegerQ[p]
```

Rubi steps

$$\begin{aligned}\int \frac{\operatorname{sech}^4(x)}{a+b\cosh^2(x)}\,dx &= \text{Subst}\left(\int \frac{(1-x^2)^2}{x^4\,(a-(a+b)x^2)}\,dx,x,\coth(x)\right)\\ &= \text{Subst}\left(\int \left(\frac{1}{ax^4}+\frac{-a+b}{a^2x^2}+\frac{b^2}{a^2\,(a-(a+b)x^2)}\right)dx,x,\coth(x)\right)\\ &= \frac{(a-b)\tanh(x)}{a^2}-\frac{\tanh^3(x)}{3a}+\frac{b^2\text{Subst}\left(\int \frac{1}{a-(a+b)x^2}\,dx,x,\coth(x)\right)}{a^2}\\ &= \frac{b^2\tanh^{-1}\left(\frac{\sqrt{a}\,\tanh(x)}{\sqrt{a+b}}\right)}{a^{5/2}\sqrt{a+b}}+\frac{(a-b)\tanh(x)}{a^2}-\frac{\tanh^3(x)}{3a}\end{aligned}$$

Mathematica [A]
time = 0.10, size = 55, normalized size = 1.00

$$\frac{b^2\tanh^{-1}\left(\frac{\sqrt{a}\,\tanh(x)}{\sqrt{a+b}}\right)}{a^{5/2}\sqrt{a+b}}+\frac{(2a-3b+a\operatorname{sech}^2(x))\tanh(x)}{3a^2}$$

Antiderivative was successfully verified.

```
[In] Integrate[Sech[x]^4/(a + b*Cosh[x]^2),x]
```

```
[Out] (b^2*ArcTanh[(Sqrt[a]*Tanh[x])/Sqrt[a + b]])/(a^(5/2)*Sqrt[a + b]) + ((2*a
- 3*b + a*Sech[x]^2)*Tanh[x])/(3*a^2)
```

Maple [B] Leaf count of result is larger than twice the leaf count of optimal. 138 vs. 2(45) = 90.
time = 0.74, size = 139, normalized size = 2.53

method	result
default	$-\frac{2b^2\left(-\frac{\ln\left(\sqrt{a+b}\,(\tanh^2(\frac{x}{2}))+2\tanh(\frac{x}{2})\sqrt{a}+\sqrt{a+b}\right)}{4\sqrt{a}\,\sqrt{a+b}}+\frac{\ln\left(\sqrt{a+b}\,(\tanh^2(\frac{x}{2}))-2\tanh(\frac{x}{2})\sqrt{a}+\sqrt{a+b}\right)}{4\sqrt{a}\,\sqrt{a+b}}\right)}{a^2}-$
risch	$-\frac{2(-3\,e^{4x}b+6\,e^{2x}a-6b\,e^{2x}+2a-3b)}{3(1+e^{2x})^3a^2}+\frac{b^2\ln\left(e^{2x}+\frac{2a\sqrt{a^2+ab}+b\sqrt{a^2+ab}-2a^2-2ab}{b\sqrt{a^2+ab}}\right)}{2\sqrt{a^2+ab}\,a^2}-\frac{b^2\ln\left(e^{2x}+\frac{2a\sqrt{a^2+ab}}{b\sqrt{}}\right.}{2\sqrt{a^2+}}$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(sech(x)^4/(a+b*cosh(x)^2),x,method=_RETURNVERBOSE)
```

```
[Out] -2*b^2/a^2*(-1/4/a^(1/2)/(a+b)^(1/2)*ln((a+b)^(1/2)*tanh(1/2*x)^2+2*tanh(1/
2*x)*a^(1/2)+(a+b)^(1/2))+1/4/a^(1/2)/(a+b)^(1/2)*ln((a+b)^(1/2)*tanh(1/2*x
)^2-2*tanh(1/2*x)*a^(1/2)+(a+b)^(1/2)))-2/a^2*((-a+b)*tanh(1/2*x)^5+(-2/3*a
+2*b)*tanh(1/2*x)^3+(-a+b)*tanh(1/2*x))/(tanh(1/2*x)^2+1)^3
```

Maxima [B] Leaf count of result is larger than twice the leaf count of optimal. 119 vs. 2(45) = 90.
time = 0.48, size = 119, normalized size = 2.16

$$-\frac{b^2 \log\left(\frac{be^{(-2x)}+2a+b-2\sqrt{(a+b)a}}{be^{(-2x)}+2a+b+2\sqrt{(a+b)a}}\right)}{2\sqrt{(a+b)a}\,a^2}+\frac{2\left(6(a-b)e^{(-2x)}-3\,be^{(-4x)}+2\,a-3\,b\right)}{3\left(3\,a^2e^{(-2x)}+3\,a^2e^{(-4x)}+a^2e^{(-6x)}+a^2\right)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(sech(x)^4/(a+b*cosh(x)^2),x, algorithm="maxima")
```

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

Fricas [B] Leaf count of result is larger than twice the leaf count of optimal. 608 vs. 2(45) = 90.
time = 0.39, size = 1377, normalized size = 25.04

Too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(sech(x)^4/(a+b*cosh(x)^2),x, algorithm="fricas")
```

```
[Out] [1/6*(12*(a^2*b + a*b^2)*cosh(x)^4 + 48*(a^2*b + a*b^2)*cosh(x)*sinh(x)^3 +
 12*(a^2*b + a*b^2)*sinh(x)^4 - 8*a^3 + 4*a^2*b + 12*a*b^2 - 24*(a^3 - a*b^
2)*cosh(x)^2 - 24*(a^3 - a*b^2 - 3*(a^2*b + a*b^2)*cosh(x)^2)*sinh(x)^2 + 3
*(b^2*cosh(x)^6 + 6*b^2*cosh(x)*sinh(x)^5 + b^2*sinh(x)^6 + 3*b^2*cosh(x)^4
 + 3*(5*b^2*cosh(x)^2 + b^2)*sinh(x)^4 + 3*b^2*cosh(x)^2 + 4*(5*b^2*cosh(x)
^3 + 3*b^2*cosh(x))*sinh(x)^3 + 3*(5*b^2*cosh(x)^4 + 6*b^2*cosh(x)^2 + b^2)
*sinh(x)^2 + b^2 + 6*(b^2*cosh(x)^5 + 2*b^2*cosh(x)^3 + b^2*cosh(x))*sinh(x
))*sqrt(a^2 + a*b)*log((b^2*cosh(x)^4 + 4*b^2*cosh(x)*sinh(x)^3 + b^2*sinh(
x)^4 + 2*(2*a*b + b^2)*cosh(x)^2 + 2*(3*b^2*cosh(x)^2 + 2*a*b + b^2)*sinh(x
)^2 + 8*a^2 + 8*a*b + b^2 + 4*(b^2*cosh(x)^3 + (2*a*b + b^2)*cosh(x))*sinh(
x) - 4*(b*cosh(x)^2 + 2*b*cosh(x)*sinh(x) + b*sinh(x)^2 + 2*a + b)*sqrt(a^2
 + a*b))/(b*cosh(x)^4 + 4*b*cosh(x)*sinh(x)^3 + b*sinh(x)^4 + 2*(2*a + b)*c
osh(x)^2 + 2*(3*b*cosh(x)^2 + 2*a + b)*sinh(x)^2 + 4*(b*cosh(x)^3 + (2*a +
b)*cosh(x))*sinh(x) + b)) + 48*((a^2*b + a*b^2)*cosh(x)^3 - (a^3 - a*b^2)*c
osh(x))*sinh(x))/((a^4 + a^3*b)*cosh(x)^6 + 6*(a^4 + a^3*b)*cosh(x)*sinh(x)
```

```
^5 + (a^4 + a^3*b)*sinh(x)^6 + 3*(a^4 + a^3*b)*cosh(x)^4 + 3*(a^4 + a^3*b +
 5*(a^4 + a^3*b)*cosh(x)^2)*sinh(x)^4 + a^4 + a^3*b + 4*(5*(a^4 + a^3*b)*co
sh(x)^3 + 3*(a^4 + a^3*b)*cosh(x))*sinh(x)^3 + 3*(a^4 + a^3*b)*cosh(x)^2 +
3*(5*(a^4 + a^3*b)*cosh(x)^4 + a^4 + a^3*b + 6*(a^4 + a^3*b)*cosh(x)^2)*sin
h(x)^2 + 6*((a^4 + a^3*b)*cosh(x)^5 + 2*(a^4 + a^3*b)*cosh(x)^3 + (a^4 + a^
3*b)*cosh(x))*sinh(x)), 1/3*(6*(a^2*b + a*b^2)*cosh(x)^4 + 24*(a^2*b + a*b^
2)*cosh(x)*sinh(x)^3 + 6*(a^2*b + a*b^2)*sinh(x)^4 - 4*a^3 + 2*a^2*b + 6*a*
b^2 - 12*(a^3 - a*b^2)*cosh(x)^2 - 12*(a^3 - a*b^2 - 3*(a^2*b + a*b^2)*cosh
(x)^2)*sinh(x)^2 + 3*(b^2*cosh(x)^6 + 6*b^2*cosh(x)*sinh(x)^5 + b^2*sinh(x)
^6 + 3*b^2*cosh(x)^4 + 3*(5*b^2*cosh(x)^2 + b^2)*sinh(x)^4 + 3*b^2*cosh(x)^
2 + 4*(5*b^2*cosh(x)^3 + 3*b^2*cosh(x))*sinh(x)^3 + 3*(5*b^2*cosh(x)^4 + 6*
b^2*cosh(x)^2 + b^2)*sinh(x)^2 + b^2 + 6*(b^2*cosh(x)^5 + 2*b^2*cosh(x)^3 +
 b^2*cosh(x))*sinh(x))*sqrt(-a^2 - a*b)*arctan(1/2*(b*cosh(x)^2 + 2*b*cosh(
x)*sinh(x) + b*sinh(x)^2 + 2*a + b)*sqrt(-a^2 - a*b)/(a^2 + a*b)) + 24*((a^
2*b + a*b^2)*cosh(x)^3 - (a^3 - a*b^2)*cosh(x))*sinh(x))/((a^4 + a^3*b)*cos
h(x)^6 + 6*(a^4 + a^3*b)*cosh(x)*sinh(x)^5 + (a^4 + a^3*b)*sinh(x)^6 + 3*(a
^4 + a^3*b)*cosh(x)^4 + 3*(a^4 + a^3*b + 5*(a^4 + a^3*b)*cosh(x)^2)*sinh(x)
^4 + a^4 + a^3*b + 4*(5*(a^4 + a^3*b)*cosh(x)^3 + 3*(a^4 + a^3*b)*cosh(x))*
sinh(x)^3 + 3*(a^4 + a^3*b)*cosh(x)^2 + 3*(5*(a^4 + a^3*b)*cosh(x)^4 + a^4
+ a^3*b + 6*(a^4 + a^3*b)*cosh(x)^2)*sinh(x)^2 + 6*((a^4 + a^3*b)*cosh(x)^5
 + 2*(a^4 + a^3*b)*cosh(x)^3 + (a^4 + a^3*b)*cosh(x))*sinh(x))]
```

Sympy [F]
time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{sech}^4(x)}{a + b\cosh^2(x)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(sech(x)**4/(a+b*cosh(x)**2),x)
```

```
[Out] Integral(sech(x)**4/(a + b*cosh(x)**2), x)
```

Giac [A]
time = 0.53, size = 87, normalized size = 1.58

$$\frac{b^2 \arctan\left(\frac{be^{(2x)}+2a+b}{2\sqrt{-a^2-ab}}\right)}{\sqrt{-a^2-ab}\,a^2} + \frac{2\left(3\,be^{(4x)} - 6\,ae^{(2x)} + 6\,be^{(2x)} - 2\,a + 3\,b\right)}{3\,a^2\left(e^{(2x)}+1\right)^3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(sech(x)^4/(a+b*cosh(x)^2),x, algorithm="giac")
```

```
[Out] b^2*arctan(1/2*(b*e^(2*x) + 2*a + b)/sqrt(-a^2 - a*b))/(sqrt(-a^2 - a*b)*a^
2) + 2/3*(3*b*e^(4*x) - 6*a*e^(2*x) + 6*b*e^(2*x) - 2*a + 3*b)/(a^2*(e^(2*x
) + 1)^3)
```

Mupad [B]
time = 1.32, size = 239, normalized size = 4.35

$$\frac{8}{3\,a\,\left(3\,{\mathrm{e}}^{2\,x}+3\,{\mathrm{e}}^{4\,x}+{\mathrm{e}}^{6\,x}+1\right)}-\frac{4}{a\,\left(2\,{\mathrm{e}}^{2\,x}+{\mathrm{e}}^{4\,x}+1\right)}+\frac{2\,b}{a^2\,\left({\mathrm{e}}^{2\,x}+1\right)}-\frac{b^2\,\ln\left(\frac{4\,b^2\,\left(2\,a\,b+8\,a^2\,{\mathrm{e}}^{2\,x}+b^2\,{\mathrm{e}}^{2\,x}+b^2+8\,a\,b\,{\mathrm{e}}^{2\,x}\right)}{a^5\,\left(a+b\right)}-\frac{8\,b^2\,\left(b+4\,a\,{\mathrm{e}}^{2\,x}+2\,b\,{\mathrm{e}}^{2\,x}\right)}{a^{9/2}\,\sqrt{a+b}}\right)}{2\,a^{5/2}\,\sqrt{a+b}}+\frac{b^2\,\ln\left(\frac{8\,b^2\,\left(b+4\,a\,{\mathrm{e}}^{2\,x}+2\,b\,{\mathrm{e}}^{2\,x}\right)}{a^{9/2}\,\sqrt{a+b}}+\frac{4\,b^2\,\left(2\,a\,b+8\,a^2\,{\mathrm{e}}^{2\,x}+b^2\,{\mathrm{e}}^{2\,x}+b^2+8\,a\,b\,{\mathrm{e}}^{2\,x}\right)}{a^5\,\left(a+b\right)}\right)}{2\,a^{5/2}\,\sqrt{a+b}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(1/(cosh(x)^4*(a + b*cosh(x)^2)),x)
```

```
[Out] 8/(3*a*(3*exp(2*x) + 3*exp(4*x) + exp(6*x) + 1)) - 4/(a*(2*exp(2*x) + exp(4
*x) + 1)) + (2*b)/(a^2*(exp(2*x) + 1)) - (b^2*log((4*b^2*(2*a*b + 8*a^2*exp
(2*x) + b^2*exp(2*x) + b^2 + 8*a*b*exp(2*x)))/(a^5*(a + b)) - (8*b^2*(b + 4
*a*exp(2*x) + 2*b*exp(2*x)))/(a^(9/2)*(a + b)^(1/2))))/(2*a^(5/2)*(a + b)^(
1/2)) + (b^2*log((8*b^2*(b + 4*a*exp(2*x) + 2*b*exp(2*x)))/(a^(9/2)*(a + b)
^(1/2)) + (4*b^2*(2*a*b + 8*a^2*exp(2*x) + b^2*exp(2*x) + b^2 + 8*a*b*exp(2
*x)))/(a^5*(a + b))))/(2*a^(5/2)*(a + b)^(1/2))
```

3.32 $\int \frac{\text{sech}^5(x)}{a+b\cosh^2(x)}\,dx$

Optimal. Leaf size=90

$$\frac{(3a^2-4ab+8b^2)\,\text{ArcTan}(\sinh(x))}{8a^3}-\frac{b^{5/2}\text{ArcTan}\left(\frac{\sqrt{b}\,\sinh(x)}{\sqrt{a+b}}\right)}{a^3\sqrt{a+b}}+\frac{(3a-4b)\text{sech}(x)\tanh(x)}{8a^2}+\frac{\text{sech}^3(x)\tanh(x)}{4a}$$

```
[Out] 1/8*(3*a^2-4*a*b+8*b^2)*arctan(sinh(x))/a^3-b^(5/2)*arctan(sinh(x)*b^(1/2)/
(a+b)^(1/2))/a^3/(a+b)^(1/2)+1/8*(3*a-4*b)*sech(x)*tanh(x)/a^2+1/4*sech(x)^
3*tanh(x)/a
```

Rubi [A]
time = 0.10, antiderivative size = 90, normalized size of antiderivative = 1.00, number of steps used = 6, number of rules used = 6, integrand size = 15, $\frac{\text{number of rules}}{\text{integrand size}}=0.400$, Rules used = {3265, 425, 541, 536, 209, 211}

$$-\frac{b^{5/2}\text{ArcTan}\left(\frac{\sqrt{b}\,\sinh(x)}{\sqrt{a+b}}\right)}{a^3\sqrt{a+b}}+\frac{(3a-4b)\tanh(x)\text{sech}(x)}{8a^2}+\frac{(3a^2-4ab+8b^2)\,\text{ArcTan}(\sinh(x))}{8a^3}+\frac{\tanh(x)\text{sech}^3(x)}{4a}$$

Antiderivative was successfully verified.

```
[In] Int[Sech[x]^5/(a + b*Cosh[x]^2),x]
```

```
[Out] ((3*a^2 - 4*a*b + 8*b^2)*ArcTan[Sinh[x]])/(8*a^3) - (b^(5/2)*ArcTan[(Sqrt[b
]*Sinh[x])/Sqrt[a + b]])/(a^3*Sqrt[a + b]) + ((3*a - 4*b)*Sech[x]*Tanh[x])/
(8*a^2) + (Sech[x]^3*Tanh[x])/(4*a)
```

Rule 209

```
Int[((a_) + (b_.)*(x_)^2)^(-1), x_Symbol] :> Simp[(1/(Rt[a, 2]*Rt[b, 2]))*A
rcTan[Rt[b, 2]*(x/Rt[a, 2])], x] /; FreeQ[{a, b}, x] && PosQ[a/b] && (GtQ[a
, 0] || GtQ[b, 0])
```

Rule 211

```
Int[((a_) + (b_.)*(x_)^2)^(-1), x_Symbol] :> Simp[(Rt[a/b, 2]/a)*ArcTan[x/R
t[a/b, 2]], x] /; FreeQ[{a, b}, x] && PosQ[a/b]
```

Rule 425

```
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[1/(a*n*(p + 1)*(b*c - a*d)), Int[(a + b*x^n)^(p + 1)*(c
+ d*x^n)^q*Simp[b*c + n*(p + 1)*(b*c - a*d) + d*b*(n*(p + q + 2) + 1)*x^n,
x], x], x] /; FreeQ[{a, b, c, d, n, q}, x] && NeQ[b*c - a*d, 0] && LtQ[p, -
```

```
1] &&  !( !IntegerQ[p] && IntegerQ[q] && LtQ[q, -1]) && IntBinomialQ[a, b,
c, d, n, p, q, x]
```

Rule 536

```
Int[((e_) + (f_.)*(x_)^(n_))/(((a_) + (b_.)*(x_)^(n_))*((c_) + (d_.)*(x_)^(
n_))), x_Symbol] :> Dist[(b*e - a*f)/(b*c - a*d), Int[1/(a + b*x^n), x], x]
 - Dist[(d*e - c*f)/(b*c - a*d), Int[1/(c + d*x^n), x], x] /; FreeQ[{a, b,
c, d, e, f, n}, x]
```

Rule 541

```
Int[((a_) + (b_.)*(x_)^(n_))^(p_)*((c_) + (d_.)*(x_)^(n_))^(q_.)*((e_) + (f
_.)*(x_)^(n_)), x_Symbol] :> Simp[(-(b*e - a*f))*x*(a + b*x^n)^(p + 1)*((c
+ d*x^n)^(q + 1)/(a*n*(b*c - a*d)*(p + 1))), x] + Dist[1/(a*n*(b*c - a*d)*(
p + 1)), Int[(a + b*x^n)^(p + 1)*(c + d*x^n)^q*Simp[c*(b*e - a*f) + e*n*(b*
c - a*d)*(p + 1) + d*(b*e - a*f)*(n*(p + q + 2) + 1)*x^n, x], x], x] /; Fre
eQ[{a, b, c, d, e, f, n, q}, x] && LtQ[p, -1]
```

Rule 3265

```
Int[sin[(e_.) + (f_.)*(x_)]^(m_.)*((a_) + (b_.)*sin[(e_.) + (f_.)*(x_)]^2)^
(p_.), x_Symbol] :> With[{ff = FreeFactors[Cos[e + f*x], x]}, Dist[-ff/f, S
ubst[Int[(1 - ff^2*x^2)^((m - 1)/2)*(a + b - b*ff^2*x^2)^p, x], x, Cos[e +
f*x]/ff], x]] /; FreeQ[{a, b, e, f, p}, x] && IntegerQ[(m - 1)/2]
```

Rubi steps

$$
\begin{aligned}
\int \frac{\operatorname{sech}^5(x)}{a+b\cosh^2(x)}\,dx &= \text{Subst}\left(\int \frac{1}{(1+x^2)^3\,(a+b+bx^2)}\,dx, x, \sinh(x)\right)\\
&= \frac{\operatorname{sech}^3(x)\tanh(x)}{4a} - \frac{\text{Subst}\left(\int \frac{-3a+b-3bx^2}{(1+x^2)^2(a+b+bx^2)}\,dx, x, \sinh(x)\right)}{4a}\\
&= \frac{(3a-4b)\operatorname{sech}(x)\tanh(x)}{8a^2} + \frac{\operatorname{sech}^3(x)\tanh(x)}{4a} + \frac{\text{Subst}\left(\int \frac{3a^2-ab+4b^2+(3a-4b)bx^2}{(1+x^2)(a+b+bx^2)}\,dx, x, \text{s}\right.}{8a^2}\\
&= \frac{(3a-4b)\operatorname{sech}(x)\tanh(x)}{8a^2} + \frac{\operatorname{sech}^3(x)\tanh(x)}{4a} - \frac{b^3\text{Subst}\left(\int \frac{1}{a+b+bx^2}\,dx, x, \sinh(x)\right)}{a^3} +\\
&= \frac{(3a^2-4ab+8b^2)\tan^{-1}(\sinh(x))}{8a^3} - \frac{b^{5/2}\tan^{-1}\left(\frac{\sqrt{b}\,\sinh(x)}{\sqrt{a+b}}\right)}{a^3\sqrt{a+b}} + \frac{(3a-4b)\operatorname{sech}(x)\tanh}{8a^2}
\end{aligned}
$$

Mathematica [A]

time = 0.21, size = 86, normalized size = 0.96

$$\frac{\frac{8b^{5/2}\operatorname{ArcTan}\left(\frac{\sqrt{a+b}\operatorname{csch}(x)}{\sqrt{b}}\right)}{\sqrt{a+b}}+2(3a^2-4ab+8b^2)\operatorname{ArcTan}\left(\tanh\left(\frac{x}{2}\right)\right)+a(3a-4b)\operatorname{sech}(x)\tanh(x)+2a^2\operatorname{sech}^3(x)\tanh(x)}{8a^3}$$

Antiderivative was successfully verified.

```
[In] Integrate[Sech[x]^5/(a + b*Cosh[x]^2),x]
```

```
[Out] ((8*b^(5/2)*ArcTan[(Sqrt[a + b]*Csch[x])/Sqrt[b]])/Sqrt[a + b] + 2*(3*a^2 -
 4*a*b + 8*b^2)*ArcTan[Tanh[x/2]] + a*(3*a - 4*b)*Sech[x]*Tanh[x] + 2*a^2*S
ech[x]^3*Tanh[x])/(8*a^3)
```

Maple [B] Leaf count of result is larger than twice the leaf count of optimal. 182 vs. 2(76) = 152.
time = 0.81, size = 183, normalized size = 2.03

method	result
default	$-\frac{2b^3\left(\frac{\arctan\left(\frac{2\sqrt{a+b}\,\tanh\left(\frac{x}{2}\right)+2\sqrt{a}}{2\sqrt{b}}\right)}{2\sqrt{a+b}\,\sqrt{b}}+\frac{\arctan\left(\frac{2\sqrt{a+b}\,\tanh\left(\frac{x}{2}\right)-2\sqrt{a}}{2\sqrt{b}}\right)}{2\sqrt{a+b}\,\sqrt{b}}\right)}{a^3}+\frac{2\left(\left(-\frac{5}{8}a^2+\frac{1}{2}ab\right)\left(\tanh^7\left(\frac{x}{2}\right)\right)+\left(\frac{3}{8}a^2+\right.\right.}{}$
risch	$\frac{e^x\left(3a\,e^{6x}-4\,e^{6x}b+11a\,e^{4x}-4\,e^{4x}b-11\,e^{2x}a+4b\,e^{2x}-3a+4b\right)}{4\left(1+e^{2x}\right)^4a^2}+\frac{3i\ln(e^x+i)}{8a}-\frac{ib\ln(e^x+i)}{2a^2}+\frac{i\ln(e^x+i)b^2}{a^3}-\frac{3i\ln(e^x-i)}{8a}+ib$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(sech(x)^5/(a+b*cosh(x)^2),x,method=_RETURNVERBOSE)
```

```
[Out] -2*b^3/a^3*(1/2/(a+b)^(1/2)/b^(1/2)*arctan(1/2*(2*(a+b)^(1/2)*tanh(1/2*x)+2
*a^(1/2))/b^(1/2))+1/2/(a+b)^(1/2)/b^(1/2)*arctan(1/2*(2*(a+b)^(1/2)*tanh(1
/2*x)-2*a^(1/2))/b^(1/2)))+2/a^3*(((-5/8*a^2+1/2*a*b)*tanh(1/2*x)^7+(3/8*a^
2+1/2*a*b)*tanh(1/2*x)^5+(-3/8*a^2-1/2*a*b)*tanh(1/2*x)^3+(5/8*a^2-1/2*a*b)
*tanh(1/2*x))/(tanh(1/2*x)^2+1)^4+1/8*(3*a^2-4*a*b+8*b^2)*arctan(tanh(1/2*x
)))
```

Maxima [F]
time = 0.00, size = 0, normalized size = 0.00

Failed to integrate

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(sech(x)^5/(a+b*cosh(x)^2),x, algorithm="maxima")
```

```
[Out] 1/4*((3*a - 4*b)*e^(7*x) + (11*a - 4*b)*e^(5*x) - (11*a - 4*b)*e^(3*x) - (3
*a - 4*b)*e^x)/(a^2*e^(8*x) + 4*a^2*e^(6*x) + 6*a^2*e^(4*x) + 4*a^2*e^(2*x)
 + a^2) + 1/4*(3*a^2 - 4*a*b + 8*b^2)*arctan(e^x)/a^3 - 32*integrate(1/16*(
b^3*e^(3*x) + b^3*e^x)/(a^3*b*e^(4*x) + a^3*b + 2*(2*a^4 + a^3*b)*e^(2*x)),
 x)
```

Fricas [B] Leaf count of result is larger than twice the leaf count of optimal. 1673 vs. $2(76) = 152$.
time = 0.46, size = 3239, normalized size = 35.99

Too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(sech(x)^5/(a+b*cosh(x)^2),x, algorithm="fricas")
```

```
[Out] [1/4*((3*a^2 - 4*a*b)*cosh(x)^7 + 7*(3*a^2 - 4*a*b)*cosh(x)*sinh(x)^6 + (3*
a^2 - 4*a*b)*sinh(x)^7 + (11*a^2 - 4*a*b)*cosh(x)^5 + (21*(3*a^2 - 4*a*b)*c
osh(x)^2 + 11*a^2 - 4*a*b)*sinh(x)^5 + 5*(7*(3*a^2 - 4*a*b)*cosh(x)^3 + (11
*a^2 - 4*a*b)*cosh(x))*sinh(x)^4 - (11*a^2 - 4*a*b)*cosh(x)^3 + (35*(3*a^2
- 4*a*b)*cosh(x)^4 + 10*(11*a^2 - 4*a*b)*cosh(x)^2 - 11*a^2 + 4*a*b)*sinh(x
)^3 + (21*(3*a^2 - 4*a*b)*cosh(x)^5 + 10*(11*a^2 - 4*a*b)*cosh(x)^3 - 3*(11
*a^2 - 4*a*b)*cosh(x))*sinh(x)^2 + 2*(b^2*cosh(x)^8 + 8*b^2*cosh(x)*sinh(x)
^7 + b^2*sinh(x)^8 + 4*b^2*cosh(x)^6 + 4*(7*b^2*cosh(x)^2 + b^2)*sinh(x)^6
+ 6*b^2*cosh(x)^4 + 8*(7*b^2*cosh(x)^3 + 3*b^2*cosh(x))*sinh(x)^5 + 2*(35*b
^2*cosh(x)^4 + 30*b^2*cosh(x)^2 + 3*b^2)*sinh(x)^4 + 4*b^2*cosh(x)^2 + 8*(7
*b^2*cosh(x)^5 + 10*b^2*cosh(x)^3 + 3*b^2*cosh(x))*sinh(x)^3 + 4*(7*b^2*cos
h(x)^6 + 15*b^2*cosh(x)^4 + 9*b^2*cosh(x)^2 + b^2)*sinh(x)^2 + b^2 + 8*(b^2
*cosh(x)^7 + 3*b^2*cosh(x)^5 + 3*b^2*cosh(x)^3 + b^2*cosh(x))*sinh(x))*sqrt
(-b/(a + b))*log((b*cosh(x)^4 + 4*b*cosh(x)*sinh(x)^3 + b*sinh(x)^4 - 2*(2*
a + 3*b)*cosh(x)^2 + 2*(3*b*cosh(x)^2 - 2*a - 3*b)*sinh(x)^2 + 4*(b*cosh(x)
^3 - (2*a + 3*b)*cosh(x))*sinh(x) - 4*((a + b)*cosh(x)^3 + 3*(a + b)*cosh(x
)*sinh(x)^2 + (a + b)*sinh(x)^3 - (a + b)*cosh(x) + (3*(a + b)*cosh(x)^2 -
a - b)*sinh(x))*sqrt(-b/(a + b)) + b)/(b*cosh(x)^4 + 4*b*cosh(x)*sinh(x)^3
+ b*sinh(x)^4 + 2*(2*a + b)*cosh(x)^2 + 2*(3*b*cosh(x)^2 + 2*a + b)*sinh(x)
^2 + 4*(b*cosh(x)^3 + (2*a + b)*cosh(x))*sinh(x) + b)) + ((3*a^2 - 4*a*b +
8*b^2)*cosh(x)^8 + 8*(3*a^2 - 4*a*b + 8*b^2)*cosh(x)*sinh(x)^7 + (3*a^2 - 4
*a*b + 8*b^2)*sinh(x)^8 + 4*(3*a^2 - 4*a*b + 8*b^2)*cosh(x)^6 + 4*(7*(3*a^2
 - 4*a*b + 8*b^2)*cosh(x)^2 + 3*a^2 - 4*a*b + 8*b^2)*sinh(x)^6 + 8*(7*(3*a^
2 - 4*a*b + 8*b^2)*cosh(x)^3 + 3*(3*a^2 - 4*a*b + 8*b^2)*cosh(x))*sinh(x)^5
 + 6*(3*a^2 - 4*a*b + 8*b^2)*cosh(x)^4 + 2*(35*(3*a^2 - 4*a*b + 8*b^2)*cosh
(x)^4 + 30*(3*a^2 - 4*a*b + 8*b^2)*cosh(x)^2 + 9*a^2 - 12*a*b + 24*b^2)*sin
h(x)^4 + 8*(7*(3*a^2 - 4*a*b + 8*b^2)*cosh(x)^5 + 10*(3*a^2 - 4*a*b + 8*b^2
)*cosh(x)^3 + 3*(3*a^2 - 4*a*b + 8*b^2)*cosh(x))*sinh(x)^3 + 4*(3*a^2 - 4*a
*b + 8*b^2)*cosh(x)^2 + 4*(7*(3*a^2 - 4*a*b + 8*b^2)*cosh(x)^6 + 15*(3*a^2
- 4*a*b + 8*b^2)*cosh(x)^4 + 9*(3*a^2 - 4*a*b + 8*b^2)*cosh(x)^2 + 3*a^2 -
```

```
4*a*b + 8*b^2)*sinh(x)^2 + 3*a^2 - 4*a*b + 8*b^2 + 8*((3*a^2 - 4*a*b + 8*b^
2)*cosh(x)^7 + 3*(3*a^2 - 4*a*b + 8*b^2)*cosh(x)^5 + 3*(3*a^2 - 4*a*b + 8*b
^2)*cosh(x)^3 + (3*a^2 - 4*a*b + 8*b^2)*cosh(x))*sinh(x))*arctan(cosh(x) +
sinh(x)) - (3*a^2 - 4*a*b)*cosh(x) + (7*(3*a^2 - 4*a*b)*cosh(x)^6 + 5*(11*a
^2 - 4*a*b)*cosh(x)^4 - 3*(11*a^2 - 4*a*b)*cosh(x)^2 - 3*a^2 + 4*a*b)*sinh(
x))/(a^3*cosh(x)^8 + 8*a^3*cosh(x)*sinh(x)^7 + a^3*sinh(x)^8 + 4*a^3*cosh(x
)^6 + 6*a^3*cosh(x)^4 + 4*(7*a^3*cosh(x)^2 + a^3)*sinh(x)^6 + 8*(7*a^3*cosh
(x)^3 + 3*a^3*cosh(x))*sinh(x)^5 + 4*a^3*cosh(x)^2 + 2*(35*a^3*cosh(x)^4 +
30*a^3*cosh(x)^2 + 3*a^3)*sinh(x)^4 + 8*(7*a^3*cosh(x)^5 + 10*a^3*cosh(x)^3
 + 3*a^3*cosh(x))*sinh(x)^3 + a^3 + 4*(7*a^3*cosh(x)^6 + 15*a^3*cosh(x)^4 +
 9*a^3*cosh(x)^2 + a^3)*sinh(x)^2 + 8*(a^3*cosh(x)^7 + 3*a^3*cosh(x)^5 + 3*
a^3*cosh(x)^3 + a^3*cosh(x))*sinh(x)), 1/4*((3*a^2 - 4*a*b)*cosh(x)^7 + 7*(
3*a^2 - 4*a*b)*cosh(x)*sinh(x)^6 + (3*a^2 - 4*a*b)*sinh(x)^7 + (11*a^2 - 4*
a*b)*cosh(x)^5 + (21*(3*a^2 - 4*a*b)*cosh(x)^2 + 11*a^2 - 4*a*b)*sinh(x)^5
+ 5*(7*(3*a^2 - 4*a*b)*cosh(x)^3 + (11*a^2 - 4*a*b)*cosh(x))*sinh(x)^4 - (1
1*a^2 - 4*a*b)*cosh(x)^3 + (35*(3*a^2 - 4*a*b)*cosh(x)^4 + 10*(11*a^2 - 4*a
*b)*cosh(x)^2 - 11*a^2 + 4*a*b)*sinh(x)^3 + (21*(3*a^2 - 4*a*b)*cosh(x)^5 +
 10*(11*a^2 - 4*a*b)*cosh(x)^3 - 3*(11*a^2 - 4*a*b)*cosh(x))*sinh(x)^2 - 4*
(b^2*cosh(x)^8 + 8*b^2*cosh(x)*sinh(x)^7 + b^2*sinh(x)^8 + 4*b^2*cosh(x)^6
+ 4*(7*b^2*cosh(x)^2 + b^2)*sinh(x)^6 + 6*b^2*cosh(x)^4 + 8*(7*b^2*cosh(x)^
3 + 3*b^2*cosh(x))*sinh(x)^5 + 2*(35*b^2*cosh(x)^4 + 30*b^2*cosh(x)^2 + 3*b
^2)*sinh(x)^4 + 4*b^2*cosh(x)^2 + 8*(7*b^2*cosh(x)^5 + 10*b^2*cosh(x)^3 + 3
*b^2*cosh(x))*sinh(x)^3 + 4*(7*b^2*cosh(x)^6 + 15*b^2*cosh(x)^4 + 9*b^2*cos
h(x)^2 + b^2)*sinh(x)^2 + b^2 + 8*(b^2*cosh(x)^7 + 3*b^2*cosh(x)^5 + 3*b^2*
cosh(x)^3 + b^2*cosh(x))*sinh(x))*sqrt(b/(a + b))*arctan(1/2*sqrt(b/(a + b)
)*(cosh(x) + sinh(x))) - 4*(b^2*cosh(x)^8 + 8*b^2*cosh(x)*sinh(x)^7 + b^2*s
inh(x)^8 + 4*b^2*cosh(x)^6 + 4*(7*b^2*cosh(x)^2 + b^2)*sinh(x)^6 + 6*b^2*co
sh(x)^4 + 8*(7*b^2*cosh(x)^3 + 3*b^2*cosh(x))*sinh(x)^5 + 2*(35*b^2*cosh(x)
^4 + 30*b^2*cosh(x)^2 + 3*b^2)*sinh(x)^4 + 4*b^2*cosh(x)^2 + 8*(7*b^2*cosh(
x)^5 + 10*b^2*cosh(x)^3 + 3*b^2*cosh(x))*sinh(x)^3 + 4*(7*b^2*cosh(x)^6 + 1
5*b^2*cosh(x)^4 + 9*b^2*cosh(x)^2 + b^2)*sinh(x)^2 + b^2 + 8*(b^2*cosh(x)^7
 + 3*b^2*cosh(x)^5 + 3*b^2*cosh(x)^3 + b^2*cosh(x))*sinh(x))*sqrt(b/(a + b)
)*arctan(1/2*(b*cosh(x)^3 + 3*b*cosh(x)*sinh(x)^2 + b*sinh(x)^3 + (4*a + 3*
b)*cosh(x) + (3*b*cosh(x)^2 + 4*a + 3*b)*sinh(x))*sqrt(b/(a + b))/b) + ((3*
a^2 - 4*a*b + 8*b^2)*cosh(x)^8 + 8*(3*a^2 - 4*a*b + 8*b^2)*cosh(x)*sinh(x)^
7 + (3*a^2 - 4*a*b + 8*b^2)*sinh(x)^8 + 4*(3*a^2 - 4*a*b + 8*b^2)*cosh(x)^6
 + 4*(7*(3*a^2 - 4*a*b + 8*b^2)*cosh(x)^2 + 3*a...
```

Sympy [F]
time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\operatorname{sech}^5(x)}{a+b\cosh^2(x)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(sech(x)**5/(a+b*cosh(x)**2),x)
```

```
[Out] Integral(sech(x)**5/(a + b*cosh(x)**2), x)
```

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(sech(x)^5/(a+b*cosh(x)^2),x, algorithm="giac")
```

```
[Out] Exception raised: TypeError >> An error occurred running a Giac command:INP
UT:sage2:=int(sage0,sageVARx):;OUTPUT:Warning, need to choose a branch for
the root of a polynomial with parameters. This might be wrong.The choice wa
s done
```

Mupad [**B**]
time = 36.10, size = 1305, normalized size = 14.50

[illegible]

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(1/(cosh(x)^5*(a + b*cosh(x)^2)),x)
```

```
[Out] (atan((exp(x)*(243*a^12*(a^6)^(1/2) + 5024*b^6*(a^6)^(3/2) + 18432*b^12*(a^
6)^(1/2) + 6912*a^2*b^10*(a^6)^(1/2) + 30720*a^3*b^9*(a^6)^(1/2) - 26880*a^
4*b^8*(a^6)^(1/2) + 24192*a^5*b^7*(a^6)^(1/2) - 13408*a^7*b^5*(a^6)^(1/2) +
 17160*a^8*b^4*(a^6)^(1/2) - 9540*a^9*b^3*(a^6)^(1/2) + 4563*a^10*b^2*(a^6)
^(1/2) - 9216*a*b^11*(a^6)^(1/2) - 1134*a^11*b*(a^6)^(1/2)))/(81*a^13*(9*a^
4 - 24*a^3*b - 64*a*b^3 + 64*b^4 + 64*a^2*b^2)^(1/2) - 270*a^12*b*(9*a^4 -
24*a^3*b - 64*a*b^3 + 64*b^4 + 64*a^2*b^2)^(1/2) + 2304*a^3*b^10*(9*a^4 - 2
4*a^3*b - 64*a*b^3 + 64*b^4 + 64*a^2*b^2)^(1/2) + 3840*a^6*b^7*(9*a^4 - 24*
a^3*b - 64*a*b^3 + 64*b^4 + 64*a^2*b^2)^(1/2) - 1440*a^7*b^6*(9*a^4 - 24*a^
3*b - 64*a*b^3 + 64*b^4 + 64*a^2*b^2)^(1/2) + 864*a^8*b^5*(9*a^4 - 24*a^3*b
 - 64*a*b^3 + 64*b^4 + 64*a^2*b^2)^(1/2) + 1600*a^9*b^4*(9*a^4 - 24*a^3*b -
 64*a*b^3 + 64*b^4 + 64*a^2*b^2)^(1/2) - 1200*a^10*b^3*(9*a^4 - 24*a^3*b -
64*a*b^3 + 64*b^4 + 64*a^2*b^2)^(1/2) + 945*a^11*b^2*(9*a^4 - 24*a^3*b - 64
*a*b^3 + 64*b^4 + 64*a^2*b^2)^(1/2)))*(9*a^4 - 24*a^3*b - 64*a*b^3 + 64*b^4
 + 64*a^2*b^2)^(1/2))/(4*(a^6)^(1/2)) - (6*exp(x))/(a*(3*exp(2*x) + 3*exp(4
*x) + exp(6*x) + 1)) + ((b^5)^(1/2)*(2*atan((exp(x)*((2*(48*b^8*(a^6*b + a^
7)^(1/2) + 40*a^3*b^5*(a^6*b + a^7)^(1/2) - 15*a^4*b^4*(a^6*b + a^7)^(1/2)
+ 9*a^5*b^3*(a^6*b + a^7)^(1/2)))/(a^11*b*(a + b)*(a*b + a^2)*(a^6*b + a^7)
^(1/2)*(b^5)^(1/2)*(48*a*b^5 - 6*a^5*b + 9*a^6 + 48*b^6 + 40*a^3*b^3 + 25*a
^4*b^2)) - (4*(96*a^4*(b^5)^(3/2) + 18*a^9*(b^5)^(1/2) + 80*a^6*b^3*(b^5)^(
1/2) + 50*a^7*b^2*(b^5)^(1/2) + 96*a^3*b*(b^5)^(3/2) - 12*a^8*b*(b^5)^(1/2)
```

```
))/(a^8*b^4*(a + b)*(a*b + a^2)*(a^6*(a + b))^(1/2)*(a^6*b + a^7)^(1/2)*(9*
a^5 - 15*a^4*b + 48*b^5 + 40*a^3*b^2))) - (2*exp(3*x)*(48*b^8*(a^6*b + a^7)
^(1/2) + 40*a^3*b^5*(a^6*b + a^7)^(1/2) - 15*a^4*b^4*(a^6*b + a^7)^(1/2) +
9*a^5*b^3*(a^6*b + a^7)^(1/2)))/(a^11*b*(a + b)*(a*b + a^2)*(a^6*b + a^7)^(
1/2)*(b^5)^(1/2)*(48*a*b^5 - 6*a^5*b + 9*a^6 + 48*b^6 + 40*a^3*b^3 + 25*a^4
*b^2)))*((a^11*b*(a^6*b + a^7)^(1/2))/4 + (a^9*b^3*(a^6*b + a^7)^(1/2))/4 +
 (a^10*b^2*(a^6*b + a^7)^(1/2))/2)) - 2*atan((b^3*exp(x)*(a^6*(a + b))^(1/2
)*(9*a^5 - 15*a^4*b + 48*b^5 + 40*a^3*b^2))/(2*a^3*(b^5)^(1/2)*(48*a*b^5 -
6*a^5*b + 9*a^6 + 48*b^6 + 40*a^3*b^3 + 25*a^4*b^2)))))/(2*(a^6*b + a^7)^(1
/2)) + (4*exp(x))/(a*(4*exp(2*x) + 6*exp(4*x) + 4*exp(6*x) + exp(8*x) + 1))
 + (exp(x)*(a + 4*b))/(2*a^2*(2*exp(2*x) + exp(4*x) + 1)) - (exp(x)*(4*a*b
- 3*a^2))/(4*a^3*(exp(2*x) + 1))
```

3.33 $\int \frac{1}{(a+b\cosh^2(x))^2}\,dx$

Optimal. Leaf size=65

$$\frac{(2a+b)\tanh^{-1}\left(\frac{\sqrt{a}\tanh(x)}{\sqrt{a+b}}\right)}{2a^{3/2}(a+b)^{3/2}}-\frac{b\cosh(x)\sinh(x)}{2a(a+b)\left(a+b\cosh^2(x)\right)}$$

```
[Out] 1/2*(2*a+b)*arctanh(a^(1/2)*tanh(x)/(a+b)^(1/2))/a^(3/2)/(a+b)^(3/2)-1/2*b*
cosh(x)*sinh(x)/a/(a+b)/(a+b*cosh(x)^2)
```

Rubi [A]
time = 0.04, antiderivative size = 65, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 4, integrand size = 10, $\frac{\text{number of rules}}{\text{integrand size}} = 0.400$, Rules used = {3263, 12, 3260, 214}

$$\frac{(2a+b)\tanh^{-1}\left(\frac{\sqrt{a}\tanh(x)}{\sqrt{a+b}}\right)}{2a^{3/2}(a+b)^{3/2}}-\frac{b\sinh(x)\cosh(x)}{2a(a+b)\left(a+b\cosh^2(x)\right)}$$

Antiderivative was successfully verified.

```
[In] Int[(a + b*Cosh[x]^2)^(-2),x]
```

```
[Out] ((2*a + b)*ArcTanh[(Sqrt[a]*Tanh[x])/Sqrt[a + b]])/(2*a^(3/2)*(a + b)^(3/2)
) - (b*Cosh[x]*Sinh[x])/(2*a*(a + b)*(a + b*Cosh[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 214

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

Rule 3260

```
Int[((a_) + (b_.)*sin[(e_.) + (f_.)*(x_)]^2)^(-1), x_Symbol] :> With[{ff =
FreeFactors[Tan[e + f*x], x]}, Dist[ff/f, Subst[Int[1/(a + (a + b)*ff^2*x^2
), x], x, Tan[e + f*x]/ff], x]] /; FreeQ[{a, b, e, f}, x]
```

Rule 3263

```
Int[((a_) + (b_.)*sin[(e_.) + (f_.)*(x_)]^2)^(p_), x_Symbol] :> Simp[(-b)*C
os[e + f*x]*Sin[e + f*x]*((a + b*Sin[e + f*x]^2)^(p + 1)/(2*a*f*(p + 1)*(a
```

```
+ b))), x] + Dist[1/(2*a*(p + 1)*(a + b)), Int[(a + b*Sin[e + f*x]^2)^(p +
1)*Simp[2*a*(p + 1) + b*(2*p + 3) - 2*b*(p + 2)*Sin[e + f*x]^2, x], x], x]
/; FreeQ[{a, b, e, f}, x] && NeQ[a + b, 0] && LtQ[p, -1]
```

Rubi steps

$$
\begin{aligned}
\int \frac{1}{\left(a+b\cosh^2(x)\right)^2}\,dx &= -\frac{b\cosh(x)\sinh(x)}{2a(a+b)\left(a+b\cosh^2(x)\right)}-\frac{\int \frac{-2a-b}{a+b\cosh^2(x)}\,dx}{2a(a+b)}\\
&= -\frac{b\cosh(x)\sinh(x)}{2a(a+b)\left(a+b\cosh^2(x)\right)}+\frac{(2a+b)\int \frac{1}{a+b\cosh^2(x)}\,dx}{2a(a+b)}\\
&= -\frac{b\cosh(x)\sinh(x)}{2a(a+b)\left(a+b\cosh^2(x)\right)}+\frac{(2a+b)\text{Subst}\left(\int \frac{1}{a-(a+b)x^2}\,dx,x,\coth(x)\right)}{2a(a+b)}\\
&= \frac{(2a+b)\tanh^{-1}\left(\frac{\sqrt{a}\tanh(x)}{\sqrt{a+b}}\right)}{2a^{3/2}(a+b)^{3/2}}-\frac{b\cosh(x)\sinh(x)}{2a(a+b)\left(a+b\cosh^2(x)\right)}
\end{aligned}
$$

Mathematica [A]
time = 0.15, size = 68, normalized size = 1.05

$$
\frac{(2a+b)\tanh^{-1}\left(\frac{\sqrt{a}\tanh(x)}{\sqrt{a+b}}\right)}{2a^{3/2}(a+b)^{3/2}}-\frac{b\sinh(2x)}{2a(a+b)(2a+b+b\cosh(2x))}
$$

Antiderivative was successfully verified.

```
[In] Integrate[(a + b*Cosh[x]^2)^(-2),x]
```

```
[Out] ((2*a + b)*ArcTanh[(Sqrt[a]*Tanh[x])/Sqrt[a + b]])/(2*a^(3/2)*(a + b)^(3/2)
) - (b*Sinh[2*x])/(2*a*(a + b)*(2*a + b + b*Cosh[2*x]))
```

Maple [B] Leaf count of result is larger than twice the leaf count of optimal. 167 vs. $2(53) = 106$.
time = 0.53, size = 168, normalized size = 2.58

method	result
default	$-\frac{2\left(\frac{b\left(\tanh^3\left(\frac{x}{2}\right)\right)}{2a(a+b)}+\frac{b\tanh\left(\frac{x}{2}\right)}{2a(a+b)}\right)}{a\left(\tanh^4\left(\frac{x}{2}\right)\right)+b\left(\tanh^4\left(\frac{x}{2}\right)\right)-2a\left(\tanh^2\left(\frac{x}{2}\right)\right)+2b\left(\tanh^2\left(\frac{x}{2}\right)\right)+a+b}-\frac{(2a+b)\left(-\frac{\ln\left(\sqrt{a+b}\left(\tanh^2\left(\frac{x}{2}\right)\right)+2\tanh\left(\frac{x}{2}\right)\sqrt{a}+\sqrt{\right.}}{4\sqrt{a}\sqrt{a+b}}\right.}{}$

risch	$\frac{2\,e^{2x}a+b\,e^{2x}+b}{a(a+b)(e^{4x}b+4\,e^{2x}a+2b\,e^{2x}+b)}+\frac{\ln\left(e^{2x}+\frac{2a\sqrt{a^2+ab}+b\sqrt{a^2+ab}-2a^2-2ab}{b\sqrt{a^2+ab}}\right)}{2\sqrt{a^2+ab}\,(a+b)}+\frac{\ln\left(e^{2x}+\frac{2a\sqrt{a^2+ab}+b\sqrt{a^2+c}}{b\sqrt{a^2+ab}}\right.}{4\sqrt{a^2+ab}\,(a+b)a}$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(1/(a+b*cosh(x)^2)^2,x,method=_RETURNVERBOSE)
```

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

Maxima [B] Leaf count of result is larger than twice the leaf count of optimal. 134 vs. $2(53) = 106$.
time = 0.49, size = 134, normalized size = 2.06

$$-\frac{(2\,a+b)\log\left(\frac{be^{(-2\,x)}+2\,a+b-2\,\sqrt{(a+b)a}}{be^{(-2\,x)}+2\,a+b+2\,\sqrt{(a+b)a}}\right)}{4\,\sqrt{(a+b)a}\,(a^2+ab)}-\frac{(2\,a+b)e^{(-2\,x)}+b}{a^2b+ab^2+2\,(2\,a^3+3\,a^2b+ab^2)e^{(-2\,x)}+(a^2b+ab^2)e^{(-4\,x)}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(a+b*cosh(x)^2)^2,x, algorithm="maxima")
```

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

Fricas [B] Leaf count of result is larger than twice the leaf count of optimal. 539 vs. $2(53) = 106$.
time = 0.40, size = 1239, normalized size = 19.06

[illegible]

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(a+b*cosh(x)^2)^2,x, algorithm="fricas")
```

```
[Out] [1/4*(4*a^2*b + 4*a*b^2 + 4*(2*a^3 + 3*a^2*b + a*b^2)*cosh(x)^2 + 8*(2*a^3
+ 3*a^2*b + a*b^2)*cosh(x)*sinh(x) + 4*(2*a^3 + 3*a^2*b + a*b^2)*sinh(x)^2
+ ((2*a*b + b^2)*cosh(x)^4 + 4*(2*a*b + b^2)*cosh(x)*sinh(x)^3 + (2*a*b + b
^2)*sinh(x)^4 + 2*(4*a^2 + 4*a*b + b^2)*cosh(x)^2 + 2*(3*(2*a*b + b^2)*cosh
(x)^2 + 4*a^2 + 4*a*b + b^2)*sinh(x)^2 + 2*a*b + b^2 + 4*((2*a*b + b^2)*cos
h(x)^3 + (4*a^2 + 4*a*b + b^2)*cosh(x))*sinh(x))*sqrt(a^2 + a*b)*log((b^2*c
osh(x)^4 + 4*b^2*cosh(x)*sinh(x)^3 + b^2*sinh(x)^4 + 2*(2*a*b + b^2)*cosh(x
```

```
)^2 + 2*(3*b^2*cosh(x)^2 + 2*a*b + b^2)*sinh(x)^2 + 8*a^2 + 8*a*b + b^2 + 4
*(b^2*cosh(x)^3 + (2*a*b + b^2)*cosh(x))*sinh(x) - 4*(b*cosh(x)^2 + 2*b*cos
h(x)*sinh(x) + b*sinh(x)^2 + 2*a + b)*sqrt(a^2 + a*b))/(b*cosh(x)^4 + 4*b*c
osh(x)*sinh(x)^3 + b*sinh(x)^4 + 2*(2*a + b)*cosh(x)^2 + 2*(3*b*cosh(x)^2 +
 2*a + b)*sinh(x)^2 + 4*(b*cosh(x)^3 + (2*a + b)*cosh(x))*sinh(x) + b)))/(a
^4*b + 2*a^3*b^2 + a^2*b^3 + (a^4*b + 2*a^3*b^2 + a^2*b^3)*cosh(x)^4 + 4*(a
^4*b + 2*a^3*b^2 + a^2*b^3)*cosh(x)*sinh(x)^3 + (a^4*b + 2*a^3*b^2 + a^2*b^
3)*sinh(x)^4 + 2*(2*a^5 + 5*a^4*b + 4*a^3*b^2 + a^2*b^3)*cosh(x)^2 + 2*(2*a
^5 + 5*a^4*b + 4*a^3*b^2 + a^2*b^3 + 3*(a^4*b + 2*a^3*b^2 + a^2*b^3)*cosh(x
)^2)*sinh(x)^2 + 4*((a^4*b + 2*a^3*b^2 + a^2*b^3)*cosh(x)^3 + (2*a^5 + 5*a^
4*b + 4*a^3*b^2 + a^2*b^3)*cosh(x))*sinh(x)), 1/2*(2*a^2*b + 2*a*b^2 + 2*(2
*a^3 + 3*a^2*b + a*b^2)*cosh(x)^2 + 4*(2*a^3 + 3*a^2*b + a*b^2)*cosh(x)*sin
h(x) + 2*(2*a^3 + 3*a^2*b + a*b^2)*sinh(x)^2 + ((2*a*b + b^2)*cosh(x)^4 + 4
*(2*a*b + b^2)*cosh(x)*sinh(x)^3 + (2*a*b + b^2)*sinh(x)^4 + 2*(4*a^2 + 4*a
*b + b^2)*cosh(x)^2 + 2*(3*(2*a*b + b^2)*cosh(x)^2 + 4*a^2 + 4*a*b + b^2)*s
inh(x)^2 + 2*a*b + b^2 + 4*((2*a*b + b^2)*cosh(x)^3 + (4*a^2 + 4*a*b + b^2)
*cosh(x))*sinh(x))*sqrt(-a^2 - a*b)*arctan(1/2*(b*cosh(x)^2 + 2*b*cosh(x)*s
inh(x) + b*sinh(x)^2 + 2*a + b)*sqrt(-a^2 - a*b)/(a^2 + a*b)))/(a^4*b + 2*a
^3*b^2 + a^2*b^3 + (a^4*b + 2*a^3*b^2 + a^2*b^3)*cosh(x)^4 + 4*(a^4*b + 2*a
^3*b^2 + a^2*b^3)*cosh(x)*sinh(x)^3 + (a^4*b + 2*a^3*b^2 + a^2*b^3)*sinh(x)
^4 + 2*(2*a^5 + 5*a^4*b + 4*a^3*b^2 + a^2*b^3)*cosh(x)^2 + 2*(2*a^5 + 5*a^4
*b + 4*a^3*b^2 + a^2*b^3 + 3*(a^4*b + 2*a^3*b^2 + a^2*b^3)*cosh(x)^2)*sinh(
x)^2 + 4*((a^4*b + 2*a^3*b^2 + a^2*b^3)*cosh(x)^3 + (2*a^5 + 5*a^4*b + 4*a^
3*b^2 + a^2*b^3)*cosh(x))*sinh(x))]
```

Sympy [**F(-1)**] Timed out
time = 0.00, size = 0, normalized size = 0.00

Timed out

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(a+b*cosh(x)**2)**2,x)
```

```
[Out] Timed out
```

Giac [**A**]
time = 0.42, size = 104, normalized size = 1.60

$$\frac{(2\,a+b)\arctan\left(\frac{be^{(2\,x)}+2\,a+b}{2\,\sqrt{-a^2-ab}}\right)}{2\,(a^2+ab)\sqrt{-a^2-ab}}+\frac{2\,ae^{(2\,x)}+be^{(2\,x)}+b}{(a^2+ab)(be^{(4\,x)}+4\,ae^{(2\,x)}+2\,be^{(2\,x)}+b)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(a+b*cosh(x)^2)^2,x, algorithm="giac")
```

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

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

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

Verification of antiderivative is not currently implemented for this CAS.

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

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

3.34 $\int \frac{1}{(a+b\cosh^2(x))^3}\,dx$

Optimal. Leaf size=107

$$\frac{(8a^2+8ab+3b^2)\tanh^{-1}\left(\frac{\sqrt{a}\tanh(x)}{\sqrt{a+b}}\right)}{8a^{5/2}(a+b)^{5/2}}-\frac{b\cosh(x)\sinh(x)}{4a(a+b)\left(a+b\cosh^2(x)\right)^2}-\frac{3b(2a+b)\cosh(x)\sinh(x)}{8a^2(a+b)^2\left(a+b\cosh^2(x)\right)}$$

```
[Out] 1/8*(8*a^2+8*a*b+3*b^2)*arctanh(a^(1/2)*tanh(x)/(a+b)^(1/2))/a^(5/2)/(a+b)^
(5/2)-1/4*b*cosh(x)*sinh(x)/a/(a+b)/(a+b*cosh(x)^2)^2-3/8*b*(2*a+b)*cosh(x)
*sinh(x)/a^2/(a+b)^2/(a+b*cosh(x)^2)
```

Rubi [A]

time = 0.09, antiderivative size = 107, normalized size of antiderivative = 1.00, number of steps used = 5, number of rules used = 5, integrand size = 10, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.500, Rules used = {3263, 3252, 12, 3260, 214}

$$-\frac{3b(2a+b)\sinh(x)\cosh(x)}{8a^2(a+b)^2\left(a+b\cosh^2(x)\right)}+\frac{(8a^2+8ab+3b^2)\tanh^{-1}\left(\frac{\sqrt{a}\tanh(x)}{\sqrt{a+b}}\right)}{8a^{5/2}(a+b)^{5/2}}-\frac{b\sinh(x)\cosh(x)}{4a(a+b)\left(a+b\cosh^2(x)\right)^2}$$

Antiderivative was successfully verified.

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

```
[Out] ((8*a^2 + 8*a*b + 3*b^2)*ArcTanh[(Sqrt[a]*Tanh[x])/Sqrt[a + b]])/(8*a^(5/2)
*(a + b)^(5/2)) - (b*Cosh[x]*Sinh[x])/(4*a*(a + b)*(a + b*Cosh[x]^2)^2) - (
3*b*(2*a + b)*Cosh[x]*Sinh[x])/(8*a^2*(a + b)^2*(a + b*Cosh[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 214

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

Rule 3252

```
Int[((a_) + (b_.)*sin[(e_.) + (f_.)*(x_)]^2)^(p_)*((A_.) + (B_.)*sin[(e_.)
+ (f_.)*(x_)]^2), x_Symbol] :> Simp[(-(A*b - a*B))*Cos[e + f*x]*Sin[e + f*x
]*((a + b*Sin[e + f*x]^2)^(p + 1)/(2*a*f*(a + b)*(p + 1))), x] - Dist[1/(2*
a*(a + b)*(p + 1)), Int[(a + b*Sin[e + f*x]^2)^(p + 1)*Simp[a*B - A*(2*a*(p
 + 1) + b*(2*p + 3)) + 2*(A*b - a*B)*(p + 2)*Sin[e + f*x]^2, x], x], x] /;
```

```
FreeQ[{a, b, e, f, A, B}, x] && LtQ[p, -1] && NeQ[a + b, 0]
```

Rule 3260

```
Int[((a_) + (b_.)*sin[(e_.) + (f_.)*(x_)]^2)^(-1), x_Symbol] :> With[{ff =
FreeFactors[Tan[e + f*x], x]}, Dist[ff/f, Subst[Int[1/(a + (a + b)*ff^2*x^2
), x], x, Tan[e + f*x]/ff], x]] /; FreeQ[{a, b, e, f}, x]
```

Rule 3263

```
Int[((a_) + (b_.)*sin[(e_.) + (f_.)*(x_)]^2)^(p_), x_Symbol] :> Simp[(-b)*C
os[e + f*x]*Sin[e + f*x]*((a + b*Sin[e + f*x]^2)^(p + 1)/(2*a*f*(p + 1)*(a
+ b))), x] + Dist[1/(2*a*(p + 1)*(a + b)), Int[(a + b*Sin[e + f*x]^2)^(p +
1)*Simp[2*a*(p + 1) + b*(2*p + 3) - 2*b*(p + 2)*Sin[e + f*x]^2, x], x], x]
/; FreeQ[{a, b, e, f}, x] && NeQ[a + b, 0] && LtQ[p, -1]
```

Rubi steps

$$\int \frac{1}{\left(a+b\cosh^2(x)\right)^3}\,dx = -\frac{b\cosh(x)\sinh(x)}{4a(a+b)\left(a+b\cosh^2(x)\right)^2} - \frac{\int \frac{-4a-3b+2b\cosh^2(x)}{\left(a+b\cosh^2(x)\right)^2}\,dx}{4a(a+b)}$$

$$= -\frac{b\cosh(x)\sinh(x)}{4a(a+b)\left(a+b\cosh^2(x)\right)^2} - \frac{3b(2a+b)\cosh(x)\sinh(x)}{8a^2(a+b)^2\left(a+b\cosh^2(x)\right)} - \frac{\int \frac{-8a^2-8ab-3b^2}{a+b\cosh^2(x)}\,dx}{8a^2(a+b)^2}$$

$$= -\frac{b\cosh(x)\sinh(x)}{4a(a+b)\left(a+b\cosh^2(x)\right)^2} - \frac{3b(2a+b)\cosh(x)\sinh(x)}{8a^2(a+b)^2\left(a+b\cosh^2(x)\right)} + \frac{(8a^2+8ab+3b^2)}{8a^2(a+}$$

$$= -\frac{b\cosh(x)\sinh(x)}{4a(a+b)\left(a+b\cosh^2(x)\right)^2} - \frac{3b(2a+b)\cosh(x)\sinh(x)}{8a^2(a+b)^2\left(a+b\cosh^2(x)\right)} + \frac{(8a^2+8ab+3b^2)}{}$$

$$= \frac{(8a^2+8ab+3b^2)\tanh^{-1}\left(\frac{\sqrt{a}\tanh(x)}{\sqrt{a+b}}\right)}{8a^{5/2}(a+b)^{5/2}} - \frac{b\cosh(x)\sinh(x)}{4a(a+b)\left(a+b\cosh^2(x)\right)^2} - \frac{3b(2a+}{8a^2(a+}$$

Mathematica [A]
time = 0.43, size = 106, normalized size = 0.99

$$\frac{\frac{(8a^2+8ab+3b^2)\tanh^{-1}\left(\frac{\sqrt{a}\tanh(x)}{\sqrt{a+b}}\right)}{(a+b)^{5/2}} - \frac{\sqrt{a}\,b(16a^2+16ab+3b^2+3b(2a+b)\cosh(2x))\sinh(2x)}{(a+b)^2(2a+b+b\cosh(2x))^2}}{8a^{5/2}}$$

Antiderivative was successfully verified.

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

```
[Out] (((8*a^2 + 8*a*b + 3*b^2)*ArcTanh[(Sqrt[a]*Tanh[x])/Sqrt[a + b]])/(a + b)^(
5/2) - (Sqrt[a]*b*(16*a^2 + 16*a*b + 3*b^2 + 3*b*(2*a + b)*Cosh[2*x])*Sinh[
2*x])/((a + b)^2*(2*a + b + b*Cosh[2*x])^2))/(8*a^(5/2))
```

Maple [B] Leaf count of result is larger than twice the leaf count of optimal. 263 vs. $2(93) = 186$.
time = 0.59, size = 264, normalized size = 2.47

method	result
default	$-\frac{2\left(\frac{b(8a+3b)\left(\tanh^{7}\left(\frac{x}{2}\right)\right)}{8a^{2}(a+b)}-\frac{b\left(8a^{2}-13ab-9b^{2}\right)\left(\tanh^{5}\left(\frac{x}{2}\right)\right)}{8(a+b)^{2}a^{2}}-\frac{b\left(8a^{2}-13ab-9b^{2}\right)\left(\tanh^{3}\left(\frac{x}{2}\right)\right)}{8(a+b)^{2}a^{2}}+\frac{b(8a+3b)\tanh\left(\frac{x}{2}\right)}{8a^{2}(a+b)}\right)}{\left(a\left(\tanh^{4}\left(\frac{x}{2}\right)\right)+b\left(\tanh^{4}\left(\frac{x}{2}\right)\right)-2a\left(\tanh^{2}\left(\frac{x}{2}\right)\right)+2b\left(\tanh^{2}\left(\frac{x}{2}\right)\right)+a+b\right)^{2}}-\frac{(8a^{2}+8ab+3b^{2})\Big(}{}$
risch	$\frac{8a^{2}b\,e^{6x}+8a\,b^{2}e^{6x}+3b^{3}e^{6x}+48a^{3}e^{4x}+72a^{2}b\,e^{4x}+42a\,b^{2}e^{4x}+9b^{3}e^{4x}+40a^{2}b\,e^{2x}+40a\,b^{2}e^{2x}+9b^{3}e^{2x}+6a\,b^{2}+3b^{3}}{4a^{2}(a+b)^{2}\left(e^{4x}b+4\,e^{2x}a+2b\,e^{2x}+b\right)^{2}}+\frac{\ln\Big(e^{2x}+\frac{2a\sqrt{a}}{}}{}$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(1/(a+b*cosh(x)^2)^3,x,method=_RETURNVERBOSE)
```

```
[Out] -2*(1/8*b*(8*a+3*b)/a^2/(a+b)*tanh(1/2*x)^7-1/8*b*(8*a^2-13*a*b-9*b^2)/(a+b
)^2/a^2*tanh(1/2*x)^5-1/8*b*(8*a^2-13*a*b-9*b^2)/(a+b)^2/a^2*tanh(1/2*x)^3+
1/8*b*(8*a+3*b)/a^2/(a+b)*tanh(1/2*x))/(a*tanh(1/2*x)^4+b*tanh(1/2*x)^4-2*a
*tanh(1/2*x)^2+2*b*tanh(1/2*x)^2+a+b)^2-1/4*(8*a^2+8*a*b+3*b^2)/a^2/(a^2+2*
a*b+b^2)*(-1/4/a^(1/2)/(a+b)^(1/2)*ln((a+b)^(1/2)*tanh(1/2*x)^2+2*tanh(1/2*
x)*a^(1/2)+(a+b)^(1/2))+1/4/a^(1/2)/(a+b)^(1/2)*ln((a+b)^(1/2)*tanh(1/2*x)^
2-2*tanh(1/2*x)*a^(1/2)+(a+b)^(1/2)))
```

Maxima [B] Leaf count of result is larger than twice the leaf count of optimal. 344 vs. $2(93) = 186$.
time = 0.52, size = 344, normalized size = 3.21

$$-\frac{(8\,a^{2}+8\,ab+3\,b^{2})\log\left(\frac{be^{(-2\,x)}+2\,a+b-2\,\sqrt{(a+b)a}}{be^{(-2\,x)}+2\,a+b+2\,\sqrt{(a+b)a}}\right)}{16\,(a^{4}+2\,a^{3}b+a^{2}b^{2})\sqrt{(a+b)a}}-\frac{6\,ab^{2}+3\,b^{3}+(40\,a^{2}b+40\,ab^{2}+9\,b^{3})e^{(-2\,x)}+3\,(16\,a^{3}+24\,a^{2}b+14\,ab^{2}+3\,b^{3})e^{(-4\,x)}+(8\,a^{2}b+8\,ab^{2}+3\,b^{3})e^{(-6\,x)}}{4\,(a^{4}b^{2}+2\,a^{3}b^{3}+a^{2}b^{4}+4\,(2\,a^{5}b+5\,a^{4}b^{2}+4\,a^{3}b^{3}+a^{2}b^{4})e^{(-2\,x)}+2\,(8\,a^{6}+24\,a^{5}b+27\,a^{4}b^{2}+14\,a^{3}b^{3}+3\,a^{2}b^{4})e^{(-4\,x)}+4\,(2\,a^{5}b+5\,a^{4}b^{2}+4\,a^{3}b^{3}+a^{2}b^{4})e^{(-6\,x)}+(a^{4}b^{2}+2\,a^{3}b^{3}+a^{2}b^{4})e^{(-8\,x)})}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(a+b*cosh(x)^2)^3,x, algorithm="maxima")
```

```
[Out] -1/16*(8*a^2 + 8*a*b + 3*b^2)*log((b*e^(-2*x) + 2*a + b - 2*sqrt((a + b)*a)
)/(b*e^(-2*x) + 2*a + b + 2*sqrt((a + b)*a)))/((a^4 + 2*a^3*b + a^2*b^2)*sq
rt((a + b)*a)) - 1/4*(6*a*b^2 + 3*b^3 + (40*a^2*b + 40*a*b^2 + 9*b^3)*e^(-2
*x) + 3*(16*a^3 + 24*a^2*b + 14*a*b^2 + 3*b^3)*e^(-4*x) + (8*a^2*b + 8*a*b^
2 + 3*b^3)*e^(-6*x))/(a^4*b^2 + 2*a^3*b^3 + a^2*b^4 + 4*(2*a^5*b + 5*a^4*b^
2 + 4*a^3*b^3 + a^2*b^4)*e^(-2*x) + 2*(8*a^6 + 24*a^5*b + 27*a^4*b^2 + 14*a
```

```
^3*b^3 + 3*a^2*b^4)*e^(-4*x) + 4*(2*a^5*b + 5*a^4*b^2 + 4*a^3*b^3 + a^2*b^4
)*e^(-6*x) + (a^4*b^2 + 2*a^3*b^3 + a^2*b^4)*e^(-8*x))
```

Fricas [B] Leaf count of result is larger than twice the leaf count of optimal. 2478 vs. $2(93) = 186$.
time = 0.45, size = 5117, normalized size = 47.82

Too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(a+b*cosh(x)^2)^3,x, algorithm="fricas")
```

```
[Out] [1/16*(4*(8*a^4*b + 16*a^3*b^2 + 11*a^2*b^3 + 3*a*b^4)*cosh(x)^6 + 24*(8*a^
4*b + 16*a^3*b^2 + 11*a^2*b^3 + 3*a*b^4)*cosh(x)*sinh(x)^5 + 4*(8*a^4*b + 1
6*a^3*b^2 + 11*a^2*b^3 + 3*a*b^4)*sinh(x)^6 + 24*a^3*b^2 + 36*a^2*b^3 + 12*
a*b^4 + 12*(16*a^5 + 40*a^4*b + 38*a^3*b^2 + 17*a^2*b^3 + 3*a*b^4)*cosh(x)^
4 + 12*(16*a^5 + 40*a^4*b + 38*a^3*b^2 + 17*a^2*b^3 + 3*a*b^4 + 5*(8*a^4*b
+ 16*a^3*b^2 + 11*a^2*b^3 + 3*a*b^4)*cosh(x)^2)*sinh(x)^4 + 16*(5*(8*a^4*b
+ 16*a^3*b^2 + 11*a^2*b^3 + 3*a*b^4)*cosh(x)^3 + 3*(16*a^5 + 40*a^4*b + 38*
a^3*b^2 + 17*a^2*b^3 + 3*a*b^4)*cosh(x))*sinh(x)^3 + 4*(40*a^4*b + 80*a^3*b
^2 + 49*a^2*b^3 + 9*a*b^4)*cosh(x)^2 + 4*(40*a^4*b + 80*a^3*b^2 + 49*a^2*b^
3 + 9*a*b^4 + 15*(8*a^4*b + 16*a^3*b^2 + 11*a^2*b^3 + 3*a*b^4)*cosh(x)^4 +
18*(16*a^5 + 40*a^4*b + 38*a^3*b^2 + 17*a^2*b^3 + 3*a*b^4)*cosh(x)^2)*sinh(
x)^2 + ((8*a^2*b^2 + 8*a*b^3 + 3*b^4)*cosh(x)^8 + 8*(8*a^2*b^2 + 8*a*b^3 +
3*b^4)*cosh(x)*sinh(x)^7 + (8*a^2*b^2 + 8*a*b^3 + 3*b^4)*sinh(x)^8 + 4*(16*
a^3*b + 24*a^2*b^2 + 14*a*b^3 + 3*b^4)*cosh(x)^6 + 4*(16*a^3*b + 24*a^2*b^2
 + 14*a*b^3 + 3*b^4 + 7*(8*a^2*b^2 + 8*a*b^3 + 3*b^4)*cosh(x)^2)*sinh(x)^6
+ 8*(7*(8*a^2*b^2 + 8*a*b^3 + 3*b^4)*cosh(x)^3 + 3*(16*a^3*b + 24*a^2*b^2 +
 14*a*b^3 + 3*b^4)*cosh(x))*sinh(x)^5 + 2*(64*a^4 + 128*a^3*b + 112*a^2*b^2
 + 48*a*b^3 + 9*b^4)*cosh(x)^4 + 2*(35*(8*a^2*b^2 + 8*a*b^3 + 3*b^4)*cosh(x
)^4 + 64*a^4 + 128*a^3*b + 112*a^2*b^2 + 48*a*b^3 + 9*b^4 + 30*(16*a^3*b +
24*a^2*b^2 + 14*a*b^3 + 3*b^4)*cosh(x)^2)*sinh(x)^4 + 8*a^2*b^2 + 8*a*b^3 +
 3*b^4 + 8*(7*(8*a^2*b^2 + 8*a*b^3 + 3*b^4)*cosh(x)^5 + 10*(16*a^3*b + 24*a
^2*b^2 + 14*a*b^3 + 3*b^4)*cosh(x)^3 + (64*a^4 + 128*a^3*b + 112*a^2*b^2 +
48*a*b^3 + 9*b^4)*cosh(x))*sinh(x)^3 + 4*(16*a^3*b + 24*a^2*b^2 + 14*a*b^3
+ 3*b^4)*cosh(x)^2 + 4*(7*(8*a^2*b^2 + 8*a*b^3 + 3*b^4)*cosh(x)^6 + 15*(16*
a^3*b + 24*a^2*b^2 + 14*a*b^3 + 3*b^4)*cosh(x)^4 + 16*a^3*b + 24*a^2*b^2 +
14*a*b^3 + 3*b^4 + 3*(64*a^4 + 128*a^3*b + 112*a^2*b^2 + 48*a*b^3 + 9*b^4)*
cosh(x)^2)*sinh(x)^2 + 8*((8*a^2*b^2 + 8*a*b^3 + 3*b^4)*cosh(x)^7 + 3*(16*a
^3*b + 24*a^2*b^2 + 14*a*b^3 + 3*b^4)*cosh(x)^5 + (64*a^4 + 128*a^3*b + 112
*a^2*b^2 + 48*a*b^3 + 9*b^4)*cosh(x)^3 + (16*a^3*b + 24*a^2*b^2 + 14*a*b^3
+ 3*b^4)*cosh(x))*sinh(x))*sqrt(a^2 + a*b)*log((b^2*cosh(x)^4 + 4*b^2*cosh(
x)*sinh(x)^3 + b^2*sinh(x)^4 + 2*(2*a*b + b^2)*cosh(x)^2 + 2*(3*b^2*cosh(x)
^2 + 2*a*b + b^2)*sinh(x)^2 + 8*a^2 + 8*a*b + b^2 + 4*(b^2*cosh(x)^3 + (2*a
*b + b^2)*cosh(x))*sinh(x) - 4*(b*cosh(x)^2 + 2*b*cosh(x)*sinh(x) + b*sinh(
```

```
x)^2 + 2*a + b)*sqrt(a^2 + a*b))/(b*cosh(x)^4 + 4*b*cosh(x)*sinh(x)^3 + b*s
inh(x)^4 + 2*(2*a + b)*cosh(x)^2 + 2*(3*b*cosh(x)^2 + 2*a + b)*sinh(x)^2 +
4*(b*cosh(x)^3 + (2*a + b)*cosh(x))*sinh(x) + b)) + 8*(3*(8*a^4*b + 16*a^3*
b^2 + 11*a^2*b^3 + 3*a*b^4)*cosh(x)^5 + 6*(16*a^5 + 40*a^4*b + 38*a^3*b^2 +
 17*a^2*b^3 + 3*a*b^4)*cosh(x)^3 + (40*a^4*b + 80*a^3*b^2 + 49*a^2*b^3 + 9*
a*b^4)*cosh(x))*sinh(x))/((a^6*b^2 + 3*a^5*b^3 + 3*a^4*b^4 + a^3*b^5)*cosh(
x)^8 + 8*(a^6*b^2 + 3*a^5*b^3 + 3*a^4*b^4 + a^3*b^5)*cosh(x)*sinh(x)^7 + (a
^6*b^2 + 3*a^5*b^3 + 3*a^4*b^4 + a^3*b^5)*sinh(x)^8 + a^6*b^2 + 3*a^5*b^3 +
 3*a^4*b^4 + a^3*b^5 + 4*(2*a^7*b + 7*a^6*b^2 + 9*a^5*b^3 + 5*a^4*b^4 + a^3
*b^5)*cosh(x)^6 + 4*(2*a^7*b + 7*a^6*b^2 + 9*a^5*b^3 + 5*a^4*b^4 + a^3*b^5
 + 7*(a^6*b^2 + 3*a^5*b^3 + 3*a^4*b^4 + a^3*b^5)*cosh(x)^2)*sinh(x)^6 + 8*(7
*(a^6*b^2 + 3*a^5*b^3 + 3*a^4*b^4 + a^3*b^5)*cosh(x)^3 + 3*(2*a^7*b + 7*a^6
*b^2 + 9*a^5*b^3 + 5*a^4*b^4 + a^3*b^5)*cosh(x))*sinh(x)^5 + 2*(8*a^8 + 32*
a^7*b + 51*a^6*b^2 + 41*a^5*b^3 + 17*a^4*b^4 + 3*a^3*b^5)*cosh(x)^4 + 2*(8*
a^8 + 32*a^7*b + 51*a^6*b^2 + 41*a^5*b^3 + 17*a^4*b^4 + 3*a^3*b^5 + 35*(a^6
*b^2 + 3*a^5*b^3 + 3*a^4*b^4 + a^3*b^5)*cosh(x)^4 + 30*(2*a^7*b + 7*a^6*b^2
 + 9*a^5*b^3 + 5*a^4*b^4 + a^3*b^5)*cosh(x)^2)*sinh(x)^4 + 8*(7*(a^6*b^2 +
3*a^5*b^3 + 3*a^4*b^4 + a^3*b^5)*cosh(x)^5 + 10*(2*a^7*b + 7*a^6*b^2 + 9*a^
5*b^3 + 5*a^4*b^4 + a^3*b^5)*cosh(x)^3 + (8*a^8 + 32*a^7*b + 51*a^6*b^2 + 4
1*a^5*b^3 + 17*a^4*b^4 + 3*a^3*b^5)*cosh(x))*sinh(x)^3 + 4*(2*a^7*b + 7*a^6
*b^2 + 9*a^5*b^3 + 5*a^4*b^4 + a^3*b^5)*cosh(x)^2 + 4*(2*a^7*b + 7*a^6*b^2
+ 9*a^5*b^3 + 5*a^4*b^4 + a^3*b^5 + 7*(a^6*b^2 + 3*a^5*b^3 + 3*a^4*b^4 + a^
3*b^5)*cosh(x)^6 + 15*(2*a^7*b + 7*a^6*b^2 + 9*a^5*b^3 + 5*a^4*b^4 + a^3*b^
5)*cosh(x)^4 + 3*(8*a^8 + 32*a^7*b + 51*a^6*b^2 + 41*a^5*b^3 + 17*a^4*b^4 +
 3*a^3*b^5)*cosh(x)^2)*sinh(x)^2 + 8*((a^6*b^2 + 3*a^5*b^3 + 3*a^4*b^4 + a^
3*b^5)*cosh(x)^7 + 3*(2*a^7*b + 7*a^6*b^2 + 9*a^5*b^3 + 5*a^4*b^4 + a^3*b^5
)*cosh(x)^5 + (8*a^8 + 32*a^7*b + 51*a^6*b^2 + 41*a^5*b^3 + 17*a^4*b^4 + 3*
a^3*b^5)*cosh(x)^3 + (2*a^7*b + 7*a^6*b^2 + 9*a^5*b^3 + 5*a^4*b^4 + a^3*b^5
)*cosh(x))*sinh(x)), 1/8*(2*(8*a^4*b + 16*a^3*b^2 + 11*a^2*b^3 + 3*a*b^4)*c
osh(x)^6 + 12*(8*a^4*b + 16*a^3*b^2 + 11*a^2*b^3 + 3*a*b^4)*cosh(x)*sinh(x)
^5 + 2*(8*a^4*b + 16*a^3*b^2 + 11*a^2*b^3 + 3*a*b^4)*sinh(x)^6 + 12*a^3*b^2
 + 18*a^2*b^3 + 6*a*b^4 + 6*(16*a^5 + 40*a^4*b + 38*a^3*b^2 + 17*a^2*b^3 +
3*a*b^4)*cosh(x)^4 + 6*(16*a^5 + 40*a^4*b + 38*a^3*b^2 + 17*a^2*b^3 + 3*a*b
^4 + 5*(8*a^4*b + 16*a^3*b^2 + 11*a^2*b^3 + 3*a...
```

Sympy [**F(-1)**] Timed out
time = 0.00, size = 0, normalized size = 0.00

Timed out

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(a+b*cosh(x)**2)**3,x)
```

```
[Out] Timed out
```

Giac [**B**] Leaf count of result is larger than twice the leaf count of optimal. 228 vs. $2(93) = 186$.

time = 0.61, size = 228, normalized size = 2.13

$$\frac{(8a^2+8ab+3b^2)\arctan\left(\frac{be^{(2x)}+2a+b}{2\sqrt{-a^2-ab}}\right)}{8(a^4+2a^3b+a^2b^2)\sqrt{-a^2-ab}}+\frac{8a^2be^{(6x)}+8ab^2e^{(6x)}+3b^3e^{(6x)}+48a^3e^{(4x)}+72a^2be^{(4x)}+42ab^2e^{(4x)}+9b^3e^{(4x)}+40a^2be^{(2x)}+40ab^2e^{(2x)}+9b^3e^{(2x)}+6ab^2+3b^3}{4(a^4+2a^3b+a^2b^2)(be^{(4x)}+4ae^{(2x)}+2be^{(2x)}+b)^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(a+b*cosh(x)^2)^3,x, algorithm="giac")
```

```
[Out] 1/8*(8*a^2 + 8*a*b + 3*b^2)*arctan(1/2*(b*e^(2*x) + 2*a + b)/sqrt(-a^2 - a*
b))/((a^4 + 2*a^3*b + a^2*b^2)*sqrt(-a^2 - a*b)) + 1/4*(8*a^2*b*e^(6*x) + 8
*a*b^2*e^(6*x) + 3*b^3*e^(6*x) + 48*a^3*e^(4*x) + 72*a^2*b*e^(4*x) + 42*a*b
^2*e^(4*x) + 9*b^3*e^(4*x) + 40*a^2*b*e^(2*x) + 40*a*b^2*e^(2*x) + 9*b^3*e^
(2*x) + 6*a*b^2 + 3*b^3)/((a^4 + 2*a^3*b + a^2*b^2)*(b*e^(4*x) + 4*a*e^(2*x
) + 2*b*e^(2*x) + b)^2)
```

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

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

Verification of antiderivative is not currently implemented for this CAS.

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

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

3.35 $\int \frac{1}{1+\cosh^2(x)}\,dx$

Optimal. Leaf size=15

$$\frac{\tanh^{-1}\left(\frac{\tanh(x)}{\sqrt{2}}\right)}{\sqrt{2}}$$

```
[Out] 1/2*arctanh(1/2*2^(1/2)*tanh(x))*2^(1/2)
```

Rubi [A]
time = 0.01, antiderivative size = 15, normalized size of antiderivative = 1.00, number of steps used = 2, number of rules used = 2, integrand size = 8, $\frac{\text{number of rules}}{\text{integrand size}} = 0.250$, Rules used = {3260, 212}

$$\frac{\tanh^{-1}\left(\frac{\tanh(x)}{\sqrt{2}}\right)}{\sqrt{2}}$$

Antiderivative was successfully verified.

```
[In] Int[(1 + Cosh[x]^2)^(-1),x]
```

```
[Out] ArcTanh[Tanh[x]/Sqrt[2]]/Sqrt[2]
```

Rule 212

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

Rule 3260

```
Int[((a_) + (b_.)*sin[(e_.) + (f_.)*(x_)]^2)^(-1), x_Symbol] :> With[{ff =
FreeFactors[Tan[e + f*x], x]}, Dist[ff/f, Subst[Int[1/(a + (a + b)*ff^2*x^2
), x], x, Tan[e + f*x]/ff], x]] /; FreeQ[{a, b, e, f}, x]
```

Rubi steps

$$\begin{aligned} \int \frac{1}{1+\cosh^2(x)}\,dx &= \text{Subst}\left(\int \frac{1}{1-2x^2}\,dx, x, \coth(x)\right)\\ &= \frac{\tanh^{-1}\left(\frac{\tanh(x)}{\sqrt{2}}\right)}{\sqrt{2}} \end{aligned}$$

Mathematica [F]
time = 0.02, size = 0, normalized size = 0.00

$$\int \frac{1}{1+\cosh^2(x)}\,dx$$

Verification is not applicable to the result.

```
[In] Integrate[(1 + Cosh[x]^2)^(-1),x]
```

```
[Out] Integrate[(1 + Cosh[x]^2)^(-1), x]
```

Maple [B] Leaf count of result is larger than twice the leaf count of optimal. 139 vs. 2(13) = 26.
time = 0.37, size = 140, normalized size = 9.33

method	result
risch	$\frac{\sqrt{2}\,\ln\left(e^{2x}+3-2\sqrt{2}\right)}{4}-\frac{\sqrt{2}\,\ln\left(e^{2x}+3+2\sqrt{2}\right)}{4}$
default	$\frac{\sqrt{2}\,\left(\ln\left(\frac{\tanh^2\left(\frac{x}{2}\right)+\tanh\left(\frac{x}{2}\right)\sqrt{2}+1}{\tanh^2\left(\frac{x}{2}\right)-\tanh\left(\frac{x}{2}\right)\sqrt{2}+1}\right)+2\arctan\left(\tanh\left(\frac{x}{2}\right)\sqrt{2}+1\right)+2\arctan\left(\tanh\left(\frac{x}{2}\right)\sqrt{2}-1\right)\right)}{8}-\frac{\sqrt{2}\,\left(\ln\left(\frac{\tanh^2\left(\frac{x}{2}\right)-\right.}{\tanh^2\left(\frac{x}{2}\right)+\right.}$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(1/(cosh(x)^2+1),x,method=_RETURNVERBOSE)
```

```
[Out] 1/8*2^(1/2)*(ln((tanh(1/2*x)^2+tanh(1/2*x)*2^(1/2)+1)/(tanh(1/2*x)^2-tanh(1
/2*x)*2^(1/2)+1))+2*arctan(tanh(1/2*x)*2^(1/2)+1)+2*arctan(tanh(1/2*x)*2^(1
/2)-1))-1/8*2^(1/2)*(ln((tanh(1/2*x)^2-tanh(1/2*x)*2^(1/2)+1)/(tanh(1/2*x)^
2+tanh(1/2*x)*2^(1/2)+1))+2*arctan(tanh(1/2*x)*2^(1/2)+1)+2*arctan(tanh(1/2
*x)*2^(1/2)-1))
```

Maxima [B] Leaf count of result is larger than twice the leaf count of optimal. 34 vs. 2(13) = 26.
time = 0.48, size = 34, normalized size = 2.27

$$-\frac{1}{4}\sqrt{2}\log\left(-\frac{2\sqrt{2}-e^{(-2x)}-3}{2\sqrt{2}+e^{(-2x)}+3}\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(1+cosh(x)^2),x, algorithm="maxima")
```

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

Fricas [B] Leaf count of result is larger than twice the leaf count of optimal. 66 vs. 2(13) = 26.

time = 0.38, size = 66, normalized size = 4.40

$$\frac{1}{4}\sqrt{2}\log\left(-\frac{3\left(2\sqrt{2}-3\right)\cosh\left(x\right)^{2}-4\left(3\sqrt{2}-4\right)\cosh\left(x\right)\sinh\left(x\right)+3\left(2\sqrt{2}-3\right)\sinh\left(x\right)^{2}+2\sqrt{2}-3}{\cosh\left(x\right)^{2}+\sinh\left(x\right)^{2}+3}\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(1+cosh(x)^2),x, algorithm="fricas")
```

```
[Out] 1/4*sqrt(2)*log(-(3*(2*sqrt(2) - 3)*cosh(x)^2 - 4*(3*sqrt(2) - 4)*cosh(x)*s
inh(x) + 3*(2*sqrt(2) - 3)*sinh(x)^2 + 2*sqrt(2) - 3)/(cosh(x)^2 + sinh(x)^
2 + 3))
```

Sympy [B] Leaf count of result is larger than twice the leaf count of optimal. 60 vs. $2(17) = 34$.
time = 0.48, size = 60, normalized size = 4.00

$$-\frac{\sqrt{2}\log\left(4\tanh^{2}\left(\frac{x}{2}\right)-4\sqrt{2}\tanh\left(\frac{x}{2}\right)+4\right)}{4}+\frac{\sqrt{2}\log\left(4\tanh^{2}\left(\frac{x}{2}\right)+4\sqrt{2}\tanh\left(\frac{x}{2}\right)+4\right)}{4}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(1+cosh(x)**2),x)
```

```
[Out] -sqrt(2)*log(4*tanh(x/2)**2 - 4*sqrt(2)*tanh(x/2) + 4)/4 + sqrt(2)*log(4*ta
nh(x/2)**2 + 4*sqrt(2)*tanh(x/2) + 4)/4
```

Giac [B] Leaf count of result is larger than twice the leaf count of optimal. 34 vs. $2(13) = 26$.
time = 0.40, size = 34, normalized size = 2.27

$$\frac{1}{4}\sqrt{2}\log\left(-\frac{2\sqrt{2}-e^{(2x)}-3}{2\sqrt{2}+e^{(2x)}+3}\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(1+cosh(x)^2),x, algorithm="giac")
```

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

Mupad [B]
time = 0.14, size = 50, normalized size = 3.33

$$\frac{\sqrt{2}\left(\ln\left(-4\,\mathrm{e}^{2\,x}-\frac{\sqrt{2}\,\left(12\,\mathrm{e}^{2\,x}+4\right)}{4}\right)-\ln\left(\frac{\sqrt{2}\,\left(12\,\mathrm{e}^{2\,x}+4\right)}{4}-4\,\mathrm{e}^{2\,x}\right)\right)}{4}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(1/(cosh(x)^2 + 1),x)
```

```
[Out] (2^(1/2)*(log(- 4*exp(2*x) - (2^(1/2)*(12*exp(2*x) + 4))/4) - log((2^(1/2)*
(12*exp(2*x) + 4))/4 - 4*exp(2*x))))/4
```

3.36 $\int \frac{1}{(1+\cosh^2(x))^2} \, dx$

Optimal. Leaf size=35

$$\frac{3\tanh^{-1}\left(\frac{\tanh(x)}{\sqrt{2}}\right)}{4\sqrt{2}} - \frac{\cosh(x)\sinh(x)}{4(1+\cosh^2(x))}$$

```
[Out] -1/4*cosh(x)*sinh(x)/(1+cosh(x)^2)+3/8*arctanh(1/2*2^(1/2)*tanh(x))*2^(1/2)
```

Rubi [A]
time = 0.02, antiderivative size = 35, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 4, integrand size = 8, $\frac{\text{number of rules}}{\text{integrand size}} = 0.500$, Rules used = {3263, 12, 3260, 212}

$$\frac{3\tanh^{-1}\left(\frac{\tanh(x)}{\sqrt{2}}\right)}{4\sqrt{2}} - \frac{\sinh(x)\cosh(x)}{4(\cosh^2(x)+1)}$$

Antiderivative was successfully verified.

```
[In] Int[(1 + Cosh[x]^2)^(-2),x]
```

```
[Out] (3*ArcTanh[Tanh[x]/Sqrt[2]])/(4*Sqrt[2]) - (Cosh[x]*Sinh[x])/(4*(1 + Cosh[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 212

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

Rule 3260

```
Int[((a_) + (b_.)*sin[(e_.) + (f_.)*(x_)]^2)^(-1), x_Symbol] :> With[{ff =
FreeFactors[Tan[e + f*x], x]}, Dist[ff/f, Subst[Int[1/(a + (a + b)*ff^2*x^2
), x], x, Tan[e + f*x]/ff], x]] /; FreeQ[{a, b, e, f}, x]
```

Rule 3263

```
Int[((a_) + (b_.)*sin[(e_.) + (f_.)*(x_)]^2)^(p_), x_Symbol] :> Simp[(-b)*C
os[e + f*x]*Sin[e + f*x]*((a + b*Sin[e + f*x]^2)^(p + 1)/(2*a*f*(p + 1)*(a
```

```
+ b))), x] + Dist[1/(2*a*(p + 1)*(a + b)), Int[(a + b*Sin[e + f*x]^2)^(p +
1)*Simp[2*a*(p + 1) + b*(2*p + 3) - 2*b*(p + 2)*Sin[e + f*x]^2, x], x], x]
/; FreeQ[{a, b, e, f}, x] && NeQ[a + b, 0] && LtQ[p, -1]
```

Rubi steps

$$\begin{aligned}\int \frac{1}{\left(1+\cosh^2(x)\right)^2}\,dx &= -\frac{\cosh(x)\sinh(x)}{4\left(1+\cosh^2(x)\right)}-\frac{1}{4}\int -\frac{3}{1+\cosh^2(x)}\,dx\\ &= -\frac{\cosh(x)\sinh(x)}{4\left(1+\cosh^2(x)\right)}+\frac{3}{4}\int \frac{1}{1+\cosh^2(x)}\,dx\\ &= -\frac{\cosh(x)\sinh(x)}{4\left(1+\cosh^2(x)\right)}+\frac{3}{4}\text{Subst}\left(\int \frac{1}{1-2x^2}\,dx,x,\coth(x)\right)\\ &= \frac{3\tanh^{-1}\left(\frac{\tanh(x)}{\sqrt{2}}\right)}{4\sqrt{2}}-\frac{\cosh(x)\sinh(x)}{4\left(1+\cosh^2(x)\right)}\end{aligned}$$

Mathematica [A]
time = 0.10, size = 35, normalized size = 1.00

$$\frac{3\tanh^{-1}\left(\frac{\tanh(x)}{\sqrt{2}}\right)}{4\sqrt{2}}-\frac{\sinh(2x)}{4(3+\cosh(2x))}$$

Antiderivative was successfully verified.

```
[In] Integrate[(1 + Cosh[x]^2)^(-2),x]
[Out] (3*ArcTanh[Tanh[x]/Sqrt[2]])/(4*Sqrt[2]) - Sinh[2*x]/(4*(3 + Cosh[2*x]))
```

Maple [B] Leaf count of result is larger than twice the leaf count of optimal. 166 vs. 2(28) = 56.
time = 0.37, size = 167, normalized size = 4.77

method	result
risch	$\frac{3\,e^{2x}+1}{2\,e^{4x}+12\,e^{2x}+2}+\frac{3\sqrt{2}\,\ln\left(e^{2x}+3-2\sqrt{2}\right)}{16}-\frac{3\sqrt{2}\,\ln\left(e^{2x}+3+2\sqrt{2}\right)}{16}$
default	$-\frac{\frac{\left(\tanh^3\left(\frac{x}{2}\right)\right)}{2}+\frac{\tanh\left(\frac{x}{2}\right)}{2}}{2\left(\tanh^4\left(\frac{x}{2}\right)+1\right)}+\frac{3\sqrt{2}\,\left(\ln\left(\frac{\tanh^2\left(\frac{x}{2}\right)+\tanh\left(\frac{x}{2}\right)\sqrt{2}+1}{\tanh^2\left(\frac{x}{2}\right)-\tanh\left(\frac{x}{2}\right)\sqrt{2}+1}\right)+2\arctan\left(\tanh\left(\frac{x}{2}\right)\sqrt{2}+1\right)+2\arctan\left(\tanh\left(\frac{x}{2}\right)\sqrt{2}-\right.\right.}{32}$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(1/(cosh(x)^2+1)^2,x,method=_RETURNVERBOSE)
```

```
[Out] -1/2*(1/2*tanh(1/2*x)^3+1/2*tanh(1/2*x))/(tanh(1/2*x)^4+1)+3/32*2^(1/2)*(ln
((tanh(1/2*x)^2+tanh(1/2*x)*2^(1/2)+1)/(tanh(1/2*x)^2-tanh(1/2*x)*2^(1/2)+1
))+2*arctan(tanh(1/2*x)*2^(1/2)+1)+2*arctan(tanh(1/2*x)*2^(1/2)-1))-3/32*2^
(1/2)*(ln((tanh(1/2*x)^2-tanh(1/2*x)*2^(1/2)+1)/(tanh(1/2*x)^2+tanh(1/2*x)*
2^(1/2)+1))+2*arctan(tanh(1/2*x)*2^(1/2)+1)+2*arctan(tanh(1/2*x)*2^(1/2)-1)
)
```

Maxima [B] Leaf count of result is larger than twice the leaf count of optimal. 59 vs. $2(28) = 56$.
time = 0.48, size = 59, normalized size = 1.69

$$-\frac{3}{16}\,\sqrt{2}\,\log\left(-\frac{2\,\sqrt{2} - e^{(-2\,x)} - 3}{2\,\sqrt{2} + e^{(-2\,x)} + 3}\right) - \frac{3\,e^{(-2\,x)} + 1}{2\,(6\,e^{(-2\,x)} + e^{(-4\,x)} + 1)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(1+cosh(x)^2)^2,x, algorithm="maxima")
```

```
[Out] -3/16*sqrt(2)*log(-(2*sqrt(2) - e^(-2*x) - 3)/(2*sqrt(2) + e^(-2*x) + 3)) -
 1/2*(3*e^(-2*x) + 1)/(6*e^(-2*x) + e^(-4*x) + 1)
```

Fricas [B] Leaf count of result is larger than twice the leaf count of optimal. 214 vs. $2(28) = 56$.
time = 0.37, size = 214, normalized size = 6.11

$$\frac{24\,\cosh(x)^2 + 3\left(\sqrt{2}\,\cosh(x)^4 + 4\,\sqrt{2}\,\cosh(x)\sinh(x)^3 + \sqrt{2}\,\sinh(x)^4 + 6\left(\sqrt{2}\,\cosh(x)^2 + \sqrt{2}\right)\sinh(x)^2 + 6\,\sqrt{2}\,\cosh(x)^2 + 4\left(\sqrt{2}\,\cosh(x)^3 + 3\,\sqrt{2}\,\cosh(x)\right)\sinh(x) + \sqrt{2}\right)\log\left(-\frac{3\left(2\,\sqrt{2}-3\right)\cosh(x)^2-4\left(3\,\sqrt{2}-4\right)\cosh(x)\sinh(x)+3\left(2\,\sqrt{2}-3\right)\sinh(x)^2+2\,\sqrt{2}-3}{\cosh(x)^2+\sinh(x)^2+3}\right) + 48\,\cosh(x)\sinh(x) + 24\,\sinh(x)^2 + 8}{16\left(\cosh(x)^4 + 4\,\cosh(x)\sinh(x)^3 + \sinh(x)^4 + 6\left(\cosh(x)^2 + 1\right)\sinh(x)^2 + 6\,\cosh(x)^2 + 4\left(\cosh(x)^3 + 3\,\cosh(x)\right)\sinh(x) + 1\right)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(1+cosh(x)^2)^2,x, algorithm="fricas")
```

```
[Out] 1/16*(24*cosh(x)^2 + 3*(sqrt(2)*cosh(x)^4 + 4*sqrt(2)*cosh(x)*sinh(x)^3 + s
qrt(2)*sinh(x)^4 + 6*(sqrt(2)*cosh(x)^2 + sqrt(2))*sinh(x)^2 + 6*sqrt(2)*co
sh(x)^2 + 4*(sqrt(2)*cosh(x)^3 + 3*sqrt(2)*cosh(x))*sinh(x) + sqrt(2))*log(
-(3*(2*sqrt(2) - 3)*cosh(x)^2 - 4*(3*sqrt(2) - 4)*cosh(x)*sinh(x) + 3*(2*sq
rt(2) - 3)*sinh(x)^2 + 2*sqrt(2) - 3)/(cosh(x)^2 + sinh(x)^2 + 3)) + 48*cos
h(x)*sinh(x) + 24*sinh(x)^2 + 8)/(cosh(x)^4 + 4*cosh(x)*sinh(x)^3 + sinh(x)
^4 + 6*(cosh(x)^2 + 1)*sinh(x)^2 + 6*cosh(x)^2 + 4*(cosh(x)^3 + 3*cosh(x))*
sinh(x) + 1)
```

Sympy [B] Leaf count of result is larger than twice the leaf count of optimal. 211 vs. $2(34) = 68$.
time = 1.92, size = 211, normalized size = 6.03

$$-\frac{3\sqrt{2}\log\left(4\tanh^2\left(\frac{x}{2}\right) - 4\sqrt{2}\tanh\left(\frac{x}{2}\right) + 4\right)\tanh^4\left(\frac{x}{2}\right)}{16\tanh^4\left(\frac{x}{2}\right) + 16} - \frac{3\sqrt{2}\log\left(4\tanh^2\left(\frac{x}{2}\right) - 4\sqrt{2}\tanh\left(\frac{x}{2}\right) + 4\right)}{16\tanh^4\left(\frac{x}{2}\right) + 16} + \frac{3\sqrt{2}\log\left(4\tanh^2\left(\frac{x}{2}\right) + 4\sqrt{2}\tanh\left(\frac{x}{2}\right) + 4\right)\tanh^4\left(\frac{x}{2}\right)}{16\tanh^4\left(\frac{x}{2}\right) + 16} + \frac{3\sqrt{2}\log\left(4\tanh^2\left(\frac{x}{2}\right) + 4\sqrt{2}\tanh\left(\frac{x}{2}\right) + 4\right)}{16\tanh^4\left(\frac{x}{2}\right) + 16} - \frac{4\tanh^3\left(\frac{x}{2}\right)}{16\tanh^4\left(\frac{x}{2}\right) + 16} - \frac{4\tanh\left(\frac{x}{2}\right)}{16\tanh^4\left(\frac{x}{2}\right) + 16}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(1+cosh(x)**2)**2,x)
```

```
[Out] -3*sqrt(2)*log(4*tanh(x/2)**2 - 4*sqrt(2)*tanh(x/2) + 4)*tanh(x/2)**4/(16*t
anh(x/2)**4 + 16) - 3*sqrt(2)*log(4*tanh(x/2)**2 - 4*sqrt(2)*tanh(x/2) + 4)
/(16*tanh(x/2)**4 + 16) + 3*sqrt(2)*log(4*tanh(x/2)**2 + 4*sqrt(2)*tanh(x/2
) + 4)*tanh(x/2)**4/(16*tanh(x/2)**4 + 16) + 3*sqrt(2)*log(4*tanh(x/2)**2 +
 4*sqrt(2)*tanh(x/2) + 4)/(16*tanh(x/2)**4 + 16) - 4*tanh(x/2)**3/(16*tanh(
x/2)**4 + 16) - 4*tanh(x/2)/(16*tanh(x/2)**4 + 16)
```

Giac [B] Leaf count of result is larger than twice the leaf count of optimal. 59 vs. $2(28) = 56$.
time = 0.40, size = 59, normalized size = 1.69

$$\frac{3}{16}\sqrt{2}\log\left(-\frac{2\sqrt{2}-e^{(2x)}-3}{2\sqrt{2}+e^{(2x)}+3}\right)+\frac{3e^{(2x)}+1}{2\left(e^{(4x)}+6e^{(2x)}+1\right)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(1+cosh(x)^2)^2,x, algorithm="giac")
```

```
[Out] 3/16*sqrt(2)*log(-(2*sqrt(2) - e^(2*x) - 3)/(2*sqrt(2) + e^(2*x) + 3)) + 1/
2*(3*e^(2*x) + 1)/(e^(4*x) + 6*e^(2*x) + 1)
```

Mupad [B]
time = 1.05, size = 76, normalized size = 2.17

$$\frac{3\sqrt{2}\ \ln\left(-3\,e^{2x}-\frac{3\sqrt{2}\ (12\,e^{2x}+4)}{16}\right)}{16}-\frac{3\sqrt{2}\ \ln\left(\frac{3\sqrt{2}\ (12\,e^{2x}+4)}{16}-3\,e^{2x}\right)}{16}+\frac{\frac{3\,e^{2x}}{2}+\frac{1}{2}}{6\,e^{2x}+e^{4x}+1}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(1/(cosh(x)^2 + 1)^2,x)
```

```
[Out] (3*2^(1/2)*log(- 3*exp(2*x) - (3*2^(1/2)*(12*exp(2*x) + 4))/16))/16 - (3*2^
(1/2)*log((3*2^(1/2)*(12*exp(2*x) + 4))/16 - 3*exp(2*x)))/16 + ((3*exp(2*x)
)/2 + 1/2)/(6*exp(2*x) + exp(4*x) + 1)
```

3.37 $\int \frac{1}{\left(1+\cosh^2(x)\right)^3}\,dx$

Optimal. Leaf size=51

$$\frac{19\tanh^{-1}\left(\frac{\tanh(x)}{\sqrt{2}}\right)}{32\sqrt{2}}-\frac{\cosh(x)\sinh(x)}{8\left(1+\cosh^2(x)\right)^2}-\frac{9\cosh(x)\sinh(x)}{32\left(1+\cosh^2(x)\right)}$$

```
[Out] -1/8*cosh(x)*sinh(x)/(1+cosh(x)^2)^2-9/32*cosh(x)*sinh(x)/(1+cosh(x)^2)+19/
64*arctanh(1/2*2^(1/2)*tanh(x))*2^(1/2)
```

Rubi [A]
time = 0.04, antiderivative size = 51, normalized size of antiderivative = 1.00, number of steps used = 5, number of rules used = 5, integrand size = 8, $\frac{\text{number of rules}}{\text{integrand size}} = 0.625$, Rules used = {3263, 3252, 12, 3260, 212}

$$\frac{19\tanh^{-1}\left(\frac{\tanh(x)}{\sqrt{2}}\right)}{32\sqrt{2}}-\frac{9\sinh(x)\cosh(x)}{32\left(\cosh^2(x)+1\right)}-\frac{\sinh(x)\cosh(x)}{8\left(\cosh^2(x)+1\right)^2}$$

Antiderivative was successfully verified.

```
[In] Int[(1 + Cosh[x]^2)^(-3),x]
```

```
[Out] (19*ArcTanh[Tanh[x]/Sqrt[2]])/(32*Sqrt[2]) - (Cosh[x]*Sinh[x])/(8*(1 + Cosh
[x]^2)^2) - (9*Cosh[x]*Sinh[x])/(32*(1 + Cosh[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 212

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

Rule 3252

```
Int[((a_) + (b_.)*sin[(e_.) + (f_.)*(x_)]^2)^(p_)*((A_.) + (B_.)*sin[(e_.)
+ (f_.)*(x_)]^2), x_Symbol] :> Simp[(-(A*b - a*B))*Cos[e + f*x]*Sin[e + f*x
]*((a + b*Sin[e + f*x]^2)^(p + 1)/(2*a*f*(a + b)*(p + 1))), x] - Dist[1/(2*
a*(a + b)*(p + 1)), Int[(a + b*Sin[e + f*x]^2)^(p + 1)*Simp[a*B - A*(2*a*(p
 + 1) + b*(2*p + 3)) + 2*(A*b - a*B)*(p + 2)*Sin[e + f*x]^2, x], x], x] /;
FreeQ[{a, b, e, f, A, B}, x] && LtQ[p, -1] && NeQ[a + b, 0]
```

Rule 3260

```
Int[((a_) + (b_.)*sin[(e_.) + (f_.)*(x_)]^2)^(-1), x_Symbol] :> With[{ff =
FreeFactors[Tan[e + f*x], x]}, Dist[ff/f, Subst[Int[1/(a + (a + b)*ff^2*x^2
), x], x, Tan[e + f*x]/ff], x]] /; FreeQ[{a, b, e, f}, x]
```

Rule 3263

```
Int[((a_) + (b_.)*sin[(e_.) + (f_.)*(x_)]^2)^(p_), x_Symbol] :> Simp[(-b)*C
os[e + f*x]*Sin[e + f*x]*((a + b*Sin[e + f*x]^2)^(p + 1)/(2*a*f*(p + 1)*(a
+ b))), x] + Dist[1/(2*a*(p + 1)*(a + b)), Int[(a + b*Sin[e + f*x]^2)^(p +
1)*Simp[2*a*(p + 1) + b*(2*p + 3) - 2*b*(p + 2)*Sin[e + f*x]^2, x], x], x]
/; FreeQ[{a, b, e, f}, x] && NeQ[a + b, 0] && LtQ[p, -1]
```

Rubi steps

$$
\begin{aligned}
\int \frac{1}{\left(1+\cosh^2(x)\right)^3}\,dx &= -\frac{\cosh(x)\sinh(x)}{8\left(1+\cosh^2(x)\right)^2}-\frac{1}{8}\int \frac{-7+2\cosh^2(x)}{\left(1+\cosh^2(x)\right)^2}\,dx\\
&= -\frac{\cosh(x)\sinh(x)}{8\left(1+\cosh^2(x)\right)^2}-\frac{9\cosh(x)\sinh(x)}{32\left(1+\cosh^2(x)\right)}-\frac{1}{32}\int -\frac{19}{1+\cosh^2(x)}\,dx\\
&= -\frac{\cosh(x)\sinh(x)}{8\left(1+\cosh^2(x)\right)^2}-\frac{9\cosh(x)\sinh(x)}{32\left(1+\cosh^2(x)\right)}+\frac{19}{32}\int \frac{1}{1+\cosh^2(x)}\,dx\\
&= -\frac{\cosh(x)\sinh(x)}{8\left(1+\cosh^2(x)\right)^2}-\frac{9\cosh(x)\sinh(x)}{32\left(1+\cosh^2(x)\right)}+\frac{19}{32}\text{Subst}\left(\int \frac{1}{1-2x^2}\,dx,x,\coth(x)\right)\\
&= \frac{19\tanh^{-1}\left(\frac{\tanh(x)}{\sqrt{2}}\right)}{32\sqrt{2}}-\frac{\cosh(x)\sinh(x)}{8\left(1+\cosh^2(x)\right)^2}-\frac{9\cosh(x)\sinh(x)}{32\left(1+\cosh^2(x)\right)}
\end{aligned}
$$

Mathematica [A]
time = 0.13, size = 51, normalized size = 1.00

$$
\frac{19\tanh^{-1}\left(\frac{\tanh(x)}{\sqrt{2}}\right)}{32\sqrt{2}}-\frac{\sinh(2x)}{4(3+\cosh(2x))^2}-\frac{9\sinh(2x)}{32(3+\cosh(2x))}
$$

Antiderivative was successfully verified.

```
[In] Integrate[(1 + Cosh[x]^2)^(-3),x]
```

```
[Out] (19*ArcTanh[Tanh[x]/Sqrt[2]])/(32*Sqrt[2]) - Sinh[2*x]/(4*(3 + Cosh[2*x])^2
) - (9*Sinh[2*x])/(32*(3 + Cosh[2*x]))
```

Maple [B] Leaf count of result is larger than twice the leaf count of optimal. 182 vs. $2(42) = 84$.
time = 0.38, size = 183, normalized size = 3.59

method	result
risch	$\frac{19\,e^{6x}+171\,e^{4x}+89\,e^{2x}+9}{16\left(e^{4x}+6\,e^{2x}+1\right)^{2}}+\frac{19\sqrt{2}\,\ln\left(e^{2x}+3-2\sqrt{2}\right)}{128}-\frac{19\sqrt{2}\,\ln\left(e^{2x}+3+2\sqrt{2}\right)}{128}$
default	$-\frac{\frac{11\left(\tanh^{7}\left(\frac{x}{2}\right)\right)}{8}+\frac{7\left(\tanh^{5}\left(\frac{x}{2}\right)\right)}{8}+\frac{7\left(\tanh^{3}\left(\frac{x}{2}\right)\right)}{8}+\frac{11\tanh\left(\frac{x}{2}\right)}{8}}{4\left(\tanh^{4}\left(\frac{x}{2}\right)+1\right)^{2}}+\frac{19\sqrt{2}\left(\ln\left(\frac{\tanh^{2}\left(\frac{x}{2}\right)+\tanh\left(\frac{x}{2}\right)\sqrt{2}+1}{\tanh^{2}\left(\frac{x}{2}\right)-\tanh\left(\frac{x}{2}\right)\sqrt{2}+1}\right)+2\arctan\left(\tanh\left(\frac{x}{2}\right)\sqrt{2}\right.\right.}{256}$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(1/(cosh(x)^2+1)^3,x,method=_RETURNVERBOSE)
```

```
[Out] -1/4*(11/8*tanh(1/2*x)^7+7/8*tanh(1/2*x)^5+7/8*tanh(1/2*x)^3+11/8*tanh(1/2*
x))/(tanh(1/2*x)^4+1)^2+19/256*2^(1/2)*(ln((tanh(1/2*x)^2+tanh(1/2*x)*2^(1/
2)+1)/(tanh(1/2*x)^2-tanh(1/2*x)*2^(1/2)+1))+2*arctan(tanh(1/2*x)*2^(1/2)+1
)+2*arctan(tanh(1/2*x)*2^(1/2)-1))-19/256*2^(1/2)*(ln((tanh(1/2*x)^2-tanh(1
/2*x)*2^(1/2)+1)/(tanh(1/2*x)^2+tanh(1/2*x)*2^(1/2)+1))+2*arctan(tanh(1/2*x
)*2^(1/2)+1)+2*arctan(tanh(1/2*x)*2^(1/2)-1))
```

Maxima [A]
time = 0.48, size = 83, normalized size = 1.63

$$-\frac{19}{128}\sqrt{2}\log\left(-\frac{2\sqrt{2}-e^{(-2x)}-3}{2\sqrt{2}+e^{(-2x)}+3}\right)-\frac{89\,e^{(-2x)}+171\,e^{(-4x)}+19\,e^{(-6x)}+9}{16\left(12\,e^{(-2x)}+38\,e^{(-4x)}+12\,e^{(-6x)}+e^{(-8x)}+1\right)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(1+cosh(x)^2)^3,x, algorithm="maxima")
```

```
[Out] -19/128*sqrt(2)*log(-(2*sqrt(2) - e^(-2*x) - 3)/(2*sqrt(2) + e^(-2*x) + 3))
 - 1/16*(89*e^(-2*x) + 171*e^(-4*x) + 19*e^(-6*x) + 9)/(12*e^(-2*x) + 38*e^
(-4*x) + 12*e^(-6*x) + e^(-8*x) + 1)
```

Fricas [B] Leaf count of result is larger than twice the leaf count of optimal. 575 vs. $2(42) = 84$.
time = 0.50, size = 575, normalized size = 11.27

$$\frac{152\cosh(x)^6+912\cosh(x)\sinh(x)^5+152\sinh(x)^6+456\left(5\cosh(x)^2+3\right)\sinh(x)^4+1368\cosh(x)^4+608\left(5\cosh(x)^3+9\cosh(x)\right)\sinh(x)^3+8\left(285\cosh(x)^4+1026\cosh(x)^2+89\right)\sinh(x)^2+712\cosh(x)^2+19\left(\sqrt{2}\cosh(x)^8+8\sqrt{2}\cosh(x)\sinh(x)^7+\sqrt{2}\sinh(x)^8+4\left(7\sqrt{2}\cosh(x)^2+3\sqrt{2}\right)\sinh(x)^6+12\sqrt{2}\cosh(x)^6+8\left(7\sqrt{2}\cosh(x)^3+9\sqrt{2}\cosh(x)\right)\sinh(x)^5+2\left(35\sqrt{2}\cosh(x)^4+90\sqrt{2}\cosh(x)^2+19\sqrt{2}\right)\sinh(x)^4+38\sqrt{2}\cosh(x)^4+8\left(7\sqrt{2}\cosh(x)^5+30\sqrt{2}\cosh(x)^3+19\sqrt{2}\cosh(x)\right)\sinh(x)^3+4\left(7\sqrt{2}\cosh(x)^6+45\sqrt{2}\cosh(x)^4+57\sqrt{2}\cosh(x)^2+3\sqrt{2}\right)\sinh(x)^2+12\sqrt{2}\cosh(x)^2+8\left(\sqrt{2}\cosh(x)^7+9\sqrt{2}\cosh(x)^5+19\sqrt{2}\cosh(x)^3+3\sqrt{2}\cosh(x)\right)\sinh(x)+\sqrt{2}\right)\log\left(-\frac{3\left(2\sqrt{2}-3\right)\cosh(x)^2-4\left(3\sqrt{2}-4\right)\cosh(x)\sinh(x)+3\left(2\sqrt{2}-3\right)\sinh(x)^2+2\sqrt{2}-3}{\cosh(x)^2+\sinh(x)^2+3}\right)+16\left(57\cosh(x)^5+342\cosh(x)^3+89\cosh(x)\right)\sinh(x)+72}{128\left(\cosh(x)^8+8\cosh(x)\sinh(x)^7+\sinh(x)^8+4\left(7\cosh(x)^2+3\right)\sinh(x)^6+12\cosh(x)^6+8\left(7\cosh(x)^3+9\cosh(x)\right)\sinh(x)^5+2\left(35\cosh(x)^4+90\cosh(x)^2+19\right)\sinh(x)^4+38\cosh(x)^4+8\left(7\cosh(x)^5+30\cosh(x)^3+19\cosh(x)\right)\sinh(x)^3+4\left(7\cosh(x)^6+45\cosh(x)^4+57\cosh(x)^2+3\right)\sinh(x)^2+12\cosh(x)^2+8\left(\cosh(x)^7+9\cosh(x)^5+19\cosh(x)^3+3\cosh(x)\right)\sinh(x)+1\right)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(1+cosh(x)^2)^3,x, algorithm="fricas")
```

```
[Out] 1/128*(152*cosh(x)^6 + 912*cosh(x)*sinh(x)^5 + 152*sinh(x)^6 + 456*(5*cosh(
x)^2 + 3)*sinh(x)^4 + 1368*cosh(x)^4 + 608*(5*cosh(x)^3 + 9*cosh(x))*sinh(x
```

```
)^3 + 8*(285*cosh(x)^4 + 1026*cosh(x)^2 + 89)*sinh(x)^2 + 712*cosh(x)^2 + 1
9*(sqrt(2)*cosh(x)^8 + 8*sqrt(2)*cosh(x)*sinh(x)^7 + sqrt(2)*sinh(x)^8 + 4*
(7*sqrt(2)*cosh(x)^2 + 3*sqrt(2))*sinh(x)^6 + 12*sqrt(2)*cosh(x)^6 + 8*(7*s
qrt(2)*cosh(x)^3 + 9*sqrt(2)*cosh(x))*sinh(x)^5 + 2*(35*sqrt(2)*cosh(x)^4 +
 90*sqrt(2)*cosh(x)^2 + 19*sqrt(2))*sinh(x)^4 + 38*sqrt(2)*cosh(x)^4 + 8*(7
*sqrt(2)*cosh(x)^5 + 30*sqrt(2)*cosh(x)^3 + 19*sqrt(2)*cosh(x))*sinh(x)^3 +
 4*(7*sqrt(2)*cosh(x)^6 + 45*sqrt(2)*cosh(x)^4 + 57*sqrt(2)*cosh(x)^2 + 3*s
qrt(2))*sinh(x)^2 + 12*sqrt(2)*cosh(x)^2 + 8*(sqrt(2)*cosh(x)^7 + 9*sqrt(2)
*cosh(x)^5 + 19*sqrt(2)*cosh(x)^3 + 3*sqrt(2)*cosh(x))*sinh(x) + sqrt(2))*l
og(-(3*(2*sqrt(2) - 3)*cosh(x)^2 - 4*(3*sqrt(2) - 4)*cosh(x)*sinh(x) + 3*(2
*sqrt(2) - 3)*sinh(x)^2 + 2*sqrt(2) - 3)/(cosh(x)^2 + sinh(x)^2 + 3)) + 16*
(57*cosh(x)^5 + 342*cosh(x)^3 + 89*cosh(x))*sinh(x) + 72)/(cosh(x)^8 + 8*co
sh(x)*sinh(x)^7 + sinh(x)^8 + 4*(7*cosh(x)^2 + 3)*sinh(x)^6 + 12*cosh(x)^6
+ 8*(7*cosh(x)^3 + 9*cosh(x))*sinh(x)^5 + 2*(35*cosh(x)^4 + 90*cosh(x)^2 +
19)*sinh(x)^4 + 38*cosh(x)^4 + 8*(7*cosh(x)^5 + 30*cosh(x)^3 + 19*cosh(x))*
sinh(x)^3 + 4*(7*cosh(x)^6 + 45*cosh(x)^4 + 57*cosh(x)^2 + 3)*sinh(x)^2 + 1
2*cosh(x)^2 + 8*(cosh(x)^7 + 9*cosh(x)^5 + 19*cosh(x)^3 + 3*cosh(x))*sinh(x
) + 1)
```

Sympy [B] Leaf count of result is larger than twice the leaf count of optimal. 428 vs. $2(53) = 106$.
time = 3.99, size = 428, normalized size = 8.39

$$-\frac{19\sqrt{2}\log\left(4\tanh^{2}\left(\frac{x}{2}\right)-4\sqrt{2}\tanh\left(\frac{x}{2}\right)+4\right)\tanh^{8}\left(\frac{x}{2}\right)}{128\tanh^{8}\left(\frac{x}{2}\right)+256\tanh^{4}\left(\frac{x}{2}\right)+128}-\frac{38\sqrt{2}\log\left(4\tanh^{2}\left(\frac{x}{2}\right)-4\sqrt{2}\tanh\left(\frac{x}{2}\right)+4\right)\tanh^{4}\left(\frac{x}{2}\right)}{128\tanh^{8}\left(\frac{x}{2}\right)+256\tanh^{4}\left(\frac{x}{2}\right)+128}-\frac{19\sqrt{2}\log\left(4\tanh^{2}\left(\frac{x}{2}\right)-4\sqrt{2}\tanh\left(\frac{x}{2}\right)+4\right)}{128\tanh^{8}\left(\frac{x}{2}\right)+256\tanh^{4}\left(\frac{x}{2}\right)+128}+\frac{19\sqrt{2}\log\left(4\tanh^{2}\left(\frac{x}{2}\right)+4\sqrt{2}\tanh\left(\frac{x}{2}\right)+4\right)\tanh^{8}\left(\frac{x}{2}\right)}{128\tanh^{8}\left(\frac{x}{2}\right)+256\tanh^{4}\left(\frac{x}{2}\right)+128}+\frac{38\sqrt{2}\log\left(4\tanh^{2}\left(\frac{x}{2}\right)+4\sqrt{2}\tanh\left(\frac{x}{2}\right)+4\right)\tanh^{4}\left(\frac{x}{2}\right)}{128\tanh^{8}\left(\frac{x}{2}\right)+256\tanh^{4}\left(\frac{x}{2}\right)+128}+\frac{19\sqrt{2}\log\left(4\tanh^{2}\left(\frac{x}{2}\right)+4\sqrt{2}\tanh\left(\frac{x}{2}\right)+4\right)}{128\tanh^{8}\left(\frac{x}{2}\right)+256\tanh^{4}\left(\frac{x}{2}\right)+128}-\frac{44\tanh^{7}\left(\frac{x}{2}\right)}{128\tanh^{8}\left(\frac{x}{2}\right)+256\tanh^{4}\left(\frac{x}{2}\right)+128}-\frac{28\tanh^{5}\left(\frac{x}{2}\right)}{128\tanh^{8}\left(\frac{x}{2}\right)+256\tanh^{4}\left(\frac{x}{2}\right)+128}-\frac{28\tanh^{3}\left(\frac{x}{2}\right)}{128\tanh^{8}\left(\frac{x}{2}\right)+256\tanh^{4}\left(\frac{x}{2}\right)+128}-\frac{44\tanh\left(\frac{x}{2}\right)}{128\tanh^{8}\left(\frac{x}{2}\right)+256\tanh^{4}\left(\frac{x}{2}\right)+128}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(1+cosh(x)**2)**3,x)
```

```
[Out] -19*sqrt(2)*log(4*tanh(x/2)**2 - 4*sqrt(2)*tanh(x/2) + 4)*tanh(x/2)**8/(128
*tanh(x/2)**8 + 256*tanh(x/2)**4 + 128) - 38*sqrt(2)*log(4*tanh(x/2)**2 - 4
*sqrt(2)*tanh(x/2) + 4)*tanh(x/2)**4/(128*tanh(x/2)**8 + 256*tanh(x/2)**4 +
 128) - 19*sqrt(2)*log(4*tanh(x/2)**2 - 4*sqrt(2)*tanh(x/2) + 4)/(128*tanh(
x/2)**8 + 256*tanh(x/2)**4 + 128) + 19*sqrt(2)*log(4*tanh(x/2)**2 + 4*sqrt(
2)*tanh(x/2) + 4)*tanh(x/2)**8/(128*tanh(x/2)**8 + 256*tanh(x/2)**4 + 128)
+ 38*sqrt(2)*log(4*tanh(x/2)**2 + 4*sqrt(2)*tanh(x/2) + 4)*tanh(x/2)**4/(12
8*tanh(x/2)**8 + 256*tanh(x/2)**4 + 128) + 19*sqrt(2)*log(4*tanh(x/2)**2 +
4*sqrt(2)*tanh(x/2) + 4)/(128*tanh(x/2)**8 + 256*tanh(x/2)**4 + 128) - 44*t
anh(x/2)**7/(128*tanh(x/2)**8 + 256*tanh(x/2)**4 + 128) - 28*tanh(x/2)**5/(
128*tanh(x/2)**8 + 256*tanh(x/2)**4 + 128) - 28*tanh(x/2)**3/(128*tanh(x/2)
**8 + 256*tanh(x/2)**4 + 128) - 44*tanh(x/2)/(128*tanh(x/2)**8 + 256*tanh(x
/2)**4 + 128)
```

Giac [A]
time = 0.41, size = 71, normalized size = 1.39

$$\frac{19}{128}\sqrt{2}\log\left(-\frac{2\sqrt{2}-e^{(2x)}-3}{2\sqrt{2}+e^{(2x)}+3}\right)+\frac{19e^{(6x)}+171e^{(4x)}+89e^{(2x)}+9}{16\left(e^{(4x)}+6e^{(2x)}+1\right)^{2}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(1+cosh(x)^2)^3,x, algorithm="giac")
```

```
[Out] 19/128*sqrt(2)*log(-(2*sqrt(2) - e^(2*x) - 3)/(2*sqrt(2) + e^(2*x) + 3)) +
1/16*(19*e^(6*x) + 171*e^(4*x) + 89*e^(2*x) + 9)/(e^(4*x) + 6*e^(2*x) + 1)^
2
```

Mupad [B]
time = 1.00, size = 112, normalized size = 2.20

$$\frac{19\sqrt{2}\,\ln\left(-\frac{19\,e^{2\,x}}{8}-\frac{19\sqrt{2}\,\left(12\,e^{2\,x}+4\right)}{128}\right)}{128}-\frac{17\,e^{2\,x}+3}{12\,e^{2\,x}+38\,e^{4\,x}+12\,e^{6\,x}+e^{8\,x}+1}-\frac{19\sqrt{2}\,\ln\left(\frac{19\sqrt{2}\,\left(12\,e^{2\,x}+4\right)}{128}-\frac{19\,e^{2\,x}}{8}\right)}{128}+\frac{\frac{19\,e^{2\,x}}{16}+\frac{57}{16}}{6\,e^{2\,x}+e^{4\,x}+1}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(1/(cosh(x)^2 + 1)^3,x)
```

```
[Out] (19*2^(1/2)*log(- (19*exp(2*x))/8 - (19*2^(1/2)*(12*exp(2*x) + 4))/128))/12
8 - (17*exp(2*x) + 3)/(12*exp(2*x) + 38*exp(4*x) + 12*exp(6*x) + exp(8*x) +
 1) - (19*2^(1/2)*log((19*2^(1/2)*(12*exp(2*x) + 4))/128 - (19*exp(2*x))/8)
)/128 + ((19*exp(2*x))/16 + 57/16)/(6*exp(2*x) + exp(4*x) + 1)
```

3.38 $\int \frac{1}{1-\cosh^2(x)} \, dx$

Optimal. Leaf size=2

$$\coth(x)$$

```
[Out] coth(x)
```

Rubi [A]
time = 0.01, antiderivative size = 2, normalized size of antiderivative = 1.00, number of steps used = 3, number of rules used = 3, integrand size = 10, $\frac{\text{number of rules}}{\text{integrand size}} = 0.300$, Rules used = {3254, 3852, 8}

$$\coth(x)$$

Antiderivative was successfully verified.

```
[In] Int[(1 - Cosh[x]^2)^(-1),x]
```

```
[Out] Coth[x]
```

Rule 8

```
Int[a_, x_Symbol] :> Simp[a*x, x] /; FreeQ[a, x]
```

Rule 3254

```
Int[(u_.)*((a_) + (b_.)*sin[(e_.) + (f_.)*(x_)]^2)^(p_), x_Symbol] :> Dist[
a^p, Int[ActivateTrig[u*cos[e + f*x]^(2*p)], x], x] /; FreeQ[{a, b, e, f, p
}, x] && EqQ[a + b, 0] && IntegerQ[p]
```

Rule 3852

```
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]
```

Rubi steps

$$\begin{aligned} \int \frac{1}{1-\cosh^2(x)} \, dx &= -\int \operatorname{csch}^2(x) \, dx \\ &= i\text{Subst}\left(\int 1 \, dx, x, -i\coth(x)\right) \\ &= \coth(x) \end{aligned}$$

Mathematica [A]
time = 0.00, size = 2, normalized size = 1.00

$$\coth(x)$$

Antiderivative was successfully verified.

```
[In] Integrate[(1 - Cosh[x]^2)^(-1),x]
```

```
[Out] Coth[x]
```

Maple [B] Leaf count of result is larger than twice the leaf count of optimal. 15 vs. 2(2) = 4.
time = 0.45, size = 16, normalized size = 8.00

method	result	size
risch	$\frac{2}{e^{2x}-1}$	11
default	$\frac{\tanh\left(\frac{x}{2}\right)}{2}+\frac{1}{2\tanh\left(\frac{x}{2}\right)}$	16

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(1/(1-cosh(x)^2),x,method=_RETURNVERBOSE)
```

```
[Out] 1/2*tanh(1/2*x)+1/2/tanh(1/2*x)
```

Maxima [B] Leaf count of result is larger than twice the leaf count of optimal. 10 vs. 2(2) = 4.
time = 0.26, size = 10, normalized size = 5.00

$$-\frac{2}{e^{(-2x)}-1}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(1-cosh(x)^2),x, algorithm="maxima")
```

```
[Out] -2/(e^(-2*x) - 1)
```

Fricas [B] Leaf count of result is larger than twice the leaf count of optimal. 20 vs. 2(2) = 4.
time = 0.36, size = 20, normalized size = 10.00

$$\frac{2}{\cosh(x)^2+2\cosh(x)\sinh(x)+\sinh(x)^2-1}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(1-cosh(x)^2),x, algorithm="fricas")
```

```
[Out] 2/(cosh(x)^2 + 2*cosh(x)*sinh(x) + sinh(x)^2 - 1)
```

Sympy [B] Leaf count of result is larger than twice the leaf count of optimal. 14 vs. $2(2) = 4$.
time = 0.21, size = 14, normalized size = 7.00

$$\frac{\tanh\left(\frac{x}{2}\right)}{2} + \frac{1}{2\tanh\left(\frac{x}{2}\right)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(1-cosh(x)**2),x)
```

```
[Out] tanh(x/2)/2 + 1/(2*tanh(x/2))
```

Giac [B] Leaf count of result is larger than twice the leaf count of optimal. 10 vs. $2(2) = 4$.
time = 0.40, size = 10, normalized size = 5.00

$$\frac{2}{e^{(2x)} - 1}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(1-cosh(x)^2),x, algorithm="giac")
```

```
[Out] 2/(e^(2*x) - 1)
```

Mupad [B]
time = 0.06, size = 10, normalized size = 5.00

$$\frac{2}{e^{2x} - 1}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(-1/(cosh(x)^2 - 1),x)
```

```
[Out] 2/(exp(2*x) - 1)
```

3.39 $\int \frac{1}{\left(1-\cosh^2(x)\right)^2}\,dx$

Optimal. Leaf size=11

$$\coth(x)-\frac{\coth^3(x)}{3}$$

```
[Out] coth(x)-1/3*coth(x)^3
```

Rubi [A]
time = 0.01, antiderivative size = 11, normalized size of antiderivative = 1.00, number of steps used = 3, number of rules used = 2, integrand size = 10, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.200, Rules used = {3254, 3852}

$$\coth(x)-\frac{\coth^3(x)}{3}$$

Antiderivative was successfully verified.

```
[In] Int[(1 - Cosh[x]^2)^(-2),x]
```

```
[Out] Coth[x] - Coth[x]^3/3
```

Rule 3254

```
Int[(u_.)*((a_) + (b_.)*sin[(e_.) + (f_.)*(x_)]^2)^(p_), x_Symbol] :> Dist[
a^p, Int[ActivateTrig[u*cos[e + f*x]^(2*p)], x], x] /; FreeQ[{a, b, e, f, p
}, x] && EqQ[a + b, 0] && IntegerQ[p]
```

Rule 3852

```
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]
```

Rubi steps

$$\begin{aligned}
\int \frac{1}{\left(1-\cosh^2(x)\right)^2}\,dx &= \int \operatorname{csch}^4(x)\,dx\\
&= i\text{Subst}\left(\int \left(1+x^2\right)\,dx, x, -i\coth(x)\right)\\
&= \coth(x)-\frac{\coth^3(x)}{3}
\end{aligned}$$

Mathematica [A]
time = 0.00, size = 17, normalized size = 1.55

$$\frac{2\coth(x)}{3} - \frac{1}{3}\coth(x)\operatorname{csch}^2(x)$$

Antiderivative was successfully verified.

```
[In] Integrate[(1 - Cosh[x]^2)^(-2),x]
[Out] (2*Coth[x])/3 - (Coth[x]*Csch[x]^2)/3
```

Maple [B] Leaf count of result is larger than twice the leaf count of optimal. 31 vs. 2(9) = 18.
time = 0.45, size = 32, normalized size = 2.91

method	result	size
risch	$-\frac{4(3\,\mathrm{e}^{2x}-1)}{3(\mathrm{e}^{2x}-1)^3}$	19
default	$-\frac{(\tanh^3(\frac{x}{2}))}{24}+\frac{3\tanh(\frac{x}{2})}{8}-\frac{1}{24\tanh(\frac{x}{2})^3}+\frac{3}{8\tanh(\frac{x}{2})}$	32

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(1/(1-cosh(x)^2)^2,x,method=_RETURNVERBOSE)
[Out] -1/24*tanh(1/2*x)^3+3/8*tanh(1/2*x)-1/24/tanh(1/2*x)^3+3/8/tanh(1/2*x)
```

Maxima [B] Leaf count of result is larger than twice the leaf count of optimal. 49 vs. 2(9) = 18.
time = 0.27, size = 49, normalized size = 4.45

$$\frac{4\,e^{(-2\,x)}}{3\,e^{(-2\,x)} - 3\,e^{(-4\,x)} + e^{(-6\,x)} - 1} - \frac{4}{3\,(3\,e^{(-2\,x)} - 3\,e^{(-4\,x)} + e^{(-6\,x)} - 1)}$$

Verification of antiderivative is not currently implemented for this CAS.

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

Fricas [B] Leaf count of result is larger than twice the leaf count of optimal. 84 vs. 2(9) = 18.
time = 0.39, size = 84, normalized size = 7.64

$$-\frac{8\,(\cosh(x) + 2\,\sinh(x))}{3\,(\cosh(x)^5 + 5\,\cosh(x)\sinh(x)^4 + \sinh(x)^5 + (10\,\cosh(x)^2 - 3)\,\sinh(x)^3 - 3\,\cosh(x)^3 + (10\,\cosh(x)^3 - 9\,\cosh(x))\,\sinh(x)^2 + (5\,\cosh(x)^4 - 9\,\cosh(x)^2 + 4)\,\sinh(x) + 2\,\cosh(x))}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(1-cosh(x)^2)^2,x, algorithm="fricas")
```

```
[Out] -8/3*(cosh(x) + 2*sinh(x))/(cosh(x)^5 + 5*cosh(x)*sinh(x)^4 + sinh(x)^5 + (
10*cosh(x)^2 - 3)*sinh(x)^3 - 3*cosh(x)^3 + (10*cosh(x)^3 - 9*cosh(x))*sinh
(x)^2 + (5*cosh(x)^4 - 9*cosh(x)^2 + 4)*sinh(x) + 2*cosh(x))
```

Sympy [B] Leaf count of result is larger than twice the leaf count of optimal. 34 vs. $2(8) = 16$.
time = 0.52, size = 34, normalized size = 3.09

$$-\frac{\tanh^3\left(\frac{x}{2}\right)}{24}+\frac{3\tanh\left(\frac{x}{2}\right)}{8}+\frac{3}{8\tanh\left(\frac{x}{2}\right)}-\frac{1}{24\tanh^3\left(\frac{x}{2}\right)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(1-cosh(x)**2)**2,x)
[Out] -tanh(x/2)**3/24 + 3*tanh(x/2)/8 + 3/(8*tanh(x/2)) - 1/(24*tanh(x/2)**3)
```

Giac [A]
time = 0.41, size = 18, normalized size = 1.64

$$-\frac{4\left(3\,e^{(2\,x)}-1\right)}{3\left(e^{(2\,x)}-1\right)^3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(1-cosh(x)^2)^2,x, algorithm="giac")
[Out] -4/3*(3*e^(2*x) - 1)/(e^(2*x) - 1)^3
```

Mupad [B]
time = 0.98, size = 18, normalized size = 1.64

$$-\frac{4\left(3\,e^{2\,x}-1\right)}{3\left(e^{2\,x}-1\right)^3}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(1/(cosh(x)^2 - 1)^2,x)
[Out] -(4*(3*exp(2*x) - 1))/(3*(exp(2*x) - 1)^3)
```

3.40 $\int \frac{1}{(1-\cosh^2(x))^3} \, dx$

Optimal. Leaf size=19

$$\coth(x) - \frac{2\coth^3(x)}{3} + \frac{\coth^5(x)}{5}$$

```
[Out] coth(x)-2/3*coth(x)^3+1/5*coth(x)^5
```

Rubi [A]
time = 0.01, antiderivative size = 19, normalized size of antiderivative = 1.00, number of steps used = 3, number of rules used = 2, integrand size = 10, $\frac{\text{number of rules}}{\text{integrand size}} = 0.200$, Rules used = {3254, 3852}

$$\frac{\coth^5(x)}{5} - \frac{2\coth^3(x)}{3} + \coth(x)$$

Antiderivative was successfully verified.

```
[In] Int[(1 - Cosh[x]^2)^(-3),x]
```

```
[Out] Coth[x] - (2*Coth[x]^3)/3 + Coth[x]^5/5
```

Rule 3254

```
Int[(u_.)*((a_) + (b_.)*sin[(e_.) + (f_.)*(x_)]^2)^(p_), x_Symbol] :> Dist[
a^p, Int[ActivateTrig[u*cos[e + f*x]^(2*p)], x], x] /; FreeQ[{a, b, e, f, p
}, x] && EqQ[a + b, 0] && IntegerQ[p]
```

Rule 3852

```
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]
```

Rubi steps

$$\begin{aligned}
\int \frac{1}{(1-\cosh^2(x))^3} \, dx &= -\int \operatorname{csch}^6(x) \, dx \\
&= i\text{Subst}\left(\int \left(1+2x^2+x^4\right) \, dx, x, -i\coth(x)\right) \\
&= \coth(x) - \frac{2\coth^3(x)}{3} + \frac{\coth^5(x)}{5}
\end{aligned}$$

Mathematica [A]
time = 0.00, size = 27, normalized size = 1.42

$$\frac{8\coth(x)}{15}-\frac{4}{15}\coth(x)\text{csch}^2(x)+\frac{1}{5}\coth(x)\text{csch}^4(x)$$

Antiderivative was successfully verified.

```
[In] Integrate[(1 - Cosh[x]^2)^(-3),x]
```

```
[Out] (8*Coth[x])/15 - (4*Coth[x]*Csch[x]^2)/15 + (Coth[x]*Csch[x]^4)/5
```

Maple [B] Leaf count of result is larger than twice the leaf count of optimal. 47 vs. $2(15) = 30$.
time = 0.48, size = 48, normalized size = 2.53

method	result	size
risch	$\frac{\frac{32\,e^{4x}}{3}-\frac{16\,e^{2x}}{3}+\frac{16}{15}}{\left(e^{2x}-1\right)^5}$	25
default	$\frac{\left(\tanh^5\left(\frac{x}{2}\right)\right)}{160}-\frac{5\left(\tanh^3\left(\frac{x}{2}\right)\right)}{96}+\frac{5\tanh\left(\frac{x}{2}\right)}{16}+\frac{5}{16\tanh\left(\frac{x}{2}\right)}+\frac{1}{160\tanh\left(\frac{x}{2}\right)^5}-\frac{5}{96\tanh\left(\frac{x}{2}\right)^3}$	48

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(1/(1-cosh(x)^2)^3,x,method=_RETURNVERBOSE)
```

```
[Out] 1/160*tanh(1/2*x)^5-5/96*tanh(1/2*x)^3+5/16*tanh(1/2*x)+5/16/tanh(1/2*x)+1/
160/tanh(1/2*x)^5-5/96/tanh(1/2*x)^3
```

Maxima [B] Leaf count of result is larger than twice the leaf count of optimal. 111 vs. $2(15) = 30$.
time = 0.27, size = 111, normalized size = 5.84

$$\frac{16\,e^{(-2x)}}{3\left(5\,e^{(-2x)}-10\,e^{(-4x)}+10\,e^{(-6x)}-5\,e^{(-8x)}+e^{(-10x)}-1\right)}-\frac{32\,e^{(-4x)}}{3\left(5\,e^{(-2x)}-10\,e^{(-4x)}+10\,e^{(-6x)}-5\,e^{(-8x)}+e^{(-10x)}-1\right)}-\frac{16}{15\left(5\,e^{(-2x)}-10\,e^{(-4x)}+10\,e^{(-6x)}-5\,e^{(-8x)}+e^{(-10x)}-1\right)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(1-cosh(x)^2)^3,x, algorithm="maxima")
```

```
[Out] 16/3*e^(-2*x)/(5*e^(-2*x) - 10*e^(-4*x) + 10*e^(-6*x) - 5*e^(-8*x) + e^(-10
*x) - 1) - 32/3*e^(-4*x)/(5*e^(-2*x) - 10*e^(-4*x) + 10*e^(-6*x) - 5*e^(-8*
x) + e^(-10*x) - 1) - 16/15/(5*e^(-2*x) - 10*e^(-4*x) + 10*e^(-6*x) - 5*e^(
-8*x) + e^(-10*x) - 1)
```

Fricas [B] Leaf count of result is larger than twice the leaf count of optimal. 185 vs. $2(15) = 30$.
time = 0.37, size = 185, normalized size = 9.74

$$\frac{16\left(11\cosh(x)^2+18\cosh(x)\sinh(x)+11\sinh(x)^2-5\right)}{15\left(\cosh(x)^8+8\cosh(x)\sinh(x)^7+\sinh(x)^8+\left(28\cosh(x)^2-5\right)\sinh(x)^6-5\cosh(x)^6+2\left(28\cosh(x)^3-15\cosh(x)\right)\sinh(x)^5+5\left(14\cosh(x)^4-15\cosh(x)^2+2\right)\sinh(x)^4+10\cosh(x)^4+4\left(14\cosh(x)^5-25\cosh(x)^3+10\cosh(x)\right)\sinh(x)^3+\left(28\cosh(x)^6-75\cosh(x)^4+60\cosh(x)^2-11\right)\sinh(x)^2-11\cosh(x)^2+2\left(4\cosh(x)^7-15\cosh(x)^5+20\cosh(x)^3-9\cosh(x)\right)\sinh(x)+5\right)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(1-cosh(x)^2)^3,x, algorithm="fricas")
```

```
[Out] 16/15*(11*cosh(x)^2 + 18*cosh(x)*sinh(x) + 11*sinh(x)^2 - 5)/(cosh(x)^8 + 8
*cosh(x)*sinh(x)^7 + sinh(x)^8 + (28*cosh(x)^2 - 5)*sinh(x)^6 - 5*cosh(x)^6
 + 2*(28*cosh(x)^3 - 15*cosh(x))*sinh(x)^5 + 5*(14*cosh(x)^4 - 15*cosh(x)^2
 + 2)*sinh(x)^4 + 10*cosh(x)^4 + 4*(14*cosh(x)^5 - 25*cosh(x)^3 + 10*cosh(x
))*sinh(x)^3 + (28*cosh(x)^6 - 75*cosh(x)^4 + 60*cosh(x)^2 - 11)*sinh(x)^2
- 11*cosh(x)^2 + 2*(4*cosh(x)^7 - 15*cosh(x)^5 + 20*cosh(x)^3 - 9*cosh(x))*
sinh(x) + 5)
```

Sympy [B] Leaf count of result is larger than twice the leaf count of optimal. 54 vs. $2(17) = 34$.
time = 1.26, size = 54, normalized size = 2.84

$$\frac{\tanh^5\left(\frac{x}{2}\right)}{160}-\frac{5\tanh^3\left(\frac{x}{2}\right)}{96}+\frac{5\tanh\left(\frac{x}{2}\right)}{16}+\frac{5}{16\tanh\left(\frac{x}{2}\right)}-\frac{5}{96\tanh^3\left(\frac{x}{2}\right)}+\frac{1}{160\tanh^5\left(\frac{x}{2}\right)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(1-cosh(x)**2)**3,x)
```

```
[Out] tanh(x/2)**5/160 - 5*tanh(x/2)**3/96 + 5*tanh(x/2)/16 + 5/(16*tanh(x/2)) -
5/(96*tanh(x/2)**3) + 1/(160*tanh(x/2)**5)
```

Giac [A]
time = 0.41, size = 24, normalized size = 1.26

$$\frac{16\left(10\,e^{(4\,x)}-5\,e^{(2\,x)}+1\right)}{15\left(e^{(2\,x)}-1\right)^5}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(1-cosh(x)^2)^3,x, algorithm="giac")
```

```
[Out] 16/15*(10*e^(4*x) - 5*e^(2*x) + 1)/(e^(2*x) - 1)^5
```

Mupad [B]
time = 0.06, size = 24, normalized size = 1.26

$$\frac{16\left(10\,e^{4\,x}-5\,e^{2\,x}+1\right)}{15\left(e^{2\,x}-1\right)^5}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(-1/(cosh(x)^2 - 1)^3,x)
```

```
[Out] (16*(10*exp(4*x) - 5*exp(2*x) + 1))/(15*(exp(2*x) - 1)^5)
```

3.41 $\int \sqrt{a+b\cosh^2(x)}\,dx$

Optimal. Leaf size=49

$$-\frac{i\sqrt{a+b\cosh^2(x)}\,E\left(\frac{\pi}{2}+ix|-\frac{b}{a}\right)}{\sqrt{1+\frac{b\cosh^2(x)}{a}}}$$

```
[Out] (-sinh(x)^2)^(1/2)/sinh(x)*EllipticE(cosh(x),(-b/a)^(1/2))*(a+b*cosh(x)^2)^
(1/2)/(1+b*cosh(x)^2/a)^(1/2)
```

Rubi [A]
time = 0.02, antiderivative size = 49, 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 = {3257, 3256}

$$-\frac{i\sqrt{a+b\cosh^2(x)}\,E\left(ix+\frac{\pi}{2}|-\frac{b}{a}\right)}{\sqrt{\frac{b\cosh^2(x)}{a}+1}}$$

Antiderivative was successfully verified.

```
[In] Int[Sqrt[a + b*Cosh[x]^2],x]
```

```
[Out] ((-I)*Sqrt[a + b*Cosh[x]^2]*EllipticE[Pi/2 + I*x, -(b/a)])/Sqrt[1 + (b*Cosh
[x]^2)/a]
```

Rule 3256

```
Int[Sqrt[(a_) + (b_.)*sin[(e_.) + (f_.)*(x_)]^2], x_Symbol] :> Simp[(Sqrt[a
]/f)*EllipticE[e + f*x, -b/a], x] /; FreeQ[{a, b, e, f}, x] && GtQ[a, 0]
```

Rule 3257

```
Int[Sqrt[(a_) + (b_.)*sin[(e_.) + (f_.)*(x_)]^2], x_Symbol] :> Dist[Sqrt[a
+ b*Sin[e + f*x]^2]/Sqrt[1 + b*(Sin[e + f*x]^2/a)], Int[Sqrt[1 + (b*Sin[e +
 f*x]^2)/a], x], x] /; FreeQ[{a, b, e, f}, x] &&  !GtQ[a, 0]
```

Rubi steps

$$\int \sqrt{a+b\cosh^2(x)}\,dx = \frac{\sqrt{a+b\cosh^2(x)}\int \sqrt{1+\frac{b\cosh^2(x)}{a}}\,dx}{\sqrt{1+\frac{b\cosh^2(x)}{a}}}$$
$$= -\frac{i\sqrt{a+b\cosh^2(x)}\,E\left(\frac{\pi}{2}+ix\middle|-\frac{b}{a}\right)}{\sqrt{1+\frac{b\cosh^2(x)}{a}}}$$

Mathematica [A]
time = 0.06, size = 53, normalized size = 1.08

$$-\frac{i\sqrt{2a+b+b\cosh(2x)}\,E\left(ix\middle|\frac{b}{a+b}\right)}{\sqrt{\frac{2a+b+b\cosh(2x)}{a+b}}}$$

Antiderivative was successfully verified.

```
[In] Integrate[Sqrt[a + b*Cosh[x]^2],x]
```

```
[Out] ((-I)*Sqrt[2*a + b + b*Cosh[2*x]]*EllipticE[I*x, b/(a + b)])/Sqrt[(2*a + b
+ b*Cosh[2*x])/(a + b)]
```

Maple [B] Leaf count of result is larger than twice the leaf count of optimal. 113 vs. $2(47) = 94$.
time = 1.22, size = 114, normalized size = 2.33

method	result
default	$\frac{\sqrt{\frac{a+b(\cosh^2(x))}{a}}\sqrt{-(\sinh^2(x))}\left(a\,\mathrm{EllipticF}\left(\cosh(x)\sqrt{-\frac{b}{a}},\sqrt{-\frac{a}{b}}\right)+b\,\mathrm{EllipticF}\left(\cosh(x)\sqrt{-\frac{b}{a}},\sqrt{-\frac{a}{b}}\right)-b}{\sqrt{-\frac{b}{a}}\,\sinh(x)\sqrt{a+b(\cosh^2(x))}}$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a+b*cosh(x)^2)^(1/2),x,method=_RETURNVERBOSE)
```

```
[Out] ((a+b*cosh(x)^2)/a)^(1/2)*(-sinh(x)^2)^(1/2)*(a*EllipticF(cosh(x)*(-1/a*b)^
(1/2),(-a/b)^(1/2))+b*EllipticF(cosh(x)*(-1/a*b)^(1/2),(-a/b)^(1/2))-b*Elli
pticE(cosh(x)*(-1/a*b)^(1/2),(-a/b)^(1/2)))/(-1/a*b)^(1/2)/sinh(x)/(a+b*cos
h(x)^2)^(1/2)
```

Maxima [F]
time = 0.00, size = 0, normalized size = 0.00

Failed to integrate

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*cosh(x)^2)^(1/2),x, algorithm="maxima")
[Out] integrate(sqrt(b*cosh(x)^2 + a), x)
```

Fricas [F]
time = 0.09, size = 12, normalized size = 0.24

$$\mathrm{integral}\left(\sqrt{b\cosh\left(x\right)^2+a},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*cosh(x)^2)^(1/2),x, algorithm="fricas")
[Out] integral(sqrt(b*cosh(x)^2 + a), x)
```

Sympy [F]
time = 0.00, size = 0, normalized size = 0.00

$$\int\sqrt{a+b\cosh^2\left(x\right)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*cosh(x)**2)**(1/2),x)
[Out] Integral(sqrt(a + b*cosh(x)**2), x)
```

Giac [F]
time = 0.00, size = 0, normalized size = 0.00

could not integrate

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*cosh(x)^2)^(1/2),x, algorithm="giac")
[Out] integrate(sqrt(b*cosh(x)^2 + a), x)
```

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

$$\int\sqrt{b\cosh\left(x\right)^2+a}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

3.42 $\int \sqrt{1+\cosh^2(x)}\,dx$

Optimal. Leaf size=17

$$-iE\left(\frac{\pi}{2}+ix\middle|-1\right)$$

[Out] (-sinh(x)^2)^(1/2)/sinh(x)*EllipticE(cosh(x),I)

Rubi [A]
time = 0.01, antiderivative size = 17, normalized size of antiderivative = 1.00, number of steps used = 1, number of rules used = 1, integrand size = 10, $\frac{\text{number of rules}}{\text{integrand size}} = 0.100$, Rules used = {3256}

$$-iE\left(ix+\frac{\pi}{2}\middle|-1\right)$$

Antiderivative was successfully verified.

```
[In] Int[Sqrt[1 + Cosh[x]^2],x]
```

```
[Out] (-I)*EllipticE[Pi/2 + I*x, -1]
```

Rule 3256

```
Int[Sqrt[(a_) + (b_.)*sin[(e_.) + (f_.)*(x_)]^2], x_Symbol] :> Simp[(Sqrt[a
]/f)*EllipticE[e + f*x, -b/a], x] /; FreeQ[{a, b, e, f}, x] && GtQ[a, 0]
```

Rubi steps

$$\int \sqrt{1+\cosh^2(x)}\,dx = -iE\left(\frac{\pi}{2}+ix\middle|-1\right)$$

Mathematica [A]
time = 0.02, size = 18, normalized size = 1.06

$$-i\sqrt{2}\,E\left(ix\middle|\frac{1}{2}\right)$$

Antiderivative was successfully verified.

```
[In] Integrate[Sqrt[1 + Cosh[x]^2],x]
```

```
[Out] (-I)*Sqrt[2]*EllipticE[I*x, 1/2]
```

Maple [B] Both result and optimal contain complex but leaf count of result is larger than twice the leaf count of optimal. 57 vs. $2(18) = 36$.
time = 1.00, size = 58, normalized size = 3.41

method	result	size
default	$-\frac{i\sqrt{\left(\cosh^2\left(x\right)+1\right)\left(\sinh^2\left(x\right)\right)}\,\sqrt{-\left(\sinh^2\left(x\right)\right)}\,\left(2\,\mathrm{EllipticF}\left(i\cosh\left(x\right),i\right)-\mathrm{EllipticE}\left(i\cosh\left(x\right),i\right)\right)}{\sqrt{\cosh^4\left(x\right)-1}\,\sinh\left(x\right)}$	58

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((cosh(x)^2+1)^(1/2),x,method=_RETURNVERBOSE)
[Out] -I*((cosh(x)^2+1)*sinh(x)^2)^(1/2)*(-sinh(x)^2)^(1/2)*(2*EllipticF(I*cosh(x
),I)-EllipticE(I*cosh(x),I))/(cosh(x)^4-1)^(1/2)/sinh(x)
```

Maxima [F]
time = 0.00, size = 0, normalized size = 0.00

Failed to integrate

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((1+cosh(x)^2)^(1/2),x, algorithm="maxima")
[Out] integrate(sqrt(cosh(x)^2 + 1), x)
```

Fricas [F]
time = 0.08, size = 10, normalized size = 0.59

$$\mathrm{integral}\left(\sqrt{\cosh\left(x\right)^2+1},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((1+cosh(x)^2)^(1/2),x, algorithm="fricas")
[Out] integral(sqrt(cosh(x)^2 + 1), x)
```

Sympy [F]
time = 0.00, size = 0, normalized size = 0.00

$$\int\sqrt{\cosh^2\left(x\right)+1}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((1+cosh(x)**2)**(1/2),x)
[Out] Integral(sqrt(cosh(x)**2 + 1), x)
```

Giac [F]
time = 0.00, size = 0, normalized size = 0.00

could not integrate

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((1+cosh(x)^2)^(1/2),x, algorithm="giac")
```

```
[Out] integrate(sqrt(cosh(x)^2 + 1), x)
```

Mupad [F]
time = 0.00, size = -1, normalized size = -0.06

$$\int \sqrt{\cosh(x)^2 + 1}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((cosh(x)^2 + 1)^(1/2),x)
```

```
[Out] int((cosh(x)^2 + 1)^(1/2), x)
```

3.43 $\int \sqrt{1-\cosh^2(x)}\, dx$

Optimal. Leaf size=13

$$\coth(x)\sqrt{-\sinh^2(x)}$$

[Out] coth(x)*(-sinh(x)^2)^(1/2)

Rubi [A]
time = 0.02, antiderivative size = 13, 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 = {3255, 3286, 2718}

$$\sqrt{-\sinh^2(x)}\coth(x)$$

Antiderivative was successfully verified.

[In] Int[Sqrt[1 - Cosh[x]^2],x]

[Out] Coth[x]*Sqrt[-Sinh[x]^2]

Rule 2718

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

Rule 3255

```
Int[(u_.)*((a_) + (b_.)*sin[(e_.) + (f_.)*(x_)]^2)^(p_), x_Symbol] :> Int[A
ctivateTrig[u*(a*cos[e + f*x]^2)^p], x] /; FreeQ[{a, b, e, f, p}, x] && EqQ
[a + b, 0]
```

Rule 3286

```
Int[(u_.)*((b_.)*sin[(e_.) + (f_.)*(x_)]^(n_))^(p_), x_Symbol] :> With[{ff
= FreeFactors[Sin[e + f*x], x]}, Dist[(b*ff^n)^IntPart[p]*((b*Sin[e + f*x]^
n)^FracPart[p]/(Sin[e + f*x]/ff)^(n*FracPart[p])), Int[ActivateTrig[u]*(Sin
[e + f*x]/ff)^(n*p), x], x]] /; FreeQ[{b, e, f, n, p}, x] &&  !IntegerQ[p]
&& IntegerQ[n] && (EqQ[u, 1] || MatchQ[u, ((d_.)*(trig_)[e + f*x])^(m_.) /;
 FreeQ[{d, m}, x] && MemberQ[{sin, cos, tan, cot, sec, csc}, trig]])
```

Rubi steps

$$\int \sqrt{1-\cosh^2(x)}\,dx = \int \sqrt{-\sinh^2(x)}\,dx$$
$$= \left(\operatorname{csch}(x)\sqrt{-\sinh^2(x)}\right)\int \sinh(x)\,dx$$
$$= \coth(x)\sqrt{-\sinh^2(x)}$$

Mathematica [A]
time = 0.00, size = 13, normalized size = 1.00

$$\coth(x)\sqrt{-\sinh^2(x)}$$

Antiderivative was successfully verified.

```
[In] Integrate[Sqrt[1 - Cosh[x]^2],x]
```

```
[Out] Coth[x]*Sqrt[-Sinh[x]^2]
```

Maple [A]
time = 1.00, size = 15, normalized size = 1.15

method	result	size
default	$-\frac{\sinh(x)\cosh(x)}{\sqrt{-\left(\sinh^2(x)\right)}}$	15
risch	$\frac{\sqrt{-\left(e^{2x}-1\right)^2 e^{-2x}}\, e^{2x}}{2\,e^{2x}-2}+\frac{\sqrt{-\left(e^{2x}-1\right)^2 e^{-2x}}}{2\,e^{2x}-2}$	58

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((1-cosh(x)^2)^(1/2),x,method=_RETURNVERBOSE)
```

```
[Out] -sinh(x)*cosh(x)/(-sinh(x)^2)^(1/2)
```

Maxima [C] Result contains complex when optimal does not.
time = 0.49, size = 11, normalized size = 0.85

$$-\frac{1}{2}i\,e^{(-x)}-\frac{1}{2}i\,e^{x}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((1-cosh(x)^2)^(1/2),x, algorithm="maxima")
```

```
[Out] -1/2*I*e^(-x) - 1/2*I*e^x
```

Fricas [F]
time = 0.39, size = 1, normalized size = 0.08

$$0$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((1-cosh(x)^2)^(1/2),x, algorithm="fricas")
```

```
[Out] 0
```

Sympy [F]
time = 0.00, size = 0, normalized size = 0.00

$$\int \sqrt{1-\cosh^2(x)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((1-cosh(x)**2)**(1/2),x)
```

```
[Out] Integral(sqrt(1 - cosh(x)**2), x)
```

Giac [C] Result contains complex when optimal does not.
time = 0.42, size = 31, normalized size = 2.38

$$-\frac{1}{2}i\,e^{(-x)}\mathrm{sgn}\left(-e^{(3\,x)}+e^{x}\right)-\frac{1}{2}i\,e^{x}\mathrm{sgn}\left(-e^{(3\,x)}+e^{x}\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((1-cosh(x)^2)^(1/2),x, algorithm="giac")
```

```
[Out] -1/2*I*e^(-x)*sgn(-e^(3*x) + e^x) - 1/2*I*e^x*sgn(-e^(3*x) + e^x)
```

Mupad [B]
time = 1.02, size = 13, normalized size = 1.00

$$\coth(x)\,\sqrt{1-\cosh(x)^2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((1 - cosh(x)^2)^(1/2),x)
```

```
[Out] coth(x)*(1 - cosh(x)^2)^(1/2)
```

3.44 $\int \sqrt{-1+\cosh^2(x)}\,dx$

Optimal. Leaf size=11

$$\coth(x)\sqrt{\sinh^2(x)}$$

```
[Out] coth(x)*(sinh(x)^2)^(1/2)
```

Rubi [A]
time = 0.01, antiderivative size = 11, normalized size of antiderivative = 1.00, number of steps used = 3, number of rules used = 3, integrand size = 10, $\frac{\text{number of rules}}{\text{integrand size}} = 0.300$, Rules used = {3255, 3286, 2718}

$$\sqrt{\sinh^2(x)}\,\coth(x)$$

Antiderivative was successfully verified.

```
[In] Int[Sqrt[-1 + Cosh[x]^2],x]
```

```
[Out] Coth[x]*Sqrt[Sinh[x]^2]
```

Rule 2718

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

Rule 3255

```
Int[(u_.)*((a_) + (b_.)*sin[(e_.) + (f_.)*(x_)]^2)^(p_), x_Symbol] :> Int[A
ctivateTrig[u*(a*cos[e + f*x]^2)^p], x] /; FreeQ[{a, b, e, f, p}, x] && EqQ
[a + b, 0]
```

Rule 3286

```
Int[(u_.)*((b_.)*sin[(e_.) + (f_.)*(x_)]^(n_))^(p_), x_Symbol] :> With[{ff
= FreeFactors[Sin[e + f*x], x]}, Dist[(b*ff^n)^IntPart[p]*((b*Sin[e + f*x]^
n)^FracPart[p]/(Sin[e + f*x]/ff)^(n*FracPart[p])), Int[ActivateTrig[u]*(Sin
[e + f*x]/ff)^(n*p), x], x]] /; FreeQ[{b, e, f, n, p}, x] &&  !IntegerQ[p]
&& IntegerQ[n] && (EqQ[u, 1] || MatchQ[u, ((d_.)*(trig_)[e + f*x])^(m_.) /;
 FreeQ[{d, m}, x] && MemberQ[{sin, cos, tan, cot, sec, csc}, trig]])
```

Rubi steps

$$\int \sqrt{-1+\cosh^2(x)}\,dx = \int \sqrt{\sinh^2(x)}\,dx$$
$$= \left(\operatorname{csch}(x)\sqrt{\sinh^2(x)}\right)\int \sinh(x)\,dx$$
$$= \coth(x)\sqrt{\sinh^2(x)}$$

Mathematica [A]
time = 0.01, size = 11, normalized size = 1.00

$$\coth(x)\sqrt{\sinh^2(x)}$$

Antiderivative was successfully verified.

```
[In] Integrate[Sqrt[-1 + Cosh[x]^2],x]
```

```
[Out] Coth[x]*Sqrt[Sinh[x]^2]
```

Maple [A]
time = 0.92, size = 14, normalized size = 1.27

method	result	size
default	$\frac{\cosh(x)\sqrt{-\frac{1}{2}+\frac{\cosh(2x)}{2}}}{\sinh(x)}$	14
risch	$\frac{\sqrt{\left(e^{2x}-1\right)^2 e^{-2x}}\; e^{2x}}{2\,e^{2x}-2}+\frac{\sqrt{\left(e^{2x}-1\right)^2 e^{-2x}}}{2\,e^{2x}-2}$	56

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((cosh(x)^2-1)^(1/2),x,method=_RETURNVERBOSE)
```

```
[Out] cosh(x)*(sinh(x)^2)^(1/2)/sinh(x)
```

Maxima [A]
time = 0.47, size = 11, normalized size = 1.00

$$-\frac{1}{2}\,e^{(-x)}-\frac{1}{2}\,e^{x}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((-1+cosh(x)^2)^(1/2),x, algorithm="maxima")
```

```
[Out] -1/2*e^(-x) - 1/2*e^x
```

Fricas [A]
time = 0.38, size = 2, normalized size = 0.18

$$\cosh(x)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((-1+cosh(x)^2)^(1/2),x, algorithm="fricas")
```

```
[Out] cosh(x)
```

Sympy [F]
time = 0.00, size = 0, normalized size = 0.00

$$\int \sqrt{\cosh^2(x) - 1}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((-1+cosh(x)**2)**(1/2),x)
```

```
[Out] Integral(sqrt(cosh(x)**2 - 1), x)
```

Giac [B] Leaf count of result is larger than twice the leaf count of optimal. 31 vs. 2(9) = 18.
time = 0.41, size = 31, normalized size = 2.82

$$\frac{1}{2}\, e^{(-x)}\mathrm{sgn}\left(e^{(3\,x)} - e^{x}\right) + \frac{1}{2}\, e^{x}\mathrm{sgn}\left(e^{(3\,x)} - e^{x}\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((-1+cosh(x)^2)^(1/2),x, algorithm="giac")
```

```
[Out] 1/2*e^(-x)*sgn(e^(3*x) - e^x) + 1/2*e^x*sgn(e^(3*x) - e^x)
```

Mupad [B]
time = 0.95, size = 11, normalized size = 1.00

$$\coth(x)\,\sqrt{\cosh(x)^2 - 1}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((cosh(x)^2 - 1)^(1/2),x)
```

```
[Out] coth(x)*(cosh(x)^2 - 1)^(1/2)
```

3.45 $\int \sqrt{-1-\cosh^2(x)}\, dx$

Optimal. Leaf size=39

$$-\frac{i\sqrt{-1-\cosh^2(x)}\, E\left(\frac{\pi}{2}+ix\middle|-1\right)}{\sqrt{1+\cosh^2(x)}}$$

```
[Out] (-sinh(x)^2)^(1/2)/sinh(x)*EllipticE(cosh(x),I)*(-1-cosh(x)^2)^(1/2)/(1+cos
h(x)^2)^(1/2)
```

Rubi [A]
time = 0.02, antiderivative size = 39, 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 = {3257, 3256}

$$-\frac{i\sqrt{-\cosh^2(x)-1}\, E\left(ix+\frac{\pi}{2}\middle|-1\right)}{\sqrt{\cosh^2(x)+1}}$$

Antiderivative was successfully verified.

```
[In] Int[Sqrt[-1 - Cosh[x]^2],x]
```

```
[Out] ((-I)*Sqrt[-1 - Cosh[x]^2]*EllipticE[Pi/2 + I*x, -1])/Sqrt[1 + Cosh[x]^2]
```

Rule 3256

```
Int[Sqrt[(a_) + (b_.)*sin[(e_.) + (f_.)*(x_)]^2], x_Symbol] :> Simp[(Sqrt[a
]/f)*EllipticE[e + f*x, -b/a], x] /; FreeQ[{a, b, e, f}, x] && GtQ[a, 0]
```

Rule 3257

```
Int[Sqrt[(a_) + (b_.)*sin[(e_.) + (f_.)*(x_)]^2], x_Symbol] :> Dist[Sqrt[a
+ b*Sin[e + f*x]^2]/Sqrt[1 + b*(Sin[e + f*x]^2/a)], Int[Sqrt[1 + (b*Sin[e +
 f*x]^2)/a], x], x] /; FreeQ[{a, b, e, f}, x] &&  !GtQ[a, 0]
```

Rubi steps

$$\begin{aligned}\int \sqrt{-1-\cosh^2(x)}\, dx &= \frac{\sqrt{-1-\cosh^2(x)}\int \sqrt{1+\cosh^2(x)}\, dx}{\sqrt{1+\cosh^2(x)}}\\ &= -\frac{i\sqrt{-1-\cosh^2(x)}\, E\left(\frac{\pi}{2}+ix\middle|-1\right)}{\sqrt{1+\cosh^2(x)}}\end{aligned}$$

Mathematica [A]
time = 0.03, size = 40, normalized size = 1.03

$$\frac{i\sqrt{2}\sqrt{3+\cosh(2x)}\,E\left(ix\middle|\frac{1}{2}\right)}{\sqrt{-3-\cosh(2x)}}$$

Antiderivative was successfully verified.

```
[In] Integrate[Sqrt[-1 - Cosh[x]^2],x]
[Out] (I*Sqrt[2]*Sqrt[3 + Cosh[2*x]]*EllipticE[I*x, 1/2])/Sqrt[-3 - Cosh[2*x]]
```

Maple [A]
time = 0.83, size = 62, normalized size = 1.59

method	result	size
default	$-\frac{\sqrt{-\left(\cosh^2(x)+1\right)\left(\sinh^2(x)\right)}\,\sqrt{-\left(\sinh^2(x)\right)}\,\sqrt{\cosh^2(x)+1}\,\mathrm{EllipticE}(\cosh(x),i)}{\sqrt{1-\left(\cosh^4(x)\right)}\,\sinh(x)\sqrt{-1-\left(\cosh^2(x)\right)}}$	62

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((-1-cosh(x)^2)^(1/2),x,method=_RETURNVERBOSE)
[Out] -(-(cosh(x)^2+1)*sinh(x)^2)^(1/2)*(-sinh(x)^2)^(1/2)*(cosh(x)^2+1)^(1/2)*El
lipticE(cosh(x),I)/(1-cosh(x)^4)^(1/2)/sinh(x)/(-1-cosh(x)^2)^(1/2)
```

Maxima [F]
time = 0.00, size = 0, normalized size = 0.00

Failed to integrate

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((-1-cosh(x)^2)^(1/2),x, algorithm="maxima")
[Out] integrate(sqrt(-cosh(x)^2 - 1), x)
```

Fricas [F]
time = 0.07, size = 108, normalized size = 2.77

$$\frac{2\left(e^{(2x)}-e^{x}\right)\mathrm{integral}\left(\frac{4\sqrt{-e^{(4x)}-6e^{(2x)}-1}\left(e^{(2x)}+1\right)}{e^{(6x)}-2e^{(5x)}+7e^{(4x)}-12e^{(3x)}+7e^{(2x)}-2e^{x}+1},x\right)+\sqrt{-e^{(4x)}-6e^{(2x)}-1}\left(e^{x}+1\right)}{2\left(e^{(2x)}-e^{x}\right)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((-1-cosh(x)^2)^(1/2),x, algorithm="fricas")
```

```
[Out] 1/2*(2*(e^(2*x) - e^x)*integral(4*sqrt(-e^(4*x) - 6*e^(2*x) - 1)*(e^(2*x) +
 1)/(e^(6*x) - 2*e^(5*x) + 7*e^(4*x) - 12*e^(3*x) + 7*e^(2*x) - 2*e^x + 1),
 x) + sqrt(-e^(4*x) - 6*e^(2*x) - 1)*(e^x + 1))/(e^(2*x) - e^x)
```

Sympy [F]
time = 0.00, size = 0, normalized size = 0.00

$$\int \sqrt{-\cosh^2(x) - 1}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((-1-cosh(x)**2)**(1/2),x)
```

```
[Out] Integral(sqrt(-cosh(x)**2 - 1), x)
```

Giac [F]
time = 0.00, size = 0, normalized size = 0.00

could not integrate

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((-1-cosh(x)^2)^(1/2),x, algorithm="giac")
```

```
[Out] integrate(sqrt(-cosh(x)^2 - 1), x)
```

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

$$\int \sqrt{-\cosh(x)^2 - 1}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((- cosh(x)^2 - 1)^(1/2),x)
```

```
[Out] int((- cosh(x)^2 - 1)^(1/2), x)
```

3.46 $\int \left(a+b\cosh^2(x)\right)^{3/2}\,dx$

Optimal. Leaf size=133

$$-\frac{2i(2a+b)\sqrt{a+b\cosh^2(x)}\,E\left(\frac{\pi}{2}+ix\middle|-\frac{b}{a}\right)}{3\sqrt{1+\frac{b\cosh^2(x)}{a}}}+\frac{ia(a+b)\sqrt{1+\frac{b\cosh^2(x)}{a}}\,F\left(\frac{\pi}{2}+ix\middle|-\frac{b}{a}\right)}{3\sqrt{a+b\cosh^2(x)}}+\frac{1}{3}b\cosh(x)\sqrt{a+$$

```
[Out] 1/3*b*cosh(x)*sinh(x)*(a+b*cosh(x)^2)^(1/2)+2/3*(2*a+b)*(-sinh(x)^2)^(1/2)/
sinh(x)*EllipticE(cosh(x),(-b/a)^(1/2))*(a+b*cosh(x)^2)^(1/2)/(1+b*cosh(x)^
2/a)^(1/2)-1/3*a*(a+b)*(-sinh(x)^2)^(1/2)/sinh(x)*EllipticF(cosh(x),(-b/a)^
(1/2))*(1+b*cosh(x)^2/a)^(1/2)/(a+b*cosh(x)^2)^(1/2)
```

Rubi [A]
time = 0.11, antiderivative size = 133, 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 = {3259, 3251, 3257, 3256, 3262, 3261}

$$\frac{1}{3}b\sinh(x)\cosh(x)\sqrt{a+b\cosh^2(x)}+\frac{ia(a+b)\sqrt{\frac{b\cosh^2(x)}{a}+1}\,F\left(ix+\frac{\pi}{2}\middle|-\frac{b}{a}\right)}{3\sqrt{a+b\cosh^2(x)}}-\frac{2i(2a+b)\sqrt{a+b\cosh^2(x)}\,E\left(ix+\frac{\pi}{2}\middle|-\frac{b}{a}\right)}{3\sqrt{\frac{b\cosh^2(x)}{a}+1}}$$

Antiderivative was successfully verified.

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

```
[Out] (((-2*I)/3)*(2*a + b)*Sqrt[a + b*Cosh[x]^2]*EllipticE[Pi/2 + I*x, -(b/a)])/
Sqrt[1 + (b*Cosh[x]^2)/a] + ((I/3)*a*(a + b)*Sqrt[1 + (b*Cosh[x]^2)/a]*Elli
pticF[Pi/2 + I*x, -(b/a)])/Sqrt[a + b*Cosh[x]^2] + (b*Cosh[x]*Sqrt[a + b*Co
sh[x]^2]*Sinh[x])/3
```

Rule 3251

```
Int[((A_.) + (B_.)*sin[(e_.) + (f_.)*(x_)]^2)/Sqrt[(a_) + (b_.)*sin[(e_.) +
 (f_.)*(x_)]^2], x_Symbol] :> Dist[B/b, Int[Sqrt[a + b*Sin[e + f*x]^2], x],
 x] + Dist[(A*b - a*B)/b, Int[1/Sqrt[a + b*Sin[e + f*x]^2], x], x] /; FreeQ
[{a, b, e, f, A, B}, x]
```

Rule 3256

```
Int[Sqrt[(a_) + (b_.)*sin[(e_.) + (f_.)*(x_)]^2], x_Symbol] :> Simp[(Sqrt[a
]/f)*EllipticE[e + f*x, -b/a], x] /; FreeQ[{a, b, e, f}, x] && GtQ[a, 0]
```

Rule 3257

```
Int[Sqrt[(a_) + (b_.)*sin[(e_.) + (f_.)*(x_)]^2], x_Symbol] :> Dist[Sqrt[a
+ b*Sin[e + f*x]^2]/Sqrt[1 + b*(Sin[e + f*x]^2/a)], Int[Sqrt[1 + (b*Sin[e +
 f*x]^2)/a], x], x] /; FreeQ[{a, b, e, f}, x] &&  !GtQ[a, 0]
```

Rule 3259

```
Int[((a_) + (b_.)*sin[(e_.) + (f_.)*(x_)]^2)^(p_), x_Symbol] :> Simp[(-b)*C
os[e + f*x]*Sin[e + f*x]*((a + b*Sin[e + f*x]^2)^(p - 1)/(2*f*p)), x] + Dis
t[1/(2*p), Int[(a + b*Sin[e + f*x]^2)^(p - 2)*Simp[a*(b + 2*a*p) + b*(2*a +
 b)*(2*p - 1)*Sin[e + f*x]^2, x], x], x] /; FreeQ[{a, b, e, f}, x] && NeQ[a
 + b, 0] && GtQ[p, 1]
```

Rule 3261

```
Int[1/Sqrt[(a_) + (b_.)*sin[(e_.) + (f_.)*(x_)]^2], x_Symbol] :> Simp[(1/(S
qrt[a]*f))*EllipticF[e + f*x, -b/a], x] /; FreeQ[{a, b, e, f}, x] && GtQ[a,
 0]
```

Rule 3262

```
Int[1/Sqrt[(a_) + (b_.)*sin[(e_.) + (f_.)*(x_)]^2], x_Symbol] :> Dist[Sqrt[
1 + b*(Sin[e + f*x]^2/a)]/Sqrt[a + b*Sin[e + f*x]^2], Int[1/Sqrt[1 + (b*Sin
[e + f*x]^2)/a], x], x] /; FreeQ[{a, b, e, f}, x] &&  !GtQ[a, 0]
```

Rubi steps

$$\int \left(a+b\cosh^2(x)\right)^{3/2}\,dx=\frac{1}{3}b\cosh(x)\sqrt{a+b\cosh^2(x)}\,\sinh(x)+\frac{1}{3}\int\frac{a(3a+b)+2b(2a+b)\cosh^2(x)}{\sqrt{a+b\cosh^2(x)}}\,dx$$

$$=\frac{1}{3}b\cosh(x)\sqrt{a+b\cosh^2(x)}\,\sinh(x)-\frac{1}{3}(a(a+b))\int\frac{1}{\sqrt{a+b\cosh^2(x)}}\,dx+\frac{1}{3}($$

$$=\frac{1}{3}b\cosh(x)\sqrt{a+b\cosh^2(x)}\,\sinh(x)+\frac{\left(2(2a+b)\sqrt{a+b\cosh^2(x)}\right)\int\sqrt{1+\frac{b}{}}}{3\sqrt{1+\frac{b\cosh^2(x)}{a}}}$$

$$=-\frac{2i(2a+b)\sqrt{a+b\cosh^2(x)}\,E\left(\frac{\pi}{2}+ix|-\frac{b}{a}\right)}{3\sqrt{1+\frac{b\cosh^2(x)}{a}}}+\frac{ia(a+b)\sqrt{1+\frac{b\cosh^2(x)}{a}}\,F\left(\frac{\pi}{2}\right.}{3\sqrt{a+b\cosh^2(x)}}$$

Mathematica [A]
time = 0.33, size = 135, normalized size = 1.02

$$\frac{-8i(2a^2+3ab+b^2)\sqrt{\frac{2a+b+b\cosh(2x)}{a+b}}\,E\left(ix\middle|\frac{b}{a+b}\right)+4ia(a+b)\sqrt{\frac{2a+b+b\cosh(2x)}{a+b}}\,F\left(ix\middle|\frac{b}{a+b}\right)+\sqrt{2}\,b(2a+b+b\cosh(2x))\sinh(2x)}{12\sqrt{2a+b+b\cosh(2x)}}$$

Antiderivative was successfully verified.

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

```
[Out] ((-8*I)*(2*a^2 + 3*a*b + b^2)*Sqrt[(2*a + b + b*Cosh[2*x])/(a + b)]*Ellipti
cE[I*x, b/(a + b)] + (4*I)*a*(a + b)*Sqrt[(2*a + b + b*Cosh[2*x])/(a + b)]*
EllipticF[I*x, b/(a + b)] + Sqrt[2]*b*(2*a + b + b*Cosh[2*x])*Sinh[2*x])/(1
2*Sqrt[2*a + b + b*Cosh[2*x]])
```

Maple [B] Leaf count of result is larger than twice the leaf count of optimal. 320 vs. $2(123) = 246$.
time = 1.25, size = 321, normalized size = 2.41

method	result
default	$\frac{\sqrt{-\frac{b}{a}}\,b^2(\cosh^5(x))+\sqrt{-\frac{b}{a}}\,ab(\cosh^3(x))-\sqrt{-\frac{b}{a}}\,b^2(\cosh^3(x))+3a^2\sqrt{\frac{a+b(\cosh^2(x))}{a}}\sqrt{-(\sinh^2(x))}\,\mathrm{EllipticF}(}{}$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a+b*cosh(x)^2)^(3/2),x,method=_RETURNVERBOSE)
```

```
[Out] 1/3*((-1/a*b)^(1/2)*b^2*cosh(x)^5+(-1/a*b)^(1/2)*a*b*cosh(x)^3-(-1/a*b)^(1/
2)*b^2*cosh(x)^3+3*a^2*((a+b*cosh(x)^2)/a)^(1/2)*(-sinh(x)^2)^(1/2)*Ellipti
cF(cosh(x)*(-1/a*b)^(1/2),(-a/b)^(1/2))+5*a*b*((a+b*cosh(x)^2)/a)^(1/2)*(-s
inh(x)^2)^(1/2)*EllipticF(cosh(x)*(-1/a*b)^(1/2),(-a/b)^(1/2))+2*((a+b*cosh
(x)^2)/a)^(1/2)*(-sinh(x)^2)^(1/2)*EllipticF(cosh(x)*(-1/a*b)^(1/2),(-a/b)^
(1/2))*b^2-4*a*b*((a+b*cosh(x)^2)/a)^(1/2)*(-sinh(x)^2)^(1/2)*EllipticE(cos
h(x)*(-1/a*b)^(1/2),(-a/b)^(1/2))-2*((a+b*cosh(x)^2)/a)^(1/2)*(-sinh(x)^2)^
(1/2)*EllipticE(cosh(x)*(-1/a*b)^(1/2),(-a/b)^(1/2))*b^2-(-1/a*b)^(1/2)*a*b
*cosh(x))/(-1/a*b)^(1/2)/sinh(x)/(a+b*cosh(x)^2)^(1/2)
```

Maxima [F]
time = 0.00, size = 0, normalized size = 0.00

Failed to integrate

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*cosh(x)^2)^(3/2),x, algorithm="maxima")
```

[Out] integrate((b*cosh(x)^2 + a)^(3/2), x)

Fricas [F]
time = 0.08, size = 12, normalized size = 0.09

$$\text{integral}\left(\left(b\cosh\left(x\right)^{2}+a\right)^{\frac{3}{2}},x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

[In] integrate((a+b*cosh(x)^2)^(3/2),x, algorithm="fricas")

[Out] integral((b*cosh(x)^2 + a)^(3/2), x)

Sympy [F]
time = 0.00, size = 0, normalized size = 0.00

$$\int\left(a+b\cosh^{2}\left(x\right)\right)^{\frac{3}{2}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

[In] integrate((a+b*cosh(x)**2)**(3/2),x)

[Out] Integral((a + b*cosh(x)**2)**(3/2), x)

Giac [F]
time = 0.00, size = 0, normalized size = 0.00

could not integrate

Verification of antiderivative is not currently implemented for this CAS.

[In] integrate((a+b*cosh(x)^2)^(3/2),x, algorithm="giac")

[Out] integrate((b*cosh(x)^2 + a)^(3/2), x)

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

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

Verification of antiderivative is not currently implemented for this CAS.

[In] int((a + b*cosh(x)^2)^(3/2),x)

[Out] int((a + b*cosh(x)^2)^(3/2), x)

3.47 $\int \left(1+\cosh^2(x)\right)^{3/2}\,dx$

Optimal. Leaf size=55

$$-2iE\left(\frac{\pi}{2}+ix\middle|-1\right)+\frac{2}{3}iF\left(\frac{\pi}{2}+ix\middle|-1\right)+\frac{1}{3}\cosh(x)\sqrt{1+\cosh^2(x)}\,\sinh(x)$$

```
[Out] 2*(-sinh(x)^2)^(1/2)/sinh(x)*EllipticE(cosh(x),I)-2/3*(-sinh(x)^2)^(1/2)/si
nh(x)*EllipticF(cosh(x),I)+1/3*cosh(x)*sinh(x)*(1+cosh(x)^2)^(1/2)
```

Rubi [A]
time = 0.04, antiderivative size = 55, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 4, integrand size = 10, $\frac{\text{number of rules}}{\text{integrand size}} = 0.400$, Rules used = {3259, 3251, 3256, 3261}

$$\frac{2}{3}iF\left(ix+\frac{\pi}{2}\middle|-1\right)-2iE\left(ix+\frac{\pi}{2}\middle|-1\right)+\frac{1}{3}\sinh(x)\cosh(x)\sqrt{\cosh^2(x)+1}$$

Antiderivative was successfully verified.

```
[In] Int[(1 + Cosh[x]^2)^(3/2),x]
```

```
[Out] (-2*I)*EllipticE[Pi/2 + I*x, -1] + ((2*I)/3)*EllipticF[Pi/2 + I*x, -1] + (C
osh[x]*Sqrt[1 + Cosh[x]^2]*Sinh[x])/3
```

Rule 3251

```
Int[((A_.) + (B_.)*sin[(e_.) + (f_.)*(x_)]^2)/Sqrt[(a_) + (b_.)*sin[(e_.) +
 (f_.)*(x_)]^2], x_Symbol] :> Dist[B/b, Int[Sqrt[a + b*Sin[e + f*x]^2], x],
 x] + Dist[(A*b - a*B)/b, Int[1/Sqrt[a + b*Sin[e + f*x]^2], x], x] /; FreeQ
[{a, b, e, f, A, B}, x]
```

Rule 3256

```
Int[Sqrt[(a_) + (b_.)*sin[(e_.) + (f_.)*(x_)]^2], x_Symbol] :> Simp[(Sqrt[a
]/f)*EllipticE[e + f*x, -b/a], x] /; FreeQ[{a, b, e, f}, x] && GtQ[a, 0]
```

Rule 3259

```
Int[((a_) + (b_.)*sin[(e_.) + (f_.)*(x_)]^2)^(p_), x_Symbol] :> Simp[(-b)*C
os[e + f*x]*Sin[e + f*x]*((a + b*Sin[e + f*x]^2)^(p - 1)/(2*f*p)), x] + Dis
t[1/(2*p), Int[(a + b*Sin[e + f*x]^2)^(p - 2)*Simp[a*(b + 2*a*p) + b*(2*a +
 b)*(2*p - 1)*Sin[e + f*x]^2, x], x], x] /; FreeQ[{a, b, e, f}, x] && NeQ[a
 + b, 0] && GtQ[p, 1]
```

Rule 3261

```
Int[1/Sqrt[(a_) + (b_.)*sin[(e_.) + (f_.)*(x_)]^2], x_Symbol] :> Simp[(1/(S
qrt[a]*f))*EllipticF[e + f*x, -b/a], x] /; FreeQ[{a, b, e, f}, x] && GtQ[a,
```

0]

Rubi steps

$$\int \left(1+\cosh^2(x)\right)^{3/2} dx = \frac{1}{3}\cosh(x)\sqrt{1+\cosh^2(x)}\,\sinh(x) + \frac{1}{3}\int \frac{4+6\cosh^2(x)}{\sqrt{1+\cosh^2(x)}}\,dx$$

$$= \frac{1}{3}\cosh(x)\sqrt{1+\cosh^2(x)}\,\sinh(x) - \frac{2}{3}\int \frac{1}{\sqrt{1+\cosh^2(x)}}\,dx + 2\int \sqrt{1+\cosh^2(x}$$

$$= -2iE\left(\frac{\pi}{2}+ix\middle|-1\right) + \frac{2}{3}iF\left(\frac{\pi}{2}+ix\middle|-1\right) + \frac{1}{3}\cosh(x)\sqrt{1+\cosh^2(x)}\,\sinh(x)$$

Mathematica [**A**]
time = 0.04, size = 51, normalized size = 0.93

$$\frac{-24iE\left(ix\middle|\frac{1}{2}\right) + 4iF\left(ix\middle|\frac{1}{2}\right) + \sqrt{3+\cosh(2x)}\,\sinh(2x)}{6\sqrt{2}}$$

Antiderivative was successfully verified.

```
[In] Integrate[(1 + Cosh[x]^2)^(3/2),x]
```

```
[Out] ((-24*I)*EllipticE[I*x, 1/2] + (4*I)*EllipticF[I*x, 1/2] + Sqrt[3 + Cosh[2*
x]]*Sinh[2*x])/(6*Sqrt[2])
```

Maple [**A**]
time = 1.02, size = 99, normalized size = 1.80

method	result
default	$-\frac{\sqrt{\left(\cosh^2(x)+1\right)\left(\sinh^2(x)\right)}\left(-\left(\cosh^5(x)\right)+10i\sqrt{\cosh^2(x)+1}\,\sqrt{-\left(\sinh^2(x)\right)}\,\mathrm{EllipticF}(i\cosh(x),i)-\right.}{3\sqrt{\cosh^4(x)-1}\,\sinh(x)\sqrt{\cosh^2(x)+}}$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((cosh(x)^2+1)^(3/2),x,method=_RETURNVERBOSE)
```

```
[Out] -1/3*((cosh(x)^2+1)*sinh(x)^2)^(1/2)*(-cosh(x)^5+10*I*(cosh(x)^2+1)^(1/2)*(
-sinh(x)^2)^(1/2)*EllipticF(I*cosh(x),I)-6*I*(cosh(x)^2+1)^(1/2)*(-sinh(x)^
2)^(1/2)*EllipticE(I*cosh(x),I)+cosh(x))/(cosh(x)^4-1)^(1/2)/sinh(x)/(cosh(
x)^2+1)^(1/2)
```

Maxima [F]
time = 0.00, size = 0, normalized size = 0.00

Failed to integrate

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((1+cosh(x)^2)^(3/2),x, algorithm="maxima")
[Out] integrate((cosh(x)^2 + 1)^(3/2), x)
```

Fricas [F]
time = 0.07, size = 10, normalized size = 0.18

$$\text{integral}\left(\left(\cosh\left(x\right)^2+1\right)^{\frac{3}{2}}, x\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((1+cosh(x)^2)^(3/2),x, algorithm="fricas")
[Out] integral((cosh(x)^2 + 1)^(3/2), x)
```

Sympy [F]
time = 0.00, size = 0, normalized size = 0.00

$$\int\left(\cosh^2\left(x\right)+1\right)^{\frac{3}{2}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((1+cosh(x)**2)**(3/2),x)
[Out] Integral((cosh(x)**2 + 1)**(3/2), x)
```

Giac [F]
time = 0.00, size = 0, normalized size = 0.00

could not integrate

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((1+cosh(x)^2)^(3/2),x, algorithm="giac")
[Out] integrate((cosh(x)^2 + 1)^(3/2), x)
```

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

$$\int{\left({\mathrm{cosh}\left(x\right)}^2+1\right)}^{3/2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((cosh(x)^2 + 1)^(3/2),x)
[Out] int((cosh(x)^2 + 1)^(3/2), x)
```

3.48 $\int \left(1-\cosh^2(x)\right)^{3/2}\,dx$

Optimal. Leaf size=33

$$\frac{2}{3}\coth(x)\sqrt{-\sinh^2(x)}+\frac{1}{3}\coth(x)\left(-\sinh^2(x)\right)^{3/2}$$

```
[Out] 1/3*coth(x)*(-sinh(x)^2)^(3/2)+2/3*coth(x)*(-sinh(x)^2)^(1/2)
```

Rubi [A]
time = 0.02, antiderivative size = 33, 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 = {3255, 3282, 3286, 2718}

$$\frac{1}{3}\left(-\sinh^2(x)\right)^{3/2}\coth(x)+\frac{2}{3}\sqrt{-\sinh^2(x)}\,\coth(x)$$

Antiderivative was successfully verified.

```
[In] Int[(1 - Cosh[x]^2)^(3/2),x]
```

```
[Out] (2*Coth[x]*Sqrt[-Sinh[x]^2])/3 + (Coth[x]*(-Sinh[x]^2)^(3/2))/3
```

Rule 2718

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

Rule 3255

```
Int[(u_.)*((a_) + (b_.)*sin[(e_.) + (f_.)*(x_)]^2)^(p_), x_Symbol] :> Int[A
ctivateTrig[u*(a*cos[e + f*x]^2)^p], x] /; FreeQ[{a, b, e, f, p}, x] && EqQ
[a + b, 0]
```

Rule 3282

```
Int[((b_.)*sin[(e_.) + (f_.)*(x_)]^2)^(p_), x_Symbol] :> Simp[(-Cot[e + f*x
])*((b*Sin[e + f*x]^2)^p/(2*f*p)), x] + Dist[b*((2*p - 1)/(2*p)), Int[(b*Si
n[e + f*x]^2)^(p - 1), x], x] /; FreeQ[{b, e, f}, x] &&  !IntegerQ[p] && Gt
Q[p, 1]
```

Rule 3286

```
Int[(u_.)*((b_.)*sin[(e_.) + (f_.)*(x_)]^(n_))^(p_), x_Symbol] :> With[{ff
= FreeFactors[Sin[e + f*x], x]}, Dist[(b*ff^n)^IntPart[p]*((b*Sin[e + f*x]^
n)^FracPart[p]/(Sin[e + f*x]/ff)^(n*FracPart[p])), Int[ActivateTrig[u]*(Sin
[e + f*x]/ff)^(n*p), x], x]] /; FreeQ[{b, e, f, n, p}, x] &&  !IntegerQ[p]
&& IntegerQ[n] && (EqQ[u, 1] || MatchQ[u, ((d_.)*(trig_)[e + f*x])^(m_.) /;
```

```
FreeQ[{d, m}, x] && MemberQ[{sin, cos, tan, cot, sec, csc}, trig]])
```

Rubi steps

$$\begin{aligned}\int \left(1-\cosh^2(x)\right)^{3/2}\,dx &= \int \left(-\sinh^2(x)\right)^{3/2}\,dx\\ &= \frac{1}{3}\coth(x)\left(-\sinh^2(x)\right)^{3/2}+\frac{2}{3}\int \sqrt{-\sinh^2(x)}\,dx\\ &= \frac{1}{3}\coth(x)\left(-\sinh^2(x)\right)^{3/2}+\frac{1}{3}\left(2\text{csch}(x)\sqrt{-\sinh^2(x)}\right)\int \sinh(x)\,dx\\ &= \frac{2}{3}\coth(x)\sqrt{-\sinh^2(x)}+\frac{1}{3}\coth(x)\left(-\sinh^2(x)\right)^{3/2}\end{aligned}$$

Mathematica [A]
time = 0.02, size = 25, normalized size = 0.76

$$-\frac{1}{12}(-9\cosh(x)+\cosh(3x))\text{csch}(x)\sqrt{-\sinh^2(x)}$$

Antiderivative was successfully verified.

```
[In] Integrate[(1 - Cosh[x]^2)^(3/2),x]
[Out] -1/12*((-9*Cosh[x] + Cosh[3*x])*Csch[x]*Sqrt[-Sinh[x]^2])
```

Maple [A]
time = 0.88, size = 21, normalized size = 0.64

method	result
default	$\frac{\sinh(x)\cosh(x)\left(\sinh^2(x)-2\right)}{3\sqrt{-\left(\sinh^2(x)\right)}}$
risch	$-\frac{e^{4x}\sqrt{-\left(e^{2x}-1\right)^2 e^{-2x}}}{24(e^{2x}-1)}+\frac{3\sqrt{-\left(e^{2x}-1\right)^2 e^{-2x}}\,e^{2x}}{8(e^{2x}-1)}+\frac{3\sqrt{-\left(e^{2x}-1\right)^2 e^{-2x}}}{8(e^{2x}-1)}-\frac{e^{-2x}\sqrt{-\left(e^{2x}-1\right.}}{24(e^{2x}-1)}$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((1-cosh(x)^2)^(3/2),x,method=_RETURNVERBOSE)
[Out] 1/3*sinh(x)*cosh(x)*(sinh(x)^2-2)/(-sinh(x)^2)^(1/2)
```

Maxima [C] Result contains complex when optimal does not.
time = 0.48, size = 23, normalized size = 0.70

$$\frac{1}{24}i\,e^{(3\,x)}-\frac{3}{8}i\,e^{(-x)}+\frac{1}{24}i\,e^{(-3\,x)}-\frac{3}{8}i\,e^{x}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((1-cosh(x)^2)^(3/2),x, algorithm="maxima")
```

```
[Out] 1/24*I*e^(3*x) - 3/8*I*e^(-x) + 1/24*I*e^(-3*x) - 3/8*I*e^x
```

Fricas [F]
time = 0.52, size = 1, normalized size = 0.03

$$0$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((1-cosh(x)^2)^(3/2),x, algorithm="fricas")
```

```
[Out] 0
```

Sympy [F]
time = 0.00, size = 0, normalized size = 0.00

$$\int \left(1 - \cosh^{2}\left(x\right)\right)^{\frac{3}{2}}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((1-cosh(x)**2)**(3/2),x)
```

```
[Out] Integral((1 - cosh(x)**2)**(3/2), x)
```

Giac [C] Result contains complex when optimal does not.
time = 0.43, size = 66, normalized size = 2.00

$$-\frac{1}{24} i \left(9 e^{(2x)} \operatorname{sgn}\left(-e^{(3x)} + e^{x}\right) - \operatorname{sgn}\left(-e^{(3x)} + e^{x}\right)\right) e^{(-3x)} + \frac{1}{24} i e^{(3x)} \operatorname{sgn}\left(-e^{(3x)} + e^{x}\right) - \frac{3}{8} i e^{x} \operatorname{sgn}\left(-e^{(3x)} + e^{x}\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((1-cosh(x)^2)^(3/2),x, algorithm="giac")
```

```
[Out] -1/24*I*(9*e^(2*x)*sgn(-e^(3*x) + e^x) - sgn(-e^(3*x) + e^x))*e^(-3*x) + 1/
24*I*e^(3*x)*sgn(-e^(3*x) + e^x) - 3/8*I*e^x*sgn(-e^(3*x) + e^x)
```

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

$$\int {\left(1-{\mathrm{cosh}\left(x\right)}^2\right)}^{3/2} \,d x$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((1 - cosh(x)^2)^(3/2),x)
```

```
[Out] int((1 - cosh(x)^2)^(3/2), x)
```

3.49 $\int \left(-1+\cosh^2(x)\right)^{3/2}\,dx$

Optimal. Leaf size=29

$$-\frac{2}{3}\coth(x)\sqrt{\sinh^2(x)}+\frac{1}{3}\coth(x)\sinh^2(x)^{3/2}$$

```
[Out] 1/3*coth(x)*(sinh(x)^2)^(3/2)-2/3*coth(x)*(sinh(x)^2)^(1/2)
```

Rubi [A]
time = 0.02, antiderivative size = 29, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 4, integrand size = 10, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.400, Rules used = {3255, 3282, 3286, 2718}

$$\frac{1}{3}\sinh^2(x)^{3/2}\coth(x)-\frac{2}{3}\sqrt{\sinh^2(x)}\,\coth(x)$$

Antiderivative was successfully verified.

```
[In] Int[(-1 + Cosh[x]^2)^(3/2),x]
```

```
[Out] (-2*Coth[x]*Sqrt[Sinh[x]^2])/3 + (Coth[x]*(Sinh[x]^2)^(3/2))/3
```

Rule 2718

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

Rule 3255

```
Int[(u_.)*((a_) + (b_.)*sin[(e_.) + (f_.)*(x_)]^2)^(p_), x_Symbol] :> Int[A
ctivateTrig[u*(a*cos[e + f*x]^2)^p], x] /; FreeQ[{a, b, e, f, p}, x] && EqQ
[a + b, 0]
```

Rule 3282

```
Int[((b_.)*sin[(e_.) + (f_.)*(x_)]^2)^(p_), x_Symbol] :> Simp[(-Cot[e + f*x
])*((b*Sin[e + f*x]^2)^p/(2*f*p)), x] + Dist[b*((2*p - 1)/(2*p)), Int[(b*Si
n[e + f*x]^2)^(p - 1), x], x] /; FreeQ[{b, e, f}, x] &&  !IntegerQ[p] && Gt
Q[p, 1]
```

Rule 3286

```
Int[(u_.)*((b_.)*sin[(e_.) + (f_.)*(x_)]^(n_))^(p_), x_Symbol] :> With[{ff
= FreeFactors[Sin[e + f*x], x]}, Dist[(b*ff^n)^IntPart[p]*((b*Sin[e + f*x]^
n)^FracPart[p]/(Sin[e + f*x]/ff)^(n*FracPart[p])), Int[ActivateTrig[u]*(Sin
[e + f*x]/ff)^(n*p), x], x]] /; FreeQ[{b, e, f, n, p}, x] &&  !IntegerQ[p]
&& IntegerQ[n] && (EqQ[u, 1] || MatchQ[u, ((d_.)*(trig_)[e + f*x])^(m_.) /;
```

```
FreeQ[{d, m}, x] && MemberQ[{sin, cos, tan, cot, sec, csc}, trig]])
```

Rubi steps

$$\int \left(-1+\cosh^2(x)\right)^{3/2}\,dx = \int \sinh^2(x)^{3/2}\,dx$$
$$= \frac{1}{3}\coth(x)\sinh^2(x)^{3/2} - \frac{2}{3}\int \sqrt{\sinh^2(x)}\,dx$$
$$= \frac{1}{3}\coth(x)\sinh^2(x)^{3/2} - \frac{1}{3}\left(2\operatorname{csch}(x)\sqrt{\sinh^2(x)}\right)\int \sinh(x)\,dx$$
$$= -\frac{2}{3}\coth(x)\sqrt{\sinh^2(x)} + \frac{1}{3}\coth(x)\sinh^2(x)^{3/2}$$

Mathematica [A]
time = 0.01, size = 23, normalized size = 0.79

$$\frac{1}{12}(-9\cosh(x)+\cosh(3x))\operatorname{csch}(x)\sqrt{\sinh^2(x)}$$

Antiderivative was successfully verified.

```
[In] Integrate[(-1 + Cosh[x]^2)^(3/2),x]
[Out] ((-9*Cosh[x] + Cosh[3*x])*Csch[x]*Sqrt[Sinh[x]^2])/12
```

Maple [A]
time = 0.94, size = 21, normalized size = 0.72

method	result	siz
default	$\frac{\sqrt{-\frac{1}{2}+\frac{\cosh(2x)}{2}}\,\cosh(x)\left(\cosh^2(x)-3\right)}{3\sinh(x)}$	21
risch	$\frac{e^{4x}\sqrt{\left(e^{2x}-1\right)^2 e^{-2x}}}{24\,e^{2x}-24} - \frac{3\sqrt{\left(e^{2x}-1\right)^2 e^{-2x}}\,e^{2x}}{8\left(e^{2x}-1\right)} - \frac{3\sqrt{\left(e^{2x}-1\right)^2 e^{-2x}}}{8\left(e^{2x}-1\right)} + \frac{e^{-2x}\sqrt{\left(e^{2x}-1\right)^2 e^{-2x}}}{24\,e^{2x}-24}$	11

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((cosh(x)^2-1)^(3/2),x,method=_RETURNVERBOSE)
[Out] 1/3*(sinh(x)^2)^(1/2)*cosh(x)*(cosh(x)^2-3)/sinh(x)
```

Maxima [A]
time = 0.49, size = 23, normalized size = 0.79

$$-\frac{1}{24}\,e^{(3\,x)} + \frac{3}{8}\,e^{(-x)} - \frac{1}{24}\,e^{(-3\,x)} + \frac{3}{8}\,e^{x}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((-1+cosh(x)^2)^(3/2),x, algorithm="maxima")
```

```
[Out] -1/24*e^(3*x) + 3/8*e^(-x) - 1/24*e^(-3*x) + 3/8*e^x
```

Fricas [A]
time = 0.37, size = 19, normalized size = 0.66

$$\frac{1}{12}\cosh(x)^{3}+\frac{1}{4}\cosh(x)\sinh(x)^{2}-\frac{3}{4}\cosh(x)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((-1+cosh(x)^2)^(3/2),x, algorithm="fricas")
```

```
[Out] 1/12*cosh(x)^3 + 1/4*cosh(x)*sinh(x)^2 - 3/4*cosh(x)
```

Sympy [F]
time = 0.00, size = 0, normalized size = 0.00

$$\int\left(\cosh^{2}(x)-1\right)^{\frac{3}{2}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((-1+cosh(x)**2)**(3/2),x)
```

```
[Out] Integral((cosh(x)**2 - 1)**(3/2), x)
```

Giac [B] Leaf count of result is larger than twice the leaf count of optimal. 66 vs. 2(21) = 42.
time = 0.42, size = 66, normalized size = 2.28

$$-\frac{1}{24}\left(9e^{(2x)}\operatorname{sgn}\left(e^{(3x)}-e^{x}\right)-\operatorname{sgn}\left(e^{(3x)}-e^{x}\right)\right)e^{(-3x)}+\frac{1}{24}e^{(3x)}\operatorname{sgn}\left(e^{(3x)}-e^{x}\right)-\frac{3}{8}e^{x}\operatorname{sgn}\left(e^{(3x)}-e^{x}\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((-1+cosh(x)^2)^(3/2),x, algorithm="giac")
```

```
[Out] -1/24*(9*e^(2*x)*sgn(e^(3*x) - e^x) - sgn(e^(3*x) - e^x))*e^(-3*x) + 1/24*e
^(3*x)*sgn(e^(3*x) - e^x) - 3/8*e^x*sgn(e^(3*x) - e^x)
```

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

$$\int{\left({\cosh(x)}^2-1\right)}^{3/2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((cosh(x)^2 - 1)^(3/2),x)
```

```
[Out] int((cosh(x)^2 - 1)^(3/2), x)
```

3.50 $\int \left(-1-\cosh^2(x)\right)^{3/2}\,dx$

Optimal. Leaf size=101

$$\frac{2i\sqrt{-1-\cosh^2(x)}\,E\left(\frac{\pi}{2}+ix\middle|-1\right)}{\sqrt{1+\cosh^2(x)}}+\frac{2i\sqrt{1+\cosh^2(x)}\,F\left(\frac{\pi}{2}+ix\middle|-1\right)}{3\sqrt{-1-\cosh^2(x)}}-\frac{1}{3}\cosh(x)\sqrt{-1-\cosh^2(x)}\,\sinh(x$$

```
[Out] -1/3*cosh(x)*sinh(x)*(-1-cosh(x)^2)^(1/2)-2*(-sinh(x)^2)^(1/2)/sinh(x)*Elli
pticE(cosh(x),I)*(-1-cosh(x)^2)^(1/2)/(1+cosh(x)^2)^(1/2)-2/3*(-sinh(x)^2)^
(1/2)/sinh(x)*EllipticF(cosh(x),I)*(1+cosh(x)^2)^(1/2)/(-1-cosh(x)^2)^(1/2)
```

Rubi [A]
time = 0.07, antiderivative size = 101, 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 = {3259, 3251, 3257, 3256, 3262, 3261}

$$-\frac{1}{3}\sinh(x)\cosh(x)\sqrt{-\cosh^2(x)-1}+\frac{2i\sqrt{\cosh^2(x)+1}\,F\left(ix+\frac{\pi}{2}\middle|-1\right)}{3\sqrt{-\cosh^2(x)-1}}+\frac{2i\sqrt{-\cosh^2(x)-1}\,E\left(ix+\frac{\pi}{2}\middle|-1\right)}{\sqrt{\cosh^2(x)+1}}$$

Antiderivative was successfully verified.

```
[In] Int[(-1 - Cosh[x]^2)^(3/2),x]
```

```
[Out] ((2*I)*Sqrt[-1 - Cosh[x]^2]*EllipticE[Pi/2 + I*x, -1])/Sqrt[1 + Cosh[x]^2]
+ (((2*I)/3)*Sqrt[1 + Cosh[x]^2]*EllipticF[Pi/2 + I*x, -1])/Sqrt[-1 - Cosh[
x]^2] - (Cosh[x]*Sqrt[-1 - Cosh[x]^2]*Sinh[x])/3
```

Rule 3251

```
Int[((A_.) + (B_.)*sin[(e_.) + (f_.)*(x_)]^2)/Sqrt[(a_) + (b_.)*sin[(e_.) +
 (f_.)*(x_)]^2], x_Symbol] :> Dist[B/b, Int[Sqrt[a + b*Sin[e + f*x]^2], x],
 x] + Dist[(A*b - a*B)/b, Int[1/Sqrt[a + b*Sin[e + f*x]^2], x], x] /; FreeQ
[{a, b, e, f, A, B}, x]
```

Rule 3256

```
Int[Sqrt[(a_) + (b_.)*sin[(e_.) + (f_.)*(x_)]^2], x_Symbol] :> Simp[(Sqrt[a
]/f)*EllipticE[e + f*x, -b/a], x] /; FreeQ[{a, b, e, f}, x] && GtQ[a, 0]
```

Rule 3257

```
Int[Sqrt[(a_) + (b_.)*sin[(e_.) + (f_.)*(x_)]^2], x_Symbol] :> Dist[Sqrt[a
+ b*Sin[e + f*x]^2]/Sqrt[1 + b*(Sin[e + f*x]^2/a)], Int[Sqrt[1 + (b*Sin[e +
 f*x]^2)/a], x], x] /; FreeQ[{a, b, e, f}, x] && !GtQ[a, 0]
```

Rule 3259

```
Int[((a_) + (b_.)*sin[(e_.) + (f_.)*(x_)]^2)^(p_), x_Symbol] :> Simp[(-b)*C
os[e + f*x]*Sin[e + f*x]*((a + b*Sin[e + f*x]^2)^(p - 1)/(2*f*p)), x] + Dis
t[1/(2*p), Int[(a + b*Sin[e + f*x]^2)^(p - 2)*Simp[a*(b + 2*a*p) + b*(2*a +
 b)*(2*p - 1)*Sin[e + f*x]^2, x], x], x] /; FreeQ[{a, b, e, f}, x] && NeQ[a
 + b, 0] && GtQ[p, 1]
```

Rule 3261

```
Int[1/Sqrt[(a_) + (b_.)*sin[(e_.) + (f_.)*(x_)]^2], x_Symbol] :> Simp[(1/(S
qrt[a]*f))*EllipticF[e + f*x, -b/a], x] /; FreeQ[{a, b, e, f}, x] && GtQ[a,
 0]
```

Rule 3262

```
Int[1/Sqrt[(a_) + (b_.)*sin[(e_.) + (f_.)*(x_)]^2], x_Symbol] :> Dist[Sqrt[
1 + b*(Sin[e + f*x]^2/a)]/Sqrt[a + b*Sin[e + f*x]^2], Int[1/Sqrt[1 + (b*Sin
[e + f*x]^2)/a], x], x] /; FreeQ[{a, b, e, f}, x] &&  !GtQ[a, 0]
```

Rubi steps

$$\begin{aligned}\int \left(-1-\cosh^2(x)\right)^{3/2}\,dx &= -\frac{1}{3}\cosh(x)\sqrt{-1-\cosh^2(x)}\,\sinh(x)+\frac{1}{3}\int \frac{4+6\cosh^2(x)}{\sqrt{-1-\cosh^2(x)}}\,dx\\ &= -\frac{1}{3}\cosh(x)\sqrt{-1-\cosh^2(x)}\,\sinh(x)-\frac{2}{3}\int \frac{1}{\sqrt{-1-\cosh^2(x)}}\,dx-2\int \sqrt{-\\ &= -\frac{1}{3}\cosh(x)\sqrt{-1-\cosh^2(x)}\,\sinh(x)-\frac{\left(2\sqrt{-1-\cosh^2(x)}\right)\int \sqrt{1+\cosh^2(}{\sqrt{1+\cosh^2(x)}}\\ &= \frac{2i\sqrt{-1-\cosh^2(x)}\,E\left(\frac{\pi}{2}+ix\middle|-1\right)}{\sqrt{1+\cosh^2(x)}}+\frac{2i\sqrt{1+\cosh^2(x)}\,F\left(\frac{\pi}{2}+ix\middle|-1\right)}{3\sqrt{-1-\cosh^2(x)}}-\frac{1}{3}\end{aligned}$$

Mathematica [A]
time = 0.05, size = 78, normalized size = 0.77

$$\frac{-48i\sqrt{3+\cosh(2x)}\,E\left(ix\middle|\frac{1}{2}\right)+8i\sqrt{3+\cosh(2x)}\,F\left(ix\middle|\frac{1}{2}\right)+6\sinh(2x)+\sinh(4x)}{12\sqrt{2}\,\sqrt{-3-\cosh(2x)}}$$

Antiderivative was successfully verified.

```
[In] Integrate[(-1 - Cosh[x]^2)^(3/2),x]
```

```
[Out] ((-48*I)*Sqrt[3 + Cosh[2*x]]*EllipticE[I*x, 1/2] + (8*I)*Sqrt[3 + Cosh[2*x]
]*EllipticF[I*x, 1/2] + 6*Sinh[2*x] + Sinh[4*x])/(12*Sqrt[2]*Sqrt[-3 - Cosh
[2*x]])
```

Maple [A]
time = 1.08, size = 96, normalized size = 0.95

method	result
default	$-\frac{\sqrt{-\left(\cosh^2(x)+1\right)\left(\sinh^2(x)\right)}\,\left(-\left(\cosh^5(x)\right)+2\sqrt{-\left(\sinh^2(x)\right)}\,\sqrt{\cosh^2(x)+1}\,\mathrm{EllipticF}(\cosh(x),i)-\right.}{3\sqrt{1-\left(\cosh^4(x)\right)}\,\sinh(x)\sqrt{-1-\left(\cosh^2\right.}}$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((-1-cosh(x)^2)^(3/2),x,method=_RETURNVERBOSE)
```

```
[Out] -1/3*(-(cosh(x)^2+1)*sinh(x)^2)^(1/2)*(-cosh(x)^5+2*(-sinh(x)^2)^(1/2)*(cos
h(x)^2+1)^(1/2)*EllipticF(cosh(x),I)-6*(-sinh(x)^2)^(1/2)*(cosh(x)^2+1)^(1/
2)*EllipticE(cosh(x),I)+cosh(x))/(1-cosh(x)^4)^(1/2)/sinh(x)/(-1-cosh(x)^2)
^(1/2)
```

Maxima [F]
time = 0.00, size = 0, normalized size = 0.00

Failed to integrate

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((-1-cosh(x)^2)^(3/2),x, algorithm="maxima")
```

```
[Out] integrate((-cosh(x)^2 - 1)^(3/2), x)
```

Fricas [F]
time = 0.08, size = 143, normalized size = 1.42

$$\frac{24\left(e^{(4x)}-e^{(3x)}\right)\mathrm{integral}\left(-\frac{4\sqrt{-e^{(4x)}-6e^{(2x)}-1}\,\left(5e^{(2x)}+2e^{x}+5\right)}{3\left(e^{(6x)}-2e^{(5x)}+7e^{(4x)}-12e^{(3x)}+7e^{(2x)}-2e^{x}+1\right)},x\right)-\left(e^{(5x)}-e^{(4x)}+24e^{(3x)}+24e^{(2x)}-e^{x}+1\right)\sqrt{-e^{(4x)}-6e^{(2x)}-1}}{24\left(e^{(4x)}-e^{(3x)}\right)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((-1-cosh(x)^2)^(3/2),x, algorithm="fricas")
```

```
[Out] 1/24*(24*(e^(4*x) - e^(3*x))*integral(-4/3*sqrt(-e^(4*x) - 6*e^(2*x) - 1)*(
5*e^(2*x) + 2*e^x + 5)/(e^(6*x) - 2*e^(5*x) + 7*e^(4*x) - 12*e^(3*x) + 7*e^
(2*x) - 2*e^x + 1), x) - (e^(5*x) - e^(4*x) + 24*e^(3*x) + 24*e^(2*x) - e^x
 + 1)*sqrt(-e^(4*x) - 6*e^(2*x) - 1))/(e^(4*x) - e^(3*x))
```

Sympy [F]
time = 0.00, size = 0, normalized size = 0.00

$$\int \left(-\cosh^{2}\left(x\right)-1\right)^{\frac{3}{2}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((-1-cosh(x)**2)**(3/2),x)
```

```
[Out] Integral((-cosh(x)**2 - 1)**(3/2), x)
```

Giac [F]
time = 0.00, size = 0, normalized size = 0.00

could not integrate

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((-1-cosh(x)^2)^(3/2),x, algorithm="giac")
```

```
[Out] integrate((-cosh(x)^2 - 1)^(3/2), x)
```

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

$$\int {\left(-{\mathrm{cosh}\left(x\right)}^2-1\right)}^{3/2}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((- cosh(x)^2 - 1)^(3/2),x)
```

```
[Out] int((- cosh(x)^2 - 1)^(3/2), x)
```

3.51 $\int \frac{1}{\sqrt{a+b\cosh^2(x)}}\,dx$

Optimal. Leaf size=49

$$-\frac{i\sqrt{1+\frac{b\cosh^2(x)}{a}}\,F\left(\frac{\pi}{2}+ix|-\frac{b}{a}\right)}{\sqrt{a+b\cosh^2(x)}}$$

```
[Out] (-sinh(x)^2)^(1/2)/sinh(x)*EllipticF(cosh(x),(-b/a)^(1/2))*(1+b*cosh(x)^2/a
)^(1/2)/(a+b*cosh(x)^2)^(1/2)
```

Rubi [A]
time = 0.02, antiderivative size = 49, 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 = {3262, 3261}

$$-\frac{i\sqrt{\frac{b\cosh^2(x)}{a}+1}\,F\left(ix+\frac{\pi}{2}|-\frac{b}{a}\right)}{\sqrt{a+b\cosh^2(x)}}$$

Antiderivative was successfully verified.

```
[In] Int[1/Sqrt[a + b*Cosh[x]^2],x]
```

```
[Out] ((-I)*Sqrt[1 + (b*Cosh[x]^2)/a]*EllipticF[Pi/2 + I*x, -(b/a)])/Sqrt[a + b*C
osh[x]^2]
```

Rule 3261

```
Int[1/Sqrt[(a_) + (b_.)*sin[(e_.) + (f_.)*(x_)]^2], x_Symbol] :> Simp[(1/(S
qrt[a]*f))*EllipticF[e + f*x, -b/a], x] /; FreeQ[{a, b, e, f}, x] && GtQ[a,
 0]
```

Rule 3262

```
Int[1/Sqrt[(a_) + (b_.)*sin[(e_.) + (f_.)*(x_)]^2], x_Symbol] :> Dist[Sqrt[
1 + b*(Sin[e + f*x]^2/a)]/Sqrt[a + b*Sin[e + f*x]^2], Int[1/Sqrt[1 + (b*Sin
[e + f*x]^2)/a], x], x] /; FreeQ[{a, b, e, f}, x] &&  !GtQ[a, 0]
```

Rubi steps

$$\int \frac{1}{\sqrt{a+b\cosh^2(x)}}\,dx = \frac{\sqrt{1+\frac{b\cosh^2(x)}{a}}\int \frac{1}{\sqrt{1+\frac{b\cosh^2(x)}{a}}}\,dx}{\sqrt{a+b\cosh^2(x)}}$$
$$= -\frac{i\sqrt{1+\frac{b\cosh^2(x)}{a}}\,F\left(\frac{\pi}{2}+ix\middle|-\frac{b}{a}\right)}{\sqrt{a+b\cosh^2(x)}}$$

Mathematica [**A**]
time = 0.04, size = 53, normalized size = 1.08

$$-\frac{i\sqrt{\frac{2a+b+b\cosh(2x)}{a+b}}\,F\left(ix\middle|\frac{b}{a+b}\right)}{\sqrt{2a+b+b\cosh(2x)}}$$

Antiderivative was successfully verified.

```
[In] Integrate[1/Sqrt[a + b*Cosh[x]^2],x]
[Out] ((-I)*Sqrt[(2*a + b + b*Cosh[2*x])/(a + b)]*EllipticF[I*x, b/(a + b)])/Sqrt
[2*a + b + b*Cosh[2*x]]
```

Maple [**A**]
time = 0.88, size = 66, normalized size = 1.35

method	result	size
default	$\frac{\sqrt{\frac{a+b\left(\cosh^2(x)\right)}{a}}\,\sqrt{-\left(\sinh^2(x)\right)}\,\mathrm{EllipticF}\left(\cosh(x)\sqrt{-\frac{b}{a}},\sqrt{-\frac{a}{b}}\right)}{\sqrt{-\frac{b}{a}}\,\sinh(x)\sqrt{a+b\left(\cosh^2(x)\right)}}$	66

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(1/(a+b*cosh(x)^2)^(1/2),x,method=_RETURNVERBOSE)
[Out] 1/(-1/a*b)^(1/2)*((a+b*cosh(x)^2)/a)^(1/2)*(-sinh(x)^2)^(1/2)*EllipticF(cos
h(x)*(-1/a*b)^(1/2),(-a/b)^(1/2))/sinh(x)/(a+b*cosh(x)^2)^(1/2)
```

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

Failed to integrate

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(a+b*cosh(x)^2)^(1/2),x, algorithm="maxima")
```

```
[Out] integrate(1/sqrt(b*cosh(x)^2 + a), x)
```

Fricas [B] Leaf count of result is larger than twice the leaf count of optimal. 132 vs. $2(47) = 94$.
time = 0.08, size = 132, normalized size = 2.69

$$-\frac{2\left(2\,b\sqrt{\frac{a^2+ab}{b^2}}+2\,a+b\right)\sqrt{\frac{2\,b\sqrt{\frac{a^2+ab}{b^2}}-2\,a-b}{b}}\,F(\arcsin\left(\sqrt{\frac{2\,b\sqrt{\frac{a^2+ab}{b^2}}-2\,a-b}{b}}\,(\cosh\left(x\right)+\sinh\left(x\right))\right)\mid\frac{8\,a^2+8\,ab+b^2+4\,(2\,ab+b^2)\sqrt{\frac{a^2+ab}{b^2}}}{b^2})}{b^{\frac{3}{2}}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(a+b*cosh(x)^2)^(1/2),x, algorithm="fricas")
```

```
[Out] -2*(2*b*sqrt((a^2 + a*b)/b^2) + 2*a + b)*sqrt((2*b*sqrt((a^2 + a*b)/b^2) -
2*a - b)/b)*elliptic_f(arcsin(sqrt((2*b*sqrt((a^2 + a*b)/b^2) - 2*a - b)/b)
*(cosh(x) + sinh(x))), (8*a^2 + 8*a*b + b^2 + 4*(2*a*b + b^2)*sqrt((a^2 + a
*b)/b^2))/b^2)/b^(3/2)
```

Sympy [F]
time = 0.00, size = 0, normalized size = 0.00

$$\int\frac{1}{\sqrt{a+b\cosh^2\left(x\right)}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(a+b*cosh(x)**2)**(1/2),x)
```

```
[Out] Integral(1/sqrt(a + b*cosh(x)**2), x)
```

Giac [F]
time = 0.00, size = 0, normalized size = 0.00

could not integrate

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(a+b*cosh(x)^2)^(1/2),x, algorithm="giac")
```

```
[Out] integrate(1/sqrt(b*cosh(x)^2 + a), x)
```

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

$$\int\frac{1}{\sqrt{b\,{\cosh\left(x\right)}^2+a}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

3.52 $\int \frac{1}{\sqrt{1+\cosh^2(x)}}\,dx$

Optimal. Leaf size=17

$$-iF\left(\frac{\pi}{2}+ix\middle|-1\right)$$

```
[Out] (-sinh(x)^2)^(1/2)/sinh(x)*EllipticF(cosh(x),I)
```

Rubi [A]
time = 0.01, antiderivative size = 17, normalized size of antiderivative = 1.00, number of steps used = 1, number of rules used = 1, integrand size = 10, $\frac{\text{number of rules}}{\text{integrand size}} = 0.100$, Rules used = {3261}

$$-iF\left(ix+\frac{\pi}{2}\middle|-1\right)$$

Antiderivative was successfully verified.

```
[In] Int[1/Sqrt[1 + Cosh[x]^2],x]
[Out] (-I)*EllipticF[Pi/2 + I*x, -1]
```

Rule 3261

```
Int[1/Sqrt[(a_) + (b_.)*sin[(e_.) + (f_.)*(x_)]^2], x_Symbol] :> Simp[(1/(S
qrt[a]*f))*EllipticF[e + f*x, -b/a], x] /; FreeQ[{a, b, e, f}, x] && GtQ[a,
 0]
```

Rubi steps

$$\int \frac{1}{\sqrt{1+\cosh^2(x)}}\,dx = -iF\left(\frac{\pi}{2}+ix\middle|-1\right)$$

Mathematica [A]
time = 0.02, size = 18, normalized size = 1.06

$$-\frac{iF\left(ix\middle|\frac{1}{2}\right)}{\sqrt{2}}$$

Antiderivative was successfully verified.

```
[In] Integrate[1/Sqrt[1 + Cosh[x]^2],x]
[Out] ((-I)*EllipticF[I*x, 1/2])/Sqrt[2]
```

Maple [B] Both result and optimal contain complex but leaf count of result is larger than twice the leaf count of optimal. 44 vs. $2(18) = 36$.
time = 0.77, size = 45, normalized size = 2.65

method	result	size
default	$-\frac{i\sqrt{\left(\cosh^2\left(x\right)+1\right)\left(\sinh^2\left(x\right)\right)}\,\sqrt{-\left(\sinh^2\left(x\right)\right)}\,\mathrm{EllipticF}(i\cosh(x),i)}{\sqrt{\cosh^4\left(x\right)-1}\,\sinh(x)}$	45

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(1/(cosh(x)^2+1)^(1/2),x,method=_RETURNVERBOSE)
```

```
[Out] -I*((cosh(x)^2+1)*sinh(x)^2)^(1/2)*(-sinh(x)^2)^(1/2)/(cosh(x)^4-1)^(1/2)*E
llipticF(I*cosh(x),I)/sinh(x)
```

Maxima [F]
time = 0.00, size = 0, normalized size = 0.00

Failed to integrate

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(1+cosh(x)^2)^(1/2),x, algorithm="maxima")
```

```
[Out] integrate(1/sqrt(cosh(x)^2 + 1), x)
```

Fricas [B] Leaf count of result is larger than twice the leaf count of optimal. 42 vs. $2(17) = 34$.
time = 0.09, size = 42, normalized size = 2.47

$$-2\left(2\sqrt{2}+3\right)\sqrt{2\sqrt{2}-3}\,F(\arcsin\left(\sqrt{2\sqrt{2}-3}\,(\cosh\left(x\right)+\sinh\left(x\right))\right)\mid 12\sqrt{2}+17)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(1+cosh(x)^2)^(1/2),x, algorithm="fricas")
```

```
[Out] -2*(2*sqrt(2) + 3)*sqrt(2*sqrt(2) - 3)*elliptic_f(arcsin(sqrt(2*sqrt(2) - 3
)*(cosh(x) + sinh(x))), 12*sqrt(2) + 17)
```

Sympy [F]
time = 0.00, size = 0, normalized size = 0.00

$$\int\frac{1}{\sqrt{\cosh^2\left(x\right)+1}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(1+cosh(x)**2)**(1/2),x)
```

```
[Out] Integral(1/sqrt(cosh(x)**2 + 1), x)
```

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

could not integrate

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(1+cosh(x)^2)^(1/2),x, algorithm="giac")
```

```
[Out] integrate(1/sqrt(cosh(x)^2 + 1), x)
```

Mupad [**F**]
time = 0.00, size = -1, normalized size = -0.06

$$\int \frac{1}{\sqrt{\cosh(x)^2+1}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(1/(cosh(x)^2 + 1)^(1/2),x)
```

```
[Out] int(1/(cosh(x)^2 + 1)^(1/2), x)
```

3.53 $\int \frac{1}{\sqrt{1-\cosh^2(x)}}\,dx$

Optimal. Leaf size=17

$$-\frac{\tanh^{-1}(\cosh(x))\sinh(x)}{\sqrt{-\sinh^2(x)}}$$

```
[Out] -arctanh(cosh(x))*sinh(x)/(-sinh(x)^2)^(1/2)
```

Rubi [A]
time = 0.02, antiderivative size = 17, 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 = {3255, 3286, 3855}

$$-\frac{\sinh(x)\tanh^{-1}(\cosh(x))}{\sqrt{-\sinh^2(x)}}$$

Antiderivative was successfully verified.

```
[In] Int[1/Sqrt[1 - Cosh[x]^2],x]
```

```
[Out] -((ArcTanh[Cosh[x]]*Sinh[x])/Sqrt[-Sinh[x]^2])
```

Rule 3255

```
Int[(u_.)*((a_) + (b_.)*sin[(e_.) + (f_.)*(x_)]^2)^(p_), x_Symbol] :> Int[A
ctivateTrig[u*(a*cos[e + f*x]^2)^p], x] /; FreeQ[{a, b, e, f, p}, x] && EqQ
[a + b, 0]
```

Rule 3286

```
Int[(u_.)*((b_.)*sin[(e_.) + (f_.)*(x_)]^(n_))^(p_), x_Symbol] :> With[{ff
= FreeFactors[Sin[e + f*x], x]}, Dist[(b*ff^n)^IntPart[p]*((b*Sin[e + f*x]^
n)^FracPart[p]/(Sin[e + f*x]/ff)^(n*FracPart[p])), Int[ActivateTrig[u]*(Sin
[e + f*x]/ff)^(n*p), x], x]] /; FreeQ[{b, e, f, n, p}, x] &&  !IntegerQ[p]
&& IntegerQ[n] && (EqQ[u, 1] || MatchQ[u, ((d_.)*(trig_)[e + f*x])^(m_.) /;
 FreeQ[{d, m}, x] && MemberQ[{sin, cos, tan, cot, sec, csc}, trig]])
```

Rule 3855

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

Rubi steps

$$\int \frac{1}{\sqrt{1-\cosh^2(x)}}\,dx = \int \frac{1}{\sqrt{-\sinh^2(x)}}\,dx$$
$$= \frac{\sinh(x)\int \operatorname{csch}(x)\,dx}{\sqrt{-\sinh^2(x)}}$$
$$= -\frac{\tanh^{-1}(\cosh(x))\sinh(x)}{\sqrt{-\sinh^2(x)}}$$

Mathematica [**A**]
time = 0.01, size = 20, normalized size = 1.18

$$\frac{\log\left(\tanh\left(\frac{x}{2}\right)\right)\sinh(x)}{\sqrt{-\sinh^2(x)}}$$

Antiderivative was successfully verified.

```
[In] Integrate[1/Sqrt[1 - Cosh[x]^2],x]
```

```
[Out] (Log[Tanh[x/2]]*Sinh[x])/Sqrt[-Sinh[x]^2]
```

Maple [**B**] Leaf count of result is larger than twice the leaf count of optimal. 33 vs. $2(15) = 30$.
time = 0.85, size = 34, normalized size = 2.00

method	result	size
default	$-\frac{\sinh(x)\sqrt{-\left(\cosh^2(x)\right)}\,\arctan\left(\frac{1}{\sqrt{-\left(\cosh^2(x)\right)}}\right)}{\cosh(x)\sqrt{-\left(\sinh^2(x)\right)}}$	34
risch	$-\frac{e^{-x}\left(e^{2x}-1\right)\ln\left(e^x+1\right)}{\sqrt{-\left(e^{2x}-1\right)^2 e^{-2x}}}+\frac{e^{-x}\left(e^{2x}-1\right)\ln\left(e^x-1\right)}{\sqrt{-\left(e^{2x}-1\right)^2 e^{-2x}}}$	67

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(1/(1-cosh(x)^2)^(1/2),x,method=_RETURNVERBOSE)
```

```
[Out] -sinh(x)*(-cosh(x)^2)^(1/2)*arctan(1/(-cosh(x)^2)^(1/2))/cosh(x)/(-sinh(x)^
2)^(1/2)
```

Maxima [**C**] Result contains complex when optimal does not.
time = 0.49, size = 19, normalized size = 1.12

$$-i\,\log\left(e^{(-x)}+1\right)+i\,\log\left(e^{(-x)}-1\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(1-cosh(x)^2)^(1/2),x, algorithm="maxima")
```

```
[Out] -I*log(e^(-x) + 1) + I*log(e^(-x) - 1)
```

Fricas [F]
time = 0.39, size = 1, normalized size = 0.06

$$0$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(1-cosh(x)^2)^(1/2),x, algorithm="fricas")
```

```
[Out] 0
```

Sympy [F]
time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{1}{\sqrt{1-\cosh^{2}(x)}}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(1-cosh(x)**2)**(1/2),x)
```

```
[Out] Integral(1/sqrt(1 - cosh(x)**2), x)
```

Giac [C] Result contains complex when optimal does not.
time = 0.42, size = 40, normalized size = 2.35

$$-\frac{i\log\left(e^{x}+1\right)}{\operatorname{sgn}\left(-e^{(3x)}+e^{x}\right)}+\frac{i\log\left(\left|e^{x}-1\right|\right)}{\operatorname{sgn}\left(-e^{(3x)}+e^{x}\right)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(1-cosh(x)^2)^(1/2),x, algorithm="giac")
```

```
[Out] -I*log(e^x + 1)/sgn(-e^(3*x) + e^x) + I*log(abs(e^x - 1))/sgn(-e^(3*x) + e^
x)
```

Mupad [F]
time = 0.00, size = -1, normalized size = -0.06

$$\int \frac{1}{\sqrt{1-{\cosh\left(x\right)}^2}}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(1/(1 - cosh(x)^2)^(1/2),x)
```

```
[Out] int(1/(1 - cosh(x)^2)^(1/2), x)
```

3.54 $\int \frac{1}{\sqrt{-1+\cosh^2(x)}}\,dx$

Optimal. Leaf size=15

$$-\frac{\tanh^{-1}(\cosh(x))\sinh(x)}{\sqrt{\sinh^2(x)}}$$

```
[Out] -arctanh(cosh(x))*sinh(x)/(sinh(x)^2)^(1/2)
```

Rubi [A]
time = 0.01, antiderivative size = 15, normalized size of antiderivative = 1.00, number of steps used = 3, number of rules used = 3, integrand size = 10, $\frac{\text{number of rules}}{\text{integrand size}} = 0.300$, Rules used = {3255, 3286, 3855}

$$-\frac{\sinh(x)\tanh^{-1}(\cosh(x))}{\sqrt{\sinh^2(x)}}$$

Antiderivative was successfully verified.

```
[In] Int[1/Sqrt[-1 + Cosh[x]^2],x]
```

```
[Out] -((ArcTanh[Cosh[x]]*Sinh[x])/Sqrt[Sinh[x]^2])
```

Rule 3255

```
Int[(u_.)*((a_) + (b_.)*sin[(e_.) + (f_.)*(x_)]^2)^(p_), x_Symbol] :> Int[A
ctivateTrig[u*(a*cos[e + f*x]^2)^p], x] /; FreeQ[{a, b, e, f, p}, x] && EqQ
[a + b, 0]
```

Rule 3286

```
Int[(u_.)*((b_.)*sin[(e_.) + (f_.)*(x_)]^(n_))^(p_), x_Symbol] :> With[{ff
= FreeFactors[Sin[e + f*x], x]}, Dist[(b*ff^n)^IntPart[p]*((b*Sin[e + f*x]^
n)^FracPart[p]/(Sin[e + f*x]/ff)^(n*FracPart[p])), Int[ActivateTrig[u]*(Sin
[e + f*x]/ff)^(n*p), x], x]] /; FreeQ[{b, e, f, n, p}, x] &&  !IntegerQ[p]
&& IntegerQ[n] && (EqQ[u, 1] || MatchQ[u, ((d_.)*(trig_)[e + f*x])^(m_.) /;
 FreeQ[{d, m}, x] && MemberQ[{sin, cos, tan, cot, sec, csc}, trig]])
```

Rule 3855

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

Rubi steps

$$\int \frac{1}{\sqrt{-1+\cosh^2(x)}}\,dx = \int \frac{1}{\sqrt{\sinh^2(x)}}\,dx$$
$$= \frac{\sinh(x)\int \operatorname{csch}(x)\,dx}{\sqrt{\sinh^2(x)}}$$
$$= -\frac{\tanh^{-1}(\cosh(x))\sinh(x)}{\sqrt{\sinh^2(x)}}$$

Mathematica [A]
time = 0.01, size = 18, normalized size = 1.20

$$\frac{\log\left(\tanh\left(\frac{x}{2}\right)\right)\sinh(x)}{\sqrt{\sinh^2(x)}}$$

Antiderivative was successfully verified.

```
[In] Integrate[1/Sqrt[-1 + Cosh[x]^2],x]
[Out] (Log[Tanh[x/2]]*Sinh[x])/Sqrt[Sinh[x]^2]
```

Maple [A]
time = 0.92, size = 16, normalized size = 1.07

method	result	size
default	$-\frac{\sqrt{-\frac{1}{2}+\frac{\cosh(2x)}{2}}\,\operatorname{arctanh}(\cosh(x))}{\sinh(x)}$	16
risch	$-\frac{e^{-x}\left(e^{2x}-1\right)\ln\left(e^{x}+1\right)}{\sqrt{\left(e^{2x}-1\right)^{2}e^{-2x}}}+\frac{e^{-x}\left(e^{2x}-1\right)\ln\left(e^{x}-1\right)}{\sqrt{\left(e^{2x}-1\right)^{2}e^{-2x}}}$	65

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(1/(cosh(x)^2-1)^(1/2),x,method=_RETURNVERBOSE)
[Out] -(sinh(x)^2)^(1/2)*arctanh(cosh(x))/sinh(x)
```

Maxima [A]
time = 0.50, size = 17, normalized size = 1.13

$$\log\left(e^{(-x)}+1\right)-\log\left(e^{(-x)}-1\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(-1+cosh(x)^2)^(1/2),x, algorithm="maxima")
```

```
[Out] log(e^(-x) + 1) - log(e^(-x) - 1)
```

Fricas [**A**]
time = 0.38, size = 17, normalized size = 1.13

$$-\log\left(\cosh\left(x\right)+\sinh\left(x\right)+1\right)+\log\left(\cosh\left(x\right)+\sinh\left(x\right)-1\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(-1+cosh(x)^2)^(1/2),x, algorithm="fricas")
```

```
[Out] -log(cosh(x) + sinh(x) + 1) + log(cosh(x) + sinh(x) - 1)
```

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

$$\int\frac{1}{\sqrt{\cosh^{2}\left(x\right)-1}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(-1+cosh(x)**2)**(1/2),x)
```

```
[Out] Integral(1/sqrt(cosh(x)**2 - 1), x)
```

Giac [**B**] Leaf count of result is larger than twice the leaf count of optimal. 39 vs. 2(13) = 26.
time = 0.42, size = 39, normalized size = 2.60

$$-\frac{\log\left(e^{x}+1\right)}{\operatorname{sgn}\left(e^{(3\,x)}-e^{x}\right)}+\frac{\log\left(|e^{x}-1|\right)}{\operatorname{sgn}\left(e^{(3\,x)}-e^{x}\right)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(-1+cosh(x)^2)^(1/2),x, algorithm="giac")
```

```
[Out] -log(e^x + 1)/sgn(e^(3*x) - e^x) + log(abs(e^x - 1))/sgn(e^(3*x) - e^x)
```

Mupad [**F**]
time = 0.00, size = -1, normalized size = -0.07

$$\int\frac{1}{\sqrt{{\cosh\left(x\right)}^{2}-1}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(1/(cosh(x)^2 - 1)^(1/2),x)
```

```
[Out] int(1/(cosh(x)^2 - 1)^(1/2), x)
```

3.55 $\int \frac{1}{\sqrt{-1-\cosh^2(x)}}\,dx$

Optimal. Leaf size=39

$$-\frac{i\sqrt{1+\cosh^2(x)}\,F\left(\frac{\pi}{2}+ix\middle|-1\right)}{\sqrt{-1-\cosh^2(x)}}$$

```
[Out] (-sinh(x)^2)^(1/2)/sinh(x)*EllipticF(cosh(x),I)*(1+cosh(x)^2)^(1/2)/(-1-cos
h(x)^2)^(1/2)
```

Rubi [A]
time = 0.02, antiderivative size = 39, 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 = {3262, 3261}

$$-\frac{i\sqrt{\cosh^2(x)+1}\,F\left(ix+\frac{\pi}{2}\middle|-1\right)}{\sqrt{-\cosh^2(x)-1}}$$

Antiderivative was successfully verified.

```
[In] Int[1/Sqrt[-1 - Cosh[x]^2],x]
```

```
[Out] ((-I)*Sqrt[1 + Cosh[x]^2]*EllipticF[Pi/2 + I*x, -1])/Sqrt[-1 - Cosh[x]^2]
```

Rule 3261

```
Int[1/Sqrt[(a_) + (b_.)*sin[(e_.) + (f_.)*(x_)]^2], x_Symbol] :> Simp[(1/(S
qrt[a]*f))*EllipticF[e + f*x, -b/a], x] /; FreeQ[{a, b, e, f}, x] && GtQ[a,
 0]
```

Rule 3262

```
Int[1/Sqrt[(a_) + (b_.)*sin[(e_.) + (f_.)*(x_)]^2], x_Symbol] :> Dist[Sqrt[
1 + b*(Sin[e + f*x]^2/a)]/Sqrt[a + b*Sin[e + f*x]^2], Int[1/Sqrt[1 + (b*Sin
[e + f*x]^2)/a], x], x] /; FreeQ[{a, b, e, f}, x] &&  !GtQ[a, 0]
```

Rubi steps

$$\int \frac{1}{\sqrt{-1-\cosh^2(x)}}\,dx = \frac{\sqrt{1+\cosh^2(x)}\int \frac{1}{\sqrt{1+\cosh^2(x)}}\,dx}{\sqrt{-1-\cosh^2(x)}}$$
$$= -\frac{i\sqrt{1+\cosh^2(x)}\,F\left(\frac{\pi}{2}+ix\middle|-1\right)}{\sqrt{-1-\cosh^2(x)}}$$

Mathematica [**A**]
time = 0.03, size = 40, normalized size = 1.03

$$-\frac{i\sqrt{3+\cosh(2x)}\,F\left(ix\middle|\frac{1}{2}\right)}{\sqrt{2}\sqrt{-3-\cosh(2x)}}$$

Antiderivative was successfully verified.

```
[In] Integrate[1/Sqrt[-1 - Cosh[x]^2],x]
```

```
[Out] ((-I)*Sqrt[3 + Cosh[2*x]]*EllipticF[I*x, 1/2])/(Sqrt[2]*Sqrt[-3 - Cosh[2*x]
])
```

Maple [**A**]
time = 0.77, size = 61, normalized size = 1.56

method	result	size
default	$\frac{\sqrt{-\left(\cosh^2\left(x\right)+1\right)\left(\sinh^2\left(x\right)\right)}\,\sqrt{-\left(\sinh^2\left(x\right)\right)}\,\sqrt{\cosh^2\left(x\right)+1}\,\mathrm{EllipticF}(\cosh(x),i)}{\sqrt{1-\left(\cosh^4\left(x\right)\right)}\,\sinh(x)\sqrt{-1-\left(\cosh^2\left(x\right)\right)}}$	61

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(1/(-1-cosh(x)^2)^(1/2),x,method=_RETURNVERBOSE)
```

```
[Out] (-(cosh(x)^2+1)*sinh(x)^2)^(1/2)*(-sinh(x)^2)^(1/2)*(cosh(x)^2+1)^(1/2)/(1-
cosh(x)^4)^(1/2)*EllipticF(cosh(x),I)/sinh(x)/(-1-cosh(x)^2)^(1/2)
```

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

Failed to integrate

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(-1-cosh(x)^2)^(1/2),x, algorithm="maxima")
```

```
[Out] integrate(1/sqrt(-cosh(x)^2 - 1), x)
```

Fricas [A]
time = 0.07, size = 39, normalized size = 1.00

$$-2\sqrt{2\sqrt{2}-3}\left(-2i\sqrt{2}-3i\right)F(\arcsin\left(\sqrt{2\sqrt{2}-3}\,e^{x}\right)\mid 12\sqrt{2}+17)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(-1-cosh(x)^2)^(1/2),x, algorithm="fricas")
```

```
[Out] -2*sqrt(2*sqrt(2) - 3)*(-2*I*sqrt(2) - 3*I)*elliptic_f(arcsin(sqrt(2*sqrt(2
) - 3)*e^x), 12*sqrt(2) + 17)
```

Sympy [F]
time = 0.00, size = 0, normalized size = 0.00

$$\int\frac{1}{\sqrt{-\cosh^{2}(x)-1}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(-1-cosh(x)**2)**(1/2),x)
```

```
[Out] Integral(1/sqrt(-cosh(x)**2 - 1), x)
```

Giac [F]
time = 0.00, size = 0, normalized size = 0.00

could not integrate

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(-1-cosh(x)^2)^(1/2),x, algorithm="giac")
```

```
[Out] integrate(1/sqrt(-cosh(x)^2 - 1), x)
```

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

$$\int\frac{1}{\sqrt{-\cosh(x)^{2}-1}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(1/(- cosh(x)^2 - 1)^(1/2),x)
```

```
[Out] int(1/(- cosh(x)^2 - 1)^(1/2), x)
```

3.56 $\int \frac{1}{a+b\cosh^3(x)}\,dx$

Optimal. Leaf size=288

$$\frac{2\tanh^{-1}\left(\frac{\sqrt{\sqrt[3]{a}-\sqrt[3]{b}}\tanh\left(\frac{x}{2}\right)}{\sqrt{\sqrt[3]{a}+\sqrt[3]{b}}}\right)}{3a^{2/3}\sqrt{\sqrt[3]{a}-\sqrt[3]{b}}\sqrt{\sqrt[3]{a}+\sqrt[3]{b}}}+\frac{2\tanh^{-1}\left(\frac{\sqrt{\sqrt[3]{a}+\sqrt[3]{-1}\sqrt[3]{b}}\tanh\left(\frac{x}{2}\right)}{\sqrt{\sqrt[3]{a}-\sqrt[3]{-1}\sqrt[3]{b}}}\right)}{3a^{2/3}\sqrt{\sqrt[3]{a}-\sqrt[3]{-1}\sqrt[3]{b}}\sqrt{\sqrt[3]{a}+\sqrt[3]{-1}\sqrt[3]{b}}}+\frac{2\tanh^{-1}\left(\frac{\sqrt{\sqrt[3]{a}-\cdots}}{\sqrt{\sqrt[3]{a}\cdots}}\right)}{3a^{2/3}\sqrt{\sqrt[3]{a}-(-1)^{2/3}\cdots}}$$

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

Rubi [A]
time = 0.33, antiderivative size = 288, normalized size of antiderivative = 1.00, number of steps used = 8, number of rules used = 3, integrand size = 10, $\frac{\text{number of rules}}{\text{integrand size}} = 0.300$, Rules used = {3292, 2738, 214}

$$\frac{2\tanh^{-1}\left(\frac{\sqrt{\sqrt[3]{a}-\sqrt[3]{b}}\tanh\left(\frac{x}{2}\right)}{\sqrt{\sqrt[3]{a}+\sqrt[3]{b}}}\right)}{3a^{2/3}\sqrt{\sqrt[3]{a}-\sqrt[3]{b}}\sqrt{\sqrt[3]{a}+\sqrt[3]{b}}}+\frac{2\tanh^{-1}\left(\frac{\sqrt{\sqrt[3]{a}+\sqrt[3]{-1}\sqrt[3]{b}}\tanh\left(\frac{x}{2}\right)}{\sqrt{\sqrt[3]{a}-\sqrt[3]{-1}\sqrt[3]{b}}}\right)}{3a^{2/3}\sqrt{\sqrt[3]{a}-\sqrt[3]{-1}\sqrt[3]{b}}\sqrt{\sqrt[3]{a}+\sqrt[3]{-1}\sqrt[3]{b}}}+\frac{2\tanh^{-1}\left(\frac{\sqrt{\sqrt[3]{a}-(-1)^{2/3}\sqrt[3]{b}}\tanh\left(\frac{x}{2}\right)}{\sqrt{\sqrt[3]{a}+(-1)^{2/3}\sqrt[3]{b}}}\right)}{3a^{2/3}\sqrt{\sqrt[3]{a}-(-1)^{2/3}\sqrt[3]{b}}\sqrt{\sqrt[3]{a}+(-1)^{2/3}\sqrt[3]{b}}}$$

Antiderivative was successfully verified.

```
[In] Int[(a + b*Cosh[x]^3)^(-1),x]
```

```
[Out] (2*ArcTanh[(Sqrt[a^(1/3) - b^(1/3)]*Tanh[x/2])/Sqrt[a^(1/3) + b^(1/3)]])/(3
*a^(2/3)*Sqrt[a^(1/3) - b^(1/3)]*Sqrt[a^(1/3) + b^(1/3)]) + (2*ArcTanh[(Sqr
t[a^(1/3) + (-1)^(1/3)*b^(1/3)]*Tanh[x/2])/Sqrt[a^(1/3) - (-1)^(1/3)*b^(1/3
)]])/(3*a^(2/3)*Sqrt[a^(1/3) - (-1)^(1/3)*b^(1/3)]*Sqrt[a^(1/3) + (-1)^(1/3
)*b^(1/3)]) + (2*ArcTanh[(Sqrt[a^(1/3) - (-1)^(2/3)*b^(1/3)]*Tanh[x/2])/Sqr
t[a^(1/3) + (-1)^(2/3)*b^(1/3)]])/(3*a^(2/3)*Sqrt[a^(1/3) - (-1)^(2/3)*b^(1
/3)]*Sqrt[a^(1/3) + (-1)^(2/3)*b^(1/3)])
```

Rule 214

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

Rule 2738

```
Int[((a_) + (b_.)*sin[Pi/2 + (c_.) + (d_.)*(x_)])^(-1), x_Symbol] :> With[{
e = FreeFactors[Tan[(c + d*x)/2], x]}, Dist[2*(e/d), Subst[Int[1/(a + b + (
```

```
a - b)*e^2*x^2), x], x, Tan[(c + d*x)/2]/e], x]] /; FreeQ[{a, b, c, d}, x]
&& NeQ[a^2 - b^2, 0]
```

Rule 3292

```
Int[((a_) + (b_.)*((c_.)*sin[(e_.) + (f_.)*(x_)])^(n_))^(p_), x_Symbol] :>
Int[ExpandTrig[(a + b*(c*sin[e + f*x])^n)^p, x], x] /; FreeQ[{a, b, c, e, f
, n}, x] && (IGtQ[p, 0] || (EqQ[p, -1] && IntegerQ[n]))
```

Rubi steps

$$\int \frac{1}{a+b\cosh^3(x)}\,dx = \int \left(-\frac{1}{3a^{2/3}\left(-\sqrt[3]{a}-\sqrt[3]{b}\cosh(x)\right)}-\frac{1}{3a^{2/3}\left(-\sqrt[3]{a}+\sqrt[3]{-1}\sqrt[3]{b}\cosh(x)\right)}-\frac{}{3a^{2/3}}\right.$$
$$=-\frac{\int \frac{1}{-\sqrt[3]{a}-\sqrt[3]{b}\cosh(x)}\,dx}{3a^{2/3}}-\frac{\int \frac{1}{-\sqrt[3]{a}+\sqrt[3]{-1}\sqrt[3]{b}\cosh(x)}\,dx}{3a^{2/3}}-\frac{\int \frac{1}{-\sqrt[3]{a}-(-1)^{2/3}\sqrt[3]{b}\cosh(x)}}{3a^{2/3}}$$
$$=-\frac{2\text{Subst}\left(\int \frac{1}{-\sqrt[3]{a}-\sqrt[3]{b}-\left(-\sqrt[3]{a}+\sqrt[3]{b}\right)x^2}\,dx,x,\tanh\left(\frac{x}{2}\right)\right)}{3a^{2/3}}-\frac{2\text{Subst}\left(\int \frac{}{-\sqrt[3]{a}+\sqrt[3]{-1}}\right.}{}$$
$$=\frac{2\tanh^{-1}\left(\frac{\sqrt{\sqrt[3]{a}-\sqrt[3]{b}}\tanh\left(\frac{x}{2}\right)}{\sqrt{\sqrt[3]{a}+\sqrt[3]{b}}}\right)}{3a^{2/3}\sqrt{\sqrt[3]{a}-\sqrt[3]{b}}\sqrt{\sqrt[3]{a}+\sqrt[3]{b}}}+\frac{2\tanh^{-1}\left(\frac{\sqrt{\sqrt[3]{a}+\sqrt[3]{-1}\sqrt[3]{b}}\tanh\left(\frac{x}{2}\right)}{\sqrt{\sqrt[3]{a}-\sqrt[3]{-1}\sqrt[3]{b}}}\right)}{3a^{2/3}\sqrt{\sqrt[3]{a}-\sqrt[3]{-1}\sqrt[3]{b}}\sqrt{\sqrt[3]{a}+\sqrt[3]{-1}\sqrt[3]{b}}}$$

Mathematica [C] Result contains higher order function than in optimal. Order 9 vs. order 3 in optimal.
time = 0.08, size = 105, normalized size = 0.36

$$\frac{2}{3}\text{RootSum}\left[b+3b\#1^2+8a\#1^3+3b\#1^4+b\#1^6\&,\frac{x\#1+2\log\left(-\cosh\left(\frac{x}{2}\right)-\sinh\left(\frac{x}{2}\right)+\cosh\left(\frac{x}{2}\right)\#1-\sinh\left(\frac{x}{2}\right)\#1\right)\#1}{b+4a\#1+2b\#1^2+b\#1^4}\&\right]$$

Antiderivative was successfully verified.

```
[In] Integrate[(a + b*Cosh[x]^3)^(-1),x]
```

```
[Out] (2*RootSum[b + 3*b*#1^2 + 8*a*#1^3 + 3*b*#1^4 + b*#1^6 & , (x*#1 + 2*Log[-C
osh[x/2] - Sinh[x/2] + Cosh[x/2]*#1 - Sinh[x/2]*#1]*#1)/(b + 4*a*#1 + 2*b*#
1^2 + b*#1^4) & ])/3
```

Maple [C] Result contains higher order function than in optimal. Order 9 vs. order 3.
time = 4.18, size = 100, normalized size = 0.35

method	result
default	$\frac{\left(\sum_{\_R=\mathrm{RootOf}\left((a-b)\_Z^6+(-3a-3b)\_Z^4+(3a-3b)\_Z^2-a-b\right)}\frac{\left(-\_R^4+2\_R^2-1\right)\ln\left(\tanh\left(\frac{x}{2}\right)-\_R\right)}{\_R^5a-\_R^5b-2\_R^3a-2\_R^3b+\_Ra-\_Rb}\right)}{3}$
risch	$\sum_{\_R=\mathrm{RootOf}\left(-1+(729a^6-729a^4b^2)\_Z^6-243a^4\_Z^4+27\_Z^2a^2\right)}\_R\ln\left(\mathrm{e}^x+\left(\frac{486a^6}{b}-486a^4b\right)\_R^5+\left(-\frac{81a^5}{b}+8\right.\right.$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(1/(a+b*cosh(x)^3),x,method=_RETURNVERBOSE)
```

```
[Out] 1/3*sum((-_R^4+2*_R^2-1)/(_R^5*a-_R^5*b-2*_R^3*a-2*_R^3*b+_R*a-_R*b)*ln(tan
h(1/2*x)-_R),_R=RootOf((a-b)*_Z^6+(-3*a-3*b)*_Z^4+(3*a-3*b)*_Z^2-a-b))
```

Maxima [F]
time = 0.00, size = 0, normalized size = 0.00

Failed to integrate

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(a+b*cosh(x)^3),x, algorithm="maxima")
```

```
[Out] integrate(1/(b*cosh(x)^3 + a), x)
```

Fricas [C] Result contains complex when optimal does not.
time = 1.24, size = 18612, normalized size = 64.62

too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(a+b*cosh(x)^3),x, algorithm="fricas")
```

```
[Out] -1/2*sqrt(2/3)*sqrt(1/6)*sqrt(-((2*(1/2)^(2/3)*(-I*sqrt(3) + 1)*(1/(a^4 - a
^2*b^2) - 1/(a^2 - b^2)^2)/(1/(a^6 - a^4*b^2) - 3/((a^4 - a^2*b^2)*(a^2 - b
^2)) + 2/(a^2 - b^2)^3 + b^2/((a^2 - b^2)^2*a^4))^(1/3) - (1/2)^(1/3)*(I*sq
rt(3) + 1)*(1/(a^6 - a^4*b^2) - 3/((a^4 - a^2*b^2)*(a^2 - b^2)) + 2/(a^2 -
b^2)^3 + b^2/((a^2 - b^2)^2*a^4))^(1/3) + 2/(a^2 - b^2))*(a^2 - b^2) - 3*sq
rt(1/3)*(a^2 - b^2)*sqrt(-((a^6 - 2*a^4*b^2 + a^2*b^4)*(2*(1/2)^(2/3)*(-I*s
qrt(3) + 1)*(1/(a^4 - a^2*b^2) - 1/(a^2 - b^2)^2)/(1/(a^6 - a^4*b^2) - 3/((
a^4 - a^2*b^2)*(a^2 - b^2)) + 2/(a^2 - b^2)^3 + b^2/((a^2 - b^2)^2*a^4))^(1
/3) - (1/2)^(1/3)*(I*sqrt(3) + 1)*(1/(a^6 - a^4*b^2) - 3/((a^4 - a^2*b^2)*(
a^2 - b^2)) + 2/(a^2 - b^2)^3 + b^2/((a^2 - b^2)^2*a^4))^(1/3) + 2/(a^2 - b
^2))^2 - 4*(a^4 - a^2*b^2)*(2*(1/2)^(2/3)*(-I*sqrt(3) + 1)*(1/(a^4 - a^2*b^
2) - 1/(a^2 - b^2)^2)/(1/(a^6 - a^4*b^2) - 3/((a^4 - a^2*b^2)*(a^2 - b^2))
```

```
+ 2/(a^2 - b^2)^3 + b^2/((a^2 - b^2)^2*a^4))^(1/3) - (1/2)^(1/3)*(I*sqrt(3)
 + 1)*(1/(a^6 - a^4*b^2)  ...
```

Sympy [**F(-1)**] Timed out
time = 0.00, size = 0, normalized size = 0.00

Timed out

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(a+b*cosh(x)**3),x)
[Out] Timed out
```

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

could not integrate

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(a+b*cosh(x)^3),x, algorithm="giac")
[Out] integrate(1/(b*cosh(x)^3 + a), x)
```

Mupad [**B**]
time = 5.16, size = 633, normalized size = 2.20

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(1/(a + b*cosh(x)^3),x)
[Out] symsum(log(-(24576*(root(729*a^4*b^2*d^6 - 729*a^6*d^6 + 243*a^4*d^4 - 27*a
^2*d^2 + 1, d, k)*b - 4*exp(x) + 54*root(729*a^4*b^2*d^6 - 729*a^6*d^6 + 24
3*a^4*d^4 - 27*a^2*d^2 + 1, d, k)^3*a^2*b + 108*root(729*a^4*b^2*d^6 - 729*
a^6*d^6 + 243*a^4*d^4 - 27*a^2*d^2 + 1, d, k)^4*a^3*b + 81*root(729*a^4*b^2
*d^6 - 729*a^6*d^6 + 243*a^4*d^4 - 27*a^2*d^2 + 1, d, k)^5*a^4*b + 24*root(
729*a^4*b^2*d^6 - 729*a^6*d^6 + 243*a^4*d^4 - 27*a^2*d^2 + 1, d, k)^2*a^2*e
xp(x) + 216*root(729*a^4*b^2*d^6 - 729*a^6*d^6 + 243*a^4*d^4 - 27*a^2*d^2 +
 1, d, k)^3*a^3*exp(x) + 108*root(729*a^4*b^2*d^6 - 729*a^6*d^6 + 243*a^4*d
^4 - 27*a^2*d^2 + 1, d, k)^4*a^4*exp(x) - 324*root(729*a^4*b^2*d^6 - 729*a^
6*d^6 + 243*a^4*d^4 - 27*a^2*d^2 + 1, d, k)^5*a^5*exp(x) + 12*root(729*a^4*
b^2*d^6 - 729*a^6*d^6 + 243*a^4*d^4 - 27*a^2*d^2 + 1, d, k)^2*a*b - 20*root
(729*a^4*b^2*d^6 - 729*a^6*d^6 + 243*a^4*d^4 - 27*a^2*d^2 + 1, d, k)*a*exp(
x) + 27*root(729*a^4*b^2*d^6 - 729*a^6*d^6 + 243*a^4*d^4 - 27*a^2*d^2 + 1,
d, k)^4*a^2*b^2*exp(x) + 405*root(729*a^4*b^2*d^6 - 729*a^6*d^6 + 243*a^4*d
^4 - 27*a^2*d^2 + 1, d, k)^5*a^3*b^2*exp(x)))/b^5)*root(729*a^4*b^2*d^6 - 7
29*a^6*d^6 + 243*a^4*d^4 - 27*a^2*d^2 + 1, d, k), k, 1, 6)
```

3.57 $\int \frac{1}{a-b\cosh^3(x)}\,dx$

Optimal. Leaf size=288

$$\frac{2\tanh^{-1}\left(\frac{\sqrt{\sqrt[3]{a}+\sqrt[3]{b}}\,\tanh\left(\frac{x}{2}\right)}{\sqrt{\sqrt[3]{a}-\sqrt[3]{b}}}\right)}{3a^{2/3}\sqrt{\sqrt[3]{a}-\sqrt[3]{b}}\,\sqrt{\sqrt[3]{a}+\sqrt[3]{b}}}+\frac{2\tanh^{-1}\left(\frac{\sqrt{\sqrt[3]{a}-\sqrt[3]{-1}\,\sqrt[3]{b}}\,\tanh\left(\frac{x}{2}\right)}{\sqrt{\sqrt[3]{a}+\sqrt[3]{-1}\,\sqrt[3]{b}}}\right)}{3a^{2/3}\sqrt{\sqrt[3]{a}-\sqrt[3]{-1}\,\sqrt[3]{b}}\,\sqrt{\sqrt[3]{a}+\sqrt[3]{-1}\,\sqrt[3]{b}}}+\frac{2\tanh^{-1}\left(\frac{\sqrt{\sqrt[3]{a}+\ldots}}{\sqrt{\sqrt[3]{a}\ldots}}\right.}{3a^{2/3}\sqrt{\sqrt[3]{a}-(-1)^{2/3}\ldots}}$$

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

Rubi [A]
time = 0.22, antiderivative size = 288, normalized size of antiderivative = 1.00, number of steps used = 8, number of rules used = 3, integrand size = 11, $\frac{\text{number of rules}}{\text{integrand size}} = 0.273$, Rules used = {3292, 2738, 214}

$$\frac{2\tanh^{-1}\left(\frac{\sqrt{\sqrt[3]{a}+\sqrt[3]{b}}\,\tanh\left(\frac{x}{2}\right)}{\sqrt{\sqrt[3]{a}-\sqrt[3]{b}}}\right)}{3a^{2/3}\sqrt{\sqrt[3]{a}-\sqrt[3]{b}}\,\sqrt{\sqrt[3]{a}+\sqrt[3]{b}}}+\frac{2\tanh^{-1}\left(\frac{\sqrt{\sqrt[3]{a}-\sqrt[3]{-1}\,\sqrt[3]{b}}\,\tanh\left(\frac{x}{2}\right)}{\sqrt{\sqrt[3]{a}+\sqrt[3]{-1}\,\sqrt[3]{b}}}\right)}{3a^{2/3}\sqrt{\sqrt[3]{a}-\sqrt[3]{-1}\,\sqrt[3]{b}}\,\sqrt{\sqrt[3]{a}+\sqrt[3]{-1}\,\sqrt[3]{b}}}+\frac{2\tanh^{-1}\left(\frac{\sqrt{\sqrt[3]{a}+(-1)^{2/3}\sqrt[3]{b}}\,\tanh\left(\frac{x}{2}\right)}{\sqrt{\sqrt[3]{a}-(-1)^{2/3}\sqrt[3]{b}}}\right)}{3a^{2/3}\sqrt{\sqrt[3]{a}-(-1)^{2/3}\sqrt[3]{b}}\,\sqrt{\sqrt[3]{a}+(-1)^{2/3}\sqrt[3]{b}}}$$

Antiderivative was successfully verified.

```
[In] Int[(a - b*Cosh[x]^3)^(-1),x]
```

```
[Out] (2*ArcTanh[(Sqrt[a^(1/3) + b^(1/3)]*Tanh[x/2])/Sqrt[a^(1/3) - b^(1/3)]])/(3
*a^(2/3)*Sqrt[a^(1/3) - b^(1/3)]*Sqrt[a^(1/3) + b^(1/3)]) + (2*ArcTanh[(Sqr
t[a^(1/3) - (-1)^(1/3)*b^(1/3)]*Tanh[x/2])/Sqrt[a^(1/3) + (-1)^(1/3)*b^(1/3
)]])/(3*a^(2/3)*Sqrt[a^(1/3) - (-1)^(1/3)*b^(1/3)]*Sqrt[a^(1/3) + (-1)^(1/3
)*b^(1/3)]) + (2*ArcTanh[(Sqrt[a^(1/3) + (-1)^(2/3)*b^(1/3)]*Tanh[x/2])/Sqr
t[a^(1/3) - (-1)^(2/3)*b^(1/3)]])/(3*a^(2/3)*Sqrt[a^(1/3) - (-1)^(2/3)*b^(1
/3)]*Sqrt[a^(1/3) + (-1)^(2/3)*b^(1/3)])
```

Rule 214

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

Rule 2738

```
Int[((a_) + (b_.)*sin[Pi/2 + (c_.) + (d_.)*(x_)])^(-1), x_Symbol] :> With[{
e = FreeFactors[Tan[(c + d*x)/2], x]}, Dist[2*(e/d), Subst[Int[1/(a + b + (
```

```
a - b)*e^2*x^2), x], x, Tan[(c + d*x)/2]/e], x]] /; FreeQ[{a, b, c, d}, x]
&& NeQ[a^2 - b^2, 0]
```

Rule 3292

```
Int[((a_) + (b_.)*((c_.)*sin[(e_.) + (f_.)*(x_)])^(n_))^(p_), x_Symbol] :>
Int[ExpandTrig[(a + b*(c*sin[e + f*x])^n)^p, x], x] /; FreeQ[{a, b, c, e, f
, n}, x] && (IGtQ[p, 0] || (EqQ[p, -1] && IntegerQ[n]))
```

Rubi steps

$$\begin{aligned}\int \frac{1}{a-b\cosh^3(x)}\,dx &= \int \left(\frac{1}{3a^{2/3}\left(\sqrt[3]{a}-\sqrt[3]{b}\cosh(x)\right)}+\frac{1}{3a^{2/3}\left(\sqrt[3]{a}+\sqrt[3]{-1}\sqrt[3]{b}\cosh(x)\right)}+\frac{}{3a^{2/3}\left(\sqrt[3]{a}\right.}\right.\\
&= \frac{\int \frac{1}{\sqrt[3]{a}-\sqrt[3]{b}\cosh(x)}\,dx}{3a^{2/3}}+\frac{\int \frac{1}{\sqrt[3]{a}+\sqrt[3]{-1}\sqrt[3]{b}\cosh(x)}\,dx}{3a^{2/3}}+\frac{\int \frac{1}{\sqrt[3]{a}-(-1)^{2/3}\sqrt[3]{b}\cosh(x)}\,dx}{3a^{2/3}}\\
&= \frac{2\text{Subst}\left(\int \frac{1}{\sqrt[3]{a}-\sqrt[3]{b}-\left(\sqrt[3]{a}+\sqrt[3]{b}\right)x^2}\,dx,x,\tanh\left(\frac{x}{2}\right)\right)}{3a^{2/3}}+\frac{2\text{Subst}\left(\int \frac{}{\sqrt[3]{a}+\sqrt[3]{-1}\sqrt[3]{b}-\right.}{}\\
&= \frac{2\tanh^{-1}\left(\frac{\sqrt{\sqrt[3]{a}+\sqrt[3]{b}}\tanh\left(\frac{x}{2}\right)}{\sqrt{\sqrt[3]{a}-\sqrt[3]{b}}}\right)}{3a^{2/3}\sqrt{\sqrt[3]{a}-\sqrt[3]{b}}\sqrt{\sqrt[3]{a}+\sqrt[3]{b}}}+\frac{2\tanh^{-1}\left(\frac{\sqrt{\sqrt[3]{a}-\sqrt[3]{-1}\sqrt[3]{b}}\tanh\left(\frac{x}{2}\right)}{\sqrt{\sqrt[3]{a}+\sqrt[3]{-1}\sqrt[3]{b}}}\right)}{3a^{2/3}\sqrt{\sqrt[3]{a}-\sqrt[3]{-1}\sqrt[3]{b}}\sqrt{\sqrt[3]{a}+\sqrt[3]{-1}\sqrt[3]{b}}}\end{aligned}$$

Mathematica [C] Result contains higher order function than in optimal. Order 9 vs. order 3 in optimal.
time = 0.06, size = 105, normalized size = 0.36

$$-\frac{2}{3}\text{RootSum}\left[b+3b\#1^2-8a\#1^3+3b\#1^4+b\#1^6\&,\frac{x\#1+2\log\left(-\cosh\left(\frac{x}{2}\right)-\sinh\left(\frac{x}{2}\right)+\cosh\left(\frac{x}{2}\right)\#1-\sinh\left(\frac{x}{2}\right)\#1\right)\#1}{b-4a\#1+2b\#1^2+b\#1^4}\&\right]$$

Antiderivative was successfully verified.

```
[In] Integrate[(a - b*Cosh[x]^3)^(-1),x]
```

```
[Out] (-2*RootSum[b + 3*b*#1^2 - 8*a*#1^3 + 3*b*#1^4 + b*#1^6 & , (x*#1 + 2*Log[-
Cosh[x/2] - Sinh[x/2] + Cosh[x/2]*#1 - Sinh[x/2]*#1]*#1)/(b - 4*a*#1 + 2*b*
#1^2 + b*#1^4) & ])/3
```

Maple [C] Result contains higher order function than in optimal. Order 9 vs. order 3.
time = 3.69, size = 94, normalized size = 0.33

method	result
default	$\frac{\left(\sum_{\_R=\mathrm{RootOf}\left((a+b)\_Z^6+(-3a+3b)\_Z^4+(3a+3b)\_Z^2-a+b\right)}\frac{\left(-\_R^4+2\_R^2-1\right)\ln\left(\tanh\left(\frac{x}{2}\right)-\_R\right)}{\_R^5a+\_R^5b-2\_R^3a+2\_R^3b+\_Ra+\_Rb}\right)}{3}$
risch	$\sum_{\_R=\mathrm{RootOf}\left(-1+(729a^6-729a^4b^2)\_Z^6-243a^4\_Z^4+27\_Z^2a^2\right)}\_R\ln\left(\mathrm{e}^x+\left(-\frac{486a^6}{b}+486a^4b\right)\_R^5+\left(\frac{81a^5}{b}-8\right.\right.$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(1/(a-b*cosh(x)^3),x,method=_RETURNVERBOSE)
```

```
[Out] 1/3*sum((-_R^4+2*_R^2-1)/(_R^5*a+_R^5*b-2*_R^3*a+2*_R^3*b+_R*a+_R*b)*ln(tan
h(1/2*x)-_R),_R=RootOf((a+b)*_Z^6+(-3*a+3*b)*_Z^4+(3*a+3*b)*_Z^2-a+b))
```

Maxima [F]
time = 0.00, size = 0, normalized size = 0.00

Failed to integrate

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(a-b*cosh(x)^3),x, algorithm="maxima")
```

```
[Out] -integrate(1/(b*cosh(x)^3 - a), x)
```

Fricas [C] Result contains complex when optimal does not.
time = 1.20, size = 18612, normalized size = 64.62

too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(a-b*cosh(x)^3),x, algorithm="fricas")
```

```
[Out] 1/2*sqrt(2/3)*sqrt(1/6)*sqrt(-((2*(1/2)^(2/3)*(-I*sqrt(3) + 1)*(1/(a^4 - a^
2*b^2) - 1/(a^2 - b^2)^2)/(1/(a^6 - a^4*b^2) - 3/((a^4 - a^2*b^2)*(a^2 - b^
2)) + 2/(a^2 - b^2)^3 + b^2/((a^2 - b^2)^2*a^4))^(1/3) - (1/2)^(1/3)*(I*sqr
t(3) + 1)*(1/(a^6 - a^4*b^2) - 3/((a^4 - a^2*b^2)*(a^2 - b^2)) + 2/(a^2 - b
^2)^3 + b^2/((a^2 - b^2)^2*a^4))^(1/3) + 2/(a^2 - b^2))*(a^2 - b^2) + 3*sqr
t(1/3)*(a^2 - b^2)*sqrt(-((a^6 - 2*a^4*b^2 + a^2*b^4)*(2*(1/2)^(2/3)*(-I*sq
rt(3) + 1)*(1/(a^4 - a^2*b^2) - 1/(a^2 - b^2)^2)/(1/(a^6 - a^4*b^2) - 3/((a
^4 - a^2*b^2)*(a^2 - b^2)) + 2/(a^2 - b^2)^3 + b^2/((a^2 - b^2)^2*a^4))^(1/
3) - (1/2)^(1/3)*(I*sqrt(3) + 1)*(1/(a^6 - a^4*b^2) - 3/((a^4 - a^2*b^2)*(a
^2 - b^2)) + 2/(a^2 - b^2)^3 + b^2/((a^2 - b^2)^2*a^4))^(1/3) + 2/(a^2 - b^
2))^2 - 4*(a^4 - a^2*b^2)*(2*(1/2)^(2/3)*(-I*sqrt(3) + 1)*(1/(a^4 - a^2*b^2
) - 1/(a^2 - b^2)^2)/(1/(a^6 - a^4*b^2) - 3/((a^4 - a^2*b^2)*(a^2 - b^2)) +
```

```
2/(a^2 - b^2)^3 + b^2/((a^2 - b^2)^2*a^4))^(1/3) - (1/2)^(1/3)*(I*sqrt(3)
+ 1)*(1/(a^6 - a^4*b^2) - ...
```

Sympy [**F(-1)**] Timed out
time = 0.00, size = 0, normalized size = 0.00

Timed out

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(a-b*cosh(x)**3),x)
[Out] Timed out
```

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

could not integrate

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(a-b*cosh(x)^3),x, algorithm="giac")
[Out] integrate(-1/(b*cosh(x)^3 - a), x)
```

Mupad [**B**]
time = 5.89, size = 633, normalized size = 2.20

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(1/(a - b*cosh(x)^3),x)
[Out] symsum(log(-(24576*(4*exp(x) + root(729*a^4*b^2*d^6 - 729*a^6*d^6 + 243*a^4
*d^4 - 27*a^2*d^2 + 1, d, k)*b + 54*root(729*a^4*b^2*d^6 - 729*a^6*d^6 + 24
3*a^4*d^4 - 27*a^2*d^2 + 1, d, k)^3*a^2*b + 108*root(729*a^4*b^2*d^6 - 729*
a^6*d^6 + 243*a^4*d^4 - 27*a^2*d^2 + 1, d, k)^4*a^3*b + 81*root(729*a^4*b^2
*d^6 - 729*a^6*d^6 + 243*a^4*d^4 - 27*a^2*d^2 + 1, d, k)^5*a^4*b - 24*root(
729*a^4*b^2*d^6 - 729*a^6*d^6 + 243*a^4*d^4 - 27*a^2*d^2 + 1, d, k)^2*a^2*e
xp(x) - 216*root(729*a^4*b^2*d^6 - 729*a^6*d^6 + 243*a^4*d^4 - 27*a^2*d^2 +
 1, d, k)^3*a^3*exp(x) - 108*root(729*a^4*b^2*d^6 - 729*a^6*d^6 + 243*a^4*d
^4 - 27*a^2*d^2 + 1, d, k)^4*a^4*exp(x) + 324*root(729*a^4*b^2*d^6 - 729*a^
6*d^6 + 243*a^4*d^4 - 27*a^2*d^2 + 1, d, k)^5*a^5*exp(x) + 12*root(729*a^4*
b^2*d^6 - 729*a^6*d^6 + 243*a^4*d^4 - 27*a^2*d^2 + 1, d, k)^2*a*b + 20*root
(729*a^4*b^2*d^6 - 729*a^6*d^6 + 243*a^4*d^4 - 27*a^2*d^2 + 1, d, k)*a*exp(
x) - 27*root(729*a^4*b^2*d^6 - 729*a^6*d^6 + 243*a^4*d^4 - 27*a^2*d^2 + 1,
d, k)^4*a^2*b^2*exp(x) - 405*root(729*a^4*b^2*d^6 - 729*a^6*d^6 + 243*a^4*d
^4 - 27*a^2*d^2 + 1, d, k)^5*a^3*b^2*exp(x)))/b^5)*root(729*a^4*b^2*d^6 - 7
29*a^6*d^6 + 243*a^4*d^4 - 27*a^2*d^2 + 1, d, k), k, 1, 6)
```

3.58 $\int \frac{1}{1+\cosh^3(x)}\,dx$

Optimal. Leaf size=91

$$-\frac{2\sqrt[4]{-\frac{1}{3}}\operatorname{ArcTan}\left((-1)^{3/4}\sqrt[4]{3}\tanh\left(\frac{x}{2}\right)\right)}{3\left(1-\sqrt[3]{-1}\right)}-\frac{2\sqrt[4]{-\frac{1}{3}}\tanh^{-1}\left((-1)^{3/4}\sqrt[4]{3}\tanh\left(\frac{x}{2}\right)\right)}{3\left(1+(-1)^{2/3}\right)}+\frac{\sinh(x)}{3(1+\cosh(x))}$$

```
[Out] -2/9*(-1)^(1/4)*3^(3/4)*arctan((-1)^(3/4)*3^(1/4)*tanh(1/2*x))/(1-(-1)^(1/3
))-2/9*(-1)^(1/4)*3^(3/4)*arctanh((-1)^(3/4)*3^(1/4)*tanh(1/2*x))/(1+(-1)^(
2/3))+1/3*sinh(x)/(1+cosh(x))
```

Rubi [A]
time = 0.10, antiderivative size = 91, normalized size of antiderivative = 1.00, number of steps used = 7, number of rules used = 5, integrand size = 8, $\frac{\text{number of rules}}{\text{integrand size}} = 0.625$, Rules used = {3292, 2727, 2738, 211, 214}

$$-\frac{2\sqrt[4]{-\frac{1}{3}}\operatorname{ArcTan}\left((-1)^{3/4}\sqrt[4]{3}\tanh\left(\frac{x}{2}\right)\right)}{3\left(1-\sqrt[3]{-1}\right)}-\frac{2\sqrt[4]{-\frac{1}{3}}\tanh^{-1}\left((-1)^{3/4}\sqrt[4]{3}\tanh\left(\frac{x}{2}\right)\right)}{3\left(1+(-1)^{2/3}\right)}+\frac{\sinh(x)}{3(\cosh(x)+1)}$$

Antiderivative was successfully verified.

```
[In] Int[(1 + Cosh[x]^3)^(-1),x]
```

```
[Out] (-2*(-1/3)^(1/4)*ArcTan[(-1)^(3/4)*3^(1/4)*Tanh[x/2]])/(3*(1 - (-1)^(1/3)))
 - (2*(-1/3)^(1/4)*ArcTanh[(-1)^(3/4)*3^(1/4)*Tanh[x/2]])/(3*(1 + (-1)^(2/3
))) + Sinh[x]/(3*(1 + Cosh[x]))
```

Rule 211

```
Int[((a_) + (b_.)*(x_)^2)^(-1), x_Symbol] :> Simp[(Rt[a/b, 2]/a)*ArcTan[x/R
t[a/b, 2]], x] /; FreeQ[{a, b}, x] && PosQ[a/b]
```

Rule 214

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

Rule 2727

```
Int[((a_) + (b_.)*sin[(c_.) + (d_.)*(x_)])^(-1), x_Symbol] :> Simp[-Cos[c +
 d*x]/(d*(b + a*Sin[c + d*x])), x] /; FreeQ[{a, b, c, d}, x] && EqQ[a^2 - b
^2, 0]
```

Rule 2738

```
Int[((a_) + (b_.)*sin[Pi/2 + (c_.) + (d_.)*(x_)])^(-1), x_Symbol] :> With[{
e = FreeFactors[Tan[(c + d*x)/2], x]}, Dist[2*(e/d), Subst[Int[1/(a + b + (
a - b)*e^2*x^2), x], x, Tan[(c + d*x)/2]/e], x]] /; FreeQ[{a, b, c, d}, x]
&& NeQ[a^2 - b^2, 0]
```

Rule 3292

```
Int[((a_) + (b_.)*((c_.)*sin[(e_.) + (f_.)*(x_)])^(n_))^(p_), x_Symbol] :>
Int[ExpandTrig[(a + b*(c*sin[e + f*x])^n)^p, x], x] /; FreeQ[{a, b, c, e, f
, n}, x] && (IGtQ[p, 0] || (EqQ[p, -1] && IntegerQ[n]))
```

Rubi steps

$$\int \frac{1}{1+\cosh^3(x)}\,dx = \int \left(-\frac{1}{3(-1-\cosh(x))} - \frac{1}{3\left(-1+\sqrt[3]{-1}\cosh(x)\right)} - \frac{1}{3\left(-1-(-1)^{2/3}\cosh(x)\right)}\right) dx$$

$$= -\left(\frac{1}{3}\int \frac{1}{-1-\cosh(x)}\,dx\right) - \frac{1}{3}\int \frac{1}{-1+\sqrt[3]{-1}\cosh(x)}\,dx - \frac{1}{3}\int \frac{1}{-1-(-1)^{2/3}\cosh}$$

$$= \frac{\sinh(x)}{3(1+\cosh(x))} - \frac{2}{3}\text{Subst}\left(\int \frac{1}{-1+\sqrt[3]{-1}-\left(-1-\sqrt[3]{-1}\right)x^2}\,dx, x, \tanh\left(\frac{x}{2}\right)\right) - \frac{2}{3}$$

$$= -\frac{2\sqrt[4]{-\frac{1}{3}}\tan^{-1}\left((-1)^{3/4}\sqrt[4]{3}\tanh\left(\frac{x}{2}\right)\right)}{3\left(1-\sqrt[3]{-1}\right)} - \frac{2\sqrt[4]{-\frac{1}{3}}\tanh^{-1}\left((-1)^{3/4}\sqrt[4]{3}\tanh\left(\frac{x}{2}\right)\right)}{3\left(1+(-1)^{2/3}\right)} +$$

Mathematica [C] Result contains complex when optimal does not.
time = 0.56, size = 133, normalized size = 1.46

$$\frac{1}{18}\left(-\sqrt{6+2i\sqrt{3}}\left(3i+\sqrt{3}\right)\text{ArcTan}\left(\frac{\left(3+i\sqrt{3}\right)\tanh\left(\frac{x}{2}\right)}{\sqrt{6-2i\sqrt{3}}}\right) - \sqrt{6-2i\sqrt{3}}\left(-3i+\sqrt{3}\right)\text{ArcTan}\left(\frac{\left(3-i\sqrt{3}\right)\tanh\left(\frac{x}{2}\right)}{\sqrt{6+2i\sqrt{3}}}\right) + 6\tanh\left(\frac{x}{2}\right)\right)$$

Antiderivative was successfully verified.

```
[In] Integrate[(1 + Cosh[x]^3)^(-1),x]
```

```
[Out] (-(Sqrt[6 + (2*I)*Sqrt[3]]*(3*I + Sqrt[3])*ArcTan[((3 + I*Sqrt[3])*Tanh[x/2
])/Sqrt[6 - (2*I)*Sqrt[3]]]) - Sqrt[6 - (2*I)*Sqrt[3]]*(-3*I + Sqrt[3])*Arc
Tan[((3 - I*Sqrt[3])*Tanh[x/2])/Sqrt[6 + (2*I)*Sqrt[3]]] + 6*Tanh[x/2])/18
```

Maple [B] Leaf count of result is larger than twice the leaf count of optimal. 193 vs. 2(67) = 134.
time = 0.49, size = 194, normalized size = 2.13

method	result
risch	$-\frac{2}{3(e^x+1)}+\left(\sum_{\_R=\mathrm{RootOf}(243\_Z^4-27\_Z^2+1)}\_R\ln\left(-162\_R^3+27\_R^2+9\_R+e^x-2\right)\right)$
default	$\frac{\tanh(\frac{x}{2})}{3}+\frac{3^{\frac{3}{4}}\sqrt{2}\left(\ln\left(\frac{\tanh^2(\frac{x}{2})+\frac{3^{\frac{3}{4}}\tanh(\frac{x}{2})\sqrt{2}}{3}+\frac{\sqrt{3}}{3}}{\tanh^2(\frac{x}{2})-\frac{3^{\frac{3}{4}}\tanh(\frac{x}{2})\sqrt{2}}{3}+\frac{\sqrt{3}}{3}}\right)+2\arctan\left(\sqrt{2}\,3^{\frac{1}{4}}\tanh(\frac{x}{2})+1\right)+2\arctan\left(\sqrt{2}\,3^{\frac{1}{4}}\tanh(\frac{x}{2})-\right.\right.}{36}$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(1/(1+cosh(x)^3),x,method=_RETURNVERBOSE)
```

```
[Out] 1/3*tanh(1/2*x)+1/36*3^(3/4)*2^(1/2)*(ln((tanh(1/2*x)^2+1/3*3^(3/4)*tanh(1/
2*x)*2^(1/2)+1/3*3^(1/2))/(tanh(1/2*x)^2-1/3*3^(3/4)*tanh(1/2*x)*2^(1/2)+1/
3*3^(1/2)))+2*arctan(2^(1/2)*3^(1/4)*tanh(1/2*x)+1)+2*arctan(2^(1/2)*3^(1/4
)*tanh(1/2*x)-1))-1/12*3^(1/4)*2^(1/2)*(ln((tanh(1/2*x)^2-1/3*3^(3/4)*tanh(
1/2*x)*2^(1/2)+1/3*3^(1/2))/(tanh(1/2*x)^2+1/3*3^(3/4)*tanh(1/2*x)*2^(1/2)+
1/3*3^(1/2)))+2*arctan(2^(1/2)*3^(1/4)*tanh(1/2*x)+1)+2*arctan(2^(1/2)*3^(1
/4)*tanh(1/2*x)-1))
```

Maxima [F]
time = 0.00, size = 0, normalized size = 0.00

Failed to integrate

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(1+cosh(x)^3),x, algorithm="maxima")
```

```
[Out] -2/3/(e^x + 1) - integrate(2/3*(e^(3*x) - 4*e^(2*x) + e^x)/(e^(4*x) - 2*e^(
3*x) + 6*e^(2*x) - 2*e^x + 1), x)
```

Fricas [B] Leaf count of result is larger than twice the leaf count of optimal. 602 vs. $2(65) = 130$.
time = 0.41, size = 602, normalized size = 6.62

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(1+cosh(x)^3),x, algorithm="fricas")
```

```
[Out] 1/36*(4*(3^(3/4)*e^x + 3^(3/4))*sqrt(-4*sqrt(3) + 8)*arctan(1/12*(sqrt(3)*(
sqrt(3) + 3) - 3*sqrt(3) + 9)*e^x - 1/48*(2*sqrt(3)*(sqrt(3) + 3) - (3^(3/4
)*(3*sqrt(3) + 5) + 3*3^(1/4)*(sqrt(3) + 1))*sqrt(-4*sqrt(3) + 8) - 6*sqrt(
3) + 18)*sqrt(2*(3^(1/4)*(sqrt(3) + 2) - 3^(1/4)*e^x)*sqrt(-4*sqrt(3) + 8)
```

```
+ 4*sqrt(3) + 4*e^(2*x) - 4*e^x + 4) + 1/12*sqrt(3)*(sqrt(3) - 3) - 1/24*((
3^(3/4)*(3*sqrt(3) + 5) + 3*3^(1/4)*(sqrt(3) + 1))*e^x - 3^(3/4)*(sqrt(3) +
 1) - 3*3^(1/4)*(sqrt(3) - 1))*sqrt(-4*sqrt(3) + 8) + 1/4*sqrt(3) - 1/4) +
4*(3^(3/4)*e^x + 3^(3/4))*sqrt(-4*sqrt(3) + 8)*arctan(-1/12*(sqrt(3)*(sqrt(
3) + 3) - 3*sqrt(3) + 9)*e^x + 1/48*(2*sqrt(3)*(sqrt(3) + 3) + (3^(3/4)*(3*
sqrt(3) + 5) + 3*3^(1/4)*(sqrt(3) + 1))*sqrt(-4*sqrt(3) + 8) - 6*sqrt(3) +
18)*sqrt(-2*(3^(1/4)*(sqrt(3) + 2) - 3^(1/4)*e^x)*sqrt(-4*sqrt(3) + 8) + 4*
sqrt(3) + 4*e^(2*x) - 4*e^x + 4) - 1/12*sqrt(3)*(sqrt(3) - 3) - 1/24*((3^(3
/4)*(3*sqrt(3) + 5) + 3*3^(1/4)*(sqrt(3) + 1))*e^x - 3^(3/4)*(sqrt(3) + 1)
- 3*3^(1/4)*(sqrt(3) - 1))*sqrt(-4*sqrt(3) + 8) - 1/4*sqrt(3) + 1/4) - (3^(
1/4)*(2*sqrt(3) + 3)*e^x + 3^(1/4)*(2*sqrt(3) + 3))*sqrt(-4*sqrt(3) + 8)*lo
g(2*(3^(1/4)*(sqrt(3) + 2) - 3^(1/4)*e^x)*sqrt(-4*sqrt(3) + 8) + 4*sqrt(3)
+ 4*e^(2*x) - 4*e^x + 4) + (3^(1/4)*(2*sqrt(3) + 3)*e^x + 3^(1/4)*(2*sqrt(3
) + 3))*sqrt(-4*sqrt(3) + 8)*log(-2*(3^(1/4)*(sqrt(3) + 2) - 3^(1/4)*e^x)*s
qrt(-4*sqrt(3) + 8) + 4*sqrt(3) + 4*e^(2*x) - 4*e^x + 4) - 24)/(e^x + 1)
```

Sympy [**B**] Leaf count of result is larger than twice the leaf count of optimal. 330 vs. $2(73) = 146$.
time = 1.96, size = 330, normalized size = 3.63

$$-\frac{2\sqrt{2}\cdot 3^{\frac{3}{4}}\log\left(36\tanh^{2}\left(\frac{x}{2}\right)-12\sqrt{2}\cdot 3^{\frac{3}{4}}\tanh\left(\frac{x}{2}\right)+12\sqrt{3}\right)}{18+18\sqrt{3}}-\frac{3\sqrt{2}\cdot\sqrt[4]{3}\log\left(36\tanh^{2}\left(\frac{x}{2}\right)-12\sqrt{2}\cdot 3^{\frac{3}{4}}\tanh\left(\frac{x}{2}\right)+12\sqrt{3}\right)}{18+18\sqrt{3}}+\frac{3\sqrt{2}\cdot\sqrt[4]{3}\log\left(36\tanh^{2}\left(\frac{x}{2}\right)+12\sqrt{2}\cdot 3^{\frac{3}{4}}\tanh\left(\frac{x}{2}\right)+12\sqrt{3}\right)}{18+18\sqrt{3}}+\frac{2\sqrt{2}\cdot 3^{\frac{3}{4}}\log\left(36\tanh^{2}\left(\frac{x}{2}\right)+12\sqrt{2}\cdot 3^{\frac{3}{4}}\tanh\left(\frac{x}{2}\right)+12\sqrt{3}\right)}{18+18\sqrt{3}}+\frac{6\tanh\left(\frac{x}{2}\right)}{18+18\sqrt{3}}+\frac{6\sqrt{3}\tanh\left(\frac{x}{2}\right)}{18+18\sqrt{3}}-\frac{2\sqrt{2}\cdot 3^{\frac{3}{4}}\operatorname{atan}\left(\sqrt{2}\cdot\sqrt[4]{3}\tanh\left(\frac{x}{2}\right)-1\right)}{18+18\sqrt{3}}-\frac{2\sqrt{2}\cdot 3^{\frac{3}{4}}\operatorname{atan}\left(\sqrt{2}\cdot\sqrt[4]{3}\tanh\left(\frac{x}{2}\right)+1\right)}{18+18\sqrt{3}}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(1+cosh(x)**3),x)
```

```
[Out] -2*sqrt(2)*3**(3/4)*log(36*tanh(x/2)**2 - 12*sqrt(2)*3**(3/4)*tanh(x/2) + 1
2*sqrt(3))/(18 + 18*sqrt(3)) - 3*sqrt(2)*3**(1/4)*log(36*tanh(x/2)**2 - 12*
sqrt(2)*3**(3/4)*tanh(x/2) + 12*sqrt(3))/(18 + 18*sqrt(3)) + 3*sqrt(2)*3**(
1/4)*log(36*tanh(x/2)**2 + 12*sqrt(2)*3**(3/4)*tanh(x/2) + 12*sqrt(3))/(18
+ 18*sqrt(3)) + 2*sqrt(2)*3**(3/4)*log(36*tanh(x/2)**2 + 12*sqrt(2)*3**(3/4
)*tanh(x/2) + 12*sqrt(3))/(18 + 18*sqrt(3)) + 6*tanh(x/2)/(18 + 18*sqrt(3))
 + 6*sqrt(3)*tanh(x/2)/(18 + 18*sqrt(3)) - 2*sqrt(2)*3**(3/4)*atan(sqrt(2)*
3**(1/4)*tanh(x/2) - 1)/(18 + 18*sqrt(3)) - 2*sqrt(2)*3**(3/4)*atan(sqrt(2)
*3**(1/4)*tanh(x/2) + 1)/(18 + 18*sqrt(3))
```

Giac [**B**] Leaf count of result is larger than twice the leaf count of optimal. 275 vs. $2(65) = 130$.
time = 0.42, size = 275, normalized size = 3.02

$$\frac{1}{18}\sqrt{6\sqrt{3}+9}\log\left(4\left(2\sqrt{3}\sqrt{6\sqrt{3}+9}-3\sqrt{6\sqrt{3}+9}+6e^{x}-3\right)^{2}+4\left(\sqrt{3}\sqrt{6\sqrt{3}+9}-3\sqrt{3}\right)^{2}\right)-\frac{1}{18}\sqrt{6\sqrt{3}+9}\log\left(4\left(2\sqrt{3}\sqrt{6\sqrt{3}+9}-3\sqrt{6\sqrt{3}+9}-6e^{x}+3\right)^{2}+4\left(\sqrt{3}\sqrt{6\sqrt{3}+9}+3\sqrt{3}\right)^{2}\right)-\frac{\sqrt{3}\sqrt{6\sqrt{3}+9}\arctan\left(\frac{3\left(\sqrt{2\sqrt{3}-3}+2e^{x}-1\right)}{\sqrt{3}\sqrt{6\sqrt{3}+9}-3\sqrt{3}}\right)}{9\left(2\sqrt{3}+3\right)}-\frac{\sqrt{3}\sqrt{6\sqrt{3}+9}\arctan\left(-\frac{3\left(\sqrt{2\sqrt{3}-3}-2e^{x}+1\right)}{\sqrt{3}\sqrt{6\sqrt{3}+9}+3\sqrt{3}}\right)}{9\left(2\sqrt{3}+3\right)}-\frac{2}{3\left(e^{x}+1\right)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(1+cosh(x)^3),x, algorithm="giac")
```

```
[Out] 1/18*sqrt(6*sqrt(3) + 9)*log(4*(2*sqrt(3)*sqrt(6*sqrt(3) + 9) - 3*sqrt(6*sq
rt(3) + 9) + 6*e^x - 3)^2 + 4*(sqrt(3)*sqrt(6*sqrt(3) + 9) - 3*sqrt(3))^2)
```

```
- 1/18*sqrt(6*sqrt(3) + 9)*log(4*(2*sqrt(3)*sqrt(6*sqrt(3) + 9) - 3*sqrt(6*
sqrt(3) + 9) - 6*e^x + 3)^2 + 4*(sqrt(3)*sqrt(6*sqrt(3) + 9) + 3*sqrt(3))^2
) - 1/9*sqrt(3)*sqrt(6*sqrt(3) + 9)*arctan(3*(sqrt(2*sqrt(3) - 3) + 2*e^x -
 1)/(sqrt(3)*sqrt(6*sqrt(3) + 9) - 3*sqrt(3)))/(2*sqrt(3) + 3) - 1/9*sqrt(3
)*sqrt(6*sqrt(3) + 9)*arctan(-3*(sqrt(2*sqrt(3) - 3) - 2*e^x + 1)/(sqrt(3)*
sqrt(6*sqrt(3) + 9) + 3*sqrt(3)))/(2*sqrt(3) + 3) - 2/3/(e^x + 1)
```

Mupad [B]
time = 3.43, size = 291, normalized size = 3.20

$$\ln\left(\frac{128}{9}+\sqrt{\frac{1}{18}-\frac{\sqrt{3}\,1\mathrm{i}}{54}}\,\left(\frac{160}{3}+\sqrt{\frac{1}{18}-\frac{\sqrt{3}\,1\mathrm{i}}{54}}\,\left(384\,\mathrm{e}^x+\sqrt{\frac{1}{18}-\frac{\sqrt{3}\,1\mathrm{i}}{54}}\,\left(1152\,\mathrm{e}^x-864\right)-192\right)-\frac{32\,\mathrm{e}^x}{3}\right)-\frac{32\,\mathrm{e}^x}{3}\right)\,\sqrt{\frac{1}{18}-\frac{\sqrt{3}\,1\mathrm{i}}{54}}+\ln\left(\frac{128}{9}+\sqrt{\frac{1}{18}+\frac{\sqrt{3}\,1\mathrm{i}}{54}}\,\left(\frac{160}{3}+\sqrt{\frac{1}{18}+\frac{\sqrt{3}\,1\mathrm{i}}{54}}\,\left(384\,\mathrm{e}^x+\sqrt{\frac{1}{18}+\frac{\sqrt{3}\,1\mathrm{i}}{54}}\,\left(1152\,\mathrm{e}^x-864\right)-192\right)-\frac{32\,\mathrm{e}^x}{3}\right)-\frac{32\,\mathrm{e}^x}{3}\right)\,\sqrt{\frac{1}{18}+\frac{\sqrt{3}\,1\mathrm{i}}{54}}-\ln\left(\frac{128}{9}-\sqrt{\frac{1}{18}-\frac{\sqrt{3}\,1\mathrm{i}}{54}}\,\left(\frac{160}{3}+\sqrt{\frac{1}{18}-\frac{\sqrt{3}\,1\mathrm{i}}{54}}\,\left(192+\sqrt{\frac{1}{18}-\frac{\sqrt{3}\,1\mathrm{i}}{54}}\,\left(1152\,\mathrm{e}^x-864\right)-384\,\mathrm{e}^x\right)-\frac{32\,\mathrm{e}^x}{3}\right)-\frac{32\,\mathrm{e}^x}{3}\right)\,\sqrt{\frac{1}{18}-\frac{\sqrt{3}\,1\mathrm{i}}{54}}-\ln\left(\frac{128}{9}-\sqrt{\frac{1}{18}+\frac{\sqrt{3}\,1\mathrm{i}}{54}}\,\left(\frac{160}{3}+\sqrt{\frac{1}{18}+\frac{\sqrt{3}\,1\mathrm{i}}{54}}\,\left(192+\sqrt{\frac{1}{18}+\frac{\sqrt{3}\,1\mathrm{i}}{54}}\,\left(1152\,\mathrm{e}^x-864\right)-384\,\mathrm{e}^x\right)-\frac{32\,\mathrm{e}^x}{3}\right)-\frac{32\,\mathrm{e}^x}{3}\right)\,\sqrt{\frac{1}{18}+\frac{\sqrt{3}\,1\mathrm{i}}{54}}-\frac{2}{3\,\left(\mathrm{e}^x+1\right)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(1/(cosh(x)^3 + 1),x)
```

```
[Out] log((1/18 - (3^(1/2)*1i)/54)^(1/2)*((1/18 - (3^(1/2)*1i)/54)^(1/2)*(384*exp
(x) + (1/18 - (3^(1/2)*1i)/54)^(1/2)*(1152*exp(x) - 864) - 192) - (32*exp(x
))/3 + 160/3) - (32*exp(x))/3 + 128/9)*(1/18 - (3^(1/2)*1i)/54)^(1/2) + log
(((3^(1/2)*1i)/54 + 1/18)^(1/2)*(((3^(1/2)*1i)/54 + 1/18)^(1/2)*(384*exp(x)
 + ((3^(1/2)*1i)/54 + 1/18)^(1/2)*(1152*exp(x) - 864) - 192) - (32*exp(x))/
3 + 160/3) - (32*exp(x))/3 + 128/9)*((3^(1/2)*1i)/54 + 1/18)^(1/2) - log(12
8/9 - (1/18 - (3^(1/2)*1i)/54)^(1/2)*((1/18 - (3^(1/2)*1i)/54)^(1/2)*((1/18
 - (3^(1/2)*1i)/54)^(1/2)*(1152*exp(x) - 864) - 384*exp(x) + 192) - (32*exp
(x))/3 + 160/3) - (32*exp(x))/3)*(1/18 - (3^(1/2)*1i)/54)^(1/2) - log(128/9
 - ((3^(1/2)*1i)/54 + 1/18)^(1/2)*(((3^(1/2)*1i)/54 + 1/18)^(1/2)*(((3^(1/2
)*1i)/54 + 1/18)^(1/2)*(1152*exp(x) - 864) - 384*exp(x) + 192) - (32*exp(x)
)/3 + 160/3) - (32*exp(x))/3)*((3^(1/2)*1i)/54 + 1/18)^(1/2) - 2/(3*(exp(x)
 + 1))
```

3.59 $\int \frac{1}{1-\cosh^3(x)}\,dx$

Optimal. Leaf size=95

$$-\frac{2\sqrt[4]{-1}\,\text{ArcTan}\left(\frac{(-1)^{3/4}\tanh\left(\frac{x}{2}\right)}{\sqrt[4]{3}}\right)}{3^{3/4}\left(1-(-1)^{2/3}\right)}-\frac{2\sqrt[4]{-1}\,\tanh^{-1}\left(\frac{(-1)^{3/4}\tanh\left(\frac{x}{2}\right)}{\sqrt[4]{3}}\right)}{3^{3/4}\left(1+\sqrt[3]{-1}\right)}-\frac{\sinh(x)}{3(1-\cosh(x))}$$

```
[Out] -2/3*(-1)^(1/4)*arctan(1/3*(-1)^(3/4)*tanh(1/2*x)*3^(3/4))*3^(1/4)/(1-(-1)^
(2/3))-2/3*(-1)^(1/4)*arctanh(1/3*(-1)^(3/4)*tanh(1/2*x)*3^(3/4))*3^(1/4)/(
1+(-1)^(1/3))-1/3*sinh(x)/(1-cosh(x))
```

Rubi [A]
time = 0.09, antiderivative size = 95, 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 = {3292, 2727, 2738, 214, 211}

$$-\frac{2\sqrt[4]{-1}\,\text{ArcTan}\left(\frac{(-1)^{3/4}\tanh\left(\frac{x}{2}\right)}{\sqrt[4]{3}}\right)}{3^{3/4}\left(1-(-1)^{2/3}\right)}-\frac{2\sqrt[4]{-1}\,\tanh^{-1}\left(\frac{(-1)^{3/4}\tanh\left(\frac{x}{2}\right)}{\sqrt[4]{3}}\right)}{3^{3/4}\left(1+\sqrt[3]{-1}\right)}-\frac{\sinh(x)}{3(1-\cosh(x))}$$

Antiderivative was successfully verified.

```
[In] Int[(1 - Cosh[x]^3)^(-1),x]
```

```
[Out] (-2*(-1)^(1/4)*ArcTan[((-1)^(3/4)*Tanh[x/2])/3^(1/4)])/(3^(3/4)*(1 - (-1)^(
2/3))) - (2*(-1)^(1/4)*ArcTanh[((-1)^(3/4)*Tanh[x/2])/3^(1/4)])/(3^(3/4)*(1
 + (-1)^(1/3))) - Sinh[x]/(3*(1 - Cosh[x]))
```

Rule 211

```
Int[((a_) + (b_.)*(x_)^2)^(-1), x_Symbol] :> Simp[(Rt[a/b, 2]/a)*ArcTan[x/R
t[a/b, 2]], x] /; FreeQ[{a, b}, x] && PosQ[a/b]
```

Rule 214

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

Rule 2727

```
Int[((a_) + (b_.)*sin[(c_.) + (d_.)*(x_)])^(-1), x_Symbol] :> Simp[-Cos[c +
 d*x]/(d*(b + a*Sin[c + d*x])), x] /; FreeQ[{a, b, c, d}, x] && EqQ[a^2 - b
^2, 0]
```

Rule 2738

```
Int[((a_) + (b_.)*sin[Pi/2 + (c_.) + (d_.)*(x_)])^(-1), x_Symbol] :> With[{
e = FreeFactors[Tan[(c + d*x)/2], x]}, Dist[2*(e/d), Subst[Int[1/(a + b + (
a - b)*e^2*x^2), x], x, Tan[(c + d*x)/2]/e], x]] /; FreeQ[{a, b, c, d}, x]
&& NeQ[a^2 - b^2, 0]
```

Rule 3292

```
Int[((a_) + (b_.)*((c_.)*sin[(e_.) + (f_.)*(x_)])^(n_))^(p_), x_Symbol] :>
Int[ExpandTrig[(a + b*(c*sin[e + f*x])^n)^p, x], x] /; FreeQ[{a, b, c, e, f
, n}, x] && (IGtQ[p, 0] || (EqQ[p, -1] && IntegerQ[n]))
```

Rubi steps

$$\begin{aligned}\int \frac{1}{1-\cosh^3(x)}\,dx &= \int \left(\frac{1}{3(1-\cosh(x))}+\frac{1}{3\left(1+\sqrt[3]{-1}\cosh(x)\right)}+\frac{1}{3\left(1-(-1)^{2/3}\cosh(x)\right)}\right)dx\\ &= \frac{1}{3}\int \frac{1}{1-\cosh(x)}\,dx+\frac{1}{3}\int \frac{1}{1+\sqrt[3]{-1}\cosh(x)}\,dx+\frac{1}{3}\int \frac{1}{1-(-1)^{2/3}\cosh(x)}\,dx\\ &= -\frac{\sinh(x)}{3(1-\cosh(x))}+\frac{2}{3}\text{Subst}\left(\int \frac{1}{1+\sqrt[3]{-1}-\left(1-\sqrt[3]{-1}\right)x^2}\,dx,x,\tanh\left(\frac{x}{2}\right)\right)+\frac{2}{3}\text{Sub}\\ &= -\frac{2\sqrt[4]{-1}\tan^{-1}\left(\frac{(-1)^{3/4}\tanh\left(\frac{x}{2}\right)}{\sqrt[4]{3}}\right)}{3^{3/4}\left(1-(-1)^{2/3}\right)}-\frac{2\sqrt[4]{-1}\tanh^{-1}\left(\frac{(-1)^{3/4}\tanh\left(\frac{x}{2}\right)}{\sqrt[4]{3}}\right)}{3^{3/4}\left(1+\sqrt[3]{-1}\right)}-\frac{\sinh(x)}{3(1-\cosh(x))}\end{aligned}$$

Mathematica [C] Result contains complex when optimal does not.
time = 0.36, size = 147, normalized size = 1.55

$$\frac{\left(3i+\sqrt{3}\right)\text{ArcTan}\left(\frac{\left(1-i\sqrt{3}\right)\tanh\left(\frac{x}{2}\right)}{\sqrt{2\left(3-i\sqrt{3}\right)}}\right)}{3\sqrt{\frac{3}{2}\left(3-i\sqrt{3}\right)}}+\frac{\left(-3i+\sqrt{3}\right)\text{ArcTan}\left(\frac{\left(1+i\sqrt{3}\right)\tanh\left(\frac{x}{2}\right)}{\sqrt{2\left(3+i\sqrt{3}\right)}}\right)}{3\sqrt{\frac{3}{2}\left(3+i\sqrt{3}\right)}}+\frac{1}{3}\coth\left(\frac{x}{2}\right)$$

Antiderivative was successfully verified.

```
[In] Integrate[(1 - Cosh[x]^3)^(-1),x]
```

```
[Out] ((3*I + Sqrt[3])*ArcTan[((1 - I*Sqrt[3])*Tanh[x/2])/Sqrt[2*(3 - I*Sqrt[3])]
])/(3*Sqrt[(3*(3 - I*Sqrt[3]))/2]) + ((-3*I + Sqrt[3])*ArcTan[((1 + I*Sqrt[
3])*Tanh[x/2])/Sqrt[2*(3 + I*Sqrt[3])]])/(3*Sqrt[(3*(3 + I*Sqrt[3]))/2]) +
Coth[x/2]/3
```

Maple [B] Leaf count of result is larger than twice the leaf count of optimal. 189 vs. $2(71) = 142$.
time = 0.49, size = 190, normalized size = 2.00

method	result
risch	$\frac{2}{3(e^x-1)} + \left(\sum_{\_R=\mathrm{RootOf}(243\_Z^4-27\_Z^2+1)} \_R \ln\left(162\_R^3 - 27\_R^2 - 9\_R + e^x + 2\right)\right)$
default	$\frac{1}{3\tanh\left(\frac{x}{2}\right)} + \frac{3^{\frac{1}{4}}\sqrt{2}\left(\ln\left(\frac{\tanh^2\left(\frac{x}{2}\right)+\sqrt{2}\,3^{\frac{1}{4}}\tanh\left(\frac{x}{2}\right)+\sqrt{3}}{\tanh^2\left(\frac{x}{2}\right)-\sqrt{2}\,3^{\frac{1}{4}}\tanh\left(\frac{x}{2}\right)+\sqrt{3}}\right)+2\arctan\left(\frac{3^{\frac{3}{4}}\tanh\left(\frac{x}{2}\right)\sqrt{2}}{3}+1\right)+2\arctan\left(\frac{3^{\frac{3}{4}}\tanh\left(\frac{x}{2}\right)\sqrt{2}}{3}\right.\right.}{12}$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(1/(1-cosh(x)^3),x,method=_RETURNVERBOSE)
```

```
[Out] 1/3/tanh(1/2*x)+1/12*3^(1/4)*2^(1/2)*(ln((tanh(1/2*x)^2+2^(1/2)*3^(1/4)*tan
h(1/2*x)+3^(1/2))/(tanh(1/2*x)^2-2^(1/2)*3^(1/4)*tanh(1/2*x)+3^(1/2)))+2*ar
ctan(1/3*3^(3/4)*tanh(1/2*x)*2^(1/2)+1)+2*arctan(1/3*3^(3/4)*tanh(1/2*x)*2^
(1/2)-1))-1/36*3^(3/4)*2^(1/2)*(ln((tanh(1/2*x)^2-2^(1/2)*3^(1/4)*tanh(1/2*
x)+3^(1/2))/(tanh(1/2*x)^2+2^(1/2)*3^(1/4)*tanh(1/2*x)+3^(1/2)))+2*arctan(1
/3*3^(3/4)*tanh(1/2*x)*2^(1/2)+1)+2*arctan(1/3*3^(3/4)*tanh(1/2*x)*2^(1/2)-
1))
```

Maxima [F]
time = 0.00, size = 0, normalized size = 0.00

Failed to integrate

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(1-cosh(x)^3),x, algorithm="maxima")
```

```
[Out] 2/3/(e^x - 1) + integrate(2/3*(e^(3*x) + 4*e^(2*x) + e^x)/(e^(4*x) + 2*e^(3
*x) + 6*e^(2*x) + 2*e^x + 1), x)
```

Fricas [B] Leaf count of result is larger than twice the leaf count of optimal. 602 vs. $2(67) = 134$.
time = 0.38, size = 602, normalized size = 6.34

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(1-cosh(x)^3),x, algorithm="fricas")
```

```
[Out] -1/36*(4*(3^(3/4)*e^x - 3^(3/4))*sqrt(-4*sqrt(3) + 8)*arctan(1/12*(sqrt(3)*
(sqrt(3) + 3) - 3*sqrt(3) + 9)*e^x - 1/48*(2*sqrt(3)*(sqrt(3) + 3) - (3^(3/
```

```
4)*(3*sqrt(3) + 5) + 3*3^(1/4)*(sqrt(3) + 1))*sqrt(-4*sqrt(3) + 8) - 6*sqrt
(3) + 18)*sqrt(2*(3^(1/4)*(sqrt(3) + 2) + 3^(1/4)*e^x)*sqrt(-4*sqrt(3) + 8)
 + 4*sqrt(3) + 4*e^(2*x) + 4*e^x + 4) - 1/12*sqrt(3)*(sqrt(3) - 3) - 1/24*(
(3^(3/4)*(3*sqrt(3) + 5) + 3*3^(1/4)*(sqrt(3) + 1))*e^x + 3^(3/4)*(sqrt(3)
+ 1) + 3*3^(1/4)*(sqrt(3) - 1))*sqrt(-4*sqrt(3) + 8) - 1/4*sqrt(3) + 1/4) +
 4*(3^(3/4)*e^x - 3^(3/4))*sqrt(-4*sqrt(3) + 8)*arctan(-1/12*(sqrt(3)*(sqrt
(3) + 3) - 3*sqrt(3) + 9)*e^x + 1/48*(2*sqrt(3)*(sqrt(3) + 3) + (3^(3/4)*(3
*sqrt(3) + 5) + 3*3^(1/4)*(sqrt(3) + 1))*sqrt(-4*sqrt(3) + 8) - 6*sqrt(3) +
 18)*sqrt(-2*(3^(1/4)*(sqrt(3) + 2) + 3^(1/4)*e^x)*sqrt(-4*sqrt(3) + 8) + 4
*sqrt(3) + 4*e^(2*x) + 4*e^x + 4) + 1/12*sqrt(3)*(sqrt(3) - 3) - 1/24*((3^(
3/4)*(3*sqrt(3) + 5) + 3*3^(1/4)*(sqrt(3) + 1))*e^x + 3^(3/4)*(sqrt(3) + 1)
 + 3*3^(1/4)*(sqrt(3) - 1))*sqrt(-4*sqrt(3) + 8) + 1/4*sqrt(3) - 1/4) + (3^
(1/4)*(2*sqrt(3) + 3)*e^x - 3^(1/4)*(2*sqrt(3) + 3))*sqrt(-4*sqrt(3) + 8)*l
og(2*(3^(1/4)*(sqrt(3) + 2) + 3^(1/4)*e^x)*sqrt(-4*sqrt(3) + 8) + 4*sqrt(3)
 + 4*e^(2*x) + 4*e^x + 4) - (3^(1/4)*(2*sqrt(3) + 3)*e^x - 3^(1/4)*(2*sqrt(
3) + 3))*sqrt(-4*sqrt(3) + 8)*log(-2*(3^(1/4)*(sqrt(3) + 2) + 3^(1/4)*e^x)*
sqrt(-4*sqrt(3) + 8) + 4*sqrt(3) + 4*e^(2*x) + 4*e^x + 4) - 24)/(e^x - 1)
```

Sympy [**B**] Leaf count of result is larger than twice the leaf count of optimal. 320 vs. $2(78) = 156$.
time = 1.70, size = 320, normalized size = 3.37

$$-\frac{\sqrt{2}\cdot\sqrt[4]{3}\log\left(4\tanh^2\left(\frac{x}{2}\right)-4\sqrt{2}\cdot\sqrt[4]{3}\tanh\left(\frac{x}{2}\right)+4\sqrt{3}\right)}{12}-\frac{\sqrt{2}\cdot 3^{\frac{3}{4}}\log\left(4\tanh^2\left(\frac{x}{2}\right)-4\sqrt{2}\cdot\sqrt[4]{3}\tanh\left(\frac{x}{2}\right)+4\sqrt{3}\right)}{36}+\frac{\sqrt{2}\cdot 3^{\frac{3}{4}}\log\left(4\tanh^2\left(\frac{x}{2}\right)+4\sqrt{2}\cdot\sqrt[4]{3}\tanh\left(\frac{x}{2}\right)+4\sqrt{3}\right)}{36}+\frac{\sqrt{2}\cdot\sqrt[4]{3}\log\left(4\tanh^2\left(\frac{x}{2}\right)+4\sqrt{2}\cdot\sqrt[4]{3}\tanh\left(\frac{x}{2}\right)+4\sqrt{3}\right)}{12}-\frac{\sqrt{2}\cdot 3^{\frac{3}{4}}\operatorname{atan}\left(\frac{\sqrt{2}\cdot 3^{\frac{3}{4}}\tanh\left(\frac{x}{2}\right)}{3}-1\right)}{18}+\frac{\sqrt{2}\cdot\sqrt[4]{3}\operatorname{atan}\left(\frac{\sqrt{2}\cdot 3^{\frac{3}{4}}\tanh\left(\frac{x}{2}\right)}{3}-1\right)}{6}-\frac{\sqrt{2}\cdot 3^{\frac{3}{4}}\operatorname{atan}\left(\frac{\sqrt{2}\cdot 3^{\frac{3}{4}}\tanh\left(\frac{x}{2}\right)}{3}+1\right)}{18}+\frac{\sqrt{2}\cdot\sqrt[4]{3}\operatorname{atan}\left(\frac{\sqrt{2}\cdot 3^{\frac{3}{4}}\tanh\left(\frac{x}{2}\right)}{3}+1\right)}{6}+\frac{1}{3\tanh\left(\frac{x}{2}\right)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(1-cosh(x)**3),x)
```

```
[Out] -sqrt(2)*3**(1/4)*log(4*tanh(x/2)**2 - 4*sqrt(2)*3**(1/4)*tanh(x/2) + 4*sqr
t(3))/12 - sqrt(2)*3**(3/4)*log(4*tanh(x/2)**2 - 4*sqrt(2)*3**(1/4)*tanh(x/
2) + 4*sqrt(3))/36 + sqrt(2)*3**(3/4)*log(4*tanh(x/2)**2 + 4*sqrt(2)*3**(1/
4)*tanh(x/2) + 4*sqrt(3))/36 + sqrt(2)*3**(1/4)*log(4*tanh(x/2)**2 + 4*sqrt
(2)*3**(1/4)*tanh(x/2) + 4*sqrt(3))/12 - sqrt(2)*3**(3/4)*atan(sqrt(2)*3**(
3/4)*tanh(x/2)/3 - 1)/18 + sqrt(2)*3**(1/4)*atan(sqrt(2)*3**(3/4)*tanh(x/2)
/3 - 1)/6 - sqrt(2)*3**(3/4)*atan(sqrt(2)*3**(3/4)*tanh(x/2)/3 + 1)/18 + sq
rt(2)*3**(1/4)*atan(sqrt(2)*3**(3/4)*tanh(x/2)/3 + 1)/6 + 1/(3*tanh(x/2))
```

Giac [**B**] Leaf count of result is larger than twice the leaf count of optimal. 275 vs. $2(67) = 134$.
time = 0.43, size = 275, normalized size = 2.89

$$-\frac{1}{18}\sqrt{6\sqrt{3}+9}\log\left(4\left(2\sqrt{3}\sqrt{6\sqrt{3}+9}-3\sqrt{6\sqrt{3}+9}+6e^{x}+3\right)^{2}+4\left(\sqrt{3}\sqrt{6\sqrt{3}+9}+3\sqrt{3}\right)^{2}\right)+\frac{1}{18}\sqrt{6\sqrt{3}+9}\log\left(4\left(2\sqrt{3}\sqrt{6\sqrt{3}+9}-3\sqrt{6\sqrt{3}+9}-6e^{x}-3\right)^{2}+4\left(\sqrt{3}\sqrt{6\sqrt{3}+9}-3\sqrt{3}\right)^{2}\right)+\frac{\sqrt{3}\sqrt{6\sqrt{3}+9}\arctan\left(\frac{3\left(\sqrt{2\sqrt{3}-3}+2e^{x}+1\right)}{\sqrt{3}\sqrt{6\sqrt{3}+9}+3\sqrt{3}}\right)}{9\left(2\sqrt{3}+3\right)}+\frac{\sqrt{3}\sqrt{6\sqrt{3}+9}\arctan\left(-\frac{3\left(\sqrt{2\sqrt{3}-3}-2e^{x}-1\right)}{\sqrt{3}\sqrt{6\sqrt{3}+9}-3\sqrt{3}}\right)}{9\left(2\sqrt{3}+3\right)}+\frac{2}{3\left(e^{x}-1\right)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(1-cosh(x)^3),x, algorithm="giac")
```

```
[Out] -1/18*sqrt(6*sqrt(3) + 9)*log(4*(2*sqrt(3)*sqrt(6*sqrt(3) + 9) - 3*sqrt(6*s
qrt(3) + 9) + 6*e^x + 3)^2 + 4*(sqrt(3)*sqrt(6*sqrt(3) + 9) + 3*sqrt(3))^2)
 + 1/18*sqrt(6*sqrt(3) + 9)*log(4*(2*sqrt(3)*sqrt(6*sqrt(3) + 9) - 3*sqrt(6
*sqrt(3) + 9) - 6*e^x - 3)^2 + 4*(sqrt(3)*sqrt(6*sqrt(3) + 9) - 3*sqrt(3))^
2) + 1/9*sqrt(3)*sqrt(6*sqrt(3) + 9)*arctan(3*(sqrt(2*sqrt(3) - 3) + 2*e^x
+ 1)/(sqrt(3)*sqrt(6*sqrt(3) + 9) + 3*sqrt(3)))/(2*sqrt(3) + 3) + 1/9*sqrt(
3)*sqrt(6*sqrt(3) + 9)*arctan(-3*(sqrt(2*sqrt(3) - 3) - 2*e^x - 1)/(sqrt(3)
*sqrt(6*sqrt(3) + 9) - 3*sqrt(3)))/(2*sqrt(3) + 3) + 2/3/(e^x - 1)
```

Mupad [B]
time = 3.42, size = 295, normalized size = 3.11

$$\ln\left(\frac{32\,e^x}{3}+\sqrt{\frac{1}{18}-\frac{\sqrt{3}\,1i}{54}}\left(\frac{32\,e^x}{3}-\sqrt{\frac{1}{18}-\frac{\sqrt{3}\,1i}{54}}\left(384\,e^x+\sqrt{\frac{1}{18}-\frac{\sqrt{3}\,1i}{54}}\,(1152\,e^x+864)+192\right)+\frac{160}{3}\right)+\frac{128}{9}\right)\sqrt{\frac{1}{18}-\frac{\sqrt{3}\,1i}{54}}+\ln\left(\frac{32\,e^x}{3}+\sqrt{\frac{1}{18}+\frac{\sqrt{3}\,1i}{54}}\left(\frac{32\,e^x}{3}-\sqrt{\frac{1}{18}+\frac{\sqrt{3}\,1i}{54}}\left(384\,e^x+\sqrt{\frac{1}{18}+\frac{\sqrt{3}\,1i}{54}}\,(1152\,e^x+864)+192\right)+\frac{160}{3}\right)+\frac{128}{9}\right)\sqrt{\frac{1}{18}+\frac{\sqrt{3}\,1i}{54}}-\ln\left(\frac{32\,e^x}{3}-\sqrt{\frac{1}{18}-\frac{\sqrt{3}\,1i}{54}}\left(\frac{32\,e^x}{3}+\sqrt{\frac{1}{18}-\frac{\sqrt{3}\,1i}{54}}\left(384\,e^x-\sqrt{\frac{1}{18}-\frac{\sqrt{3}\,1i}{54}}\,(1152\,e^x+864)+192\right)+\frac{160}{3}\right)+\frac{128}{9}\right)\sqrt{\frac{1}{18}-\frac{\sqrt{3}\,1i}{54}}-\ln\left(\frac{32\,e^x}{3}-\sqrt{\frac{1}{18}+\frac{\sqrt{3}\,1i}{54}}\left(\frac{32\,e^x}{3}+\sqrt{\frac{1}{18}+\frac{\sqrt{3}\,1i}{54}}\left(384\,e^x-\sqrt{\frac{1}{18}+\frac{\sqrt{3}\,1i}{54}}\,(1152\,e^x+864)+192\right)+\frac{160}{3}\right)+\frac{128}{9}\right)\sqrt{\frac{1}{18}+\frac{\sqrt{3}\,1i}{54}}+\frac{2}{3\,(e^x-1)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(-1/(cosh(x)^3 - 1),x)
```

```
[Out] log((32*exp(x))/3 + (1/18 - (3^(1/2)*1i)/54)^(1/2)*((32*exp(x))/3 - (1/18 -
 (3^(1/2)*1i)/54)^(1/2)*(384*exp(x) + (1/18 - (3^(1/2)*1i)/54)^(1/2)*(1152*
exp(x) + 864) + 192) + 160/3) + 128/9)*(1/18 - (3^(1/2)*1i)/54)^(1/2) + log
((32*exp(x))/3 + ((3^(1/2)*1i)/54 + 1/18)^(1/2)*((32*exp(x))/3 - ((3^(1/2)*
1i)/54 + 1/18)^(1/2)*(384*exp(x) + ((3^(1/2)*1i)/54 + 1/18)^(1/2)*(1152*exp
(x) + 864) + 192) + 160/3) + 128/9)*((3^(1/2)*1i)/54 + 1/18)^(1/2) - log((3
2*exp(x))/3 - (1/18 - (3^(1/2)*1i)/54)^(1/2)*((32*exp(x))/3 + (1/18 - (3^(1
/2)*1i)/54)^(1/2)*(384*exp(x) - (1/18 - (3^(1/2)*1i)/54)^(1/2)*(1152*exp(x)
 + 864) + 192) + 160/3) + 128/9)*(1/18 - (3^(1/2)*1i)/54)^(1/2) - log((32*e
xp(x))/3 - ((3^(1/2)*1i)/54 + 1/18)^(1/2)*((32*exp(x))/3 + ((3^(1/2)*1i)/54
 + 1/18)^(1/2)*(384*exp(x) - ((3^(1/2)*1i)/54 + 1/18)^(1/2)*(1152*exp(x) +
864) + 192) + 160/3) + 128/9)*((3^(1/2)*1i)/54 + 1/18)^(1/2) + 2/(3*(exp(x)
 - 1))
```

3.60 $\int \frac{1}{a+b\cosh^4(x)}\,dx$

Optimal. Leaf size=361

$$\frac{\sqrt{\sqrt{a}-\sqrt{a+b}}\tanh^{-1}\left(\frac{\sqrt{\sqrt{a}+\sqrt{a+b}}-\sqrt{2}\sqrt[4]{a}\tanh(x)}{\sqrt{\sqrt{a}-\sqrt{a+b}}}\right)}{2\sqrt{2}a^{3/4}\sqrt{a+b}}-\frac{\sqrt{\sqrt{a}-\sqrt{a+b}}\tanh^{-1}\left(\frac{\sqrt{\sqrt{a}+\sqrt{}}}{\sqrt{\sqrt{}}}\right)}{2\sqrt{2}a^{3/4}\sqrt{a+b}}$$

```
[Out] 1/4*arctanh(((a^(1/2)+(a+b)^(1/2))^(1/2)-a^(1/4)*2^(1/2)*tanh(x))/(a^(1/2)-
(a+b)^(1/2))^(1/2))*(a^(1/2)-(a+b)^(1/2))^(1/2)/a^(3/4)*2^(1/2)/(a+b)^(1/2)
-1/4*arctanh(((a^(1/2)+(a+b)^(1/2))^(1/2)+a^(1/4)*2^(1/2)*tanh(x))/(a^(1/2)
-(a+b)^(1/2))^(1/2))*(a^(1/2)-(a+b)^(1/2))^(1/2)/a^(3/4)*2^(1/2)/(a+b)^(1/2
)-1/8*ln((a+b)^(1/2)-a^(1/4)*2^(1/2)*(a^(1/2)+(a+b)^(1/2))^(1/2)*tanh(x)+a^
(1/2)*tanh(x)^2)*(a^(1/2)+(a+b)^(1/2))^(1/2)/a^(3/4)*2^(1/2)/(a+b)^(1/2)+1/
8*ln((a+b)^(1/2)+a^(1/4)*2^(1/2)*(a^(1/2)+(a+b)^(1/2))^(1/2)*tanh(x)+a^(1/2
)*tanh(x)^2)*(a^(1/2)+(a+b)^(1/2))^(1/2)/a^(3/4)*2^(1/2)/(a+b)^(1/2)
```

Rubi [A]
time = 0.76, antiderivative size = 485, normalized size of antiderivative = 1.34, number of steps used = 10, number of rules used = 6, integrand size = 10, $\frac{\text{number of rules}}{\text{integrand size}} = 0.600$, Rules used = {3288, 1183, 648, 632, 210, 642}

$$\frac{\left(\sqrt{a}-\sqrt{a+b}\right)\text{ArcTan}\left(\frac{\sqrt[4]{a}\sqrt{\sqrt{a}\sqrt{a+b}+a+b}-\sqrt{2}(a+b)^{3/4}\coth(x)}{\sqrt[4]{a}\sqrt{-\sqrt{a}\sqrt{a+b}+a+b}}\right)}{2\sqrt{2}a^{3/4}\sqrt[4]{a+b}\sqrt{-\sqrt{a}\sqrt{a+b}+a+b}}-\frac{\left(\sqrt{a}-\sqrt{a+b}\right)\text{ArcTan}\left(\frac{\sqrt{2}(a+b)^{3/4}\coth(x)+\sqrt[4]{a}\sqrt{\sqrt{a}\sqrt{a+b}+a+b}}{\sqrt[4]{a}\sqrt{-\sqrt{a}\sqrt{a+b}+a+b}}\right)}{2\sqrt{2}a^{3/4}\sqrt[4]{a+b}\sqrt{-\sqrt{a}\sqrt{a+b}+a+b}}-\frac{\left(\sqrt{a+b}+\sqrt{a}\right)\log\left((a+b)^{3/4}\coth^2(x)-\sqrt{2}\sqrt[4]{a}\sqrt{\sqrt{a}\sqrt{a+b}+a+b}\coth(x)+\sqrt{a}\sqrt[4]{a+b}\right)}{4\sqrt{2}a^{3/4}\sqrt[4]{a+b}\sqrt{\sqrt{a}\sqrt{a+b}+a+b}}+\frac{\left(\sqrt{a+b}+\sqrt{a}\right)\log\left((a+b)^{3/4}\coth^2(x)+\sqrt{2}\sqrt[4]{a}\sqrt{\sqrt{a}\sqrt{a+b}+a+b}\coth(x)+\sqrt{a}\sqrt[4]{a+b}\right)}{4\sqrt{2}a^{3/4}\sqrt[4]{a+b}\sqrt{\sqrt{a}\sqrt{a+b}+a+b}}$$

Antiderivative was successfully verified.

```
[In] Int[(a + b*Cosh[x]^4)^(-1),x]
```

```
[Out] ((Sqrt[a] - Sqrt[a + b])*ArcTan[(a^(1/4)*Sqrt[a + b + Sqrt[a]*Sqrt[a + b]]
- Sqrt[2]*(a + b)^(3/4)*Coth[x])/(a^(1/4)*Sqrt[a + b - Sqrt[a]*Sqrt[a + b]]
)])/(2*Sqrt[2]*a^(3/4)*(a + b)^(1/4)*Sqrt[a + b - Sqrt[a]*Sqrt[a + b]]) - (
(Sqrt[a] - Sqrt[a + b])*ArcTan[(a^(1/4)*Sqrt[a + b + Sqrt[a]*Sqrt[a + b]] +
 Sqrt[2]*(a + b)^(3/4)*Coth[x])/(a^(1/4)*Sqrt[a + b - Sqrt[a]*Sqrt[a + b]])
])/(2*Sqrt[2]*a^(3/4)*(a + b)^(1/4)*Sqrt[a + b - Sqrt[a]*Sqrt[a + b]]) - ((
Sqrt[a] + Sqrt[a + b])*Log[Sqrt[a]*(a + b)^(1/4) - Sqrt[2]*a^(1/4)*Sqrt[a +
 b + Sqrt[a]*Sqrt[a + b]]*Coth[x] + (a + b)^(3/4)*Coth[x]^2])/(4*Sqrt[2]*a^
(3/4)*(a + b)^(1/4)*Sqrt[a + b + Sqrt[a]*Sqrt[a + b]]) + ((Sqrt[a] + Sqrt[a
 + b])*Log[Sqrt[a]*(a + b)^(1/4) + Sqrt[2]*a^(1/4)*Sqrt[a + b + Sqrt[a]*Sqr
t[a + b]]*Coth[x] + (a + b)^(3/4)*Coth[x]^2])/(4*Sqrt[2]*a^(3/4)*(a + b)^(1
/4)*Sqrt[a + b + Sqrt[a]*Sqrt[a + b]])
```

Rule 210

```
Int[((a_) + (b_.)*(x_)^2)^(-1), x_Symbol] :> Simp[(-(Rt[-a, 2]*Rt[-b, 2])^(
-1))*ArcTan[Rt[-b, 2]*(x/Rt[-a, 2])], x] /; FreeQ[{a, b}, x] && PosQ[a/b] &
```

```
& (LtQ[a, 0] || LtQ[b, 0])
```

Rule 632

```
Int[((a_.) + (b_.)*(x_) + (c_.)*(x_)^2)^(-1), x_Symbol] :> Dist[-2, Subst[I
nt[1/Simp[b^2 - 4*a*c - x^2, x], x], x, b + 2*c*x], x] /; FreeQ[{a, b, c},
x] && NeQ[b^2 - 4*a*c, 0]
```

Rule 642

```
Int[((d_) + (e_.)*(x_))/((a_.) + (b_.)*(x_) + (c_.)*(x_)^2), x_Symbol] :> S
imp[d*(Log[RemoveContent[a + b*x + c*x^2, x]]/b), x] /; FreeQ[{a, b, c, d,
e}, x] && EqQ[2*c*d - b*e, 0]
```

Rule 648

```
Int[((d_.) + (e_.)*(x_))/((a_) + (b_.)*(x_) + (c_.)*(x_)^2), x_Symbol] :> D
ist[(2*c*d - b*e)/(2*c), Int[1/(a + b*x + c*x^2), x], x] + Dist[e/(2*c), In
t[(b + 2*c*x)/(a + b*x + c*x^2), x], x] /; FreeQ[{a, b, c, d, e}, x] && NeQ
[2*c*d - b*e, 0] && NeQ[b^2 - 4*a*c, 0] &&  !NiceSqrtQ[b^2 - 4*a*c]
```

Rule 1183

```
Int[((d_) + (e_.)*(x_)^2)/((a_) + (b_.)*(x_)^2 + (c_.)*(x_)^4), x_Symbol] :
> With[{q = Rt[a/c, 2]}, With[{r = Rt[2*q - b/c, 2]}, Dist[1/(2*c*q*r), Int
[(d*r - (d - e*q)*x)/(q - r*x + x^2), x], x] + Dist[1/(2*c*q*r), Int[(d*r +
 (d - e*q)*x)/(q + r*x + x^2), x], x]]] /; FreeQ[{a, b, c, d, e}, x] && NeQ
[b^2 - 4*a*c, 0] && NeQ[c*d^2 - b*d*e + a*e^2, 0] && NegQ[b^2 - 4*a*c]
```

Rule 3288

```
Int[((a_) + (b_.)*sin[(e_.) + (f_.)*(x_)]^4)^(p_.), x_Symbol] :> With[{ff =
 FreeFactors[Tan[e + f*x], x]}, Dist[ff/f, Subst[Int[(a + 2*a*ff^2*x^2 + (a
 + b)*ff^4*x^4)^p/(1 + ff^2*x^2)^(2*p + 1), x], x, Tan[e + f*x]/ff], x]] /;
 FreeQ[{a, b, e, f}, x] && IntegerQ[p]
```

Rubi steps

$$\int \frac{1}{a+b\cosh^4(x)}\,dx = \text{Subst}\left(\int \frac{1-x^2}{a-2ax^2+(a+b)x^4}\,dx, x, \coth(x)\right)$$

$$= \frac{\sqrt[4]{a+b}\,\text{Subst}\left(\int \frac{\frac{\sqrt{2}\sqrt[4]{a}\sqrt{a+b+\sqrt{a}\sqrt{a+b}}}{(a+b)^{3/4}}-\left(1+\frac{\sqrt{a}}{\sqrt{a+b}}\right)x}{\frac{\sqrt{a}}{\sqrt{a+b}}-\frac{\sqrt{2}\sqrt[4]{a}\sqrt{a+b+\sqrt{a}\sqrt{a+b}}\,x}{(a+b)^{3/4}}+x^2}\,dx, x, \coth(x)\right)}{2\sqrt{2}\,a^{3/4}\sqrt{a+b+\sqrt{a}\sqrt{a+b}}} +$$

$$= -\frac{\left(\sqrt{a}-\sqrt{a+b}\right)\text{Subst}\left(\int \frac{1}{\frac{\sqrt{a}}{\sqrt{a+b}}-\frac{\sqrt{2}\sqrt[4]{a}\sqrt{a+b+\sqrt{a}\sqrt{a+b}}\,x}{(a+b)^{3/4}}+x^2}\,dx, x, \text{co}\right.}{4\sqrt{a}\,(a+b)}$$

$$= -\frac{\left(\sqrt{a}+\sqrt{a+b}\right)\log\left(\sqrt{a}\sqrt[4]{a+b}-\sqrt{2}\sqrt[4]{a}\sqrt{a+b+\sqrt{a}\sqrt{a+b}}\coth(x)+(\right.}{4\sqrt{2}\,a^{3/4}\sqrt[4]{a+b}\sqrt{a+b+\sqrt{a}\sqrt{a+b}}}$$

$$= \frac{\left(\sqrt{a}-\sqrt{a+b}\right)\tan^{-1}\left(\frac{(a+b)^{3/4}\left(\frac{\sqrt[4]{a}\sqrt{a+b+\sqrt{a}\sqrt{a+b}}}{(a+b)^{3/4}}-\sqrt{2}\coth(x)\right)}{\sqrt[4]{a}\sqrt{a+b-\sqrt{a}\sqrt{a+b}}}\right)}{2\sqrt{2}\,a^{3/4}\sqrt[4]{a+b}\sqrt{a+b-\sqrt{a}\sqrt{a+b}}} - \frac{\left(\sqrt{\right.}{}$$

Mathematica [C] Result contains complex when optimal does not.
time = 0.16, size = 121, normalized size = 0.34

$$-\frac{\text{ArcTan}\left(\frac{\sqrt{a}\tanh(x)}{\sqrt{-a+i\sqrt{a}\sqrt{b}}}\right)}{2\sqrt{a}\sqrt{-a+i\sqrt{a}\sqrt{b}}}+\frac{\tanh^{-1}\left(\frac{\sqrt{a}\tanh(x)}{\sqrt{a+i\sqrt{a}\sqrt{b}}}\right)}{2\sqrt{a}\sqrt{a+i\sqrt{a}\sqrt{b}}}$$

Antiderivative was successfully verified.

```
[In] Integrate[(a + b*Cosh[x]^4)^(-1),x]
```

```
[Out] -1/2*ArcTan[(Sqrt[a]*Tanh[x])/Sqrt[-a + I*Sqrt[a]*Sqrt[b]]]/(Sqrt[a]*Sqrt[-
a + I*Sqrt[a]*Sqrt[b]]) + ArcTanh[(Sqrt[a]*Tanh[x])/Sqrt[a + I*Sqrt[a]*Sqrt
[b]]]/(2*Sqrt[a]*Sqrt[a + I*Sqrt[a]*Sqrt[b]])
```

Maple [C] Result contains higher order function than in optimal. Order 9 vs. order 3.
time = 0.75, size = 121, normalized size = 0.34

method	result
risch	$\sum_{\_R=\mathrm{RootOf}\left(1+(256a^4+256a^3b)\_Z^4-32\_Z^2a^2\right)} \_R\ln\left(\mathrm{e}^{2x}+\left(-\frac{128a^4}{b}-128a^3\right)\_R^3+\left(\frac{32a^3}{b}+32a^2\right)\_R^2\right.$
default	$\frac{\left(\sum_{\_R=\mathrm{RootOf}\left((a+b)\_Z^8+(-4a+4b)\_Z^6+(6a+6b)\_Z^4+(-4a+4b)\_Z^2+a+b\right)} \frac{\left(-\_R^6+3\_R^4-3\_R^2+1\right)\ln\left(\tanh\left(\frac{x}{2}\right)-\_R\right.}{\_R^7a+\_R^7b-3\_R^5a+3\_R^5b+3\_R^3a+3\_R^3b-\_}\right.}{4}$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(1/(a+b*cosh(x)^4),x,method=_RETURNVERBOSE)
```

```
[Out] 1/4*sum((-_R^6+3*_R^4-3*_R^2+1)/(_R^7*a+_R^7*b-3*_R^5*a+3*_R^5*b+3*_R^3*a+3
*_R^3*b-_R*a+_R*b)*ln(tanh(1/2*x)-_R),_R=RootOf((a+b)*_Z^8+(-4*a+4*b)*_Z^6+
(6*a+6*b)*_Z^4+(-4*a+4*b)*_Z^2+a+b))
```

Maxima [F]
time = 0.00, size = 0, normalized size = 0.00

Failed to integrate

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(a+b*cosh(x)^4),x, algorithm="maxima")
```

```
[Out] integrate(1/(b*cosh(x)^4 + a), x)
```

Fricas [B] Leaf count of result is larger than twice the leaf count of optimal. 771 vs. $2(247) = 494$.
time = 0.43, size = 771, normalized size = 2.14

[illegible]

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(a+b*cosh(x)^4),x, algorithm="fricas")
```

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

```
) + 1)/(a^2 + a*b))*log(b*cosh(x)^2 + 2*b*cosh(x)*sinh(x) + b*sinh(x)^2 - 2
*(a*b + (a^4 + a^3*b)*sqrt(-b/(a^5 + 2*a^4*b + a^3*b^2)))*sqrt(((a^2 + a*b)
*sqrt(-b/(a^5 + 2*a^4*b + a^3*b^2)) + 1)/(a^2 + a*b)) + 2*(a^3 + a^2*b)*sqr
t(-b/(a^5 + 2*a^4*b + a^3*b^2)) + b) - 1/4*sqrt(-((a^2 + a*b)*sqrt(-b/(a^5
+ 2*a^4*b + a^3*b^2)) - 1)/(a^2 + a*b))*log(b*cosh(x)^2 + 2*b*cosh(x)*sinh(
x) + b*sinh(x)^2 + 2*(a*b - (a^4 + a^3*b)*sqrt(-b/(a^5 + 2*a^4*b + a^3*b^2)
))*sqrt(-((a^2 + a*b)*sqrt(-b/(a^5 + 2*a^4*b + a^3*b^2)) - 1)/(a^2 + a*b))
- 2*(a^3 + a^2*b)*sqrt(-b/(a^5 + 2*a^4*b + a^3*b^2)) + b) + 1/4*sqrt(-((a^2
 + a*b)*sqrt(-b/(a^5 + 2*a^4*b + a^3*b^2)) - 1)/(a^2 + a*b))*log(b*cosh(x)^
2 + 2*b*cosh(x)*sinh(x) + b*sinh(x)^2 - 2*(a*b - (a^4 + a^3*b)*sqrt(-b/(a^5
 + 2*a^4*b + a^3*b^2)))*sqrt(-((a^2 + a*b)*sqrt(-b/(a^5 + 2*a^4*b + a^3*b^2
)) - 1)/(a^2 + a*b)) - 2*(a^3 + a^2*b)*sqrt(-b/(a^5 + 2*a^4*b + a^3*b^2)) +
 b)
```

Sympy [**F(-1)**] Timed out
time = 0.00, size = 0, normalized size = 0.00

Timed out

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(a+b*cosh(x)**4),x)
```

```
[Out] Timed out
```

Giac [**F(-2)**]
time = 0.00, size = 0, normalized size = 0.00

Exception raised: NotImplementedError

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(a+b*cosh(x)^4),x, algorithm="giac")
```

```
[Out] Exception raised: NotImplementedError >> Unable to parse Giac output: Warni
ng, need to choose a branch for the root of a polynomial with parameters. T
his might be wrong.The choice was done assuming [sageVARa,sageVARb]=[34,61]
Warning, need to
```

Mupad [**B**]
time = 7.55, size = 1563, normalized size = 4.33

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] log((524288*(1024*a^3*exp(2*x) - 35*b^3*exp(2*x) + 185*a*b^2 + 464*a^2*b +
256*a^3 - 24*b^3 + 988*a*b^2*exp(2*x) + 2048*a^2*b*exp(2*x)))/(a*b^6*(a + b
)^2) - (((((4194304*(253*a*b^3 - b^4*exp(2*x) + 1184*a^3*b + 512*a^4 - b^4
+ 930*a^2*b^2 + 1392*a^2*b^2*exp(2*x) + 627*a*b^3*exp(2*x) + 768*a^3*b*exp(
2*x)))/(b^6*(a + b)^2) + (8388608*a*((a^2 + (-a^3*b)^(1/2))/(a^3*(a + b)))^
(1/2)*(512*a^3*exp(2*x) - 6*b^3*exp(2*x) + 181*a*b^2 + 432*a^2*b + 256*a^3
- 5*b^3 + 622*a*b^2*exp(2*x) + 1152*a^2*b*exp(2*x)))/(b^6*(a + b)))*((a^2 +
 (-a^3*b)^(1/2))/(a^3*(a + b)))^(1/2))/4 - (2097152*(176*a*b + 1536*a^2*exp
(2*x) - 134*b^2*exp(2*x) + 256*a^2 - 75*b^2 + 1408*a*b*exp(2*x)))/(b^6*(a +
 b)))*((a^2 + (-a^3*b)^(1/2))/(a^3*(a + b)))^(1/2))/4)*((a^2 + (-a^3*b)^(1/
2))/(16*(a^3*b + a^4)))^(1/2) - log((524288*(1024*a^3*exp(2*x) - 35*b^3*exp
(2*x) + 185*a*b^2 + 464*a^2*b + 256*a^3 - 24*b^3 + 988*a*b^2*exp(2*x) + 204
8*a^2*b*exp(2*x)))/(a*b^6*(a + b)^2) - (((((4194304*(253*a*b^3 - b^4*exp(2*
x) + 1184*a^3*b + 512*a^4 - b^4 + 930*a^2*b^2 + 1392*a^2*b^2*exp(2*x) + 627
*a*b^3*exp(2*x) + 768*a^3*b*exp(2*x)))/(b^6*(a + b)^2) - (8388608*a*((a^2 +
 (-a^3*b)^(1/2))/(a^3*(a + b)))^(1/2)*(512*a^3*exp(2*x) - 6*b^3*exp(2*x) +
181*a*b^2 + 432*a^2*b + 256*a^3 - 5*b^3 + 622*a*b^2*exp(2*x) + 1152*a^2*b*e
xp(2*x)))/(b^6*(a + b)))*((a^2 + (-a^3*b)^(1/2))/(a^3*(a + b)))^(1/2))/4 +
(2097152*(176*a*b + 1536*a^2*exp(2*x) - 134*b^2*exp(2*x) + 256*a^2 - 75*b^2
 + 1408*a*b*exp(2*x)))/(b^6*(a + b)))*((a^2 + (-a^3*b)^(1/2))/(a^3*(a + b))
)^(1/2))/4)*((a^2 + (-a^3*b)^(1/2))/(16*(a^3*b + a^4)))^(1/2) - log((524288
*(1024*a^3*exp(2*x) - 35*b^3*exp(2*x) + 185*a*b^2 + 464*a^2*b + 256*a^3 - 2
4*b^3 + 988*a*b^2*exp(2*x) + 2048*a^2*b*exp(2*x)))/(a*b^6*(a + b)^2) - ((((
(4194304*(253*a*b^3 - b^4*exp(2*x) + 1184*a^3*b + 512*a^4 - b^4 + 930*a^2*b
^2 + 1392*a^2*b^2*exp(2*x) + 627*a*b^3*exp(2*x) + 768*a^3*b*exp(2*x)))/(b^6
*(a + b)^2) - (8388608*a*((a^2 - (-a^3*b)^(1/2))/(a^3*(a + b)))^(1/2)*(512*
a^3*exp(2*x) - 6*b^3*exp(2*x) + 181*a*b^2 + 432*a^2*b + 256*a^3 - 5*b^3 + 6
22*a*b^2*exp(2*x) + 1152*a^2*b*exp(2*x)))/(b^6*(a + b)))*((a^2 - (-a^3*b)^(
1/2))/(a^3*(a + b)))^(1/2))/4 + (2097152*(176*a*b + 1536*a^2*exp(2*x) - 134
*b^2*exp(2*x) + 256*a^2 - 75*b^2 + 1408*a*b*exp(2*x)))/(b^6*(a + b)))*((a^2
 - (-a^3*b)^(1/2))/(a^3*(a + b)))^(1/2))/4)*((a^2 - (-a^3*b)^(1/2))/(16*(a^
3*b + a^4)))^(1/2) + log((524288*(1024*a^3*exp(2*x) - 35*b^3*exp(2*x) + 185
*a*b^2 + 464*a^2*b + 256*a^3 - 24*b^3 + 988*a*b^2*exp(2*x) + 2048*a^2*b*exp
(2*x)))/(a*b^6*(a + b)^2) - (((((4194304*(253*a*b^3 - b^4*exp(2*x) + 1184*a
^3*b + 512*a^4 - b^4 + 930*a^2*b^2 + 1392*a^2*b^2*exp(2*x) + 627*a*b^3*exp(
2*x) + 768*a^3*b*exp(2*x)))/(b^6*(a + b)^2) + (8388608*a*((a^2 - (-a^3*b)^(
1/2))/(a^3*(a + b)))^(1/2)*(512*a^3*exp(2*x) - 6*b^3*exp(2*x) + 181*a*b^2 +
 432*a^2*b + 256*a^3 - 5*b^3 + 622*a*b^2*exp(2*x) + 1152*a^2*b*exp(2*x)))/(
b^6*(a + b)))*((a^2 - (-a^3*b)^(1/2))/(a^3*(a + b)))^(1/2))/4 - (2097152*(1
76*a*b + 1536*a^2*exp(2*x) - 134*b^2*exp(2*x) + 256*a^2 - 75*b^2 + 1408*a*b
*exp(2*x)))/(b^6*(a + b)))*((a^2 - (-a^3*b)^(1/2))/(a^3*(a + b)))^(1/2))/4)
*((a^2 - (-a^3*b)^(1/2))/(16*(a^3*b + a^4)))^(1/2)
```

3.61 $\int \frac{1}{a-b\cosh^4(x)}\,dx$

Optimal. Leaf size=101

$$\frac{\tanh^{-1}\left(\frac{\sqrt[4]{a}\tanh(x)}{\sqrt{\sqrt{a}-\sqrt{b}}}\right)}{2a^{3/4}\sqrt{\sqrt{a}-\sqrt{b}}}+\frac{\tanh^{-1}\left(\frac{\sqrt[4]{a}\tanh(x)}{\sqrt{\sqrt{a}+\sqrt{b}}}\right)}{2a^{3/4}\sqrt{\sqrt{a}+\sqrt{b}}}$$

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

Rubi [A]

time = 0.09, antiderivative size = 101, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 3, integrand size = 11, $\frac{\text{number of rules}}{\text{integrand size}} = 0.273$, Rules used = {3288, 1180, 214}

$$\frac{\tanh^{-1}\left(\frac{\sqrt[4]{a}\tanh(x)}{\sqrt{\sqrt{a}-\sqrt{b}}}\right)}{2a^{3/4}\sqrt{\sqrt{a}-\sqrt{b}}}+\frac{\tanh^{-1}\left(\frac{\sqrt[4]{a}\tanh(x)}{\sqrt{\sqrt{a}+\sqrt{b}}}\right)}{2a^{3/4}\sqrt{\sqrt{a}+\sqrt{b}}}$$

Antiderivative was successfully verified.

```
[In] Int[(a - b*Cosh[x]^4)^(-1),x]
```

```
[Out] ArcTanh[(a^(1/4)*Tanh[x])/Sqrt[Sqrt[a] - Sqrt[b]]]/(2*a^(3/4)*Sqrt[Sqrt[a]
 - Sqrt[b]]) + ArcTanh[(a^(1/4)*Tanh[x])/Sqrt[Sqrt[a] + Sqrt[b]]]/(2*a^(3/4)
*Sqrt[Sqrt[a] + Sqrt[b]])
```

Rule 214

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

Rule 1180

```
Int[((d_) + (e_.)*(x_)^2)/((a_) + (b_.)*(x_)^2 + (c_.)*(x_)^4), x_Symbol] :
> With[{q = Rt[b^2 - 4*a*c, 2]}, Dist[e/2 + (2*c*d - b*e)/(2*q), Int[1/(b/2
 - q/2 + c*x^2), x], x] + Dist[e/2 - (2*c*d - b*e)/(2*q), Int[1/(b/2 + q/2
+ c*x^2), x], x]] /; FreeQ[{a, b, c, d, e}, x] && NeQ[b^2 - 4*a*c, 0] && Ne
Q[c*d^2 - a*e^2, 0] && PosQ[b^2 - 4*a*c]
```

Rule 3288

```
Int[((a_) + (b_.)*sin[(e_.) + (f_.)*(x_)]^4)^(p_.), x_Symbol] :> With[{ff =
 FreeFactors[Tan[e + f*x], x]}, Dist[ff/f, Subst[Int[(a + 2*a*ff^2*x^2 + (a
 + b)*ff^4*x^4)^p/(1 + ff^2*x^2)^(2*p + 1), x], x, Tan[e + f*x]/ff], x]] /;
 FreeQ[{a, b, e, f}, x] && IntegerQ[p]
```

Rubi steps

$$\int \frac{1}{a-b\cosh^4(x)}\,dx = \text{Subst}\left(\int \frac{1-x^2}{a-2ax^2+(a-b)x^4}\,dx, x, \coth(x)\right)$$
$$= \frac{1}{2}\left(-1-\frac{\sqrt{b}}{\sqrt{a}}\right)\text{Subst}\left(\int \frac{1}{-a-\sqrt{a}\sqrt{b}+(a-b)x^2}\,dx, x, \coth(x)\right)+\frac{1}{2}\left(-1+\right.$$
$$= \frac{\tanh^{-1}\left(\frac{\sqrt[4]{a}\tanh(x)}{\sqrt{\sqrt{a}-\sqrt{b}}}\right)}{2a^{3/4}\sqrt{\sqrt{a}-\sqrt{b}}}+\frac{\tanh^{-1}\left(\frac{\sqrt[4]{a}\tanh(x)}{\sqrt{\sqrt{a}+\sqrt{b}}}\right)}{2a^{3/4}\sqrt{\sqrt{a}+\sqrt{b}}}$$

Mathematica [A]
time = 0.14, size = 109, normalized size = 1.08

$$-\frac{\text{ArcTan}\left(\frac{\sqrt{a}\tanh(x)}{\sqrt{-a+\sqrt{a}\sqrt{b}}}\right)}{2\sqrt{a}\sqrt{-a+\sqrt{a}\sqrt{b}}}+\frac{\tanh^{-1}\left(\frac{\sqrt{a}\tanh(x)}{\sqrt{a+\sqrt{a}\sqrt{b}}}\right)}{2\sqrt{a}\sqrt{a+\sqrt{a}\sqrt{b}}}$$

Antiderivative was successfully verified.

```
[In] Integrate[(a - b*Cosh[x]^4)^(-1),x]
```

```
[Out] -1/2*ArcTan[(Sqrt[a]*Tanh[x])/Sqrt[-a + Sqrt[a]*Sqrt[b]]]/(Sqrt[a]*Sqrt[-a
+ Sqrt[a]*Sqrt[b]]) + ArcTanh[(Sqrt[a]*Tanh[x])/Sqrt[a + Sqrt[a]*Sqrt[b]]]/
(2*Sqrt[a]*Sqrt[a + Sqrt[a]*Sqrt[b]])
```

Maple [C] Result contains higher order function than in optimal. Order 9 vs. order 3.
time = 0.78, size = 127, normalized size = 1.26

method	result
risch	$\sum_{\_R=\text{RootOf}\left(1+(256a^4-256a^3b)\_Z^4-32\_Z^2a^2\right)} \_R\ln\left(\mathrm{e}^{2x}+\left(\frac{128a^4}{b}-128a^3\right)\_R^3+\left(-\frac{32a^3}{b}+32a^2\right)\_R^2\right.$

default	$\frac{\left(\sum_{\_R=\mathrm{RootOf}\left((a-b)\_Z^8+(-4a-4b)\_Z^6+(6a-6b)\_Z^4+(-4a-4b)\_Z^2+a-b\right)} \frac{\left(-\_R^6+3\_R^4-3\_R^2+1\right)\ln\left(\tanh\left(\frac{x}{2}\right)-\_R\right)}{\_R^7a-\_R^7b-3\_R^5a-3\_R^5b+3\_R^3a-3\_R^3b-\_R}$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(1/(a-b*cosh(x)^4),x,method=_RETURNVERBOSE)
```

```
[Out] 1/4*sum((-_R^6+3*_R^4-3*_R^2+1)/(_R^7*a-_R^7*b-3*_R^5*a-3*_R^5*b+3*_R^3*a-3
*_R^3*b-_R*a-_R*b)*ln(tanh(1/2*x)-_R),_R=RootOf((a-b)*_Z^8+(-4*a-4*b)*_Z^6+
(6*a-6*b)*_Z^4+(-4*a-4*b)*_Z^2+a-b))
```

Maxima [F]
time = 0.00, size = 0, normalized size = 0.00

Failed to integrate

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(a-b*cosh(x)^4),x, algorithm="maxima")
```

```
[Out] -integrate(1/(b*cosh(x)^4 - a), x)
```

Fricas [B] Leaf count of result is larger than twice the leaf count of optimal. 779 vs. 2(65) = 130.
time = 0.44, size = 779, normalized size = 7.71

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(a-b*cosh(x)^4),x, algorithm="fricas")
```

```
[Out] -1/4*sqrt(((a^2 - a*b)*sqrt(b/(a^5 - 2*a^4*b + a^3*b^2)) + 1)/(a^2 - a*b))*
log(b*cosh(x)^2 + 2*b*cosh(x)*sinh(x) + b*sinh(x)^2 + 2*(a*b - (a^4 - a^3*b
)*sqrt(b/(a^5 - 2*a^4*b + a^3*b^2)))*sqrt(((a^2 - a*b)*sqrt(b/(a^5 - 2*a^4*
b + a^3*b^2)) + 1)/(a^2 - a*b)) - 2*(a^3 - a^2*b)*sqrt(b/(a^5 - 2*a^4*b + a
^3*b^2)) + b) + 1/4*sqrt(((a^2 - a*b)*sqrt(b/(a^5 - 2*a^4*b + a^3*b^2)) + 1
)/(a^2 - a*b))*log(b*cosh(x)^2 + 2*b*cosh(x)*sinh(x) + b*sinh(x)^2 - 2*(a*b
 - (a^4 - a^3*b)*sqrt(b/(a^5 - 2*a^4*b + a^3*b^2)))*sqrt(((a^2 - a*b)*sqrt(
b/(a^5 - 2*a^4*b + a^3*b^2)) + 1)/(a^2 - a*b)) - 2*(a^3 - a^2*b)*sqrt(b/(a^
5 - 2*a^4*b + a^3*b^2)) + b) - 1/4*sqrt(-((a^2 - a*b)*sqrt(b/(a^5 - 2*a^4*b
 + a^3*b^2)) - 1)/(a^2 - a*b))*log(b*cosh(x)^2 + 2*b*cosh(x)*sinh(x) + b*si
nh(x)^2 + 2*(a*b + (a^4 - a^3*b)*sqrt(b/(a^5 - 2*a^4*b + a^3*b^2)))*sqrt(-(
(a^2 - a*b)*sqrt(b/(a^5 - 2*a^4*b + a^3*b^2)) - 1)/(a^2 - a*b)) + 2*(a^3 -
a^2*b)*sqrt(b/(a^5 - 2*a^4*b + a^3*b^2)) + b) + 1/4*sqrt(-((a^2 - a*b)*sqrt
(b/(a^5 - 2*a^4*b + a^3*b^2)) - 1)/(a^2 - a*b))*log(b*cosh(x)^2 + 2*b*cosh(
x)*sinh(x) + b*sinh(x)^2 - 2*(a*b + (a^4 - a^3*b)*sqrt(b/(a^5 - 2*a^4*b + a
```

```
^3*b^2)))*sqrt(-((a^2 - a*b)*sqrt(b/(a^5 - 2*a^4*b + a^3*b^2)) - 1)/(a^2 -
a*b)) + 2*(a^3 - a^2*b)*sqrt(b/(a^5 - 2*a^4*b + a^3*b^2)) + b)
```

Sympy [**F(-1)**] Timed out
time = 0.00, size = 0, normalized size = 0.00

Timed out

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(a-b*cosh(x)**4),x)
```

```
[Out] Timed out
```

Giac [**F(-2)**]
time = 0.00, size = 0, normalized size = 0.00

Exception raised: NotImplementedError

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(a-b*cosh(x)^4),x, algorithm="giac")
```

```
[Out] Exception raised: NotImplementedError >> Unable to parse Giac output: Warni
ng, need to choose a branch for the root of a polynomial with parameters. T
his might be wrong.The choice was done assuming [sageVARa,sageVARb]=[-49,43
]Warning, need t
```

Mupad [**B**]
time = 8.90, size = 1487, normalized size = 14.72

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(1/(a - b*cosh(x)^4),x)
```

```
[Out] log(((((1/(a^2 - (a^3*b)^(1/2)))^(1/2)*((4194304*(b^4*exp(2*x) + 253*a*b^3
+ 1184*a^3*b - 512*a^4 + b^4 - 930*a^2*b^2 - 1392*a^2*b^2*exp(2*x) + 627*a*
b^3*exp(2*x) + 768*a^3*b*exp(2*x)))/(b^6*(a - b)^2) - (8388608*a*(1/(a^2 -
(a^3*b)^(1/2)))^(1/2)*(512*a^3*exp(2*x) + 6*b^3*exp(2*x) + 181*a*b^2 - 432*
a^2*b + 256*a^3 + 5*b^3 + 622*a*b^2*exp(2*x) - 1152*a^2*b*exp(2*x)))/(b^6*(
a - b))))/4 - (2097152*(176*a*b - 1536*a^2*exp(2*x) + 134*b^2*exp(2*x) - 25
6*a^2 + 75*b^2 + 1408*a*b*exp(2*x)))/(b^6*(a - b)))*(1/(a^2 - (a^3*b)^(1/2)
))^(1/2))/4 + (524288*(1024*a^3*exp(2*x) + 35*b^3*exp(2*x) + 185*a*b^2 - 46
4*a^2*b + 256*a^3 + 24*b^3 + 988*a*b^2*exp(2*x) - 2048*a^2*b*exp(2*x)))/(a*
b^6*(a - b)^2))*(-(a^2 + (a^3*b)^(1/2))/(16*(a^3*b - a^4)))^(1/2) - log((((
(1/(a^2 - (a^3*b)^(1/2)))^(1/2)*((4194304*(b^4*exp(2*x) + 253*a*b^3 + 1184*
a^3*b - 512*a^4 + b^4 - 930*a^2*b^2 - 1392*a^2*b^2*exp(2*x) + 627*a*b^3*exp
```

```
(2*x) + 768*a^3*b*exp(2*x)))/(b^6*(a - b)^2) + (8388608*a*(1/(a^2 - (a^3*b)
^(1/2)))^(1/2)*(512*a^3*exp(2*x) + 6*b^3*exp(2*x) + 181*a*b^2 - 432*a^2*b +
 256*a^3 + 5*b^3 + 622*a*b^2*exp(2*x) - 1152*a^2*b*exp(2*x)))/(b^6*(a - b))
))/4 + (2097152*(176*a*b - 1536*a^2*exp(2*x) + 134*b^2*exp(2*x) - 256*a^2 +
 75*b^2 + 1408*a*b*exp(2*x)))/(b^6*(a - b)))*(1/(a^2 - (a^3*b)^(1/2)))^(1/2
))/4 + (524288*(1024*a^3*exp(2*x) + 35*b^3*exp(2*x) + 185*a*b^2 - 464*a^2*b
 + 256*a^3 + 24*b^3 + 988*a*b^2*exp(2*x) - 2048*a^2*b*exp(2*x)))/(a*b^6*(a
- b)^2))*(-(a^2 + (a^3*b)^(1/2))/(16*(a^3*b - a^4)))^(1/2) + log(((1/(a^2 +
 (a^3*b)^(1/2)))^(1/2)*(((1/(a^2 + (a^3*b)^(1/2)))^(1/2)*((4194304*(b^4*exp
(2*x) + 253*a*b^3 + 1184*a^3*b - 512*a^4 + b^4 - 930*a^2*b^2 - 1392*a^2*b^2
*exp(2*x) + 627*a*b^3*exp(2*x) + 768*a^3*b*exp(2*x)))/(b^6*(a - b)^2) - (83
88608*a*(1/(a^2 + (a^3*b)^(1/2)))^(1/2)*(512*a^3*exp(2*x) + 6*b^3*exp(2*x)
+ 181*a*b^2 - 432*a^2*b + 256*a^3 + 5*b^3 + 622*a*b^2*exp(2*x) - 1152*a^2*b
*exp(2*x)))/(b^6*(a - b))))/4 - (2097152*(176*a*b - 1536*a^2*exp(2*x) + 134
*b^2*exp(2*x) - 256*a^2 + 75*b^2 + 1408*a*b*exp(2*x)))/(b^6*(a - b))))/4 +
(524288*(1024*a^3*exp(2*x) + 35*b^3*exp(2*x) + 185*a*b^2 - 464*a^2*b + 256*
a^3 + 24*b^3 + 988*a*b^2*exp(2*x) - 2048*a^2*b*exp(2*x)))/(a*b^6*(a - b)^2)
)*(-(a^2 - (a^3*b)^(1/2))/(16*(a^3*b - a^4)))^(1/2) - log(((1/(a^2 + (a^3*b
)^(1/2)))^(1/2)*(((1/(a^2 + (a^3*b)^(1/2)))^(1/2)*((4194304*(b^4*exp(2*x) +
 253*a*b^3 + 1184*a^3*b - 512*a^4 + b^4 - 930*a^2*b^2 - 1392*a^2*b^2*exp(2*
x) + 627*a*b^3*exp(2*x) + 768*a^3*b*exp(2*x)))/(b^6*(a - b)^2) + (8388608*a
*(1/(a^2 + (a^3*b)^(1/2)))^(1/2)*(512*a^3*exp(2*x) + 6*b^3*exp(2*x) + 181*a
*b^2 - 432*a^2*b + 256*a^3 + 5*b^3 + 622*a*b^2*exp(2*x) - 1152*a^2*b*exp(2*
x)))/(b^6*(a - b))))/4 + (2097152*(176*a*b - 1536*a^2*exp(2*x) + 134*b^2*ex
p(2*x) - 256*a^2 + 75*b^2 + 1408*a*b*exp(2*x)))/(b^6*(a - b))))/4 + (524288
*(1024*a^3*exp(2*x) + 35*b^3*exp(2*x) + 185*a*b^2 - 464*a^2*b + 256*a^3 + 2
4*b^3 + 988*a*b^2*exp(2*x) - 2048*a^2*b*exp(2*x)))/(a*b^6*(a - b)^2))*(-(a^
2 - (a^3*b)^(1/2))/(16*(a^3*b - a^4)))^(1/2)
```

3.62 $\int \frac{1}{1+\cosh^4(x)} \, dx$

Optimal. Leaf size=176

$$-\frac{\text{ArcTan}\left(\frac{\sqrt{1+\sqrt{2}}-2\coth(x)}{\sqrt{-1+\sqrt{2}}}\right)}{4\sqrt{1+\sqrt{2}}}+\frac{\text{ArcTan}\left(\frac{\sqrt{1+\sqrt{2}}+2\coth(x)}{\sqrt{-1+\sqrt{2}}}\right)}{4\sqrt{1+\sqrt{2}}}-\frac{1}{8}\sqrt{1+\sqrt{2}}\,\log\left(\sqrt{2}-2\sqrt{1+\sqrt{2}}\right.$$

```
[Out] -1/4*arctan((-2*coth(x)+(1+2^(1/2))^(1/2))/(2^(1/2)-1)^(1/2))/(1+2^(1/2))^(
1/2)+1/4*arctan((2*coth(x)+(1+2^(1/2))^(1/2))/(2^(1/2)-1)^(1/2))/(1+2^(1/2)
)^(1/2)-1/8*ln(2*coth(x)^2+2^(1/2)-2*coth(x)*(1+2^(1/2))^(1/2))*(1+2^(1/2))
^(1/2)+1/8*ln(1+coth(x)^2*2^(1/2)+coth(x)*(2+2*2^(1/2))^(1/2))*(1+2^(1/2))^
(1/2)
```

Rubi [A]

time = 0.11, antiderivative size = 176, normalized size of antiderivative = 1.00, number of steps used = 10, number of rules used = 6, integrand size = 8, $\frac{\text{number of rules}}{\text{integrand size}} = 0.750$, Rules used = {3288, 1183, 648, 632, 210, 642}

$$-\frac{\text{ArcTan}\left(\frac{\sqrt{1+\sqrt{2}}-2\coth(x)}{\sqrt{\sqrt{2}-1}}\right)}{4\sqrt{1+\sqrt{2}}}+\frac{\text{ArcTan}\left(\frac{2\coth(x)+\sqrt{1+\sqrt{2}}}{\sqrt{\sqrt{2}-1}}\right)}{4\sqrt{1+\sqrt{2}}}-\frac{1}{8}\sqrt{1+\sqrt{2}}\,\log\left(2\coth^2(x)-2\sqrt{1+\sqrt{2}}\coth(x)+\sqrt{2}\right)+\frac{1}{8}\sqrt{1+\sqrt{2}}\,\log\left(\sqrt{2}\coth^2(x)+\sqrt{2\left(1+\sqrt{2}\right)}\coth(x)+1\right)$$

Antiderivative was successfully verified.

```
[In] Int[(1 + Cosh[x]^4)^(-1),x]
```

```
[Out] -1/4*ArcTan[(Sqrt[1 + Sqrt[2]] - 2*Coth[x])/Sqrt[-1 + Sqrt[2]]]/Sqrt[1 + Sq
rt[2]] + ArcTan[(Sqrt[1 + Sqrt[2]] + 2*Coth[x])/Sqrt[-1 + Sqrt[2]]]/(4*Sqrt
[1 + Sqrt[2]]) - (Sqrt[1 + Sqrt[2]]*Log[Sqrt[2] - 2*Sqrt[1 + Sqrt[2]]*Coth[
x] + 2*Coth[x]^2])/8 + (Sqrt[1 + Sqrt[2]]*Log[1 + Sqrt[2*(1 + Sqrt[2])]*Cot
h[x] + Sqrt[2]*Coth[x]^2])/8
```

Rule 210

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

Rule 632

```
Int[((a_.) + (b_.)*(x_) + (c_.)*(x_)^2)^(-1), x_Symbol] :> Dist[-2, Subst[I
nt[1/Simp[b^2 - 4*a*c - x^2, x], x], x, b + 2*c*x], x] /; FreeQ[{a, b, c},
x] && NeQ[b^2 - 4*a*c, 0]
```

Rule 642

```
Int[((d_) + (e_.)*(x_))/((a_.) + (b_.)*(x_) + (c_.)*(x_)^2), x_Symbol] :> S
imp[d*(Log[RemoveContent[a + b*x + c*x^2, x]]/b), x] /; FreeQ[{a, b, c, d,
e}, x] && EqQ[2*c*d - b*e, 0]
```

Rule 648

```
Int[((d_.) + (e_.)*(x_))/((a_) + (b_.)*(x_) + (c_.)*(x_)^2), x_Symbol] :> D
ist[(2*c*d - b*e)/(2*c), Int[1/(a + b*x + c*x^2), x], x] + Dist[e/(2*c), In
t[(b + 2*c*x)/(a + b*x + c*x^2), x], x] /; FreeQ[{a, b, c, d, e}, x] && NeQ
[2*c*d - b*e, 0] && NeQ[b^2 - 4*a*c, 0] &&  !NiceSqrtQ[b^2 - 4*a*c]
```

Rule 1183

```
Int[((d_) + (e_.)*(x_)^2)/((a_) + (b_.)*(x_)^2 + (c_.)*(x_)^4), x_Symbol] :
> With[{q = Rt[a/c, 2]}, With[{r = Rt[2*q - b/c, 2]}, Dist[1/(2*c*q*r), Int
[(d*r - (d - e*q)*x)/(q - r*x + x^2), x], x] + Dist[1/(2*c*q*r), Int[(d*r +
 (d - e*q)*x)/(q + r*x + x^2), x], x]]] /; FreeQ[{a, b, c, d, e}, x] && NeQ
[b^2 - 4*a*c, 0] && NeQ[c*d^2 - b*d*e + a*e^2, 0] && NegQ[b^2 - 4*a*c]
```

Rule 3288

```
Int[((a_) + (b_.)*sin[(e_.) + (f_.)*(x_)]^4)^(p_.), x_Symbol] :> With[{ff =
 FreeFactors[Tan[e + f*x], x]}, Dist[ff/f, Subst[Int[(a + 2*a*ff^2*x^2 + (a
 + b)*ff^4*x^4)^p/(1 + ff^2*x^2)^(2*p + 1), x], x, Tan[e + f*x]/ff], x]] /;
 FreeQ[{a, b, e, f}, x] && IntegerQ[p]
```

Rubi steps

$$\int \frac{1}{1+\cosh^4(x)}\,dx = \text{Subst}\left(\int \frac{1-x^2}{1-2x^2+2x^4}\,dx, x, \coth(x)\right)$$

$$= \frac{\text{Subst}\left(\int \frac{\sqrt{1+\sqrt{2}}-\left(1+\frac{1}{\sqrt{2}}\right)x}{\frac{1}{\sqrt{2}}-\sqrt{1+\sqrt{2}}\,x+x^2}\,dx, x, \coth(x)\right)}{2\sqrt{2\left(1+\sqrt{2}\right)}} + \frac{\text{Subst}\left(\int \frac{\sqrt{1+\sqrt{2}}+\left(1+\frac{1}{\sqrt{2}}\right)}{\frac{1}{\sqrt{2}}+\sqrt{1+\sqrt{2}}\,x+x}\right.}{2\sqrt{2\left(1+\sqrt{2}\right.}}$$

$$= \frac{1}{8}\sqrt{3-2\sqrt{2}}\,\text{Subst}\left(\int \frac{1}{\frac{1}{\sqrt{2}}-\sqrt{1+\sqrt{2}}\,x+x^2}\,dx, x, \coth(x)\right) + \frac{1}{8}\sqrt{3-2\sqrt{2}}$$

$$= -\frac{1}{8}\sqrt{1+\sqrt{2}}\,\log\left(\sqrt{2}-2\sqrt{1+\sqrt{2}}\,\coth(x)+2\coth^2(x)\right) + \frac{1}{8}\sqrt{1+\sqrt{2}}\,\log\left(\right.$$

$$= -\frac{1}{4}\sqrt{-1+\sqrt{2}}\,\tan^{-1}\left(\frac{\sqrt{1+\sqrt{2}}-2\coth(x)}{\sqrt{-1+\sqrt{2}}}\right) + \frac{1}{4}\sqrt{-1+\sqrt{2}}\,\tan^{-1}\left(\frac{\sqrt{1+}}{\sqrt{}}\right.$$

Mathematica [C] Result contains complex when optimal does not.
time = 0.05, size = 45, normalized size = 0.26

$$\frac{\tanh^{-1}\left(\frac{\tanh(x)}{\sqrt{1-i}}\right)}{2\sqrt{1-i}} + \frac{\tanh^{-1}\left(\frac{\tanh(x)}{\sqrt{1+i}}\right)}{2\sqrt{1+i}}$$

Antiderivative was successfully verified.

```
[In] Integrate[(1 + Cosh[x]^4)^(-1),x]
```

```
[Out] ArcTanh[Tanh[x]/Sqrt[1 - I]]/(2*Sqrt[1 - I]) + ArcTanh[Tanh[x]/Sqrt[1 + I]]
/(2*Sqrt[1 + I])
```

Maple [C] Result contains higher order function than in optimal. Order 9 vs. order 3.
time = 0.54, size = 37, normalized size = 0.21

method	result	size
risch	$\sum_{\_R=\text{RootOf}\left(512\_Z^4-32\_Z^2+1\right)} \_R \ln\left(-256\_R^3+64\_R^2+e^{2x}-1\right)$	36

default	$\frac{\left(\sum_{\_R=\mathrm{RootOf}\left(2\_Z^4-2\_Z^2+1\right)} \_R \ln\left(2\tanh\left(\frac{x}{2}\right)\_R+\tanh^2\left(\frac{x}{2}\right)+1\right)\right)}{4}$	37

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(1/(1+cosh(x)^4),x,method=_RETURNVERBOSE)
```

```
[Out] 1/4*sum(_R*ln(2*tanh(1/2*x)*_R+tanh(1/2*x)^2+1),_R=RootOf(2*_Z^4-2*_Z^2+1))
```

Maxima [F]
time = 0.00, size = 0, normalized size = 0.00

Failed to integrate

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(1+cosh(x)^4),x, algorithm="maxima")
```

```
[Out] integrate(1/(cosh(x)^4 + 1), x)
```

Fricas [B] Leaf count of result is larger than twice the leaf count of optimal. 590 vs. $2(124) = 248$.
time = 0.42, size = 590, normalized size = 3.35

[illegible]

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(1+cosh(x)^4),x, algorithm="fricas")
```

```
[Out] -1/16*2^(1/4)*(sqrt(2) + 1)*sqrt(-2*sqrt(2) + 4)*log((2^(3/4)*e^(2*x) + 2^(
1/4)*(3*sqrt(2) + 4))*sqrt(-2*sqrt(2) + 4) + 4*sqrt(2) + e^(4*x) + 2*e^(2*x
) + 5) + 1/16*2^(1/4)*(sqrt(2) + 1)*sqrt(-2*sqrt(2) + 4)*log(-(2^(3/4)*e^(2
*x) + 2^(1/4)*(3*sqrt(2) + 4))*sqrt(-2*sqrt(2) + 4) + 4*sqrt(2) + e^(4*x) +
 2*e^(2*x) + 5) + 1/4*2^(1/4)*sqrt(-2*sqrt(2) + 4)*arctan(1/14*(sqrt(2)*(5*
sqrt(2) + 6) + 8*sqrt(2) + 4)*e^(2*x) - 1/28*(2*sqrt(2)*(5*sqrt(2) + 6) - (
2^(3/4)*(8*sqrt(2) + 11) + 2*2^(1/4)*(5*sqrt(2) + 6))*sqrt(-2*sqrt(2) + 4)
+ 16*sqrt(2) + 8)*sqrt((2^(3/4)*e^(2*x) + 2^(1/4)*(3*sqrt(2) + 4))*sqrt(-2*
sqrt(2) + 4) + 4*sqrt(2) + e^(4*x) + 2*e^(2*x) + 5) + 1/14*sqrt(2)*(3*sqrt(
2) - 2) - 1/28*((2^(3/4)*(8*sqrt(2) + 11) + 2*2^(1/4)*(5*sqrt(2) + 6))*e^(2
*x) + 2^(3/4)*(2*sqrt(2) + 1) + 2*2^(1/4)*(3*sqrt(2) - 2))*sqrt(-2*sqrt(2)
+ 4) + 1/7*sqrt(2) - 3/7) + 1/4*2^(1/4)*sqrt(-2*sqrt(2) + 4)*arctan(-1/14*(
sqrt(2)*(5*sqrt(2) + 6) + 8*sqrt(2) + 4)*e^(2*x) + 1/28*(2*sqrt(2)*(5*sqrt(
2) + 6) + (2^(3/4)*(8*sqrt(2) + 11) + 2*2^(1/4)*(5*sqrt(2) + 6))*sqrt(-2*sq
rt(2) + 4) + 16*sqrt(2) + 8)*sqrt(-(2^(3/4)*e^(2*x) + 2^(1/4)*(3*sqrt(2) +
4))*sqrt(-2*sqrt(2) + 4) + 4*sqrt(2) + e^(4*x) + 2*e^(2*x) + 5) - 1/14*sqrt
(2)*(3*sqrt(2) - 2) - 1/28*((2^(3/4)*(8*sqrt(2) + 11) + 2*2^(1/4)*(5*sqrt(2
```

```
) + 6))*e^(2*x) + 2^(3/4)*(2*sqrt(2) + 1) + 2*2^(1/4)*(3*sqrt(2) - 2))*sqrt
(-2*sqrt(2) + 4) - 1/7*sqrt(2) + 3/7)
```

Sympy [**F(-1)**] Timed out
time = 0.00, size = 0, normalized size = 0.00

$$\text{Timed out}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(1+cosh(x)**4),x)
```

```
[Out] Timed out
```

Giac [**C**] Result contains complex when optimal does not.
time = 0.46, size = 281, normalized size = 1.60

$$-\left(\frac{1}{16}i+\frac{1}{16}\right)\sqrt{2\sqrt{2}-2}\left(-\frac{i}{\sqrt{2}-1}+1\right)\log\left((20i+10)\sqrt{2}e^{(2x)}+10\sqrt{2}\sqrt{10\sqrt{2}+14}+50\sqrt{2}-(2i-14)\sqrt{10\sqrt{2}+14}+(28i+14)e^{(2x)}+70\right)+\left(\frac{1}{16}i+\frac{1}{16}\right)\sqrt{2\sqrt{2}-2}\left(-\frac{i}{\sqrt{2}-1}+1\right)\log\left((20i+10)\sqrt{2}e^{(2x)}-10\sqrt{2}\sqrt{10\sqrt{2}+14}+50\sqrt{2}+(2i-14)\sqrt{10\sqrt{2}+14}+(28i+14)e^{(2x)}+70\right)-\left(\frac{1}{16}i+\frac{1}{16}\right)\sqrt{2\sqrt{2}+2}\left(-\frac{i}{\sqrt{2}+1}+1\right)\log\left(2\sqrt{2}e^{(2x)}+2\sqrt{2}\sqrt{2\sqrt{2}-2}+(4i+2)\sqrt{2}+(2i-2)\sqrt{2\sqrt{2}-2}-2e^{(2x)}-4i-2\right)+\left(\frac{1}{16}i+\frac{1}{16}\right)\sqrt{2\sqrt{2}+2}\left(-\frac{i}{\sqrt{2}+1}+1\right)\log\left(2\sqrt{2}e^{(2x)}-2\sqrt{2}\sqrt{2\sqrt{2}-2}+(4i+2)\sqrt{2}-(2i-2)\sqrt{2\sqrt{2}-2}-2e^{(2x)}-4i-2\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(1+cosh(x)^4),x, algorithm="giac")
```

```
[Out] -(1/16*I + 1/16)*sqrt(2*sqrt(2) - 2)*(-I/(sqrt(2) - 1) + 1)*log((20*I + 10)
*sqrt(2)*e^(2*x) + 10*sqrt(2)*sqrt(10*sqrt(2) + 14) + 50*sqrt(2) - (2*I - 1
4)*sqrt(10*sqrt(2) + 14) + (28*I + 14)*e^(2*x) + 70) + (1/16*I + 1/16)*sqrt
(2*sqrt(2) - 2)*(-I/(sqrt(2) - 1) + 1)*log((20*I + 10)*sqrt(2)*e^(2*x) - 10
*sqrt(2)*sqrt(10*sqrt(2) + 14) + 50*sqrt(2) + (2*I - 14)*sqrt(10*sqrt(2) +
14) + (28*I + 14)*e^(2*x) + 70) - (1/16*I + 1/16)*sqrt(2*sqrt(2) + 2)*(-I/(
sqrt(2) + 1) + 1)*log(2*sqrt(2)*e^(2*x) + 2*sqrt(2)*sqrt(2*sqrt(2) - 2) + (
4*I + 2)*sqrt(2) + (2*I - 2)*sqrt(2*sqrt(2) - 2) - 2*e^(2*x) - 4*I - 2) + (
1/16*I + 1/16)*sqrt(2*sqrt(2) + 2)*(-I/(sqrt(2) + 1) + 1)*log(2*sqrt(2)*e^(
2*x) - 2*sqrt(2)*sqrt(2*sqrt(2) - 2) + (4*I + 2)*sqrt(2) - (2*I - 2)*sqrt(2
*sqrt(2) - 2) - 2*e^(2*x) - 4*I - 2)
```

Mupad [**B**]
time = 1.01, size = 205, normalized size = 1.16

$$\frac{\sqrt{2}\,\sqrt{1-\mathrm{i}}\,\ln\left(\mathrm{e}^{2x}\,(436273152+91291648\mathrm{i})+\sqrt{2}\,\sqrt{1-\mathrm{i}}\,(-9830400+56623104\mathrm{i})+\sqrt{2}\,\sqrt{1-\mathrm{i}}\,\mathrm{e}^{2x}\,(218890240+149422080\mathrm{i})+21168128+94306304\mathrm{i}\right)}{8}-\frac{\sqrt{2}\,\sqrt{1-\mathrm{i}}\,\ln\left(\mathrm{e}^{2x}\,(436273152+91291648\mathrm{i})+\sqrt{2}\,\sqrt{1-\mathrm{i}}\,(9830400-56623104\mathrm{i})+\sqrt{2}\,\sqrt{1-\mathrm{i}}\,\mathrm{e}^{2x}\,(-218890240-149422080\mathrm{i})+21168128+94306304\mathrm{i}\right)}{8}+\frac{\sqrt{2}\,\sqrt{1+1\mathrm{i}}\,\ln\left(\mathrm{e}^{2x}\,(436273152-91291648\mathrm{i})+\sqrt{2}\,\sqrt{1+1\mathrm{i}}\,(-9830400-56623104\mathrm{i})+\sqrt{2}\,\sqrt{1+1\mathrm{i}}\,\mathrm{e}^{2x}\,(218890240-149422080\mathrm{i})+21168128-94306304\mathrm{i}\right)}{8}-\frac{\sqrt{2}\,\sqrt{1+1\mathrm{i}}\,\ln\left(\mathrm{e}^{2x}\,(436273152-91291648\mathrm{i})+\sqrt{2}\,\sqrt{1+1\mathrm{i}}\,(9830400+56623104\mathrm{i})+\sqrt{2}\,\sqrt{1+1\mathrm{i}}\,\mathrm{e}^{2x}\,(-218890240+149422080\mathrm{i})+21168128-94306304\mathrm{i}\right)}{8}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(1/(cosh(x)^4 + 1),x)
```

```
[Out] (2^(1/2)*(1 - 1i)^(1/2)*log(exp(2*x)*(436273152 + 91291648i) - 2^(1/2)*(1 -
 1i)^(1/2)*(9830400 - 56623104i) + 2^(1/2)*(1 - 1i)^(1/2)*exp(2*x)*(2188902
40 + 149422080i) + (21168128 + 94306304i)))/8 - (2^(1/2)*(1 - 1i)^(1/2)*log
(exp(2*x)*(436273152 + 91291648i) + 2^(1/2)*(1 - 1i)^(1/2)*(9830400 - 56623
104i) - 2^(1/2)*(1 - 1i)^(1/2)*exp(2*x)*(218890240 + 149422080i) + (2116812
```

```
8 + 94306304i)))/8 + (2^(1/2)*(1 + 1i)^(1/2)*log(exp(2*x)*(436273152 - 9129
1648i) - 2^(1/2)*(1 + 1i)^(1/2)*(9830400 + 56623104i) + 2^(1/2)*(1 + 1i)^(1
/2)*exp(2*x)*(218890240 - 149422080i) + (21168128 - 94306304i)))/8 - (2^(1/
2)*(1 + 1i)^(1/2)*log(exp(2*x)*(436273152 - 91291648i) + 2^(1/2)*(1 + 1i)^(
1/2)*(9830400 + 56623104i) - 2^(1/2)*(1 + 1i)^(1/2)*exp(2*x)*(218890240 - 1
49422080i) + (21168128 - 94306304i)))/8
```

3.63 $\int \frac{1}{1-\cosh^4(x)}\,dx$

Optimal. Leaf size=25

$$\frac{\tanh^{-1}\left(\frac{\tanh(x)}{\sqrt{2}}\right)}{2\sqrt{2}}+\frac{\coth(x)}{2}$$

```
[Out] 1/2*coth(x)+1/4*arctanh(1/2*2^(1/2)*tanh(x))*2^(1/2)
```

Rubi [A]
time = 0.01, antiderivative size = 25, normalized size of antiderivative = 1.00, number of steps used = 3, number of rules used = 3, integrand size = 10, $\frac{\text{number of rules}}{\text{integrand size}} = 0.300$, Rules used = {3288, 396, 212}

$$\frac{\tanh^{-1}\left(\frac{\tanh(x)}{\sqrt{2}}\right)}{2\sqrt{2}}+\frac{\coth(x)}{2}$$

Antiderivative was successfully verified.

```
[In] Int[(1 - Cosh[x]^4)^(-1),x]
```

```
[Out] ArcTanh[Tanh[x]/Sqrt[2]]/(2*Sqrt[2]) + Coth[x]/2
```

Rule 212

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

Rule 396

```
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 3288

```
Int[((a_) + (b_.)*sin[(e_.) + (f_.)*(x_)]^4)^(p_.), x_Symbol] :> With[{ff =
 FreeFactors[Tan[e + f*x], x]}, Dist[ff/f, Subst[Int[(a + 2*a*ff^2*x^2 + (a
 + b)*ff^4*x^4)^p/(1 + ff^2*x^2)^(2*p + 1), x], x, Tan[e + f*x]/ff], x]] /;
 FreeQ[{a, b, e, f}, x] && IntegerQ[p]
```

Rubi steps

$$\int \frac{1}{1-\cosh^4(x)}\,dx = \text{Subst}\left(\int \frac{1-x^2}{1-2x^2}\,dx, x, \coth(x)\right)$$
$$= \frac{\coth(x)}{2} + \frac{1}{2}\text{Subst}\left(\int \frac{1}{1-2x^2}\,dx, x, \coth(x)\right)$$
$$= \frac{\tanh^{-1}\left(\frac{\tanh(x)}{\sqrt{2}}\right)}{2\sqrt{2}} + \frac{\coth(x)}{2}$$

Mathematica [A]
time = 0.08, size = 24, normalized size = 0.96

$$\frac{1}{4}\left(\sqrt{2}\tanh^{-1}\left(\frac{\tanh(x)}{\sqrt{2}}\right) + 2\coth(x)\right)$$

Antiderivative was successfully verified.

```
[In] Integrate[(1 - Cosh[x]^4)^(-1),x]
```

```
[Out] (Sqrt[2]*ArcTanh[Tanh[x]/Sqrt[2]] + 2*Coth[x])/4
```

Maple [B] Leaf count of result is larger than twice the leaf count of optimal. 153 vs. 2(18) = 36.
time = 0.50, size = 154, normalized size = 6.16

method	result
risch	$\frac{1}{e^{2x}-1} + \frac{\sqrt{2}\,\ln\left(e^{2x}+3-2\sqrt{2}\right)}{8} - \frac{\sqrt{2}\,\ln\left(e^{2x}+3+2\sqrt{2}\right)}{8}$
default	$\frac{\tanh\left(\frac{x}{2}\right)}{4} + \frac{1}{4\tanh\left(\frac{x}{2}\right)} + \frac{\sqrt{2}\left(\ln\left(\frac{\tanh^2\left(\frac{x}{2}\right)+\tanh\left(\frac{x}{2}\right)\sqrt{2}+1}{\tanh^2\left(\frac{x}{2}\right)-\tanh\left(\frac{x}{2}\right)\sqrt{2}+1}\right)+2\arctan\left(\tanh\left(\frac{x}{2}\right)\sqrt{2}+1\right)+2\arctan\left(\tanh\left(\frac{x}{2}\right)\sqrt{2}-1\right)\right)}{16}$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(1/(1-cosh(x)^4),x,method=_RETURNVERBOSE)
```

```
[Out] 1/4*tanh(1/2*x)+1/4/tanh(1/2*x)+1/16*2^(1/2)*(ln((tanh(1/2*x)^2+tanh(1/2*x)
*2^(1/2)+1)/(tanh(1/2*x)^2-tanh(1/2*x)*2^(1/2)+1))+2*arctan(tanh(1/2*x)*2^(
1/2)+1)+2*arctan(tanh(1/2*x)*2^(1/2)-1))-1/16*2^(1/2)*(ln((tanh(1/2*x)^2-ta
nh(1/2*x)*2^(1/2)+1)/(tanh(1/2*x)^2+tanh(1/2*x)*2^(1/2)+1))+2*arctan(tanh(1
/2*x)*2^(1/2)+1)+2*arctan(tanh(1/2*x)*2^(1/2)-1))
```

Maxima [B] Leaf count of result is larger than twice the leaf count of optimal. 45 vs. 2(18) = 36.

time = 0.49, size = 45, normalized size = 1.80

$$-\frac{1}{8}\sqrt{2}\log\left(-\frac{2\sqrt{2}-e^{(-2x)}-3}{2\sqrt{2}+e^{(-2x)}+3}\right)-\frac{1}{e^{(-2x)}-1}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(1-cosh(x)^4),x, algorithm="maxima")
```

```
[Out] -1/8*sqrt(2)*log(-(2*sqrt(2) - e^(-2*x) - 3)/(2*sqrt(2) + e^(-2*x) + 3)) -
1/(e^(-2*x) - 1)
```

Fricas [B] Leaf count of result is larger than twice the leaf count of optimal. 115 vs. $2(18) = 36$.
time = 0.43, size = 115, normalized size = 4.60

$$\frac{\left(\sqrt{2}\cosh(x)^2+2\sqrt{2}\cosh(x)\sinh(x)+\sqrt{2}\sinh(x)^2-\sqrt{2}\right)\log\left(-\frac{3\left(2\sqrt{2}-3\right)\cosh(x)^2-4\left(3\sqrt{2}-4\right)\cosh(x)\sinh(x)+3\left(2\sqrt{2}-3\right)\sinh(x)^2+2\sqrt{2}-3}{\cosh(x)^2+\sinh(x)^2+3}\right)+8}{8\left(\cosh(x)^2+2\cosh(x)\sinh(x)+\sinh(x)^2-1\right)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(1-cosh(x)^4),x, algorithm="fricas")
```

```
[Out] 1/8*((sqrt(2)*cosh(x)^2 + 2*sqrt(2)*cosh(x)*sinh(x) + sqrt(2)*sinh(x)^2 - s
qrt(2))*log(-(3*(2*sqrt(2) - 3)*cosh(x)^2 - 4*(3*sqrt(2) - 4)*cosh(x)*sinh(
x) + 3*(2*sqrt(2) - 3)*sinh(x)^2 + 2*sqrt(2) - 3)/(cosh(x)^2 + sinh(x)^2 +
3)) + 8)/(cosh(x)^2 + 2*cosh(x)*sinh(x) + sinh(x)^2 - 1)
```

Sympy [B] Leaf count of result is larger than twice the leaf count of optimal. 75 vs. $2(22) = 44$.
time = 0.71, size = 75, normalized size = 3.00

$$-\frac{\sqrt{2}\log\left(4\tanh^2\left(\frac{x}{2}\right)-4\sqrt{2}\tanh\left(\frac{x}{2}\right)+4\right)}{8}+\frac{\sqrt{2}\log\left(4\tanh^2\left(\frac{x}{2}\right)+4\sqrt{2}\tanh\left(\frac{x}{2}\right)+4\right)}{8}+\frac{\tanh\left(\frac{x}{2}\right)}{4}+\frac{1}{4\tanh\left(\frac{x}{2}\right)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(1-cosh(x)**4),x)
```

```
[Out] -sqrt(2)*log(4*tanh(x/2)**2 - 4*sqrt(2)*tanh(x/2) + 4)/8 + sqrt(2)*log(4*ta
nh(x/2)**2 + 4*sqrt(2)*tanh(x/2) + 4)/8 + tanh(x/2)/4 + 1/(4*tanh(x/2))
```

Giac [B] Leaf count of result is larger than twice the leaf count of optimal. 43 vs. $2(18) = 36$.
time = 0.41, size = 43, normalized size = 1.72

$$\frac{1}{8}\sqrt{2}\log\left(-\frac{2\sqrt{2}-e^{(2x)}-3}{2\sqrt{2}+e^{(2x)}+3}\right)+\frac{1}{e^{(2x)}-1}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(1-cosh(x)^4),x, algorithm="giac")
```

```
[Out] 1/8*sqrt(2)*log(-(2*sqrt(2) - e^(2*x) - 3)/(2*sqrt(2) + e^(2*x) + 3)) + 1/(
e^(2*x) - 1)
```

Mupad [B]
time = 0.12, size = 61, normalized size = 2.44

$$\frac{\sqrt{2}\,\ln\left(-2\,e^{2\,x}-\frac{\sqrt{2}\,\left(12\,e^{2\,x}+4\right)}{8}\right)}{8}-\frac{\sqrt{2}\,\ln\left(\frac{\sqrt{2}\,\left(12\,e^{2\,x}+4\right)}{8}-2\,e^{2\,x}\right)}{8}+\frac{1}{e^{2\,x}-1}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(-1/(cosh(x)^4 - 1),x)
```

```
[Out] (2^(1/2)*log(- 2*exp(2*x) - (2^(1/2)*(12*exp(2*x) + 4))/8))/8 - (2^(1/2)*lo
g((2^(1/2)*(12*exp(2*x) + 4))/8 - 2*exp(2*x)))/8 + 1/(exp(2*x) - 1)
```

3.64 $\int \frac{1}{a+b\cosh^5(x)}\,dx$

Optimal. Leaf size=494

$$\frac{2\tanh^{-1}\left(\frac{\sqrt{\sqrt[5]{a}-\sqrt[5]{b}}\tanh\left(\frac{x}{2}\right)}{\sqrt{\sqrt[5]{a}+\sqrt[5]{b}}}\right)}{5a^{4/5}\sqrt{\sqrt[5]{a}-\sqrt[5]{b}}\sqrt{\sqrt[5]{a}+\sqrt[5]{b}}}+\frac{2\tanh^{-1}\left(\frac{\sqrt{\sqrt[5]{a}+\sqrt[5]{-1}\sqrt[5]{b}}\tanh\left(\frac{x}{2}\right)}{\sqrt{\sqrt[5]{a}-\sqrt[5]{-1}\sqrt[5]{b}}}\right)}{5a^{4/5}\sqrt{\sqrt[5]{a}-\sqrt[5]{-1}\sqrt[5]{b}}\sqrt{\sqrt[5]{a}+\sqrt[5]{-1}\sqrt[5]{b}}}+\frac{2\tanh^{-1}\left(\frac{\sqrt{\sqrt[5]{a}}}{\sqrt{}}\right)}{5a^{4/5}\sqrt{\sqrt[5]{a}-(-1)^{2/5}}}$$

```
[Out] 2/5*arctanh((a^(1/5)-b^(1/5))^(1/2)*tanh(1/2*x)/(a^(1/5)+b^(1/5))^(1/2))/a^
(4/5)/(a^(1/5)-b^(1/5))^(1/2)/(a^(1/5)+b^(1/5))^(1/2)+2/5*arctanh((a^(1/5)+
(-1)^(1/5)*b^(1/5))^(1/2)*tanh(1/2*x)/(a^(1/5)-(-1)^(1/5)*b^(1/5))^(1/2))/a
^(4/5)/(a^(1/5)-(-1)^(1/5)*b^(1/5))^(1/2)/(a^(1/5)+(-1)^(1/5)*b^(1/5))^(1/2
)+2/5*arctanh((a^(1/5)-(-1)^(2/5)*b^(1/5))^(1/2)*tanh(1/2*x)/(a^(1/5)+(-1)^
(2/5)*b^(1/5))^(1/2))/a^(4/5)/(a^(1/5)-(-1)^(2/5)*b^(1/5))^(1/2)/(a^(1/5)+(
-1)^(2/5)*b^(1/5))^(1/2)+2/5*arctanh((a^(1/5)+(-1)^(3/5)*b^(1/5))^(1/2)*tan
h(1/2*x)/(a^(1/5)-(-1)^(3/5)*b^(1/5))^(1/2))/a^(4/5)/(a^(1/5)-(-1)^(3/5)*b^
(1/5))^(1/2)/(a^(1/5)+(-1)^(3/5)*b^(1/5))^(1/2)+2/5*arctanh((a^(1/5)-(-1)^(
4/5)*b^(1/5))^(1/2)*tanh(1/2*x)/(a^(1/5)+(-1)^(4/5)*b^(1/5))^(1/2))/a^(4/5)
/(a^(1/5)-(-1)^(4/5)*b^(1/5))^(1/2)/(a^(1/5)+(-1)^(4/5)*b^(1/5))^(1/2)
```

Rubi [A]

time = 0.68, antiderivative size = 494, normalized size of antiderivative = 1.00, number of steps used = 12, number of rules used = 3, integrand size = 10, $\frac{\text{number of rules}}{\text{integrand size}} = 0.300$, Rules used = {3292, 2738, 214}

$$\frac{2\tanh^{-1}\left(\frac{\sqrt{\sqrt[5]{a}-\sqrt[5]{b}}\tanh\left(\frac{x}{2}\right)}{\sqrt{\sqrt[5]{a}+\sqrt[5]{b}}}\right)}{5a^{4/5}\sqrt{\sqrt[5]{a}-\sqrt[5]{b}}\sqrt{\sqrt[5]{a}+\sqrt[5]{b}}}+\frac{2\tanh^{-1}\left(\frac{\sqrt{\sqrt[5]{a}+\sqrt[5]{-1}\sqrt[5]{b}}\tanh\left(\frac{x}{2}\right)}{\sqrt{\sqrt[5]{a}-\sqrt[5]{-1}\sqrt[5]{b}}}\right)}{5a^{4/5}\sqrt{\sqrt[5]{a}-\sqrt[5]{-1}\sqrt[5]{b}}\sqrt{\sqrt[5]{a}+\sqrt[5]{-1}\sqrt[5]{b}}}+\frac{2\tanh^{-1}\left(\frac{\sqrt{\sqrt[5]{a}-(-1)^{2/5}\sqrt[5]{b}}\tanh\left(\frac{x}{2}\right)}{\sqrt{\sqrt[5]{a}+(-1)^{2/5}\sqrt[5]{b}}}\right)}{5a^{4/5}\sqrt{\sqrt[5]{a}-(-1)^{2/5}\sqrt[5]{b}}\sqrt{\sqrt[5]{a}+(-1)^{2/5}\sqrt[5]{b}}}+\frac{2\tanh^{-1}\left(\frac{\sqrt{\sqrt[5]{a}+(-1)^{3/5}\sqrt[5]{b}}\tanh\left(\frac{x}{2}\right)}{\sqrt{\sqrt[5]{a}-(-1)^{3/5}\sqrt[5]{b}}}\right)}{5a^{4/5}\sqrt{\sqrt[5]{a}-(-1)^{3/5}\sqrt[5]{b}}\sqrt{\sqrt[5]{a}+(-1)^{3/5}\sqrt[5]{b}}}+\frac{2\tanh^{-1}\left(\frac{\sqrt{\sqrt[5]{a}-(-1)^{4/5}\sqrt[5]{b}}\tanh\left(\frac{x}{2}\right)}{\sqrt{\sqrt[5]{a}+(-1)^{4/5}\sqrt[5]{b}}}\right)}{5a^{4/5}\sqrt{\sqrt[5]{a}-(-1)^{4/5}\sqrt[5]{b}}\sqrt{\sqrt[5]{a}+(-1)^{4/5}\sqrt[5]{b}}}$$

Antiderivative was successfully verified.

```
[In] Int[(a + b*Cosh[x]^5)^(-1),x]
```

```
[Out] (2*ArcTanh[(Sqrt[a^(1/5) - b^(1/5)]*Tanh[x/2])/Sqrt[a^(1/5) + b^(1/5)]])/(5
*a^(4/5)*Sqrt[a^(1/5) - b^(1/5)]*Sqrt[a^(1/5) + b^(1/5)]) + (2*ArcTanh[(Sqr
t[a^(1/5) + (-1)^(1/5)*b^(1/5)]*Tanh[x/2])/Sqrt[a^(1/5) - (-1)^(1/5)*b^(1/5
)]])/(5*a^(4/5)*Sqrt[a^(1/5) - (-1)^(1/5)*b^(1/5)]*Sqrt[a^(1/5) + (-1)^(1/5
)*b^(1/5)]) + (2*ArcTanh[(Sqrt[a^(1/5) - (-1)^(2/5)*b^(1/5)]*Tanh[x/2])/Sqr
t[a^(1/5) + (-1)^(2/5)*b^(1/5)]])/(5*a^(4/5)*Sqrt[a^(1/5) - (-1)^(2/5)*b^(1
/5)]*Sqrt[a^(1/5) + (-1)^(2/5)*b^(1/5)]) + (2*ArcTanh[(Sqrt[a^(1/5) + (-1)^
(3/5)*b^(1/5)]*Tanh[x/2])/Sqrt[a^(1/5) - (-1)^(3/5)*b^(1/5)]])/(5*a^(4/5)*S
qrt[a^(1/5) - (-1)^(3/5)*b^(1/5)]*Sqrt[a^(1/5) + (-1)^(3/5)*b^(1/5)]) + (2*
ArcTanh[(Sqrt[a^(1/5) - (-1)^(4/5)*b^(1/5)]*Tanh[x/2])/Sqrt[a^(1/5) + (-1)^
(4/5)*b^(1/5)]])/(5*a^(4/5)*Sqrt[a^(1/5) - (-1)^(4/5)*b^(1/5)]*Sqrt[a^(1/5)
 + (-1)^(4/5)*b^(1/5)])
```

Rule 214

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

Rule 2738

```
Int[((a_) + (b_.)*sin[Pi/2 + (c_.) + (d_.)*(x_)])^(-1), x_Symbol] :> With[{
e = FreeFactors[Tan[(c + d*x)/2], x]}, Dist[2*(e/d), Subst[Int[1/(a + b + (
a - b)*e^2*x^2), x], x, Tan[(c + d*x)/2]/e], x]] /; FreeQ[{a, b, c, d}, x]
&& NeQ[a^2 - b^2, 0]
```

Rule 3292

```
Int[((a_) + (b_.)*((c_.)*sin[(e_.) + (f_.)*(x_)])^(n_))^(p_), x_Symbol] :>
Int[ExpandTrig[(a + b*(c*sin[e + f*x])^n)^p, x], x] /; FreeQ[{a, b, c, e, f
, n}, x] && (IGtQ[p, 0] || (EqQ[p, -1] && IntegerQ[n]))
```

Rubi steps

$$\int \frac{1}{a+b\cosh^5(x)}\,dx = \int \left(-\frac{1}{5a^{4/5}\left(-\sqrt[5]{a}-\sqrt[5]{b}\cosh(x)\right)} - \frac{1}{5a^{4/5}\left(-\sqrt[5]{a}+\sqrt[5]{-1}\sqrt[5]{b}\cosh(x)\right)} - \frac{}{5a^{4/5}\left(\right.}\right.$$

$$= -\frac{\int \frac{1}{-\sqrt[5]{a}-\sqrt[5]{b}\cosh(x)}\,dx}{5a^{4/5}} - \frac{\int \frac{1}{-\sqrt[5]{a}+\sqrt[5]{-1}\sqrt[5]{b}\cosh(x)}\,dx}{5a^{4/5}} - \frac{\int \frac{1}{-\sqrt[5]{a}-(-1)^{2/5}\sqrt[5]{b}\cosh(x)}\,dx}{5a^{4/5}}$$

$$= -\frac{2\text{Subst}\left(\int \frac{1}{-\sqrt[5]{a}-\sqrt[5]{b}-\left(-\sqrt[5]{a}+\sqrt[5]{b}\right)x^2}\,dx, x, \tanh\left(\frac{x}{2}\right)\right)}{5a^{4/5}} - \frac{2\text{Subst}\left(\int \frac{}{-\sqrt[5]{a}+\sqrt[5]{-1}}\right.}{}$$

$$= \frac{2\tanh^{-1}\left(\frac{\sqrt{\sqrt[5]{a}-\sqrt[5]{b}}\tanh\left(\frac{x}{2}\right)}{\sqrt{\sqrt[5]{a}+\sqrt[5]{b}}}\right)}{5a^{4/5}\sqrt{\sqrt[5]{a}-\sqrt[5]{b}}\sqrt{\sqrt[5]{a}+\sqrt[5]{b}}} + \frac{2\tanh^{-1}\left(\frac{\sqrt{\sqrt[5]{a}+\sqrt[5]{-1}\sqrt[5]{b}}\tanh\left(\frac{x}{2}\right)}{\sqrt{\sqrt[5]{a}-\sqrt[5]{-1}\sqrt[5]{b}}}\right)}{5a^{4/5}\sqrt{\sqrt[5]{a}-\sqrt[5]{-1}\sqrt[5]{b}}\sqrt{\sqrt[5]{a}+\sqrt[5]{-1}\sqrt[5]{b}}}$$

Mathematica [C] Result contains higher order function than in optimal. Order 9 vs. order 3 in optimal.
time = 0.17, size = 139, normalized size = 0.28

$$\frac{8}{5}\text{RootSum}\left[b+5b\#1^2+10b\#1^4+32a\#1^5+10b\#1^6+5b\#1^8+b\#1^{10}\&, \frac{x\#1^3+2\log\left(-\cosh\left(\frac{x}{2}\right)-\sinh\left(\frac{x}{2}\right)+\cosh\left(\frac{x}{2}\right)\#1-\sinh\left(\frac{x}{2}\right)\#1\right)\#1^3}{b+4b\#1^2+16a\#1^3+6b\#1^4+4b\#1^6+b\#1^8}\&\right]$$

Antiderivative was successfully verified.

```
[In] Integrate[(a + b*Cosh[x]^5)^(-1),x]
```

```
[Out] (8*RootSum[b + 5*b*#1^2 + 10*b*#1^4 + 32*a*#1^5 + 10*b*#1^6 + 5*b*#1^8 + b*
#1^10 & , (x*#1^3 + 2*Log[-Cosh[x/2] - Sinh[x/2] + Cosh[x/2]*#1 - Sinh[x/2]
*#1]*#1^3)/(b + 4*b*#1^2 + 16*a*#1^3 + 6*b*#1^4 + 4*b*#1^6 + b*#1^8) & ])/5
```

Maple [C] Result contains higher order function than in optimal. Order 9 vs. order 3.
time = 1.36, size = 156, normalized size = 0.32

method	result
default	$\frac{\left(\sum_{\_R=\mathrm{RootOf}\left((a-b)\_Z^{10}+(-5a-5b)\_Z^{8}+(10a-10b)\_Z^{6}+(-10a-10b)\_Z^{4}+(5a-5b)\_Z^{2}-a-b\right)} \frac{\left(-\_R^{8}+4\_R^{6}-6\_R \right.}{\_R^{9}a-\_R^{9}b-4\_R^{7}a-4\_R^{7}b+6\_}\right.}{5}$
risch	$\sum_{\_R=\mathrm{RootOf}\left(-1+(9765625a^{10}-9765625a^{8}b^{2})\_Z^{10}-1953125a^{8}\_Z^{8}+156250a^{6}\_Z^{6}-6250a^{4}\_Z^{4}+125\_Z^{2}a^{2}\right)} \_R\ln\left(e^{x}+\left(\right.\right.$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(1/(a+b*cosh(x)^5),x,method=_RETURNVERBOSE)
```

```
[Out] 1/5*sum((-_R^8+4*_R^6-6*_R^4+4*_R^2-1)/(_R^9*a-_R^9*b-4*_R^7*a-4*_R^7*b+6*_
R^5*a-6*_R^5*b-4*_R^3*a-4*_R^3*b+_R*a-_R*b)*ln(tanh(1/2*x)-_R),_R=RootOf((a
-b)*_Z^10+(-5*a-5*b)*_Z^8+(10*a-10*b)*_Z^6+(-10*a-10*b)*_Z^4+(5*a-5*b)*_Z^2
-a-b))
```

Maxima [F]
time = 0.00, size = 0, normalized size = 0.00

Failed to integrate

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(a+b*cosh(x)^5),x, algorithm="maxima")
```

```
[Out] integrate(1/(b*cosh(x)^5 + a), x)
```

Fricas [F(-2)]
time = 0.00, size = 0, normalized size = 0.00

Exception raised: RuntimeError

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(a+b*cosh(x)^5),x, algorithm="fricas")
```

```
[Out] Exception raised: RuntimeError >> no explicit roots found
```

Sympy [F]
time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{1}{a + b\cosh^5(x)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(a+b*cosh(x)**5),x)
```

```
[Out] Integral(1/(a + b*cosh(x)**5), x)
```

Giac [F]
time = 0.00, size = 0, normalized size = 0.00

could not integrate

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(a+b*cosh(x)^5),x, algorithm="giac")
```

```
[Out] integrate(1/(b*cosh(x)^5 + a), x)
```

Mupad [F(-1)]
time = 0.00, size = -1, normalized size = -0.00

Hanged

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] \text{Hanged}
```

3.65 $\int \frac{1}{a+b\cosh^6(x)}\,dx$

Optimal. Leaf size=171

$$\frac{\tanh^{-1}\left(\frac{\sqrt[6]{a}\tanh(x)}{\sqrt{\sqrt[3]{a}+\sqrt[3]{b}}}\right)}{3a^{5/6}\sqrt{\sqrt[3]{a}+\sqrt[3]{b}}}+\frac{\tanh^{-1}\left(\frac{\sqrt[6]{a}\tanh(x)}{\sqrt{\sqrt[3]{a}-\sqrt[3]{-1}\sqrt[3]{b}}}\right)}{3a^{5/6}\sqrt{\sqrt[3]{a}-\sqrt[3]{-1}\sqrt[3]{b}}}+\frac{\tanh^{-1}\left(\frac{\sqrt[6]{a}\tanh(x)}{\sqrt{\sqrt[3]{a}+(-1)^{2/3}\sqrt[3]{b}}}\right)}{3a^{5/6}\sqrt{\sqrt[3]{a}+(-1)^{2/3}\sqrt[3]{b}}}$$

```
[Out] 1/3*arctanh(a^(1/6)*tanh(x)/(a^(1/3)+b^(1/3))^(1/2))/a^(5/6)/(a^(1/3)+b^(1/
3))^(1/2)+1/3*arctanh(a^(1/6)*tanh(x)/(a^(1/3)-(-1)^(1/3)*b^(1/3))^(1/2))/a
^(5/6)/(a^(1/3)-(-1)^(1/3)*b^(1/3))^(1/2)+1/3*arctanh(a^(1/6)*tanh(x)/(a^(1
/3)+(-1)^(2/3)*b^(1/3))^(1/2))/a^(5/6)/(a^(1/3)+(-1)^(2/3)*b^(1/3))^(1/2)
```

Rubi [A]
time = 0.18, antiderivative size = 171, normalized size of antiderivative = 1.00, number of steps used = 7, number of rules used = 3, integrand size = 10, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.300, Rules used = {3290, 3260, 212}

$$\frac{\tanh^{-1}\left(\frac{\sqrt[6]{a}\tanh(x)}{\sqrt{\sqrt[3]{a}+\sqrt[3]{b}}}\right)}{3a^{5/6}\sqrt{\sqrt[3]{a}+\sqrt[3]{b}}}+\frac{\tanh^{-1}\left(\frac{\sqrt[6]{a}\tanh(x)}{\sqrt{\sqrt[3]{a}-\sqrt[3]{-1}\sqrt[3]{b}}}\right)}{3a^{5/6}\sqrt{\sqrt[3]{a}-\sqrt[3]{-1}\sqrt[3]{b}}}+\frac{\tanh^{-1}\left(\frac{\sqrt[6]{a}\tanh(x)}{\sqrt{\sqrt[3]{a}+(-1)^{2/3}\sqrt[3]{b}}}\right)}{3a^{5/6}\sqrt{\sqrt[3]{a}+(-1)^{2/3}\sqrt[3]{b}}}$$

Antiderivative was successfully verified.

```
[In] Int[(a + b*Cosh[x]^6)^(-1),x]
```

```
[Out] ArcTanh[(a^(1/6)*Tanh[x])/Sqrt[a^(1/3) + b^(1/3)]]/(3*a^(5/6)*Sqrt[a^(1/3)
+ b^(1/3)]) + ArcTanh[(a^(1/6)*Tanh[x])/Sqrt[a^(1/3) - (-1)^(1/3)*b^(1/3)]]
/(3*a^(5/6)*Sqrt[a^(1/3) - (-1)^(1/3)*b^(1/3)]) + ArcTanh[(a^(1/6)*Tanh[x])
/Sqrt[a^(1/3) + (-1)^(2/3)*b^(1/3)]]/(3*a^(5/6)*Sqrt[a^(1/3) + (-1)^(2/3)*b
^(1/3)])
```

Rule 212

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

Rule 3260

```
Int[((a_) + (b_.)*sin[(e_.) + (f_.)*(x_)]^2)^(-1), x_Symbol] :> With[{ff =
FreeFactors[Tan[e + f*x], x]}, Dist[ff/f, Subst[Int[1/(a + (a + b)*ff^2*x^2
), x], x, Tan[e + f*x]/ff], x]] /; FreeQ[{a, b, e, f}, x]
```

Rule 3290

```
Int[((a_) + (b_.)*sin[(e_.) + (f_.)*(x_)]^(n_))^(-1), x_Symbol] :> Module[{
k}, Dist[2/(a*n), Sum[Int[1/(1 - Sin[e + f*x]^2/((-1)^(4*(k/n))*Rt[-a/b, n/
2])), x], {k, 1, n/2}], x]] /; FreeQ[{a, b, e, f}, x] && IntegerQ[n/2]
```

Rubi steps

$$\int \frac{1}{a+b\cosh^6(x)}\,dx = \frac{\int \frac{1}{1+\frac{\sqrt[3]{b}\cosh^2(x)}{\sqrt[3]{a}}}\,dx}{3a} + \frac{\int \frac{1}{1-\frac{\sqrt[3]{-1}\sqrt[3]{b}\cosh^2(x)}{\sqrt[3]{a}}}\,dx}{3a} + \frac{\int \frac{1}{1+\frac{(-1)^{2/3}\sqrt[3]{b}\cosh^2(x)}{\sqrt[3]{a}}}\,dx}{3a}$$

$$= \frac{\text{Subst}\left(\int \frac{1}{1-\left(1+\frac{\sqrt[3]{b}}{\sqrt[3]{a}}\right)x^2}\,dx, x, \coth(x)\right)}{3a} + \frac{\text{Subst}\left(\int \frac{1}{1-\left(1-\frac{\sqrt[3]{-1}\sqrt[3]{b}}{\sqrt[3]{a}}\right)x^2}\,dx, x, \coth(\right.}{3a}$$

$$= \frac{\tanh^{-1}\left(\frac{\sqrt[6]{a}\tanh(x)}{\sqrt{\sqrt[3]{a}+\sqrt[3]{b}}}\right)}{3a^{5/6}\sqrt{\sqrt[3]{a}+\sqrt[3]{b}}} + \frac{\tanh^{-1}\left(\frac{\sqrt[6]{a}\tanh(x)}{\sqrt{\sqrt[3]{a}-\sqrt[3]{-1}\sqrt[3]{b}}}\right)}{3a^{5/6}\sqrt{\sqrt[3]{a}-\sqrt[3]{-1}\sqrt[3]{b}}} + \frac{\tanh^{-1}\left(\frac{\sqrt[6]{a}}{\sqrt{\sqrt[3]{a}+}}\right.}{3a^{5/6}\sqrt{\sqrt[3]{a}+(}}$$

Mathematica [C] Result contains higher order function than in optimal. Order 9 vs. order 3 in optimal.
time = 0.15, size = 132, normalized size = 0.77

$$\frac{16}{3}\text{RootSum}\left[b+6b\#1+15b\#1^2+64a\#1^3+20b\#1^3+15b\#1^4+6b\#1^5+b\#1^6\&, \frac{x\#1^2+\log(-\cosh(x)-\sinh(x)+\cosh(x)\#1-\sinh(x)\#1)\#1^2}{b+5b\#1+32a\#1^2+10b\#1^2+10b\#1^3+5b\#1^4+b\#1^5}\&\right]$$

Antiderivative was successfully verified.

```
[In] Integrate[(a + b*Cosh[x]^6)^(-1),x]
```

```
[Out] (16*RootSum[b + 6*b*#1 + 15*b*#1^2 + 64*a*#1^3 + 20*b*#1^3 + 15*b*#1^4 + 6*
b*#1^5 + b*#1^6 & , (x*#1^2 + Log[-Cosh[x] - Sinh[x] + Cosh[x]*#1 - Sinh[x]
*#1]*#1^2)/(b + 5*b*#1 + 32*a*#1^2 + 10*b*#1^2 + 10*b*#1^3 + 5*b*#1^4 + b*#
1^5) & ])/3
```

Maple [C] Result contains higher order function than in optimal. Order 9 vs. order 3.
time = 0.90, size = 177, normalized size = 1.04

method	result

risch	$\sum_{\_R=\mathrm{RootOf}\left(-1+(46656a^6+46656a^5b)\_Z^6-3888a^4\_Z^4+108\_Z^2a^2\right)} \_R\ln\left(\mathrm{e}^{2x}+\left(-\frac{15552a^6}{b}-15552a^5\right)\_R^5+\right.$
default	$\frac{\left(\sum_{\_R=\mathrm{RootOf}\left((a+b)\_Z^{12}+(-6a+6b)\_Z^{10}+(15a+15b)\_Z^8+(-20a+20b)\_Z^6+(15a+15b)\_Z^4+(-6a+6b)\_Z^2+a+b\right)} \frac{}{\_R^{11}a+\_R^{11}b-5\_}\right.}{6}$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(1/(a+b*cosh(x)^6),x,method=_RETURNVERBOSE)
```

```
[Out] 1/6*sum((-_R^10+5*_R^8-10*_R^6+10*_R^4-5*_R^2+1)/(_R^11*a+_R^11*b-5*_R^9*a+
5*_R^9*b+10*_R^7*a+10*_R^7*b-10*_R^5*a+10*_R^5*b+5*_R^3*a+5*_R^3*b-_R*a+_R*
b)*ln(tanh(1/2*x)-_R),_R=RootOf((a+b)*_Z^12+(-6*a+6*b)*_Z^10+(15*a+15*b)*_Z
^8+(-20*a+20*b)*_Z^6+(15*a+15*b)*_Z^4+(-6*a+6*b)*_Z^2+a+b))
```

Maxima [F]
time = 0.00, size = 0, normalized size = 0.00

Failed to integrate

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(a+b*cosh(x)^6),x, algorithm="maxima")
```

```
[Out] integrate(1/(b*cosh(x)^6 + a), x)
```

Fricas [C] Result contains complex when optimal does not.
time = 1.51, size = 15201, normalized size = 88.89

too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(a+b*cosh(x)^6),x, algorithm="fricas")
```

```
[Out] -1/6*sqrt(1/2)*sqrt(2*(1/2)^(2/3)*(-I*sqrt(3) + 1)*(1/(a^4 + a^3*b) - 1/(a^
2 + a*b)^2)/(1/(a^6 + a^5*b) - 3/((a^4 + a^3*b)*(a^2 + a*b)) + 2/(a^2 + a*b
)^3 + b/((a + b)^2*a^5))^(1/3) - (1/2)^(1/3)*(I*sqrt(3) + 1)*(1/(a^6 + a^5*
b) - 3/((a^4 + a^3*b)*(a^2 + a*b)) + 2/(a^2 + a*b)^3 + b/((a + b)^2*a^5))^(
1/3) + 2/(a^2 + a*b))*log(1/2*(a^5 + a^4*b)*(2*(1/2)^(2/3)*(-I*sqrt(3) + 1)
*(1/(a^4 + a^3*b) - 1/(a^2 + a*b)^2)/(1/(a^6 + a^5*b) - 3/((a^4 + a^3*b)*(a
^2 + a*b)) + 2/(a^2 + a*b)^3 + b/((a + b)^2*a^5))^(1/3) - (1/2)^(1/3)*(I*sq
rt(3) + 1)*(1/(a^6 + a^5*b) - 3/((a^4 + a^3*b)*(a^2 + a*b)) + 2/(a^2 + a*b)
^3 + b/((a + b)^2*a^5))^(1/3) + 2/(a^2 + a*b))^2 + b*cosh(x)^2 + 2*b*cosh(x
)*sinh(x) + b*sinh(x)^2 + 1/2*sqrt(1/2)*((a^6 + a^5*b)*(2*(1/2)^(2/3)*(-I*s
qrt(3) + 1)*(1/(a^4 + a^3*b) - 1/(a^2 + a*b)^2)/(1/(a^6 + a^5*b) - 3/((a^4
```

```
+ a^3*b)*(a^2 + a*b)) + 2/(a^2 + a*b)^3 + b/((a + b)^2*a^5))^(1/3) - (1/2)^
(1/3)*(I*sqrt(3) + 1)*(1/(a^6 + a^5*b) - 3/((a^4 + a^3*b)*(a^2 + a*b)) + 2/
(a^2 + a*b)^3 + b/((a + b ...
```

Sympy [F]
time = 0.00, size = 0, normalized size = 0.00

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

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(a+b*cosh(x)**6),x)
```

```
[Out] Integral(1/(a + b*cosh(x)**6), x)
```

Giac [A]
time = 0.46, size = 1, normalized size = 0.01

$$0$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(a+b*cosh(x)^6),x, algorithm="giac")
```

```
[Out] 0
```

Mupad [B]
time = 58.39, size = 844, normalized size = 4.94

Verification of antiderivative is not currently implemented for this CAS.

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

```
[Out] symsum(log(root(46656*a^5*b*d^6 + 46656*a^6*d^6 - 3888*a^4*d^4 + 108*a^2*d^
2 - 1, d, k)*(root(46656*a^5*b*d^6 + 46656*a^6*d^6 - 3888*a^4*d^4 + 108*a^2
*d^2 - 1, d, k)*(root(46656*a^5*b*d^6 + 46656*a^6*d^6 - 3888*a^4*d^4 + 108*
a^2*d^2 - 1, d, k)*(root(46656*a^5*b*d^6 + 46656*a^6*d^6 - 3888*a^4*d^4 + 1
08*a^2*d^2 - 1, d, k)*((1459166279268040704*(327680*a^7*exp(2*x) + 298496*a
^6*b + 65536*a^7 + 158*a^2*b^5 + 91315*a^3*b^4 + 348176*a^4*b^3 + 489952*a^
5*b^2 + 196*a^2*b^5*exp(2*x) + 274019*a^3*b^4*exp(2*x) + 1132876*a^4*b^3*ex
p(2*x) + 1770440*a^5*b^2*exp(2*x) + 1239040*a^6*b*exp(2*x)))/(b^10*(a + b)^
3) + (17509995351216488448*root(46656*a^5*b*d^6 + 46656*a^6*d^6 - 3888*a^4*
d^4 + 108*a^2*d^2 - 1, d, k)*(262144*a^7*exp(2*x) + 203520*a^6*b + 65536*a^
7 + 453*a^3*b^4 + 72022*a^4*b^3 + 209472*a^5*b^2 + 630*a^3*b^4*exp(2*x) + 2
54512*a^4*b^3*exp(2*x) + 767508*a^5*b^2*exp(2*x) + 775680*a^6*b*exp(2*x)))/
(b^10*(a + b)^2)) - (486388759756013568*(655360*a^5*exp(2*x) - 9*a*b^4 + 37
```

```
0176*a^4*b + 196608*a^5 - 24408*a^2*b^3 + 149088*a^3*b^2 - 63676*a^2*b^3*ex
p(2*x) + 526248*a^3*b^2*exp(2*x) - 10*a*b^4*exp(2*x) + 1245184*a^4*b*exp(2*
x)))/(b^10*(a + b)^2)) - (40532396646334464*(655360*a^5*exp(2*x) - b^5*exp(
2*x) - 24677*a*b^4 + 773120*a^4*b + 262144*a^5 - b^5 + 198071*a^2*b^3 + 733
696*a^3*b^2 + 477713*a^2*b^3*exp(2*x) + 1770640*a^3*b^2*exp(2*x) - 53861*a*
b^4*exp(2*x) + 1894400*a^4*b*exp(2*x)))/(b^10*(a + b)^3)) + (13510798882111
488*(655360*a^3*exp(2*x) + 11382*b^3*exp(2*x) + 144416*a*b^2 + 269056*a^2*b
 + 131072*a^3 + 6459*b^3 + 677524*a*b^2*exp(2*x) + 1321472*a^2*b*exp(2*x)))
/(b^10*(a + b)^2)) + (1125899906842624*(851968*a^4*exp(2*x) + 6006*b^4*exp(
2*x) + 211497*a*b^3 + 597504*a^3*b + 196608*a^4 + 3840*b^4 + 608544*a^2*b^2
 + 2562504*a^2*b^2*exp(2*x) + 864565*a*b^3*exp(2*x) + 2555904*a^3*b*exp(2*x
)))/(b^10*(a + b)^2*(a*b + a^2)))*root(46656*a^5*b*d^6 + 46656*a^6*d^6 - 38
88*a^4*d^4 + 108*a^2*d^2 - 1, d, k), k, 1, 6)
```

3.66 $\int \frac{1}{a+b\cosh^8(x)}\,dx$

Optimal. Leaf size=245

$$-\frac{\tanh^{-1}\left(\frac{\sqrt[8]{-a}\tanh(x)}{\sqrt{\sqrt[4]{-a}-\sqrt[4]{b}}}\right)}{4(-a)^{7/8}\sqrt{\sqrt[4]{-a}-\sqrt[4]{b}}}-\frac{\tanh^{-1}\left(\frac{\sqrt[8]{-a}\tanh(x)}{\sqrt{\sqrt[4]{-a}-i\sqrt[4]{b}}}\right)}{4(-a)^{7/8}\sqrt{\sqrt[4]{-a}-i\sqrt[4]{b}}}-\frac{\tanh^{-1}\left(\frac{\sqrt[8]{-a}\tanh(x)}{\sqrt{\sqrt[4]{-a}+i\sqrt[4]{b}}}\right)}{4(-a)^{7/8}\sqrt{\sqrt[4]{-a}+i\sqrt[4]{b}}}-\frac{\tanh^{-1}\left(\frac{\sqrt[8]{-a}\tanh(x)}{\sqrt{\sqrt[4]{-a}+\sqrt[4]{b}}}\right)}{4(-a)^{7/8}\sqrt{\sqrt[4]{-a}+\sqrt[4]{b}}}$$

```
[Out] -1/4*arctanh((-a)^(1/8)*tanh(x)/((-a)^(1/4)-b^(1/4))^(1/2))/(-a)^(7/8)/((-a
)^(1/4)-b^(1/4))^(1/2)-1/4*arctanh((-a)^(1/8)*tanh(x)/((-a)^(1/4)-I*b^(1/4)
)^(1/2))/(-a)^(7/8)/((-a)^(1/4)-I*b^(1/4))^(1/2)-1/4*arctanh((-a)^(1/8)*tan
h(x)/((-a)^(1/4)+I*b^(1/4))^(1/2))/(-a)^(7/8)/((-a)^(1/4)+I*b^(1/4))^(1/2)-
1/4*arctanh((-a)^(1/8)*tanh(x)/((-a)^(1/4)+b^(1/4))^(1/2))/(-a)^(7/8)/((-a)
^(1/4)+b^(1/4))^(1/2)
```

Rubi [A]

time = 0.36, antiderivative size = 245, normalized size of antiderivative = 1.00, number of steps used = 9, number of rules used = 3, integrand size = 10, $\frac{\text{number of rules}}{\text{integrand size}} = 0.300$, Rules used = {3290, 3260, 212}

$$-\frac{\tanh^{-1}\left(\frac{\sqrt[8]{-a}\tanh(x)}{\sqrt{\sqrt[4]{-a}-i\sqrt[4]{b}}}\right)}{4(-a)^{7/8}\sqrt{\sqrt[4]{-a}-i\sqrt[4]{b}}}-\frac{\tanh^{-1}\left(\frac{\sqrt[8]{-a}\tanh(x)}{\sqrt{\sqrt[4]{-a}+i\sqrt[4]{b}}}\right)}{4(-a)^{7/8}\sqrt{\sqrt[4]{-a}+i\sqrt[4]{b}}}-\frac{\tanh^{-1}\left(\frac{\sqrt[8]{-a}\tanh(x)}{\sqrt{\sqrt[4]{-a}+\sqrt[4]{b}}}\right)}{4(-a)^{7/8}\sqrt{\sqrt[4]{-a}+\sqrt[4]{b}}}-\frac{\tanh^{-1}\left(\frac{(-a)^{5/8}\tanh(x)}{\sqrt{a\sqrt[4]{b}+(-a)^{5/4}}}\right)}{4(-a)^{3/8}\sqrt{a\sqrt[4]{b}+(-a)^{5/4}}}$$

Antiderivative was successfully verified.

```
[In] Int[(a + b*Cosh[x]^8)^(-1),x]
```

```
[Out] -1/4*ArcTanh[((-a)^(1/8)*Tanh[x])/Sqrt[(-a)^(1/4) - I*b^(1/4)]]/((-a)^(7/8)
*Sqrt[(-a)^(1/4) - I*b^(1/4)]) - ArcTanh[((-a)^(1/8)*Tanh[x])/Sqrt[(-a)^(1/
4) + I*b^(1/4)]]/(4*(-a)^(7/8)*Sqrt[(-a)^(1/4) + I*b^(1/4)]) - ArcTanh[((-a
)^(1/8)*Tanh[x])/Sqrt[(-a)^(1/4) + b^(1/4)]]/(4*(-a)^(7/8)*Sqrt[(-a)^(1/4)
+ b^(1/4)]) - ArcTanh[((-a)^(5/8)*Tanh[x])/Sqrt[(-a)^(5/4) + a*b^(1/4)]]/(4
*(-a)^(3/8)*Sqrt[(-a)^(5/4) + a*b^(1/4)])
```

Rule 212

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

Rule 3260

```
Int[((a_) + (b_.)*sin[(e_.) + (f_.)*(x_)]^2)^(-1), x_Symbol] :> With[{ff =
FreeFactors[Tan[e + f*x], x]}, Dist[ff/f, Subst[Int[1/(a + (a + b)*ff^2*x^2
```

```
), x], x, Tan[e + f*x]/ff], x]] /; FreeQ[{a, b, e, f}, x]
```

Rule 3290

```
Int[((a_) + (b_.)*sin[(e_.) + (f_.)*(x_)]^(n_))^(-1), x_Symbol] :> Module[{
k}, Dist[2/(a*n), Sum[Int[1/(1 - Sin[e + f*x]^2/((-1)^(4*(k/n))*Rt[-a/b, n/
2])), x], {k, 1, n/2}], x]] /; FreeQ[{a, b, e, f}, x] && IntegerQ[n/2]
```

Rubi steps

$$\int \frac{1}{a+b\cosh^8(x)}\,dx = \frac{\int \frac{1}{1-\frac{\sqrt[4]{b}\cosh^2(x)}{\sqrt[4]{-a}}}\,dx}{4a} + \frac{\int \frac{1}{1-\frac{i\sqrt[4]{b}\cosh^2(x)}{\sqrt[4]{-a}}}\,dx}{4a} + \frac{\int \frac{1}{1+\frac{i\sqrt[4]{b}\cosh^2(x)}{\sqrt[4]{-a}}}\,dx}{4a} + \frac{\int \frac{1}{1+\frac{\sqrt[4]{b}\cosh^2(x)}{\sqrt[4]{-a}}}\,dx}{4a}$$

$$= \frac{\text{Subst}\left(\int \frac{1}{1-\left(1-\frac{\sqrt[4]{b}}{\sqrt[4]{-a}}\right)x^2}\,dx, x, \coth(x)\right)}{4a} + \frac{\text{Subst}\left(\int \frac{1}{1-\left(1-\frac{i\sqrt[4]{b}}{\sqrt[4]{-a}}\right)x^2}\,dx, x, \coth(x\right.}{4a}$$

$$= -\frac{\tanh^{-1}\left(\frac{\sqrt[8]{-a}\tanh(x)}{\sqrt{\sqrt[4]{-a}-i\sqrt[4]{b}}}\right)}{4(-a)^{7/8}\sqrt{\sqrt[4]{-a}-i\sqrt[4]{b}}} - \frac{\tanh^{-1}\left(\frac{\sqrt[8]{-a}\tanh(x)}{\sqrt{\sqrt[4]{-a}+i\sqrt[4]{b}}}\right)}{4(-a)^{7/8}\sqrt{\sqrt[4]{-a}+i\sqrt[4]{b}}} - \frac{\tanh^{-1}\left(\frac{\sqrt[8]{-a}}{\sqrt{\sqrt[4]{-}}}\right.}{4(-a)^{7/8}\sqrt{\sqrt[4]{-}}}$$

Mathematica [C] Result contains higher order function than in optimal. Order 9 vs. order 3 in optimal.
time = 0.18, size = 158, normalized size = 0.64

$$16\text{RootSum}\left[b+8b\#1+28b\#1^2+56b\#1^3+256a\#1^4+70b\#1^4+56b\#1^5+28b\#1^6+8b\#1^7+b\#1^8\&, \frac{x\#1^3+\log(-\cosh(x)-\sinh(x)+\cosh(x)\#1-\sinh(x)\#1)\#1^3}{b+7b\#1+21b\#1^2+128a\#1^3+35b\#1^3+35b\#1^4+21b\#1^5+7b\#1^6+b\#1^7}\&\right]$$

Antiderivative was successfully verified.

```
[In] Integrate[(a + b*Cosh[x]^8)^(-1),x]
```

```
[Out] 16*RootSum[b + 8*b*#1 + 28*b*#1^2 + 56*b*#1^3 + 256*a*#1^4 + 70*b*#1^4 + 56
*b*#1^5 + 28*b*#1^6 + 8*b*#1^7 + b*#1^8 & , (x*#1^3 + Log[-Cosh[x] - Sinh[x
] + Cosh[x]*#1 - Sinh[x]*#1]*#1^3)/(b + 7*b*#1 + 21*b*#1^2 + 128*a*#1^3 + 3
5*b*#1^3 + 35*b*#1^4 + 21*b*#1^5 + 7*b*#1^6 + b*#1^7) & ]
```

Maple [C] Result contains higher order function than in optimal. Order 9 vs. order 3.
time = 1.11, size = 233, normalized size = 0.95

method	result
risch	$\sum_{\_R=\mathrm{RootOf}(1+(16777216a^8+16777216a^7b)\_Z^8-1048576a^6\_Z^6+24576a^4\_Z^4-256\_Z^2a^2)} \_R\ln\left(\mathrm{e}^{2x}+\left(-\frac{4194304a^8}{b}-\right.\right.$
default	$\left(\sum_{\_R=\mathrm{RootOf}((a+b)\_Z^{16}+(-8a+8b)\_Z^{14}+(28a+28b)\_Z^{12}+(-56a+56b)\_Z^{10}+(70a+70b)\_Z^8+(-56a+56b)\_Z^6+(28a+28b)\_Z^4+(-8a+8b)\_\right.$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(1/(a+b*cosh(x)^8),x,method=_RETURNVERBOSE)
```

```
[Out] 1/8*sum((-_R^14+7*_R^12-21*_R^10+35*_R^8-35*_R^6+21*_R^4-7*_R^2+1)/(_R^15*a
+_R^15*b-7*_R^13*a+7*_R^13*b+21*_R^11*a+21*_R^11*b-35*_R^9*a+35*_R^9*b+35*_
R^7*a+35*_R^7*b-21*_R^5*a+21*_R^5*b+7*_R^3*a+7*_R^3*b-_R*a+_R*b)*ln(tanh(1/
2*x)-_R),_R=RootOf((a+b)*_Z^16+(-8*a+8*b)*_Z^14+(28*a+28*b)*_Z^12+(-56*a+56
*b)*_Z^10+(70*a+70*b)*_Z^8+(-56*a+56*b)*_Z^6+(28*a+28*b)*_Z^4+(-8*a+8*b)*_Z
^2+a+b))
```

Maxima [F]
time = 0.00, size = 0, normalized size = 0.00

Failed to integrate

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(a+b*cosh(x)^8),x, algorithm="maxima")
```

```
[Out] integrate(1/(b*cosh(x)^8 + a), x)
```

Fricas [B] Both result and optimal contain complex but leaf count of result is larger than twice the leaf count of optimal. 661324 vs. 2(165) = 330.
time = 3.30, size = 661324, normalized size = 2699.28

too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(a+b*cosh(x)^8),x, algorithm="fricas")
```

```
[Out] -1/192*sqrt(1/2)*sqrt((-I*sqrt(3) + 1)*(((a^3*sqrt(-(2*a*b*sqrt(-b/a) - a*b
 + b^2)/((a^6 + 2*a^5*b + a^4*b^2)*sqrt(-b/a))) + a^2*b*sqrt(-(2*a*b*sqrt(-
b/a) - a*b + b^2)/((a^6 + 2*a^5*b + a^4*b^2)*sqrt(-b/a))) + 3*a)*sqrt(-b/a)
 - b)^2*a/((a^3 + a^2*b)^2*b) - 3*(2*a^2*b*sqrt(-(2*a*b*sqrt(-b/a) - a*b +
b^2)/((a^6 + 2*a^5*b + a^4*b^2)*sqrt(-b/a))) - (2*a^3*sqrt(-(2*a*b*sqrt(-b/
a) - a*b + b^2)/((a^6 + 2*a^5*b + a^4*b^2)*sqrt(-b/a))) + 3*a)*sqrt(-b/a) +
 b)/((a^5 + a^4*b)*sqrt(-b/a)))/(-1/1572864*(2*a^2*b*sqrt(-(2*a*b*sqrt(-b/a
```

```
) - a*b + b^2)/((a^6 + 2*a^5*b + a^4*b^2)*sqrt(-b/a))) - (2*a^3*sqrt(-(2*a*
b*sqrt(-b/a) - a*b + b^2)/((a^6 + 2*a^5*b + a^4*b^2)*sqrt(-b/a))) + 3*a)*sq
rt(-b/a) + b)*((a^3*sqrt(-(2*a*b*sqrt(-b/a) - a*b + b^2)/((a^6 + 2*a^5*b +
a^4*b^2)*sqrt(-b/a))) + a^2*b*sqrt(-(2*a*b*sqrt(-b/a) - a*b + b^2)/((a^6 +
2*a^5*b + a^4*b^2)*sqrt(-b/a))) + 3*a)*sqrt(-b/a) - b)*a/((a^5 + a^4*b)*(a^
3 + a^2*b)*b) - 1/524288*(2*a^2*b*sqrt(-(2*a*b*sqrt(-b/a) - a*b + b^2)/((a^
6 + 2*a^5*b + a^4*b^2)*sq ...
```

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

$$\int \frac{1}{a + b\cosh^8\left(x\right)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(a+b*cosh(x)**8),x)
[Out] Integral(1/(a + b*cosh(x)**8), x)
```

Giac [**A**]
time = 0.54, size = 1, normalized size = 0.00

$$0$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(a+b*cosh(x)^8),x, algorithm="giac")
[Out] 0
```

Mupad [**F(-1)**]
time = 0.00, size = -1, normalized size = -0.00

Hanged

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(1/(a + b*cosh(x)^8),x)
[Out] \text{Hanged}
```

3.67 $\int \frac{1}{a-b\cosh^5(x)}\,dx$

Optimal. Leaf size=494

$$\frac{2\tanh^{-1}\left(\frac{\sqrt{\sqrt[5]{a}+\sqrt[5]{b}}\,\tanh\left(\frac{x}{2}\right)}{\sqrt{\sqrt[5]{a}-\sqrt[5]{b}}}\right)}{5a^{4/5}\sqrt{\sqrt[5]{a}-\sqrt[5]{b}}\,\sqrt{\sqrt[5]{a}+\sqrt[5]{b}}}+\frac{2\tanh^{-1}\left(\frac{\sqrt{\sqrt[5]{a}-\sqrt[5]{-1}\,\sqrt[5]{b}}\,\tanh\left(\frac{x}{2}\right)}{\sqrt{\sqrt[5]{a}+\sqrt[5]{-1}\,\sqrt[5]{b}}}\right)}{5a^{4/5}\sqrt{\sqrt[5]{a}-\sqrt[5]{-1}\,\sqrt[5]{b}}\,\sqrt{\sqrt[5]{a}+\sqrt[5]{-1}\,\sqrt[5]{b}}}+\frac{2\tanh^{-1}\left(\frac{\sqrt{\sqrt[5]{a}+\cdots}}{\sqrt{\sqrt[5]{a}\cdots}}\right.}{5a^{4/5}\sqrt{\sqrt[5]{a}-(-1)^{2/5}\cdots}}$$

```
[Out] 2/5*arctanh((a^(1/5)+b^(1/5))^(1/2)*tanh(1/2*x)/(a^(1/5)-b^(1/5))^(1/2))/a^
(4/5)/(a^(1/5)-b^(1/5))^(1/2)/(a^(1/5)+b^(1/5))^(1/2)+2/5*arctanh((a^(1/5)-
(-1)^(1/5)*b^(1/5))^(1/2)*tanh(1/2*x)/(a^(1/5)+(-1)^(1/5)*b^(1/5))^(1/2))/a
^(4/5)/(a^(1/5)-(-1)^(1/5)*b^(1/5))^(1/2)/(a^(1/5)+(-1)^(1/5)*b^(1/5))^(1/2
)+2/5*arctanh((a^(1/5)+(-1)^(2/5)*b^(1/5))^(1/2)*tanh(1/2*x)/(a^(1/5)-(-1)^
(2/5)*b^(1/5))^(1/2))/a^(4/5)/(a^(1/5)-(-1)^(2/5)*b^(1/5))^(1/2)/(a^(1/5)+(
-1)^(2/5)*b^(1/5))^(1/2)+2/5*arctanh((a^(1/5)-(-1)^(3/5)*b^(1/5))^(1/2)*tan
h(1/2*x)/(a^(1/5)+(-1)^(3/5)*b^(1/5))^(1/2))/a^(4/5)/(a^(1/5)-(-1)^(3/5)*b^
(1/5))^(1/2)/(a^(1/5)+(-1)^(3/5)*b^(1/5))^(1/2)+2/5*arctanh((a^(1/5)+(-1)^(
4/5)*b^(1/5))^(1/2)*tanh(1/2*x)/(a^(1/5)-(-1)^(4/5)*b^(1/5))^(1/2))/a^(4/5)
/(a^(1/5)-(-1)^(4/5)*b^(1/5))^(1/2)/(a^(1/5)+(-1)^(4/5)*b^(1/5))^(1/2)
```

Rubi [A]
time = 0.54, antiderivative size = 494, normalized size of antiderivative = 1.00, number of steps used = 12, number of rules used = 3, integrand size = 11, $\frac{\text{number of rules}}{\text{integrand size}} = 0.273$, Rules used = {3292, 2738, 214}

$$\frac{2\tanh^{-1}\left(\frac{\sqrt{\sqrt[5]{a}+\sqrt[5]{b}}\,\tanh\left(\frac{x}{2}\right)}{\sqrt{\sqrt[5]{a}-\sqrt[5]{b}}}\right)}{5a^{4/5}\sqrt{\sqrt[5]{a}-\sqrt[5]{b}}\,\sqrt{\sqrt[5]{a}+\sqrt[5]{b}}}+\frac{2\tanh^{-1}\left(\frac{\sqrt{\sqrt[5]{a}-\sqrt[5]{-1}\,\sqrt[5]{b}}\,\tanh\left(\frac{x}{2}\right)}{\sqrt{\sqrt[5]{a}+\sqrt[5]{-1}\,\sqrt[5]{b}}}\right)}{5a^{4/5}\sqrt{\sqrt[5]{a}-\sqrt[5]{-1}\,\sqrt[5]{b}}\,\sqrt{\sqrt[5]{a}+\sqrt[5]{-1}\,\sqrt[5]{b}}}+\frac{2\tanh^{-1}\left(\frac{\sqrt{\sqrt[5]{a}+(-1)^{2/5}\sqrt[5]{b}}\,\tanh\left(\frac{x}{2}\right)}{\sqrt{\sqrt[5]{a}-(-1)^{2/5}\sqrt[5]{b}}}\right)}{5a^{4/5}\sqrt{\sqrt[5]{a}-(-1)^{2/5}\sqrt[5]{b}}\,\sqrt{\sqrt[5]{a}+(-1)^{2/5}\sqrt[5]{b}}}+\frac{2\tanh^{-1}\left(\frac{\sqrt{\sqrt[5]{a}-(-1)^{3/5}\sqrt[5]{b}}\,\tanh\left(\frac{x}{2}\right)}{\sqrt{\sqrt[5]{a}+(-1)^{3/5}\sqrt[5]{b}}}\right)}{5a^{4/5}\sqrt{\sqrt[5]{a}-(-1)^{3/5}\sqrt[5]{b}}\,\sqrt{\sqrt[5]{a}+(-1)^{3/5}\sqrt[5]{b}}}+\frac{2\tanh^{-1}\left(\frac{\sqrt{\sqrt[5]{a}+(-1)^{4/5}\sqrt[5]{b}}\,\tanh\left(\frac{x}{2}\right)}{\sqrt{\sqrt[5]{a}-(-1)^{4/5}\sqrt[5]{b}}}\right)}{5a^{4/5}\sqrt{\sqrt[5]{a}-(-1)^{4/5}\sqrt[5]{b}}\,\sqrt{\sqrt[5]{a}+(-1)^{4/5}\sqrt[5]{b}}}$$

Antiderivative was successfully verified.

```
[In] Int[(a - b*Cosh[x]^5)^(-1),x]
```

```
[Out] (2*ArcTanh[(Sqrt[a^(1/5) + b^(1/5)]*Tanh[x/2])/Sqrt[a^(1/5) - b^(1/5)]])/(5
*a^(4/5)*Sqrt[a^(1/5) - b^(1/5)]*Sqrt[a^(1/5) + b^(1/5)]) + (2*ArcTanh[(Sqr
t[a^(1/5) - (-1)^(1/5)*b^(1/5)]*Tanh[x/2])/Sqrt[a^(1/5) + (-1)^(1/5)*b^(1/5
)]])/(5*a^(4/5)*Sqrt[a^(1/5) - (-1)^(1/5)*b^(1/5)]*Sqrt[a^(1/5) + (-1)^(1/5
)*b^(1/5)]) + (2*ArcTanh[(Sqrt[a^(1/5) + (-1)^(2/5)*b^(1/5)]*Tanh[x/2])/Sqr
t[a^(1/5) - (-1)^(2/5)*b^(1/5)]])/(5*a^(4/5)*Sqrt[a^(1/5) - (-1)^(2/5)*b^(1
/5)]*Sqrt[a^(1/5) + (-1)^(2/5)*b^(1/5)]) + (2*ArcTanh[(Sqrt[a^(1/5) - (-1)^
(3/5)*b^(1/5)]*Tanh[x/2])/Sqrt[a^(1/5) + (-1)^(3/5)*b^(1/5)]])/(5*a^(4/5)*S
qrt[a^(1/5) - (-1)^(3/5)*b^(1/5)]*Sqrt[a^(1/5) + (-1)^(3/5)*b^(1/5)]) + (2*
ArcTanh[(Sqrt[a^(1/5) + (-1)^(4/5)*b^(1/5)]*Tanh[x/2])/Sqrt[a^(1/5) - (-1)^
(4/5)*b^(1/5)]])/(5*a^(4/5)*Sqrt[a^(1/5) - (-1)^(4/5)*b^(1/5)]*Sqrt[a^(1/5)
 + (-1)^(4/5)*b^(1/5)])
```

Rule 214

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

Rule 2738

```
Int[((a_) + (b_.)*sin[Pi/2 + (c_.) + (d_.)*(x_)])^(-1), x_Symbol] :> With[{
e = FreeFactors[Tan[(c + d*x)/2], x]}, Dist[2*(e/d), Subst[Int[1/(a + b + (
a - b)*e^2*x^2), x], x, Tan[(c + d*x)/2]/e], x]] /; FreeQ[{a, b, c, d}, x]
&& NeQ[a^2 - b^2, 0]
```

Rule 3292

```
Int[((a_) + (b_.)*((c_.)*sin[(e_.) + (f_.)*(x_)])^(n_))^(p_), x_Symbol] :>
Int[ExpandTrig[(a + b*(c*sin[e + f*x])^n)^p, x], x] /; FreeQ[{a, b, c, e, f
, n}, x] && (IGtQ[p, 0] || (EqQ[p, -1] && IntegerQ[n]))
```

Rubi steps

$$\int \frac{1}{a-b\cosh^5(x)}\,dx = \int \left(\frac{1}{5a^{4/5}\left(\sqrt[5]{a}-\sqrt[5]{b}\cosh(x)\right)} + \frac{1}{5a^{4/5}\left(\sqrt[5]{a}+\sqrt[5]{-1}\sqrt[5]{b}\cosh(x)\right)} + \frac{}{5a^{4/5}\left(\sqrt[5]{a}\right.}\right.$$

$$= \frac{\int \frac{1}{\sqrt[5]{a}-\sqrt[5]{b}\cosh(x)}\,dx}{5a^{4/5}} + \frac{\int \frac{1}{\sqrt[5]{a}+\sqrt[5]{-1}\sqrt[5]{b}\cosh(x)}\,dx}{5a^{4/5}} + \frac{\int \frac{1}{\sqrt[5]{a}-(-1)^{2/5}\sqrt[5]{b}\cosh(x)}\,dx}{5a^{4/5}} +$$

$$= \frac{2\text{Subst}\left(\int \frac{1}{\sqrt[5]{a}-\sqrt[5]{b}-\left(\sqrt[5]{a}+\sqrt[5]{b}\right)x^2}\,dx, x, \tanh\left(\frac{x}{2}\right)\right)}{5a^{4/5}} + \frac{2\text{Subst}\left(\int \frac{}{\sqrt[5]{a}+\sqrt[5]{-1}\sqrt[5]{b}-}\right.}{}$$

$$= \frac{2\tanh^{-1}\left(\frac{\sqrt{\sqrt[5]{a}+\sqrt[5]{b}}\tanh\left(\frac{x}{2}\right)}{\sqrt{\sqrt[5]{a}-\sqrt[5]{b}}}\right)}{5a^{4/5}\sqrt{\sqrt[5]{a}-\sqrt[5]{b}}\sqrt{\sqrt[5]{a}+\sqrt[5]{b}}} + \frac{2\tanh^{-1}\left(\frac{\sqrt{\sqrt[5]{a}-\sqrt[5]{-1}\sqrt[5]{b}}\tanh\left(\frac{x}{2}\right)}{\sqrt{\sqrt[5]{a}+\sqrt[5]{-1}\sqrt[5]{b}}}\right)}{5a^{4/5}\sqrt{\sqrt[5]{a}-\sqrt[5]{-1}\sqrt[5]{b}}\sqrt{\sqrt[5]{a}+\sqrt[5]{-1}\sqrt[5]{b}}}$$

Mathematica [C] Result contains higher order function than in optimal. Order 9 vs. order 3 in optimal.
time = 0.16, size = 139, normalized size = 0.28

$$-\frac{8}{5}\text{RootSum}\left[b+5b\#1^2+10b\#1^4-32a\#1^5+10b\#1^6+5b\#1^8+b\#1^{10}\&, \frac{x\#1^3+2\log\left(-\cosh\left(\frac{x}{2}\right)-\sinh\left(\frac{x}{2}\right)+\cosh\left(\frac{x}{2}\right)\#1-\sinh\left(\frac{x}{2}\right)\#1\right)\#1^3}{b+4b\#1^2-16a\#1^3+6b\#1^4+4b\#1^6+b\#1^8}\&\right]$$

Antiderivative was successfully verified.

```
[In] Integrate[(a - b*Cosh[x]^5)^(-1),x]
```

```
[Out] (-8*RootSum[b + 5*b*#1^2 + 10*b*#1^4 - 32*a*#1^5 + 10*b*#1^6 + 5*b*#1^8 + b
*#1^10 & , (x*#1^3 + 2*Log[-Cosh[x/2] - Sinh[x/2] + Cosh[x/2]*#1 - Sinh[x/2
]*#1]*#1^3)/(b + 4*b*#1^2 - 16*a*#1^3 + 6*b*#1^4 + 4*b*#1^6 + b*#1^8) & ])/
5
```

Maple [C] Result contains higher order function than in optimal. Order 9 vs. order 3.
time = 1.37, size = 150, normalized size = 0.30

method	result
default	$\frac{\left(\sum_{\_R=\mathrm{RootOf}\left((a+b)\_Z^{10}+(-5a+5b)\_Z^{8}+(10a+10b)\_Z^{6}+(-10a+10b)\_Z^{4}+(5a+5b)\_Z^{2}-a+b\right)} \frac{\left(-\_R^{8}+4\_R^{6}-6\_R^{4}\right.}{\_R^{9}a+\_R^{9}b-4\_R^{7}a+4\_R^{7}b+6\_R}\right.}{5}$
risch	$\sum_{\_R=\mathrm{RootOf}\left(-1+(9765625a^{10}-9765625a^{8}b^{2})\_Z^{10}-1953125a^{8}\_Z^{8}+156250a^{6}\_Z^{6}-6250a^{4}\_Z^{4}+125\_Z^{2}a^{2}\right)} \_R\ln\left(\mathrm{e}^{x}+\left(\right.\right.$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(1/(a-b*cosh(x)^5),x,method=_RETURNVERBOSE)
```

```
[Out] 1/5*sum((-_R^8+4*_R^6-6*_R^4+4*_R^2-1)/(_R^9*a+_R^9*b-4*_R^7*a+4*_R^7*b+6*_
R^5*a+6*_R^5*b-4*_R^3*a+4*_R^3*b+_R*a+_R*b)*ln(tanh(1/2*x)-_R),_R=RootOf((a
+b)*_Z^10+(-5*a+5*b)*_Z^8+(10*a+10*b)*_Z^6+(-10*a+10*b)*_Z^4+(5*a+5*b)*_Z^2
-a+b))
```

Maxima [F]
time = 0.00, size = 0, normalized size = 0.00

Failed to integrate

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(a-b*cosh(x)^5),x, algorithm="maxima")
```

```
[Out] -integrate(1/(b*cosh(x)^5 - a), x)
```

Fricas [F(-2)]
time = 0.00, size = 0, normalized size = 0.00

Exception raised: RuntimeError

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(a-b*cosh(x)^5),x, algorithm="fricas")
```

```
[Out] Exception raised: RuntimeError >> no explicit roots found
```

Sympy [F]
time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{1}{a - b\cosh^5(x)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(a-b*cosh(x)**5),x)
```

```
[Out] Integral(1/(a - b*cosh(x)**5), x)
```

Giac [F]
time = 0.00, size = 0, normalized size = 0.00

could not integrate

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(a-b*cosh(x)^5),x, algorithm="giac")
```

```
[Out] integrate(-1/(b*cosh(x)^5 - a), x)
```

Mupad [F(-1)]
time = 0.00, size = -1, normalized size = -0.00

Hanged

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(1/(a - b*cosh(x)^5),x)
```

```
[Out] \text{Hanged}
```

3.68 $\int \frac{1}{a-b\cosh^6(x)}\,dx$

Optimal. Leaf size=175

$$\frac{\tanh^{-1}\left(\frac{\sqrt[6]{a}\tanh(x)}{\sqrt{\sqrt[3]{a}-\sqrt[3]{b}}}\right)}{3a^{5/6}\sqrt{\sqrt[3]{a}-\sqrt[3]{b}}}+\frac{\tanh^{-1}\left(\frac{\sqrt[6]{a}\tanh(x)}{\sqrt{\sqrt[3]{a}+\sqrt[3]{-1}\sqrt[3]{b}}}\right)}{3a^{5/6}\sqrt{\sqrt[3]{a}+\sqrt[3]{-1}\sqrt[3]{b}}}+\frac{\tanh^{-1}\left(\frac{\sqrt[6]{a}\tanh(x)}{\sqrt{\sqrt[3]{a}-(-1)^{2/3}\sqrt[3]{b}}}\right)}{3a^{5/6}\sqrt{\sqrt[3]{a}-(-1)^{2/3}\sqrt[3]{b}}}$$

```
[Out] 1/3*arctanh(a^(1/6)*tanh(x)/(a^(1/3)-b^(1/3))^(1/2))/a^(5/6)/(a^(1/3)-b^(1/
3))^(1/2)+1/3*arctanh(a^(1/6)*tanh(x)/(a^(1/3)+(-1)^(1/3)*b^(1/3))^(1/2))/a
^(5/6)/(a^(1/3)+(-1)^(1/3)*b^(1/3))^(1/2)+1/3*arctanh(a^(1/6)*tanh(x)/(a^(1
/3)-(-1)^(2/3)*b^(1/3))^(1/2))/a^(5/6)/(a^(1/3)-(-1)^(2/3)*b^(1/3))^(1/2)
```

Rubi [A]

time = 0.19, antiderivative size = 175, normalized size of antiderivative = 1.00, number of steps used = 7, number of rules used = 3, integrand size = 11, $\frac{\text{number of rules}}{\text{integrand size}} = 0.273$, Rules used = {3290, 3260, 212}

$$\frac{\tanh^{-1}\left(\frac{\sqrt[6]{a}\tanh(x)}{\sqrt{\sqrt[3]{a}-\sqrt[3]{b}}}\right)}{3a^{5/6}\sqrt{\sqrt[3]{a}-\sqrt[3]{b}}}+\frac{\tanh^{-1}\left(\frac{\sqrt[6]{a}\tanh(x)}{\sqrt{\sqrt[3]{a}+\sqrt[3]{-1}\sqrt[3]{b}}}\right)}{3a^{5/6}\sqrt{\sqrt[3]{a}+\sqrt[3]{-1}\sqrt[3]{b}}}+\frac{\tanh^{-1}\left(\frac{\sqrt[6]{a}\tanh(x)}{\sqrt{\sqrt[3]{a}-(-1)^{2/3}\sqrt[3]{b}}}\right)}{3a^{5/6}\sqrt{\sqrt[3]{a}-(-1)^{2/3}\sqrt[3]{b}}}$$

Antiderivative was successfully verified.

```
[In] Int[(a - b*Cosh[x]^6)^(-1),x]
```

```
[Out] ArcTanh[(a^(1/6)*Tanh[x])/Sqrt[a^(1/3) - b^(1/3)]]/(3*a^(5/6)*Sqrt[a^(1/3)
- b^(1/3)]) + ArcTanh[(a^(1/6)*Tanh[x])/Sqrt[a^(1/3) + (-1)^(1/3)*b^(1/3)]]
/(3*a^(5/6)*Sqrt[a^(1/3) + (-1)^(1/3)*b^(1/3)]) + ArcTanh[(a^(1/6)*Tanh[x])
/Sqrt[a^(1/3) - (-1)^(2/3)*b^(1/3)]]/(3*a^(5/6)*Sqrt[a^(1/3) - (-1)^(2/3)*b
^(1/3)])
```

Rule 212

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

Rule 3260

```
Int[((a_) + (b_.)*sin[(e_.) + (f_.)*(x_)]^2)^(-1), x_Symbol] :> With[{ff =
FreeFactors[Tan[e + f*x], x]}, Dist[ff/f, Subst[Int[1/(a + (a + b)*ff^2*x^2
), x], x, Tan[e + f*x]/ff], x]] /; FreeQ[{a, b, e, f}, x]
```

Rule 3290

```
Int[((a_) + (b_.)*sin[(e_.) + (f_.)*(x_)]^(n_))^(-1), x_Symbol] :> Module[{
k}, Dist[2/(a*n), Sum[Int[1/(1 - Sin[e + f*x]^2/((-1)^(4*(k/n))*Rt[-a/b, n/
2])), x], {k, 1, n/2}], x]] /; FreeQ[{a, b, e, f}, x] && IntegerQ[n/2]
```

Rubi steps

$$\int \frac{1}{a-b\cosh^6(x)}\,dx = \frac{\int \frac{1}{1-\frac{\sqrt[3]{b}\cosh^2(x)}{\sqrt[3]{a}}}\,dx}{3a} + \frac{\int \frac{1}{1+\frac{\sqrt[3]{-1}\sqrt[3]{b}\cosh^2(x)}{\sqrt[3]{a}}}\,dx}{3a} + \frac{\int \frac{1}{1-\frac{(-1)^{2/3}\sqrt[3]{b}\cosh^2(x)}{\sqrt[3]{a}}}\,dx}{3a}$$

$$= \frac{\text{Subst}\left(\int \frac{1}{1-\left(1-\frac{\sqrt[3]{b}}{\sqrt[3]{a}}\right)x^2}\,dx, x, \coth(x)\right)}{3a} + \frac{\text{Subst}\left(\int \frac{1}{1-\left(1+\frac{\sqrt[3]{-1}\sqrt[3]{b}}{\sqrt[3]{a}}\right)x^2}\,dx, x, \text{coth}\right.}{3a}$$

$$= \frac{\tanh^{-1}\left(\frac{\sqrt[6]{a}\tanh(x)}{\sqrt{\sqrt[3]{a}-\sqrt[3]{b}}}\right)}{3a^{5/6}\sqrt{\sqrt[3]{a}-\sqrt[3]{b}}} + \frac{\tanh^{-1}\left(\frac{\sqrt[6]{a}\tanh(x)}{\sqrt{\sqrt[3]{a}+\sqrt[3]{-1}\sqrt[3]{b}}}\right)}{3a^{5/6}\sqrt{\sqrt[3]{a}+\sqrt[3]{-1}\sqrt[3]{b}}} + \frac{\tanh^{-1}\left(\frac{\sqrt[6]{\ }}{\sqrt{\sqrt[3]{a}-}}\right.}{3a^{5/6}\sqrt{\sqrt[3]{a}-}}$$

Mathematica [C] Result contains higher order function than in optimal. Order 9 vs. order 3 in optimal.
time = 0.12, size = 132, normalized size = 0.75

$$-\frac{16}{3}\text{RootSum}\left[b+6b\#1+15b\#1^2-64a\#1^3+20b\#1^3+15b\#1^4+6b\#1^5+b\#1^6\&, \frac{x\#1^2+\log(-\cosh(x)-\sinh(x)+\cosh(x)\#1-\sinh(x)\#1)\#1^2}{b+5b\#1-32a\#1^2+10b\#1^2+10b\#1^3+5b\#1^4+b\#1^5}\&\right]$$

Antiderivative was successfully verified.

```
[In] Integrate[(a - b*Cosh[x]^6)^(-1),x]
```

```
[Out] (-16*RootSum[b + 6*b*#1 + 15*b*#1^2 - 64*a*#1^3 + 20*b*#1^3 + 15*b*#1^4 + 6
*b*#1^5 + b*#1^6 & , (x*#1^2 + Log[-Cosh[x] - Sinh[x] + Cosh[x]*#1 - Sinh[x
]*#1]*#1^2)/(b + 5*b*#1 - 32*a*#1^2 + 10*b*#1^2 + 10*b*#1^3 + 5*b*#1^4 + b*
#1^5) & ])/3
```

Maple [C] Result contains higher order function than in optimal. Order 9 vs. order 3.
time = 0.92, size = 183, normalized size = 1.05

method	result

risch	$\sum_{\_R=\mathrm{RootOf}(-1+(46656a^6-46656a^5b)\_Z^6-3888a^4\_Z^4+108\_Z^2a^2)} \_R \ln\left(\mathrm{e}^{2x}+\left(\frac{15552a^6}{b}-15552a^5\right)\_R^5+\left(-\right.\right.$
default	$\frac{\left(\sum_{\_R=\mathrm{RootOf}\left((a-b)\_Z^{12}+(-6a-6b)\_Z^{10}+(15a-15b)\_Z^8+(-20a-20b)\_Z^6+(15a-15b)\_Z^4+(-6a-6b)\_Z^2+a-b\right)} \frac{(}{\_R^{11}a-\_R^{11}b-5\_}\right.}{6}$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(1/(a-b*cosh(x)^6),x,method=_RETURNVERBOSE)
```

```
[Out] 1/6*sum((-_R^10+5*_R^8-10*_R^6+10*_R^4-5*_R^2+1)/(_R^11*a-_R^11*b-5*_R^9*a-
5*_R^9*b+10*_R^7*a-10*_R^7*b-10*_R^5*a-10*_R^5*b+5*_R^3*a-5*_R^3*b-_R*a-_R*
b)*ln(tanh(1/2*x)-_R),_R=RootOf((a-b)*_Z^12+(-6*a-6*b)*_Z^10+(15*a-15*b)*_Z
^8+(-20*a-20*b)*_Z^6+(15*a-15*b)*_Z^4+(-6*a-6*b)*_Z^2+a-b))
```

Maxima [F]
time = 0.00, size = 0, normalized size = 0.00

Failed to integrate

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(a-b*cosh(x)^6),x, algorithm="maxima")
```

```
[Out] -integrate(1/(b*cosh(x)^6 - a), x)
```

Fricas [C] Result contains complex when optimal does not.
time = 1.41, size = 16379, normalized size = 93.59

too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(a-b*cosh(x)^6),x, algorithm="fricas")
```

```
[Out] 1/6*sqrt(1/2)*sqrt(2*(1/2)^(2/3)*(-I*sqrt(3) + 1)*(1/(a^4 - a^3*b) - 1/(a^2
 - a*b)^2)/(1/(a^6 - a^5*b) - 3/((a^4 - a^3*b)*(a^2 - a*b)) + 2/(a^2 - a*b)
^3 + b/((a - b)^2*a^5))^(1/3) - (1/2)^(1/3)*(I*sqrt(3) + 1)*(1/(a^6 - a^5*b
) - 3/((a^4 - a^3*b)*(a^2 - a*b)) + 2/(a^2 - a*b)^3 + b/((a - b)^2*a^5))^(1
/3) + 2/(a^2 - a*b))*log(-1/2*(a^5 - a^4*b)*(2*(1/2)^(2/3)*(-I*sqrt(3) + 1)
*(1/(a^4 - a^3*b) - 1/(a^2 - a*b)^2)/(1/(a^6 - a^5*b) - 3/((a^4 - a^3*b)*(a
^2 - a*b)) + 2/(a^2 - a*b)^3 + b/((a - b)^2*a^5))^(1/3) - (1/2)^(1/3)*(I*sq
rt(3) + 1)*(1/(a^6 - a^5*b) - 3/((a^4 - a^3*b)*(a^2 - a*b)) + 2/(a^2 - a*b)
^3 + b/((a - b)^2*a^5))^(1/3) + 2/(a^2 - a*b))^2 + b*cosh(x)^2 + 2*b*cosh(x
)*sinh(x) + b*sinh(x)^2 + 1/2*sqrt(1/2)*((a^6 - a^5*b)*(2*(1/2)^(2/3)*(-I*s
qrt(3) + 1)*(1/(a^4 - a^3*b) - 1/(a^2 - a*b)^2)/(1/(a^6 - a^5*b) - 3/((a^4
```

```
- a^3*b)*(a^2 - a*b)) + 2/(a^2 - a*b)^3 + b/((a - b)^2*a^5))^(1/3) - (1/2)^
(1/3)*(I*sqrt(3) + 1)*(1/(a^6 - a^5*b) - 3/((a^4 - a^3*b)*(a^2 - a*b)) + 2/
(a^2 - a*b)^3 + b/((a - b ...
```

Sympy [F]
time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{1}{a - b\cosh^{6}(x)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(a-b*cosh(x)**6),x)
```

```
[Out] Integral(1/(a - b*cosh(x)**6), x)
```

Giac [A]
time = 0.46, size = 1, normalized size = 0.01

$$0$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(a-b*cosh(x)^6),x, algorithm="giac")
```

```
[Out] 0
```

Mupad [B]
time = 57.40, size = 855, normalized size = 4.89

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(1/(a - b*cosh(x)^6),x)
```

```
[Out] symsum(log(root(46656*a^5*b*d^6 - 46656*a^6*d^6 + 3888*a^4*d^4 - 108*a^2*d^
2 + 1, d, k)*(root(46656*a^5*b*d^6 - 46656*a^6*d^6 + 3888*a^4*d^4 - 108*a^2
*d^2 + 1, d, k)*(root(46656*a^5*b*d^6 - 46656*a^6*d^6 + 3888*a^4*d^4 - 108*
a^2*d^2 + 1, d, k)*(root(46656*a^5*b*d^6 - 46656*a^6*d^6 + 3888*a^4*d^4 - 1
08*a^2*d^2 + 1, d, k)*((145916627926804070 4*(327680*a^7*exp(2*x) - 298496*a
^6*b + 65536*a^7 - 158*a^2*b^5 + 91315*a^3*b^4 - 348176*a^4*b^3 + 489952*a^
5*b^2 - 196*a^2*b^5*exp(2*x) + 274019*a^3*b^4*exp(2*x) - 1132876*a^4*b^3*ex
p(2*x) + 1770440*a^5*b^2*exp(2*x) - 1239040*a^6*b*exp(2*x)))/(b^10*(a - b)^
3) + (17509995351216488448*root(46656*a^5*b*d^6 - 46656*a^6*d^6 + 3888*a^4*
d^4 - 108*a^2*d^2 + 1, d, k)*(262144*a^7*exp(2*x) - 203520*a^6*b + 65536*a^
7 + 453*a^3*b^4 - 72022*a^4*b^3 + 209472*a^5*b^2 + 630*a^3*b^4*exp(2*x) - 2
54512*a^4*b^3*exp(2*x) + 767508*a^5*b^2*exp(2*x) - 775680*a^6*b*exp(2*x)))/
(b^10*(a - b)^2)) - (486388759756013568*(655360*a^5*exp(2*x) - 9*a*b^4 - 37
```

```
0176*a^4*b + 196608*a^5 + 24408*a^2*b^3 + 149088*a^3*b^2 + 63676*a^2*b^3*ex
p(2*x) + 526248*a^3*b^2*exp(2*x) - 10*a*b^4*exp(2*x) - 1245184*a^4*b*exp(2*
x)))/(b^10*(a - b)^2)) - (40532396646334464*(655360*a^5*exp(2*x) + b^5*exp(
2*x) - 24677*a*b^4 - 773120*a^4*b + 262144*a^5 + b^5 - 198071*a^2*b^3 + 733
696*a^3*b^2 - 477713*a^2*b^3*exp(2*x) + 1770640*a^3*b^2*exp(2*x) - 53861*a*
b^4*exp(2*x) - 1894400*a^4*b*exp(2*x)))/(b^10*(a - b)^3)) + (13510798882111
488*(655360*a^3*exp(2*x) - 11382*b^3*exp(2*x) + 144416*a*b^2 - 269056*a^2*b
 + 131072*a^3 - 6459*b^3 + 677524*a*b^2*exp(2*x) - 1321472*a^2*b*exp(2*x)))
/(b^10*(a - b)^2)) - (1125899906842624*(851968*a^4*exp(2*x) + 6006*b^4*exp(
2*x) - 211497*a*b^3 - 597504*a^3*b + 196608*a^4 + 3840*b^4 + 608544*a^2*b^2
 + 2562504*a^2*b^2*exp(2*x) - 864565*a*b^3*exp(2*x) - 2555904*a^3*b*exp(2*x
)))/(b^10*(a - b)^2*(a*b - a^2)))*root(46656*a^5*b*d^6 - 46656*a^6*d^6 + 38
88*a^4*d^4 - 108*a^2*d^2 + 1, d, k), k, 1, 6)
```

3.69 $\int \frac{1}{a-b\cosh^8(x)}\,dx$

Optimal. Leaf size=213

$$\frac{\tanh^{-1}\left(\frac{\sqrt[8]{a}\tanh(x)}{\sqrt{\sqrt[4]{a}-\sqrt[4]{b}}}\right)}{4a^{7/8}\sqrt{\sqrt[4]{a}-\sqrt[4]{b}}}+\frac{\tanh^{-1}\left(\frac{\sqrt[8]{a}\tanh(x)}{\sqrt{\sqrt[4]{a}-i\sqrt[4]{b}}}\right)}{4a^{7/8}\sqrt{\sqrt[4]{a}-i\sqrt[4]{b}}}+\frac{\tanh^{-1}\left(\frac{\sqrt[8]{a}\tanh(x)}{\sqrt{\sqrt[4]{a}+i\sqrt[4]{b}}}\right)}{4a^{7/8}\sqrt{\sqrt[4]{a}+i\sqrt[4]{b}}}+\frac{\tanh^{-1}\left(\frac{\sqrt[8]{a}\tanh(x)}{\sqrt{\sqrt[4]{a}+\sqrt[4]{b}}}\right)}{4a^{7/8}\sqrt{\sqrt[4]{a}+\sqrt[4]{b}}}$$

```
[Out] 1/4*arctanh(a^(1/8)*tanh(x)/(a^(1/4)-b^(1/4))^(1/2))/a^(7/8)/(a^(1/4)-b^(1/
4))^(1/2)+1/4*arctanh(a^(1/8)*tanh(x)/(a^(1/4)-I*b^(1/4))^(1/2))/a^(7/8)/(a
^(1/4)-I*b^(1/4))^(1/2)+1/4*arctanh(a^(1/8)*tanh(x)/(a^(1/4)+I*b^(1/4))^(1/
2))/a^(7/8)/(a^(1/4)+I*b^(1/4))^(1/2)+1/4*arctanh(a^(1/8)*tanh(x)/(a^(1/4)+
b^(1/4))^(1/2))/a^(7/8)/(a^(1/4)+b^(1/4))^(1/2)
```

Rubi [A]
time = 0.17, antiderivative size = 213, normalized size of antiderivative = 1.00, number of steps used = 9, number of rules used = 3, integrand size = 11, $\frac{\text{number of rules}}{\text{integrand size}} = 0.273$, Rules used = {3290, 3260, 212}

$$\frac{\tanh^{-1}\left(\frac{\sqrt[8]{a}\tanh(x)}{\sqrt{\sqrt[4]{a}-\sqrt[4]{b}}}\right)}{4a^{7/8}\sqrt{\sqrt[4]{a}-\sqrt[4]{b}}}+\frac{\tanh^{-1}\left(\frac{\sqrt[8]{a}\tanh(x)}{\sqrt{\sqrt[4]{a}-i\sqrt[4]{b}}}\right)}{4a^{7/8}\sqrt{\sqrt[4]{a}-i\sqrt[4]{b}}}+\frac{\tanh^{-1}\left(\frac{\sqrt[8]{a}\tanh(x)}{\sqrt{\sqrt[4]{a}+i\sqrt[4]{b}}}\right)}{4a^{7/8}\sqrt{\sqrt[4]{a}+i\sqrt[4]{b}}}+\frac{\tanh^{-1}\left(\frac{\sqrt[8]{a}\tanh(x)}{\sqrt{\sqrt[4]{a}+\sqrt[4]{b}}}\right)}{4a^{7/8}\sqrt{\sqrt[4]{a}+\sqrt[4]{b}}}$$

Antiderivative was successfully verified.

```
[In] Int[(a - b*Cosh[x]^8)^(-1),x]
```

```
[Out] ArcTanh[(a^(1/8)*Tanh[x])/Sqrt[a^(1/4) - b^(1/4)]]/(4*a^(7/8)*Sqrt[a^(1/4)
- b^(1/4)]) + ArcTanh[(a^(1/8)*Tanh[x])/Sqrt[a^(1/4) - I*b^(1/4)]]/(4*a^(7/
8)*Sqrt[a^(1/4) - I*b^(1/4)]) + ArcTanh[(a^(1/8)*Tanh[x])/Sqrt[a^(1/4) + I*
b^(1/4)]]/(4*a^(7/8)*Sqrt[a^(1/4) + I*b^(1/4)]) + ArcTanh[(a^(1/8)*Tanh[x])
/Sqrt[a^(1/4) + b^(1/4)]]/(4*a^(7/8)*Sqrt[a^(1/4) + b^(1/4)])
```

Rule 212

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

Rule 3260

```
Int[((a_) + (b_.)*sin[(e_.) + (f_.)*(x_)]^2)^(-1), x_Symbol] :> With[{ff =
FreeFactors[Tan[e + f*x], x]}, Dist[ff/f, Subst[Int[1/(a + (a + b)*ff^2*x^2
), x], x, Tan[e + f*x]/ff], x]] /; FreeQ[{a, b, e, f}, x]
```

Rule 3290

```
Int[((a_) + (b_.)*sin[(e_.) + (f_.)*(x_)]^(n_))^(-1), x_Symbol] :> Module[{
k}, Dist[2/(a*n), Sum[Int[1/(1 - Sin[e + f*x]^2/((-1)^(4*(k/n))*Rt[-a/b, n/
2])), x], {k, 1, n/2}], x]] /; FreeQ[{a, b, e, f}, x] && IntegerQ[n/2]
```

Rubi steps

$$\int \frac{1}{a-b\cosh^8(x)}\,dx = \frac{\int \frac{1}{1-\frac{\sqrt[4]{b}\cosh^2(x)}{\sqrt[4]{a}}}\,dx}{4a} + \frac{\int \frac{1}{1-\frac{i\sqrt[4]{b}\cosh^2(x)}{\sqrt[4]{a}}}\,dx}{4a} + \frac{\int \frac{1}{1+\frac{i\sqrt[4]{b}\cosh^2(x)}{\sqrt[4]{a}}}\,dx}{4a} + \frac{\int \frac{1}{1+\frac{\sqrt[4]{b}\cosh^2(x)}{\sqrt[4]{a}}}\,dx}{4a}$$

$$= \frac{\text{Subst}\left(\int \frac{1}{1-\left(1-\frac{\sqrt[4]{b}}{\sqrt[4]{a}}\right)x^2}\,dx, x, \coth(x)\right)}{4a} + \frac{\text{Subst}\left(\int \frac{1}{1-\left(1-\frac{i\sqrt[4]{b}}{\sqrt[4]{a}}\right)x^2}\,dx, x, \coth(x)\right)}{4a}$$

$$= \frac{\tanh^{-1}\left(\frac{\sqrt[8]{a}\tanh(x)}{\sqrt{\sqrt[4]{a}-\sqrt[4]{b}}}\right)}{4a^{7/8}\sqrt{\sqrt[4]{a}-\sqrt[4]{b}}} + \frac{\tanh^{-1}\left(\frac{\sqrt[8]{a}\tanh(x)}{\sqrt{\sqrt[4]{a}-i\sqrt[4]{b}}}\right)}{4a^{7/8}\sqrt{\sqrt[4]{a}-i\sqrt[4]{b}}} + \frac{\tanh^{-1}\left(\frac{\sqrt[8]{a}\tanh(x)}{\sqrt{\sqrt[4]{a}+i\sqrt[4]{b}}}\right)}{4a^{7/8}\sqrt{\sqrt[4]{a}+i\sqrt[4]{b}}}$$

Mathematica [C] Result contains higher order function than in optimal. Order 9 vs. order 3 in optimal.
time = 0.15, size = 158, normalized size = 0.74

$$-16\text{RootSum}\left[b+8b\#1+28b\#1^2+56b\#1^3-256a\#1^4+70b\#1^4+56b\#1^5+28b\#1^6+8b\#1^7+b\#1^8\&, \frac{x\#1^3+\log(-\cosh(x)-\sinh(x)+\cosh(x)\#1-\sinh(x)\#1)\#1^3}{b+7b\#1+21b\#1^2-128a\#1^3+35b\#1^3+35b\#1^4+21b\#1^5+7b\#1^6+b\#1^7}\&\right]$$

Antiderivative was successfully verified.

```
[In] Integrate[(a - b*Cosh[x]^8)^(-1),x]
```

```
[Out] -16*RootSum[b + 8*b*#1 + 28*b*#1^2 + 56*b*#1^3 - 256*a*#1^4 + 70*b*#1^4 + 5
6*b*#1^5 + 28*b*#1^6 + 8*b*#1^7 + b*#1^8 & , (x*#1^3 + Log[-Cosh[x] - Sinh[
x] + Cosh[x]*#1 - Sinh[x]*#1]*#1^3)/(b + 7*b*#1 + 21*b*#1^2 - 128*a*#1^3 +
35*b*#1^3 + 35*b*#1^4 + 21*b*#1^5 + 7*b*#1^6 + b*#1^7) & ]
```

Maple [C] Result contains higher order function than in optimal. Order 9 vs. order 3.
time = 1.12, size = 239, normalized size = 1.12

method	result
risch	$\sum_{\_R=\text{RootOf}\left(1+(16777216a^8-16777216a^7b)\_Z^8-1048576a^6\_Z^6+24576a^4\_Z^4-256\_Z^2a^2\right)} \_R\ln\left(e^{2x}+\left(\frac{4194304a^8}{b}-41\right.\right.$

default	$\left(\sum_{\_R=\mathrm{RootOf}\left((a-b)\_Z^{16}+(-8a-8b)\_Z^{14}+(28a-28b)\_Z^{12}+(-56a-56b)\_Z^{10}+(70a-70b)\_Z^{8}+(-56a-56b)\_Z^{6}+(28a-28b)\_Z^{4}+(-8a-8b\right.}\right.$

Verification of antiderivative is not currently implemented for this CAS.

[In] int(1/(a-b*cosh(x)^8),x,method=_RETURNVERBOSE)

[Out] 1/8*sum((-_R^14+7*_R^12-21*_R^10+35*_R^8-35*_R^6+21*_R^4-7*_R^2+1)/(_R^15*a-_R^15*b-7*_R^13*a-7*_R^13*b+21*_R^11*a-21*_R^11*b-35*_R^9*a-35*_R^9*b+35*_R^7*a-35*_R^7*b-21*_R^5*a-21*_R^5*b+7*_R^3*a-7*_R^3*b-_R*a-_R*b)*ln(tanh(1/2*x)-_R),_R=RootOf((a-b)*_Z^16+(-8*a-8*b)*_Z^14+(28*a-28*b)*_Z^12+(-56*a-56*b)*_Z^10+(70*a-70*b)*_Z^8+(-56*a-56*b)*_Z^6+(28*a-28*b)*_Z^4+(-8*a-8*b)*_Z^2+a-b))

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

Failed to integrate

Verification of antiderivative is not currently implemented for this CAS.

[In] integrate(1/(a-b*cosh(x)^8),x, algorithm="maxima")

[Out] -integrate(1/(b*cosh(x)^8 - a), x)

Fricas [**B**] Both result and optimal contain complex but leaf count of result is larger than twice the leaf count of optimal. 631813 vs. 2(133) = 266.
time = 3.29, size = 631813, normalized size = 2966.26

too large to display

Verification of antiderivative is not currently implemented for this CAS.

[In] integrate(1/(a-b*cosh(x)^8),x, algorithm="fricas")

[Out] -1/8*sqrt(1/2)*sqrt(1/6)*sqrt(-(6*sqrt(1/2)*sqrt(1/6)*(a^2 - a*b)*sqrt(-((a^5 - 2*a^4*b + a^3*b^2)*(2*(1/2)^(2/3)*(-I*sqrt(3) + 1)*(((a^3*sqrt((2*a*b*sqrt(b/a) + a*b + b^2)/((a^6 - 2*a^5*b + a^4*b^2)*sqrt(b/a))) - a^2*b*sqrt((2*a*b*sqrt(b/a) + a*b + b^2)/((a^6 - 2*a^5*b + a^4*b^2)*sqrt(b/a))) + 3*a)*sqrt(b/a) - b)^2*a/((a^3 - a^2*b)^2*b) + 3*(2*a^2*b*sqrt((2*a*b*sqrt(b/a) + a*b + b^2)/((a^6 - 2*a^5*b + a^4*b^2)*sqrt(b/a))) - (2*a^3*sqrt((2*a*b*sqrt(b/a) + a*b + b^2)/((a^6 - 2*a^5*b + a^4*b^2)*sqrt(b/a))) + 3*a)*sqrt(b/a) + b)/((a^5 - a^4*b)*sqrt(b/a)))/(9*(2*a^2*b*sqrt((2*a*b*sqrt(b/a) + a*b + b^2)/((a^6 - 2*a^5*b + a^4*b^2)*sqrt(b/a))) - (2*a^3*sqrt((2*a*b*sqrt(b/a) + a*b + b^2)/((a^6 - 2*a^5*b + a^4*b^2)*sqrt(b/a))) + 3*a)*sqrt(b/a) + b)*((a^3*sqrt((2*a*b*sqrt(b/a) + a*b + b^2)/((a^6 - 2*a^5*b + a^4*b^2)*sqrt(b/a))) - a^2*b*sqrt((2*a*b*sqrt(b/a) + a*b + b^2)/((a^6 - 2*a^5*b + a^4*b^2)*

```
sqrt(b/a))) + 3*a)*sqrt(b/a) - b)*a/((a^5 - a^4*b)*(a^3 - a^2*b)*b) - 27*(2
*a^2*b*sqrt((2*a*b*sqrt(b ...
```

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

$$\int \frac{1}{a - b\cosh^8(x)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(a-b*cosh(x)**8),x)
[Out] Integral(1/(a - b*cosh(x)**8), x)
```

Giac [**A**]
time = 0.54, size = 1, normalized size = 0.00

$$0$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(a-b*cosh(x)^8),x, algorithm="giac")
[Out] 0
```

Mupad [**F(-1)**]
time = 0.00, size = -1, normalized size = -0.00

Hanged

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(1/(a - b*cosh(x)^8),x)
[Out] \text{Hanged}
```

3.70 $\int \frac{1}{1+\cosh^5(x)} \, dx$

Optimal. Leaf size=223

$$-\frac{2\text{ArcTan}\left(\frac{\tanh\left(\frac{x}{2}\right)}{\sqrt{-\frac{1-\sqrt[5]{-1}}{1+\sqrt[5]{-1}}}}\right)}{5\sqrt{-1+(-1)^{2/5}}}-\frac{2\sqrt{-\frac{1+(-1)^{3/5}}{1-(-1)^{3/5}}}\,\text{ArcTan}\left(\sqrt{-\frac{1+(-1)^{3/5}}{1-(-1)^{3/5}}}\,\tanh\left(\frac{x}{2}\right)\right)}{5\left(1+(-1)^{3/5}\right)}+\frac{2\tanh^{-1}\left(\left(\sqrt{\cdots}\right.\right.}{5\sqrt{\cdots}}$$

```
[Out] 1/5*sinh(x)/(1+cosh(x))-2/5*arctan(tanh(1/2*x)/((-1+(-1)^(1/5))/(1+(-1)^(1/
5)))^(1/2))/(-1+(-1)^(2/5))^(1/2)+2/5*arctanh(((1-(-1)^(4/5))/(1+(-1)^(4/5)
))^(1/2)*tanh(1/2*x))/(1+(-1)^(3/5))^(1/2)-2/5*arctan(((-1-(-1)^(3/5))/(1-(
-1)^(3/5)))^(1/2)*tanh(1/2*x))*((-1-(-1)^(3/5))/(1-(-1)^(3/5)))^(1/2)/(1+(-
1)^(3/5))+2/5*arctanh(((1-(-1)^(2/5))/(1+(-1)^(2/5)))^(1/2)*tanh(1/2*x))/(1
-(-1)^(4/5))^(1/2)
```

Rubi [A]

time = 0.38, antiderivative size = 223, normalized size of antiderivative = 1.00, number of steps used = 11, number of rules used = 5, integrand size = 8, $\frac{\text{number of rules}}{\text{integrand size}} = 0.625$, Rules used = {3292, 2727, 2738, 211, 214}

$$-\frac{2\text{ArcTan}\left(\frac{\tanh\left(\frac{x}{2}\right)}{\sqrt{-\frac{1-\sqrt[5]{-1}}{1+\sqrt[5]{-1}}}}\right)}{5\sqrt{(-1)^{2/5}-1}}-\frac{2\sqrt{-\frac{1+(-1)^{3/5}}{1-(-1)^{3/5}}}\,\text{ArcTan}\left(\sqrt{-\frac{1+(-1)^{3/5}}{1-(-1)^{3/5}}}\,\tanh\left(\frac{x}{2}\right)\right)}{5\left(1+(-1)^{3/5}\right)}+\frac{2\tanh^{-1}\left(\sqrt{\frac{1-(-1)^{2/5}}{1+(-1)^{2/5}}}\,\tanh\left(\frac{x}{2}\right)\right)}{5\sqrt{1-(-1)^{4/5}}}+\frac{2\tanh^{-1}\left(\sqrt{\frac{1-(-1)^{4/5}}{1+(-1)^{4/5}}}\,\tanh\left(\frac{x}{2}\right)\right)}{5\sqrt{1+(-1)^{3/5}}}+\frac{\sinh(x)}{5(\cosh(x)+1)}$$

Antiderivative was successfully verified.

```
[In] Int[(1 + Cosh[x]^5)^(-1),x]
```

```
[Out] (-2*ArcTan[Tanh[x/2]/Sqrt[-((1 - (-1)^(1/5))/(1 + (-1)^(1/5)))]])/(5*Sqrt[-
1 + (-1)^(2/5)]) - (2*Sqrt[-((1 + (-1)^(3/5))/(1 - (-1)^(3/5)))]*ArcTan[Sqr
t[-((1 + (-1)^(3/5))/(1 - (-1)^(3/5)))]*Tanh[x/2]])/(5*(1 + (-1)^(3/5))) +
(2*ArcTanh[Sqrt[(1 - (-1)^(2/5))/(1 + (-1)^(2/5))]*Tanh[x/2]])/(5*Sqrt[1 -
(-1)^(4/5)]) + (2*ArcTanh[Sqrt[(1 - (-1)^(4/5))/(1 + (-1)^(4/5))]*Tanh[x/2]
])/(5*Sqrt[1 + (-1)^(3/5)]) + Sinh[x]/(5*(1 + Cosh[x]))
```

Rule 211

```
Int[((a_) + (b_.)*(x_)^2)^(-1), x_Symbol] :> Simp[(Rt[a/b, 2]/a)*ArcTan[x/R
t[a/b, 2]], x] /; FreeQ[{a, b}, x] && PosQ[a/b]
```

Rule 214

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

Rule 2727

```
Int[((a_) + (b_.)*sin[(c_.) + (d_.)*(x_)])^(-1), x_Symbol] :> Simp[-Cos[c +
 d*x]/(d*(b + a*Sin[c + d*x])), x] /; FreeQ[{a, b, c, d}, x] && EqQ[a^2 - b
^2, 0]
```

Rule 2738

```
Int[((a_) + (b_.)*sin[Pi/2 + (c_.) + (d_.)*(x_)])^(-1), x_Symbol] :> With[{
e = FreeFactors[Tan[(c + d*x)/2], x]}, Dist[2*(e/d), Subst[Int[1/(a + b + (
a - b)*e^2*x^2), x], x, Tan[(c + d*x)/2]/e], x]] /; FreeQ[{a, b, c, d}, x]
&& NeQ[a^2 - b^2, 0]
```

Rule 3292

```
Int[((a_) + (b_.)*((c_.)*sin[(e_.) + (f_.)*(x_)])^(n_))^(p_), x_Symbol] :>
Int[ExpandTrig[(a + b*(c*sin[e + f*x])^n)^p, x], x] /; FreeQ[{a, b, c, e, f
, n}, x] && (IGtQ[p, 0] || (EqQ[p, -1] && IntegerQ[n]))
```

Rubi steps

$$\begin{aligned}\int \frac{1}{1+\cosh^5(x)}\,dx &= \int \left(-\frac{1}{5(-1-\cosh(x))}-\frac{1}{5\left(-1+\sqrt[5]{-1}\,\cosh(x)\right)}-\frac{1}{5\left(-1-(-1)^{2/5}\cosh(x)\right)}-\frac{}{5(-}\right.\\ &= -\left(\frac{1}{5}\int \frac{1}{-1-\cosh(x)}\,dx\right)-\frac{1}{5}\int \frac{1}{-1+\sqrt[5]{-1}\,\cosh(x)}\,dx-\frac{1}{5}\int \frac{1}{-1-(-1)^{2/5}\cosh(x}\\ &= \frac{\sinh(x)}{5(1+\cosh(x))}-\frac{2}{5}\text{Subst}\left(\int \frac{1}{-1+\sqrt[5]{-1}-\left(-1-\sqrt[5]{-1}\right)x^2}\,dx,x,\tanh\left(\frac{x}{2}\right)\right)-\frac{2}{5}\text{S}\\ &= -\frac{2\tan^{-1}\left(\frac{\tanh\left(\frac{x}{2}\right)}{\sqrt{-\frac{1-\sqrt[5]{-1}}{1+\sqrt[5]{-1}}}}\right)}{5\sqrt{-1+(-1)^{2/5}}}-\frac{2\sqrt{-\frac{1+(-1)^{3/5}}{1-(-1)^{3/5}}}\,\tan^{-1}\left(\sqrt{-\frac{1+(-1)^{3/5}}{1-(-1)^{3/5}}}\,\tanh\left(\frac{x}{2}\right.\right.}{5\left(1+(-1)^{3/5}\right)}\end{aligned}$$

Mathematica [C] Result contains higher order function than in optimal. Order 9 vs. order 3 in optimal.
time = 0.07, size = 445, normalized size = 2.00

$$-\frac{1}{10}\text{RootSum}\left[1-2\#1+8\#1^2-14\#1^3+30\#1^4-14\#1^5+8\#1^6-2\#1^7+\#1^8\&,\frac{x+2\log\left(-\cosh\left(\frac{x}{2}\right)-\sinh\left(\frac{x}{2}\right)+\cosh\left(\frac{x}{2}\right)\#1-\sinh\left(\frac{x}{2}\right)\#1\right)-4x\#1-8\log\left(-\cosh\left(\frac{x}{2}\right)-\sinh\left(\frac{x}{2}\right)+\cosh\left(\frac{x}{2}\right)\#1-\sinh\left(\frac{x}{2}\right)\#1\right)\#1+15x\#1^2+30\log\left(-\cosh\left(\frac{x}{2}\right)-\sinh\left(\frac{x}{2}\right)+\cosh\left(\frac{x}{2}\right)\#1-\sinh\left(\frac{x}{2}\right)\#1\right)\#1^2-40x\#1^3-80\log\left(-\cosh\left(\frac{x}{2}\right)-\sinh\left(\frac{x}{2}\right)+\cosh\left(\frac{x}{2}\right)\#1-\sinh\left(\frac{x}{2}\right)\#1\right)\#1^3+15x\#1^4+30\log\left(-\cosh\left(\frac{x}{2}\right)-\sinh\left(\frac{x}{2}\right)+\cosh\left(\frac{x}{2}\right)\#1-\sinh\left(\frac{x}{2}\right)\#1\right)\#1^4-4x\#1^5-8\log\left(-\cosh\left(\frac{x}{2}\right)-\sinh\left(\frac{x}{2}\right)+\cosh\left(\frac{x}{2}\right)\#1-\sinh\left(\frac{x}{2}\right)\#1\right)\#1^5+x\#1^6+2\log\left(-\cosh\left(\frac{x}{2}\right)-\sinh\left(\frac{x}{2}\right)+\cosh\left(\frac{x}{2}\right)\#1-\sinh\left(\frac{x}{2}\right)\#1\right)\#1^6}{-1+8\#1-21\#1^2+60\#1^3-35\#1^4+24\#1^5-7\#1^6+4\#1^7}\&\right]+\frac{1}{5}\tanh\left(\frac{x}{2}\right)$$

Antiderivative was successfully verified.

```
[In] Integrate[(1 + Cosh[x]^5)^(-1),x]
```

```
[Out] -1/10*RootSum[1 - 2*#1 + 8*#1^2 - 14*#1^3 + 30*#1^4 - 14*#1^5 + 8*#1^6 - 2*
#1^7 + #1^8 & , (x + 2*Log[-Cosh[x/2] - Sinh[x/2] + Cosh[x/2]*#1 - Sinh[x/2
]*#1] - 4*x*#1 - 8*Log[-Cosh[x/2] - Sinh[x/2] + Cosh[x/2]*#1 - Sinh[x/2]*#1
]*#1 + 15*x*#1^2 + 30*Log[-Cosh[x/2] - Sinh[x/2] + Cosh[x/2]*#1 - Sinh[x/2]
*#1]*#1^2 - 40*x*#1^3 - 80*Log[-Cosh[x/2] - Sinh[x/2] + Cosh[x/2]*#1 - Sinh
[x/2]*#1]*#1^3 + 15*x*#1^4 + 30*Log[-Cosh[x/2] - Sinh[x/2] + Cosh[x/2]*#1 -
 Sinh[x/2]*#1]*#1^4 - 4*x*#1^5 - 8*Log[-Cosh[x/2] - Sinh[x/2] + Cosh[x/2]*#
1 - Sinh[x/2]*#1]*#1^5 + x*#1^6 + 2*Log[-Cosh[x/2] - Sinh[x/2] + Cosh[x/2]*
#1 - Sinh[x/2]*#1]*#1^6)/(-1 + 8*#1 - 21*#1^2 + 60*#1^3 - 35*#1^4 + 24*#1^5
 - 7*#1^6 + 4*#1^7) & ] + Tanh[x/2]/5
```

Maple [C] Result contains higher order function than in optimal. Order 9 vs. order 3.
time = 0.60, size = 62, normalized size = 0.28

method	result
default	$\frac{\tanh\left(\frac{x}{2}\right)}{5}+\frac{\left(\sum_{\_R=\mathrm{RootOf}\left(5\_Z^{8}+10\_Z^{4}+1\right)}\frac{\left(-5\_R^{6}+5\_R^{4}-5\_R^{2}+1\right)\ln\left(\tanh\left(\frac{x}{2}\right)-\_R\right)}{\_R^{7}+\_R^{3}}\right)}{50}$
risch	$-\frac{2}{5(e^{x}+1)}+\left(\sum_{\_R=\mathrm{RootOf}\left(1953125\_Z^{8}-156250\_Z^{6}+6250\_Z^{4}-125\_Z^{2}+1\right)}\_R\ln\left(2343750\_R^{7}-234375\_R^{6}\right.\right.$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(1/(1+cosh(x)^5),x,method=_RETURNVERBOSE)
```

```
[Out] 1/5*tanh(1/2*x)+1/50*sum((-5*_R^6+5*_R^4-5*_R^2+1)/(_R^7+_R^3)*ln(tanh(1/2*
x)-_R),_R=RootOf(5*_Z^8+10*_Z^4+1))
```

Maxima [F]
time = 0.00, size = 0, normalized size = 0.00

Failed to integrate

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(1+cosh(x)^5),x, algorithm="maxima")
```

```
[Out] -2/5/(e^x + 1) - integrate(2/5*(e^(7*x) - 4*e^(6*x) + 15*e^(5*x) - 40*e^(4*
x) + 15*e^(3*x) - 4*e^(2*x) + e^x)/(e^(8*x) - 2*e^(7*x) + 8*e^(6*x) - 14*e^
(5*x) + 30*e^(4*x) - 14*e^(3*x) + 8*e^(2*x) - 2*e^x + 1), x)
```

Fricas [B] Leaf count of result is larger than twice the leaf count of optimal. 3228 vs. $2(150) = 300$.

time = 0.51, size = 3228, normalized size = 14.48

Too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(1+cosh(x)^5),x, algorithm="fricas")
```

```
[Out] -1/8000*(8*sqrt(10)*sqrt(2*sqrt(10)*(2*sqrt(5) - 5)*sqrt(sqrt(5) + 5) - 20*
sqrt(5) + 60)*((sqrt(5) - 1)*e^x + sqrt(5) - 1)*(40*sqrt(5) + 200)^(1/4)*sq
rt(2*sqrt(5) + 5)*sqrt(sqrt(5) + 5)*arctan(1/40*sqrt(10)*((sqrt(5) - 5)*e^x
 + sqrt(5) + 1)*sqrt(2*sqrt(5) + 5)*sqrt(sqrt(5) + 5) + 1/400*sqrt(10)*(sqr
t(10)*((sqrt(5) - 5)*e^x + 2*sqrt(5))*sqrt(2*sqrt(5) + 5)*sqrt(sqrt(5) + 5)
 + 10*((sqrt(5) - 1)*e^x - sqrt(5) - 1)*sqrt(2*sqrt(5) + 5))*sqrt(sqrt(5) +
 5) - 1/64000*(80*sqrt(10)*sqrt(2*sqrt(5) + 5)*sqrt(sqrt(5) + 5)*(sqrt(5) -
 5) + 8*sqrt(10)*(sqrt(10)*sqrt(2*sqrt(5) + 5)*sqrt(sqrt(5) + 5)*(sqrt(5) -
 5) + 10*sqrt(2*sqrt(5) + 5)*(sqrt(5) - 1))*sqrt(sqrt(5) + 5) - sqrt(2*sqrt
(10)*(2*sqrt(5) - 5)*sqrt(sqrt(5) + 5) - 20*sqrt(5) + 60)*((sqrt(10)*sqrt(2
*sqrt(5) + 5)*sqrt(sqrt(5) + 5)*(sqrt(5) - 3) + 2*(3*sqrt(5) - 7)*sqrt(2*sq
rt(5) + 5))*(40*sqrt(5) + 200)^(3/4) + 4*(sqrt(10)*sqrt(2*sqrt(5) + 5)*sqrt
(sqrt(5) + 5)*(sqrt(5) - 5) + 10*sqrt(2*sqrt(5) + 5)*(sqrt(5) - 1))*(40*sqr
t(5) + 200)^(1/4)) + 1600*sqrt(2*sqrt(5) + 5))*sqrt(-20*sqrt(10)*sqrt(sqrt(
5) + 5)*(sqrt(5) - 5) - 200*(sqrt(5) + 1)*e^x - 2*(sqrt(10)*(sqrt(5)*e^x +
sqrt(5) - 5)*sqrt(sqrt(5) + 5) + 5*sqrt(5) - 25)*sqrt(2*sqrt(10)*(2*sqrt(5)
 - 5)*sqrt(sqrt(5) + 5) - 20*sqrt(5) + 60)*(40*sqrt(5) + 200)^(1/4) + 400*e
^(2*x) + 400) - 1/16000*sqrt(2*sqrt(10)*(2*sqrt(5) - 5)*sqrt(sqrt(5) + 5) -
 20*sqrt(5) + 60)*((sqrt(10)*(5*(sqrt(5) - 3)*e^x + 2*sqrt(5))*sqrt(2*sqrt(
5) + 5)*sqrt(sqrt(5) + 5) + 10*((3*sqrt(5) - 7)*e^x - 2)*sqrt(2*sqrt(5) + 5
))*(40*sqrt(5) + 200)^(3/4) + 20*(sqrt(10)*((sqrt(5) - 5)*e^x + 2*sqrt(5))*
sqrt(2*sqrt(5) + 5)*sqrt(sqrt(5) + 5) + 10*((sqrt(5) - 1)*e^x - sqrt(5) - 1
)*sqrt(2*sqrt(5) + 5))*(40*sqrt(5) + 200)^(1/4)) - 1/4*sqrt(2*sqrt(5) + 5)*
(sqrt(5) - 2*e^x + 1)) + 8*sqrt(10)*sqrt(2*sqrt(10)*(2*sqrt(5) - 5)*sqrt(sq
rt(5) + 5) - 20*sqrt(5) + 60)*((sqrt(5) - 1)*e^x + sqrt(5) - 1)*(40*sqrt(5)
 + 200)^(1/4)*sqrt(2*sqrt(5) + 5)*sqrt(sqrt(5) + 5)*arctan(-1/40*sqrt(10)*(
(sqrt(5) - 5)*e^x + sqrt(5) + 1)*sqrt(2*sqrt(5) + 5)*sqrt(sqrt(5) + 5) - 1/
400*sqrt(10)*(sqrt(10)*((sqrt(5) - 5)*e^x + 2*sqrt(5))*sqrt(2*sqrt(5) + 5)*
sqrt(sqrt(5) + 5) + 10*((sqrt(5) - 1)*e^x - sqrt(5) - 1)*sqrt(2*sqrt(5) + 5
))*sqrt(sqrt(5) + 5) + 1/64000*(80*sqrt(10)*sqrt(2*sqrt(5) + 5)*sqrt(sqrt(5
) + 5)*(sqrt(5) - 5) + 8*sqrt(10)*(sqrt(10)*sqrt(2*sqrt(5) + 5)*sqrt(sqrt(5
) + 5)*(sqrt(5) - 5) + 10*sqrt(2*sqrt(5) + 5)*(sqrt(5) - 1))*sqrt(sqrt(5) +
 5) + sqrt(2*sqrt(10)*(2*sqrt(5) - 5)*sqrt(sqrt(5) + 5) - 20*sqrt(5) + 60)*
((sqrt(10)*sqrt(2*sqrt(5) + 5)*sqrt(sqrt(5) + 5)*(sqrt(5) - 3) + 2*(3*sqrt(
5) - 7)*sqrt(2*sqrt(5) + 5))*(40*sqrt(5) + 200)^(3/4) + 4*(sqrt(10)*sqrt(2*
sqrt(5) + 5)*sqrt(sqrt(5) + 5)*(sqrt(5) - 5) + 10*sqrt(2*sqrt(5) + 5)*(sqrt
(5) - 1))*(40*sqrt(5) + 200)^(1/4)) + 1600*sqrt(2*sqrt(5) + 5))*sqrt(-20*sq
rt(10)*sqrt(sqrt(5) + 5)*(sqrt(5) - 5) - 200*(sqrt(5) + 1)*e^x + 2*(sqrt(10
```

```
)*(sqrt(5)*e^x + sqrt(5) - 5)*sqrt(sqrt(5) + 5) + 5*sqrt(5) - 25)*sqrt(2*sq
rt(10)*(2*sqrt(5) - 5)*sqrt(sqrt(5) + 5) - 20*sqrt(5) + 60)*(40*sqrt(5) + 2
00)^(1/4) + 400*e^(2*x) + 400) - 1/16000*sqrt(2*sqrt(10)*(2*sqrt(5) - 5)*sq
rt(sqrt(5) + 5) - 20*sqrt(5) + 60)*((sqrt(10)*(5*(sqrt(5) - 3)*e^x + 2*sqrt
(5))*sqrt(2*sqrt(5) + 5)*sqrt(sqrt(5) + 5) + 10*((3*sqrt(5) - 7)*e^x - 2)*s
qrt(2*sqrt(5) + 5))*(40*sqrt(5) + 200)^(3/4) + 20*(sqrt(10)*((sqrt(5) - 5)*
e^x + 2*sqrt(5))*sqrt(2*sqrt(5) + 5)*sqrt(sqrt(5) + 5) + 10*((sqrt(5) - 1)*
e^x - sqrt(5) - 1)*sqrt(2*sqrt(5) + 5))*(40*sqrt(5) + 200)^(1/4)) + 1/4*sqr
t(2*sqrt(5) + 5)*(sqrt(5) - 2*e^x + 1)) + 4*((sqrt(5) + 1)*e^x + sqrt(5) +
1)*sqrt(-(2*sqrt(5) + 5)*sqrt(-40*sqrt(5) + 200) + 20*sqrt(5) + 60)*sqrt(-2
*sqrt(5) + 5)*(-40*sqrt(5) + 200)^(3/4)*arctan(-1/32000*((20*(3*sqrt(5) + 7
)*e^x + (5*(sqrt(5) + 3)*e^x + 2*sqrt(5))*sqrt(-40*sqrt(5) + 200) + 40)*(-4
0*sqrt(5) + 200)^(3/4) + 20*(20*(sqrt(5) + 1)*e^x + ((sqrt(5) + 5)*e^x + 2*
sqrt(5))*sqrt(-40*sqrt(5) + 200) - 20*sqrt(5) + 20)*(-40*sqrt(5) + 200)^(1/
4))*sqrt(-(2*sqrt(5) + 5)*sqrt(-40*sqrt(5) + 200) + 20*sqrt(5) + 60)*sqrt(-
2*sqrt(5) + 5) + 1/128000*((((sqrt(5) + 3)*sqrt(-40*sqrt(5) + 200) + 12*sqr
t(5) + 28)*(-40*sqrt(5) + 200)^(3/4) + 4*((sqrt(5) + 5)*sqrt(-40*sqrt(5) +
200) + 20*sqrt(5) + 20)*(-40*sqrt(5) + 200)^(1/4))*sqrt(-(2*sqrt(5) + 5)*sq
rt(-40*sqrt(5) + 200) + 20*sqrt(5) + 60)*sqrt(-2*sqrt(5) + 5) - 4*(((sqrt(5
) + 5)*sqrt(-40*sqrt(5) + 200) + 20*sqrt(5) + 20)*sqrt(-40*sqrt(5) + 200) +
 20*(sqrt(5) + 5)*sqrt(-40*sqrt(5) + 200) - 800)*sqrt(-2*sqrt(5) + 5))*sqrt
(200*(sqrt(5) - 1)*e^x + ((sqrt(5)*e^x + sqrt(5) + 5)*sqrt(-40*sqrt(5) + 20
0) + 10*sqrt(5) + 50)*sqrt(-(2*sqrt(5) + 5)*sqrt(-40*sqrt(5) + 200) + 20*sq
rt(5) + 60)*(-40*sqrt(5) + 200)^(1/4) + 10*(sqrt(5) + 5)*sqrt(-40*sqrt(5) +
 200) + 400*e^(2*x) + 400) + 1/1600*(20*((sqrt(5) + 5)*e^x + sqrt(5) - 1)*s
qrt(-40*sqrt(5) + 200) + (20*(sqrt(5) + 1)*e^x + ((sqrt(5) + 5)*e^x + 2*sqr
t(5))*sqrt(-40*sqrt(5) + 200) - 20*sqrt(5) + 20)*sqrt(-40*sqrt(5) + 200) -
400*sqrt(5) - 800*e^x + 400)*sqrt(-2*sqrt(5) + 5)) + 4*((sqrt(5) + 1)*e^x +
 sqrt(5) + 1)*sqrt(-(2*sqrt(5) + 5)*sqrt(-40*sq...
```

Sympy [**F(-1)**] Timed out
time = 0.00, size = 0, normalized size = 0.00

Timed out

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(1+cosh(x)**5),x)
```

```
[Out] Timed out
```

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

could not integrate

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(1+cosh(x)^5),x, algorithm="giac")
```

```
[Out] sage0*x
```

Mupad [**F(-1)**]
time = 0.00, size = -1, normalized size = -0.00

Hanged

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(1/(cosh(x)^5 + 1),x)
```

```
[Out] \text{Hanged}
```

3.71 $\int \frac{1}{1+\cosh^6(x)}\,dx$

Optimal. Leaf size=83

$$\frac{\tanh^{-1}\left(\frac{\tanh(x)}{\sqrt{2}}\right)}{3\sqrt{2}}+\frac{\tanh^{-1}\left(\frac{\tanh(x)}{\sqrt{1-\sqrt[3]{-1}}}\right)}{3\sqrt{1-\sqrt[3]{-1}}}+\frac{\tanh^{-1}\left(\frac{\tanh(x)}{\sqrt{1+(-1)^{2/3}}}\right)}{3\sqrt{1+(-1)^{2/3}}}$$

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

Rubi [A]
time = 0.07, antiderivative size = 83, normalized size of antiderivative = 1.00, number of steps used = 7, number of rules used = 3, integrand size = 8, $\frac{\text{number of rules}}{\text{integrand size}} = 0.375$, Rules used = {3290, 3260, 212}

$$\frac{\tanh^{-1}\left(\frac{\tanh(x)}{\sqrt{2}}\right)}{3\sqrt{2}}+\frac{\tanh^{-1}\left(\frac{\tanh(x)}{\sqrt{1-\sqrt[3]{-1}}}\right)}{3\sqrt{1-\sqrt[3]{-1}}}+\frac{\tanh^{-1}\left(\frac{\tanh(x)}{\sqrt{1+(-1)^{2/3}}}\right)}{3\sqrt{1+(-1)^{2/3}}}$$

Antiderivative was successfully verified.

```
[In] Int[(1 + Cosh[x]^6)^(-1),x]
```

```
[Out] ArcTanh[Tanh[x]/Sqrt[2]]/(3*Sqrt[2]) + ArcTanh[Tanh[x]/Sqrt[1 - (-1)^(1/3)]
]/(3*Sqrt[1 - (-1)^(1/3)]) + ArcTanh[Tanh[x]/Sqrt[1 + (-1)^(2/3)]]/(3*Sqrt[
1 + (-1)^(2/3)])
```

Rule 212

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

Rule 3260

```
Int[((a_) + (b_.)*sin[(e_.) + (f_.)*(x_)]^2)^(-1), x_Symbol] :> With[{ff =
FreeFactors[Tan[e + f*x], x]}, Dist[ff/f, Subst[Int[1/(a + (a + b)*ff^2*x^2
), x], x, Tan[e + f*x]/ff], x]] /; FreeQ[{a, b, e, f}, x]
```

Rule 3290

```
Int[((a_) + (b_.)*sin[(e_.) + (f_.)*(x_)]^(n_))^(-1), x_Symbol] :> Module[{
k}, Dist[2/(a*n), Sum[Int[1/(1 - Sin[e + f*x]^2/((-1)^(4*(k/n))*Rt[-a/b, n/
2])), x], {k, 1, n/2}], x]] /; FreeQ[{a, b, e, f}, x] && IntegerQ[n/2]
```

Rubi steps

$$\int \frac{1}{1+\cosh^6(x)}\,dx = \frac{1}{3}\int \frac{1}{1+\cosh^2(x)}\,dx + \frac{1}{3}\int \frac{1}{1-\sqrt[3]{-1}\,\cosh^2(x)}\,dx + \frac{1}{3}\int \frac{1}{1+(-1)^{2/3}\cosh^2(x)}\,dx$$

$$= \frac{1}{3}\text{Subst}\left(\int \frac{1}{1-2x^2}\,dx, x, \coth(x)\right) + \frac{1}{3}\text{Subst}\left(\int \frac{1}{1-\left(1-\sqrt[3]{-1}\right)x^2}\,dx, x, \coth(x)\right)$$

$$= \frac{\tanh^{-1}\left(\frac{\tanh(x)}{\sqrt{2}}\right)}{3\sqrt{2}} + \frac{\tanh^{-1}\left(\frac{\tanh(x)}{\sqrt{1-\sqrt[3]{-1}}}\right)}{3\sqrt{1-\sqrt[3]{-1}}} + \frac{\tanh^{-1}\left(\frac{\tanh(x)}{\sqrt{1+(-1)^{2/3}}}\right)}{3\sqrt{1+(-1)^{2/3}}}$$

Mathematica [C] Result contains complex when optimal does not.
time = 0.32, size = 68, normalized size = 0.82

$$\frac{1}{6}\left(\text{ArcTan}(\text{csch}(x)\text{sech}(x)) + i\sqrt{3}\left(\text{ArcTan}\left(\frac{1-2i\tanh(x)}{\sqrt{3}}\right) - \text{ArcTan}\left(\frac{1+2i\tanh(x)}{\sqrt{3}}\right)\right) + \sqrt{2}\tanh^{-1}\left(\frac{\tanh(x)}{\sqrt{2}}\right)\right)$$

Antiderivative was successfully verified.

```
[In] Integrate[(1 + Cosh[x]^6)^(-1),x]
```

```
[Out] (ArcTan[Csch[x]*Sech[x]] + I*Sqrt[3]*(ArcTan[(1 - (2*I)*Tanh[x])/Sqrt[3]] -
 ArcTan[(1 + (2*I)*Tanh[x])/Sqrt[3]]) + Sqrt[2]*ArcTanh[Tanh[x]/Sqrt[2]])/6
```

Maple [C] Result contains higher order function than in optimal. Order 9 vs. order 3.
time = 0.58, size = 262, normalized size = 3.16

method	result
risch	$\frac{\sqrt{2}\ln\left(e^{2x}+3-2\sqrt{2}\right)}{12} - \frac{\sqrt{2}\ln\left(e^{2x}+3+2\sqrt{2}\right)}{12} + \left(\sum_{\_R=\text{RootOf}(1296\_Z^4-36\_Z^2+1)} \_R\ln\left(-432\_R^3+72\_\right.\right.$
default	$\frac{\left(\sum_{\_R=\text{RootOf}(\_Z^4+2\_Z^3+2\_Z^2-2\_Z+1)} \frac{\left(-\_R^2-4\_R+1\right)\ln\left(\tanh\left(\frac{x}{2}\right)-\_R\right)}{2\_R^3+3\_R^2+2\_R-1}\right)}{6} + \frac{\sqrt{2}\left(\ln\left(\frac{\tanh^2\left(\frac{x}{2}\right)+\tanh\left(\frac{x}{2}\right)\sqrt{2}+1}{\tanh^2\left(\frac{x}{2}\right)-\tanh\left(\frac{x}{2}\right)\sqrt{2}+1}\right)+\right.}{}$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(1/(1+cosh(x)^6),x,method=_RETURNVERBOSE)
```

```
[Out] 1/6*sum((-_R^2-4*_R+1)/(2*_R^3+3*_R^2+2*_R-1)*ln(tanh(1/2*x)-_R),_R=RootOf(
_Z^4+2*_Z^3+2*_Z^2-2*_Z+1))+1/24*2^(1/2)*(ln((tanh(1/2*x)^2+tanh(1/2*x)*2^(
1/2)+1)/(tanh(1/2*x)^2-tanh(1/2*x)*2^(1/2)+1))+2*arctan(tanh(1/2*x)*2^(1/2)
+1)+2*arctan(tanh(1/2*x)*2^(1/2)-1))-1/24*2^(1/2)*(ln((tanh(1/2*x)^2-tanh(1
/2*x)*2^(1/2)+1)/(tanh(1/2*x)^2+tanh(1/2*x)*2^(1/2)+1))+2*arctan(tanh(1/2*x
)*2^(1/2)+1)+2*arctan(tanh(1/2*x)*2^(1/2)-1))+1/6*sum((-_R^2+4*_R+1)/(2*_R^
3-3*_R^2+2*_R+1)*ln(tanh(1/2*x)-_R),_R=RootOf(_Z^4-2*_Z^3+2*_Z^2+2*_Z+1))
```

Maxima [F]
time = 0.00, size = 0, normalized size = 0.00

Failed to integrate

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(1+cosh(x)^6),x, algorithm="maxima")
```

```
[Out] -1/12*sqrt(2)*log(-(2*sqrt(2) - e^(-2*x) - 3)/(2*sqrt(2) + e^(-2*x) + 3)) -
 4/3*integrate(-(6*e^(-2*x) - e^(-4*x) - 1)*e^(-2*x)/(14*e^(-4*x) + e^(-8*x
) + 1), x)
```

Fricas [B] Leaf count of result is larger than twice the leaf count of optimal. 158 vs. $2(58) = 116$.
time = 0.52, size = 158, normalized size = 1.90

$$-\frac{1}{12}\sqrt{3}\log\left(16\sqrt{3}+4e^{(4x)}+28\right)+\frac{1}{12}\sqrt{3}\log\left(-16\sqrt{3}+4e^{(4x)}+28\right)+\frac{1}{12}\sqrt{2}\log\left(-\frac{2\left(2\sqrt{2}-3\right)e^{(2x)}+12\sqrt{2}-e^{(4x)}-17}{e^{(4x)}+6e^{(2x)}+1}\right)+\frac{1}{3}\arctan\left(-\left(\sqrt{3}+2\right)e^{(2x)}+\frac{1}{2}\left(\sqrt{3}+2\right)\sqrt{-16\sqrt{3}+4e^{(4x)}+28}\right)-\frac{1}{3}\arctan\left(-\left(\sqrt{3}-2\right)e^{(2x)}+\sqrt{4\sqrt{3}+e^{(4x)}+7}\left(\sqrt{3}-2\right)\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(1+cosh(x)^6),x, algorithm="fricas")
```

```
[Out] -1/12*sqrt(3)*log(16*sqrt(3) + 4*e^(4*x) + 28) + 1/12*sqrt(3)*log(-16*sqrt(
3) + 4*e^(4*x) + 28) + 1/12*sqrt(2)*log(-(2*(2*sqrt(2) - 3)*e^(2*x) + 12*sq
rt(2) - e^(4*x) - 17)/(e^(4*x) + 6*e^(2*x) + 1)) + 1/3*arctan(-(sqrt(3) + 2
)*e^(2*x) + 1/2*(sqrt(3) + 2)*sqrt(-16*sqrt(3) + 4*e^(4*x) + 28)) - 1/3*arc
tan(-(sqrt(3) - 2)*e^(2*x) + sqrt(4*sqrt(3) + e^(4*x) + 7)*(sqrt(3) - 2))
```

Sympy [F(-1)] Timed out
time = 0.00, size = 0, normalized size = 0.00

Timed out

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(1+cosh(x)**6),x)
```

```
[Out] Timed out
```

Giac [B] Leaf count of result is larger than twice the leaf count of optimal. 140 vs. 2(58) = 116.
time = 0.43, size = 140, normalized size = 1.69

$$\frac{1}{36}\left(\left(2\sqrt{3}-3\right)e^{(4x)}+2\sqrt{3}-3\right)\arctan\left(\frac{e^{(2x)}}{\sqrt{3}+2}\right)-\frac{1}{36}\left(\left(2\sqrt{3}+3\right)e^{(4x)}+2\sqrt{3}+3\right)\arctan\left(-\frac{e^{(2x)}}{\sqrt{3}-2}\right)-\frac{1}{12}\sqrt{3}\log\left(\left(\sqrt{3}+2\right)^2+e^{(4x)}\right)+\frac{1}{12}\sqrt{3}\log\left(\left(\sqrt{3}-2\right)^2+e^{(4x)}\right)+\frac{1}{12}\sqrt{2}\log\left(-\frac{2\sqrt{2}-e^{(2x)}-3}{2\sqrt{2}+e^{(2x)}+3}\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(1+cosh(x)^6),x, algorithm="giac")
```

```
[Out] 1/36*((2*sqrt(3) - 3)*e^(4*x) + 2*sqrt(3) - 3)*arctan(e^(2*x)/(sqrt(3) + 2)
) - 1/36*((2*sqrt(3) + 3)*e^(4*x) + 2*sqrt(3) + 3)*arctan(-e^(2*x)/(sqrt(3)
 - 2)) - 1/12*sqrt(3)*log((sqrt(3) + 2)^2 + e^(4*x)) + 1/12*sqrt(3)*log((sq
rt(3) - 2)^2 + e^(4*x)) + 1/12*sqrt(2)*log(-(2*sqrt(2) - e^(2*x) - 3)/(2*sq
rt(2) + e^(2*x) + 3))
```

Mupad [B]
time = 2.55, size = 337, normalized size = 4.06

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(1/(cosh(x)^6 + 1),x)
```

```
[Out] (log(3^(1/2)*(955607545932677120 - 2167269359741829120i) - exp(2*x)*(140094
49395540459520 + 6177144285775790080i) + 3^(1/2)*exp(2*x)*(8088359377641144
320 + 3566375915854233600i) - (1655160823988879360 - 3753820658157486080i))
*1i)/12 - (log(3^(1/2)*(955607545932677120 + 2167269359741829120i) - exp(2*
x)*(14009449395540459520 - 6177144285775790080i) + 3^(1/2)*exp(2*x)*(808835
9377641144320 - 3566375915854233600i) - (1655160823988879360 + 375382065815
7486080i))*1i)/12 - atan((6177144285775790080*exp(2*x) - 216726935974182912
0*3^(1/2) + 3566375915854233600*3^(1/2)*exp(2*x) - 3753820658157486080)/(14
009449395540459520*exp(2*x) + 955607545932677120*3^(1/2) + 8088359377641144
320*3^(1/2)*exp(2*x) + 1655160823988879360))/6 + (3^(1/2)*log((617714428577
5790080*exp(2*x) - 2167269359741829120*3^(1/2) + 3566375915854233600*3^(1/2
)*exp(2*x) - 3753820658157486080)^2 + (14009449395540459520*exp(2*x) + 9556
07545932677120*3^(1/2) + 8088359377641144320*3^(1/2)*exp(2*x) + 16551608239
88879360)^2))/12 - (3^(1/2)*log((6177144285775790080*exp(2*x) + 21672693597
41829120*3^(1/2) - 3566375915854233600*3^(1/2)*exp(2*x) - 37538206581574860
80)^2 + (14009449395540459520*exp(2*x) - 955607545932677120*3^(1/2) - 80883
59377641144320*3^(1/2)*exp(2*x) + 1655160823988879360)^2))/12 - (pi*sign(x
- log((24639*3^(1/2) + 42676)/(40545*3^(1/2) + 70226))/2))/6 + (pi*sign(617
7144285775790080*exp(2*x) - 2167269359741829120*3^(1/2) + 35663759158542336
00*3^(1/2)*exp(2*x) - 3753820658157486080))/6 - (2^(1/2)*log(21443225520701
44000*2^(1/2) - 17674880313941032960*exp(2*x) + 12498027726650736640*2^(1/2
)*exp(2*x) - 30325300352201523 20))/12 + (2^(1/2)*log(17674880313941032960*e
xp(2*x) + 2144322552070144000*2^(1/2) + 12498027726650736640*2^(1/2)*exp(2*
x) + 30325300352201523 20))/12
```

3.72 $\int \frac{1}{1+\cosh^8(x)}\,dx$

Optimal. Leaf size=129

$$\frac{\tanh^{-1}\left(\frac{\tanh(x)}{\sqrt{1-\sqrt[4]{-1}}}\right)}{4\sqrt{1-\sqrt[4]{-1}}}+\frac{\tanh^{-1}\left(\frac{\tanh(x)}{\sqrt{1+\sqrt[4]{-1}}}\right)}{4\sqrt{1+\sqrt[4]{-1}}}+\frac{\tanh^{-1}\left(\frac{\tanh(x)}{\sqrt{1-(-1)^{3/4}}}\right)}{4\sqrt{1-(-1)^{3/4}}}+\frac{\tanh^{-1}\left(\frac{\tanh(x)}{\sqrt{1+(-1)^{3/4}}}\right)}{4\sqrt{1+(-1)^{3/4}}}$$

```
[Out] 1/4*arctanh(tanh(x)/(1-(-1)^(1/4))^(1/2))/(1-(-1)^(1/4))^(1/2)+1/4*arctanh(
tanh(x)/(1+(-1)^(1/4))^(1/2))/(1+(-1)^(1/4))^(1/2)+1/4*arctanh(tanh(x)/(1-(
-1)^(3/4))^(1/2))/(1-(-1)^(3/4))^(1/2)+1/4*arctanh(tanh(x)/(1+(-1)^(3/4))^(
1/2))/(1+(-1)^(3/4))^(1/2)
```

Rubi [A]

time = 0.13, antiderivative size = 129, normalized size of antiderivative = 1.00, number of steps used = 9, number of rules used = 3, integrand size = 8, $\frac{\text{number of rules}}{\text{integrand size}} = 0.375$, Rules used = {3290, 3260, 212}

$$\frac{\tanh^{-1}\left(\frac{\tanh(x)}{\sqrt{1-\sqrt[4]{-1}}}\right)}{4\sqrt{1-\sqrt[4]{-1}}}+\frac{\tanh^{-1}\left(\frac{\tanh(x)}{\sqrt{1+\sqrt[4]{-1}}}\right)}{4\sqrt{1+\sqrt[4]{-1}}}+\frac{\tanh^{-1}\left(\frac{\tanh(x)}{\sqrt{1-(-1)^{3/4}}}\right)}{4\sqrt{1-(-1)^{3/4}}}+\frac{\tanh^{-1}\left(\frac{\tanh(x)}{\sqrt{1+(-1)^{3/4}}}\right)}{4\sqrt{1+(-1)^{3/4}}}$$

Antiderivative was successfully verified.

```
[In] Int[(1 + Cosh[x]^8)^(-1),x]
```

```
[Out] ArcTanh[Tanh[x]/Sqrt[1 - (-1)^(1/4)]]/(4*Sqrt[1 - (-1)^(1/4)]) + ArcTanh[Ta
nh[x]/Sqrt[1 + (-1)^(1/4)]]/(4*Sqrt[1 + (-1)^(1/4)]) + ArcTanh[Tanh[x]/Sqrt
[1 - (-1)^(3/4)]]/(4*Sqrt[1 - (-1)^(3/4)]) + ArcTanh[Tanh[x]/Sqrt[1 + (-1)^
(3/4)]]/(4*Sqrt[1 + (-1)^(3/4)])
```

Rule 212

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

Rule 3260

```
Int[((a_) + (b_.)*sin[(e_.) + (f_.)*(x_)]^2)^(-1), x_Symbol] :> With[{ff =
FreeFactors[Tan[e + f*x], x]}, Dist[ff/f, Subst[Int[1/(a + (a + b)*ff^2*x^2
), x], x, Tan[e + f*x]/ff], x]] /; FreeQ[{a, b, e, f}, x]
```

Rule 3290

```
Int[((a_) + (b_.)*sin[(e_.) + (f_.)*(x_)]^(n_))^(-1), x_Symbol] :> Module[{
k}, Dist[2/(a*n), Sum[Int[1/(1 - Sin[e + f*x]^2/((-1)^(4*(k/n))*Rt[-a/b, n/
2])), x], {k, 1, n/2}], x]] /; FreeQ[{a, b, e, f}, x] && IntegerQ[n/2]
```

Rubi steps

$$\int \frac{1}{1+\cosh^8(x)}\,dx = \frac{1}{4}\int \frac{1}{1-\sqrt[4]{-1}\,\cosh^2(x)}\,dx + \frac{1}{4}\int \frac{1}{1+\sqrt[4]{-1}\,\cosh^2(x)}\,dx + \frac{1}{4}\int \frac{1}{1-(-1)^{3/4}\cosh^2(x)}$$

$$= \frac{1}{4}\text{Subst}\left(\int \frac{1}{1-\left(1-\sqrt[4]{-1}\right)x^2}\,dx, x, \coth(x)\right) + \frac{1}{4}\text{Subst}\left(\int \frac{1}{1-\left(1+\sqrt[4]{-1}\right)x^2}\,dx,$$

$$= \frac{\tanh^{-1}\left(\frac{\tanh(x)}{\sqrt{1-\sqrt[4]{-1}}}\right)}{4\sqrt{1-\sqrt[4]{-1}}} + \frac{\tanh^{-1}\left(\frac{\tanh(x)}{\sqrt{1+\sqrt[4]{-1}}}\right)}{4\sqrt{1+\sqrt[4]{-1}}} + \frac{\tanh^{-1}\left(\frac{\tanh(x)}{\sqrt{1-(-1)^{3/4}}}\right)}{4\sqrt{1-(-1)^{3/4}}}$$

Mathematica [C] Result contains higher order function than in optimal. Order 9 vs. order 3 in optimal.
time = 0.09, size = 127, normalized size = 0.98

$$16\text{RootSum}\left[1+8\#1+28\#1^2+56\#1^3+326\#1^4+56\#1^5+28\#1^6+8\#1^7+\#1^8\&, \frac{x\#1^3+\log(-\cosh(x)-\sinh(x)+\cosh(x)\#1-\sinh(x)\#1)\#1^3}{1+7\#1+21\#1^2+163\#1^3+35\#1^4+21\#1^5+7\#1^6+\#1^7}\&\right]$$

Antiderivative was successfully verified.

```
[In] Integrate[(1 + Cosh[x]^8)^(-1),x]
[Out] 16*RootSum[1 + 8*#1 + 28*#1^2 + 56*#1^3 + 326*#1^4 + 56*#1^5 + 28*#1^6 + 8*
#1^7 + #1^8 & , (x*#1^3 + Log[-Cosh[x] - Sinh[x] + Cosh[x]*#1 - Sinh[x]*#1]
*#1^3)/(1 + 7*#1 + 21*#1^2 + 163*#1^3 + 35*#1^4 + 21*#1^5 + 7*#1^6 + #1^7)
& ]
```

Maple [C] Result contains higher order function than in optimal. Order 9 vs. order 3.
time = 0.59, size = 47, normalized size = 0.36

method	result
default	$\frac{\left(\sum_{\_R=\text{RootOf}\left(2\_Z^8-4\_Z^6+6\_Z^4-4\_Z^2+1\right)} \_R\ln\left(2\tanh\left(\frac{x}{2}\right)\_R+\tanh^2\left(\frac{x}{2}\right)+1\right)\right)}{8}$
risch	$\sum_{\_R=\text{RootOf}\left(33554432\_Z^8-1048576\_Z^6+24576\_Z^4-256\_Z^2+1\right)} \_R\ln\left(-8388608\_R^7+1048576\_R^6+131072\right.$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(1/(1+cosh(x)^8),x,method=_RETURNVERBOSE)
```

```
[Out] 1/8*sum(_R*ln(2*tanh(1/2*x)*_R+tanh(1/2*x)^2+1),_R=RootOf(2*_Z^8-4*_Z^6+6*_
Z^4-4*_Z^2+1))
```

Maxima [F]
time = 0.00, size = 0, normalized size = 0.00

Failed to integrate

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(1+cosh(x)^8),x, algorithm="maxima")
```

```
[Out] integrate(1/(cosh(x)^8 + 1), x)
```

Fricas [B] Leaf count of result is larger than twice the leaf count of optimal. 3773 vs. $2(89) = 178$.
time = 0.51, size = 3773, normalized size = 29.25

Too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(1+cosh(x)^8),x, algorithm="fricas")
```

```
[Out] -1/16*sqrt(2*sqrt(2*sqrt(2) + 4)*(2*sqrt(2) - 3) - 4*sqrt(2) + 8)*(2*sqrt(2
) + 4)^(3/4)*sqrt(2*sqrt(2) + 3)*(sqrt(2) - 1)*arctan(1/31*(2*(13*sqrt(2) -
 20)*e^(2*x) - 23*sqrt(2) + 33)*sqrt(2*sqrt(2) + 4)*sqrt(2*sqrt(2) + 3) + 1
/496*(32*(10*sqrt(2) - 13)*sqrt(2*sqrt(2) + 4)*sqrt(2*sqrt(2) + 3) + (((355
*sqrt(2) - 508)*sqrt(2*sqrt(2) + 4)*sqrt(2*sqrt(2) + 3) + 6*(59*sqrt(2) - 8
6)*sqrt(2*sqrt(2) + 3))*(2*sqrt(2) + 4)^(3/4) + 4*((82*sqrt(2) - 119)*sqrt(
2*sqrt(2) + 4)*sqrt(2*sqrt(2) + 3) + (85*sqrt(2) - 126)*sqrt(2*sqrt(2) + 3)
)*(2*sqrt(2) + 4)^(1/4))*sqrt(2*sqrt(2*sqrt(2) + 4)*(2*sqrt(2) - 3) - 4*sqr
t(2) + 8) + 4*((76*sqrt(2) - 105)*sqrt(2*sqrt(2) + 4)*sqrt(2*sqrt(2) + 3) +
 2*(53*sqrt(2) - 72)*sqrt(2*sqrt(2) + 3))*sqrt(2*sqrt(2) + 4) + 16*(23*sqrt
(2) - 33)*sqrt(2*sqrt(2) + 3))*sqrt(-4*(sqrt(2) - 1)*e^(2*x) + (2*(sqrt(2)
- 1)*e^(2*x) + ((sqrt(2) - 2)*e^(2*x) + 5*sqrt(2) - 6)*sqrt(2*sqrt(2) + 4)
+ 6*sqrt(2) - 6)*sqrt(2*sqrt(2*sqrt(2) + 4)*(2*sqrt(2) - 3) - 4*sqrt(2) + 8
)*(2*sqrt(2) + 4)^(1/4) - 4*sqrt(2*sqrt(2) + 4)*(sqrt(2) - 2) - 4*sqrt(2) +
 2*e^(4*x) + 10) + 1/248*((((254*sqrt(2) - 355)*e^(2*x) + 102*sqrt(2) - 145
)*sqrt(2*sqrt(2) + 4)*sqrt(2*sqrt(2) + 3) + 2*(3*(43*sqrt(2) - 59)*e^(2*x)
+ 23*sqrt(2) - 33)*sqrt(2*sqrt(2) + 3))*(2*sqrt(2) + 4)^(3/4) + 2*(((119*sq
rt(2) - 164)*e^(2*x) + 39*sqrt(2) - 60)*sqrt(2*sqrt(2) + 4)*sqrt(2*sqrt(2)
+ 3) + 2*((63*sqrt(2) - 85)*e^(2*x) + 17*sqrt(2) - 19)*sqrt(2*sqrt(2) + 3))
*(2*sqrt(2) + 4)^(1/4))*sqrt(2*sqrt(2*sqrt(2) + 4)*(2*sqrt(2) - 3) - 4*sqrt
(2) + 8) + 1/124*(((105*sqrt(2) - 152)*e^(2*x) - 13*sqrt(2) + 20)*sqrt(2*sq
rt(2) + 4)*sqrt(2*sqrt(2) + 3) + 4*((36*sqrt(2) - 53)*e^(2*x) + 23*sqrt(2)
```

- 33)*sqrt(2*sqrt(2) + 3))*sqrt(2*sqrt(2) + 4) + 1/31*((33*sqrt(2) - 46)*e^
(2*x) + 3*sqrt(2) - 7)*sqrt(2*sqrt(2) + 3)) - 1/16*sqrt(2*sqrt(2*sqrt(2) +
4)*(2*sqrt(2) - 3) - 4*sqrt(2) + 8)*(2*sqrt(2) + 4)^(3/4)*sqrt(2*sqrt(2) +
3)*(sqrt(2) - 1)*arctan(-1/31*(2*(13*sqrt(2) - 20)*e^(2*x) - 23*sqrt(2) + 3
3)*sqrt(2*sqrt(2) + 4)*sqrt(2*sqrt(2) + 3) - 1/496*(32*(10*sqrt(2) - 13)*sq
rt(2*sqrt(2) + 4)*sqrt(2*sqrt(2) + 3) - (((355*sqrt(2) - 508)*sqrt(2*sqrt(2
) + 4)*sqrt(2*sqrt(2) + 3) + 6*(59*sqrt(2) - 86)*sqrt(2*sqrt(2) + 3))*(2*sq
rt(2) + 4)^(3/4) + 4*((82*sqrt(2) - 119)*sqrt(2*sqrt(2) + 4)*sqrt(2*sqrt(2)
 + 3) + (85*sqrt(2) - 126)*sqrt(2*sqrt(2) + 3))*(2*sqrt(2) + 4)^(1/4))*sqrt
(2*sqrt(2*sqrt(2) + 4)*(2*sqrt(2) - 3) - 4*sqrt(2) + 8) + 4*((76*sqrt(2) -
105)*sqrt(2*sqrt(2) + 4)*sqrt(2*sqrt(2) + 3) + 2*(53*sqrt(2) - 72)*sqrt(2*s
qrt(2) + 3))*sqrt(2*sqrt(2) + 4) + 16*(23*sqrt(2) - 33)*sqrt(2*sqrt(2) + 3)
)*sqrt(-4*(sqrt(2) - 1)*e^(2*x) - (2*(sqrt(2) - 1)*e^(2*x) + ((sqrt(2) - 2)
*e^(2*x) + 5*sqrt(2) - 6)*sqrt(2*sqrt(2) + 4) + 6*sqrt(2) - 6)*sqrt(2*sqrt(
2*sqrt(2) + 4)*(2*sqrt(2) - 3) - 4*sqrt(2) + 8)*(2*sqrt(2) + 4)^(1/4) - 4*s
qrt(2*sqrt(2) + 4)*(sqrt(2) - 2) - 4*sqrt(2) + 2*e^(4*x) + 10) + 1/248*((((
254*sqrt(2) - 355)*e^(2*x) + 102*sqrt(2) - 145)*sqrt(2*sqrt(2) + 4)*sqrt(2*
sqrt(2) + 3) + 2*(3*(43*sqrt(2) - 59)*e^(2*x) + 23*sqrt(2) - 33)*sqrt(2*sqr
t(2) + 3))*(2*sqrt(2) + 4)^(3/4) + 2*(((119*sqrt(2) - 164)*e^(2*x) + 39*sqr
t(2) - 60)*sqrt(2*sqrt(2) + 4)*sqrt(2*sqrt(2) + 3) + 2*((63*sqrt(2) - 85)*e
^(2*x) + 17*sqrt(2) - 19)*sqrt(2*sqrt(2) + 3))*(2*sqrt(2) + 4)^(1/4))*sqrt(
2*sqrt(2*sqrt(2) + 4)*(2*sqrt(2) - 3) - 4*sqrt(2) + 8) - 1/124*(((105*sqrt(
2) - 152)*e^(2*x) - 13*sqrt(2) + 20)*sqrt(2*sqrt(2) + 4)*sqrt(2*sqrt(2) + 3
) + 4*((36*sqrt(2) - 53)*e^(2*x) + 23*sqrt(2) - 33)*sqrt(2*sqrt(2) + 3))*sq
rt(2*sqrt(2) + 4) - 1/31*((33*sqrt(2) - 46)*e^(2*x) + 3*sqrt(2) - 7)*sqrt(2
*sqrt(2) + 3)) + 1/16*sqrt(-2*(2*sqrt(2) + 3)*sqrt(-2*sqrt(2) + 4) + 4*sqrt
(2) + 8)*(sqrt(2) + 1)*(-2*sqrt(2) + 4)^(3/4)*sqrt(-2*sqrt(2) + 3)*arctan(1
/31*(2*(13*sqrt(2) + 20)*e^(2*x) - 23*sqrt(2) - 33)*sqrt(-2*sqrt(2) + 4)*sq
rt(-2*sqrt(2) + 3) - 1/496*(32*(10*sqrt(2) + 13)*sqrt(-2*sqrt(2) + 4)*sqrt(
-2*sqrt(2) + 3) - (((355*sqrt(2) + 508)*sqrt(-2*sqrt(2) + 4)*sqrt(-2*sqrt(2
) + 3) + 6*(59*sqrt(2) + 86)*sqrt(-2*sqrt(2) + 3))*(-2*sqrt(2) + 4)^(3/4) +
 4*((82*sqrt(2) + 119)*sqrt(-2*sqrt(2) + 4)*sqrt(-2*sqrt(2) + 3) + (85*sqrt
(2) + 126)*sqrt(-2*sqrt(2) + 3))*(-2*sqrt(2) + 4)^(1/4))*sqrt(-2*(2*sqrt(2)
 + 3)*sqrt(-2*sqrt(2) + 4) + 4*sqrt(2) + 8) + 4*((76*sqrt(2) + 105)*sqrt(-2
*sqrt(2) + 4)*sqrt(-2*sqrt(2) + 3) + 2*(53*sqrt(2) + 72)*sqrt(-2*sqrt(2) +
3))*sqrt(-2*sqrt(2) + 4) + 16*(23*sqrt(2) + 33)*sqrt(-2*sqrt(2) + 3))*sqrt(
4*(sqrt(2) + 1)*e^(2*x) + (2*(sqrt(2) + 1)*e^(2*x) + ((sqrt(2) + 2)*e^(2*x)
 + 5*sqrt(2) + 6)*sqrt(-2*sqrt(2) + 4) + 6*sqrt(2) + 6)*sqrt(-2*(2*sqrt(2)
+ 3)*sqrt(-2*sqrt(2) + 4) + 4*sqrt(2) + 8)*(-2*sqrt(2) + 4)^(1/4) + 4*(sqrt
(2) + 2)*sqrt(-2*sqrt(2) + 4) + 4*sqrt(2) + 2*e^(4*x) + 10) - 1/248*((((254
*sqrt(2) + 355)*e^(2*x) + 102*sqrt(2) + 145)*sqrt(-2*sqrt(2) + 4)*sqrt(-2*s
qrt(2) + 3) + 2*(3*(43*sqrt(2) + 59)*e^(2*x) + 23*sqrt(2) + 33)*sqrt(-2*sqr
t(2) + 3))*(-2*sqrt(2) + 4)^(3/4) + 2*(((119*sqrt(2) + 164)*e^(2*x) + 39*sq
rt(2) + 60)*sqrt(-2*sqrt(2) + 4)*sqrt(-2*sqrt(2) + 3) + 2*((63*sqrt(2) + 85
)*e^(2*x) + 17*sqrt(2) + 19)*sqrt(-2*sqrt(2) + ...

Sympy [**F(-1)**] Timed out
time = 0.00, size = 0, normalized size = 0.00

Timed out

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(1+cosh(x)**8),x)
```

```
[Out] Timed out
```

Giac [**A**]
time = 0.43, size = 1, normalized size = 0.01

$$0$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(1+cosh(x)^8),x, algorithm="giac")
```

```
[Out] 0
```

Mupad [**F(-1)**]
time = 0.00, size = -1, normalized size = -0.01

Hanged

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(1/(cosh(x)^8 + 1),x)
```

```
[Out] \text{Hanged}
```

3.73 $\int \frac{1}{1-\cosh^5(x)}\,dx$

Optimal. Leaf size=205

$$-\frac{2\text{ArcTan}\left(\frac{\tanh\left(\frac{x}{2}\right)}{\sqrt{-\frac{1-(-1)^{2/5}}{1+(-1)^{2/5}}}}\right)}{5\sqrt{-1+(-1)^{4/5}}}+\frac{2\text{ArcTan}\left(\sqrt{-\frac{1+(-1)^{4/5}}{1-(-1)^{4/5}}}\tanh\left(\frac{x}{2}\right)\right)}{5\sqrt{-1-(-1)^{3/5}}}+\frac{2\tanh^{-1}\left(\sqrt{\frac{1-\sqrt[5]{-1}}{1+\sqrt[5]{-1}}}\tanh\left(\right.\right.}{5\sqrt{1-(-1)^{2/5}}}$$

```
[Out] -1/5*sinh(x)/(1-cosh(x))+2/5*arctanh(((1-(-1)^(3/5))/(1+(-1)^(3/5)))^(1/2)*
tanh(1/2*x))/(1+(-1)^(1/5))^(1/2)+2/5*arctanh(((1-(-1)^(1/5))/(1+(-1)^(1/5)
))^(1/2)*tanh(1/2*x))/(1-(-1)^(2/5))^(1/2)+2/5*arctan(((-1-(-1)^(4/5))/(1-(
-1)^(4/5)))^(1/2)*tanh(1/2*x))/(-1-(-1)^(3/5))^(1/2)-2/5*arctan(tanh(1/2*x)
/((-1+(-1)^(2/5))/(1+(-1)^(2/5)))^(1/2))/(-1+(-1)^(4/5))^(1/2)
```

Rubi [A]
time = 0.32, antiderivative size = 205, normalized size of antiderivative = 1.00, number of steps used = 11, number of rules used = 5, integrand size = 10, $\frac{\text{number of rules}}{\text{integrand size}} = 0.500$, Rules used = {3292, 2727, 2738, 214, 211}

$$-\frac{2\text{ArcTan}\left(\frac{\tanh\left(\frac{x}{2}\right)}{\sqrt{-\frac{1-(-1)^{2/5}}{1+(-1)^{2/5}}}}\right)}{5\sqrt{(-1)^{4/5}-1}}+\frac{2\text{ArcTan}\left(\sqrt{-\frac{1+(-1)^{4/5}}{1-(-1)^{4/5}}}\tanh\left(\frac{x}{2}\right)\right)}{5\sqrt{-1-(-1)^{3/5}}}+\frac{2\tanh^{-1}\left(\sqrt{\frac{1-\sqrt[5]{-1}}{1+\sqrt[5]{-1}}}\tanh\left(\frac{x}{2}\right)\right)}{5\sqrt{1-(-1)^{2/5}}}+\frac{2\tanh^{-1}\left(\sqrt{\frac{1-(-1)^{3/5}}{1+(-1)^{3/5}}}\tanh\left(\frac{x}{2}\right)\right)}{5\sqrt{1+\sqrt[5]{-1}}}-\frac{\sinh(x)}{5(1-\cosh(x))}$$

Antiderivative was successfully verified.

```
[In] Int[(1 - Cosh[x]^5)^(-1),x]
```

```
[Out] (-2*ArcTan[Tanh[x/2]/Sqrt[-((1 - (-1)^(2/5))/(1 + (-1)^(2/5)))]])/(5*Sqrt[-
1 + (-1)^(4/5)]) + (2*ArcTan[Sqrt[-((1 + (-1)^(4/5))/(1 - (-1)^(4/5)))]*Tan
h[x/2]])/(5*Sqrt[-1 - (-1)^(3/5)]) + (2*ArcTanh[Sqrt[(1 - (-1)^(1/5))/(1 +
(-1)^(1/5))]*Tanh[x/2]])/(5*Sqrt[1 - (-1)^(2/5)]) + (2*ArcTanh[Sqrt[(1 - (-
1)^(3/5))/(1 + (-1)^(3/5))]*Tanh[x/2]])/(5*Sqrt[1 + (-1)^(1/5)]) - Sinh[x]/
(5*(1 - Cosh[x]))
```

Rule 211

```
Int[((a_) + (b_.)*(x_)^2)^(-1), x_Symbol] :> Simp[(Rt[a/b, 2]/a)*ArcTan[x/R
t[a/b, 2]], x] /; FreeQ[{a, b}, x] && PosQ[a/b]
```

Rule 214

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

Rule 2727

```
Int[((a_) + (b_.)*sin[(c_.) + (d_.)*(x_)])^(-1), x_Symbol] :> Simp[-Cos[c +
 d*x]/(d*(b + a*Sin[c + d*x])), x] /; FreeQ[{a, b, c, d}, x] && EqQ[a^2 - b
^2, 0]
```

Rule 2738

```
Int[((a_) + (b_.)*sin[Pi/2 + (c_.) + (d_.)*(x_)])^(-1), x_Symbol] :> With[{
e = FreeFactors[Tan[(c + d*x)/2], x]}, Dist[2*(e/d), Subst[Int[1/(a + b + (
a - b)*e^2*x^2), x], x, Tan[(c + d*x)/2]/e], x]] /; FreeQ[{a, b, c, d}, x]
&& NeQ[a^2 - b^2, 0]
```

Rule 3292

```
Int[((a_) + (b_.)*((c_.)*sin[(e_.) + (f_.)*(x_)])^(n_))^(p_), x_Symbol] :>
Int[ExpandTrig[(a + b*(c*sin[e + f*x])^n)^p, x], x] /; FreeQ[{a, b, c, e, f
, n}, x] && (IGtQ[p, 0] || (EqQ[p, -1] && IntegerQ[n]))
```

Rubi steps

$$\int \frac{1}{1-\cosh^5(x)}\,dx = \int \left(\frac{1}{5(1-\cosh(x))} + \frac{1}{5\left(1+\sqrt[5]{-1}\cosh(x)\right)} + \frac{1}{5\left(1-(-1)^{2/5}\cosh(x)\right)} + \frac{1}{5\left(1+(-1\right.}\right.$$

$$= \frac{1}{5}\int \frac{1}{1-\cosh(x)}\,dx + \frac{1}{5}\int \frac{1}{1+\sqrt[5]{-1}\cosh(x)}\,dx + \frac{1}{5}\int \frac{1}{1-(-1)^{2/5}\cosh(x)}\,dx + \frac{1}{5}$$

$$= -\frac{\sinh(x)}{5(1-\cosh(x))} + \frac{2}{5}\text{Subst}\left(\int \frac{1}{1+\sqrt[5]{-1}-\left(1-\sqrt[5]{-1}\right)x^2}\,dx, x, \tanh\left(\frac{x}{2}\right)\right) + \frac{2}{5}\text{Su}$$

$$= -\frac{2\tan^{-1}\left(\frac{\tanh\left(\frac{x}{2}\right)}{\sqrt{-\frac{1-(-1)^{2/5}}{1+(-1)^{2/5}}}}\right)}{5\sqrt{-1+(-1)^{4/5}}} + \frac{2\tan^{-1}\left(\sqrt{-\frac{1+(-1)^{4/5}}{1-(-1)^{4/5}}}\tanh\left(\frac{x}{2}\right)\right)}{5\sqrt{-1-(-1)^{3/5}}} + \frac{2\tanh^{-1}}{}$$

Mathematica [C] Result contains higher order function than in optimal. Order 9 vs. order 3 in optimal.
time = 0.06, size = 445, normalized size = 2.17

$$\frac{1}{5}\coth\left(\frac{x}{2}\right) + \frac{1}{10}\text{RootSum}\left[1+2\#1+8\#1^2+14\#1^3+30\#1^4+14\#1^5+8\#1^6+2\#1^7+\#1^8\&, \frac{x+2\log\left(-\cosh\left(\frac{x}{2}\right)-\sinh\left(\frac{x}{2}\right)+\cosh\left(\frac{x}{2}\right)\#1-\sinh\left(\frac{x}{2}\right)\#1\right)+4x\#1+8\log\left(-\cosh\left(\frac{x}{2}\right)-\sinh\left(\frac{x}{2}\right)+\cosh\left(\frac{x}{2}\right)\#1-\sinh\left(\frac{x}{2}\right)\#1\right)\#1+15x\#1^2+30\log\left(-\cosh\left(\frac{x}{2}\right)-\sinh\left(\frac{x}{2}\right)+\cosh\left(\frac{x}{2}\right)\#1-\sinh\left(\frac{x}{2}\right)\#1\right)\#1^2+40x\#1^3+80\log\left(-\cosh\left(\frac{x}{2}\right)-\sinh\left(\frac{x}{2}\right)+\cosh\left(\frac{x}{2}\right)\#1-\sinh\left(\frac{x}{2}\right)\#1\right)\#1^3+15x\#1^4+30\log\left(-\cosh\left(\frac{x}{2}\right)-\sinh\left(\frac{x}{2}\right)+\cosh\left(\frac{x}{2}\right)\#1-\sinh\left(\frac{x}{2}\right)\#1\right)\#1^4+4x\#1^5+8\log\left(-\cosh\left(\frac{x}{2}\right)-\sinh\left(\frac{x}{2}\right)+\cosh\left(\frac{x}{2}\right)\#1-\sinh\left(\frac{x}{2}\right)\#1\right)\#1^5+x\#1^6+2\log\left(-\cosh\left(\frac{x}{2}\right)-\sinh\left(\frac{x}{2}\right)+\cosh\left(\frac{x}{2}\right)\#1-\sinh\left(\frac{x}{2}\right)\#1\right)\#1^6}{1+8\#1+21\#1^2+60\#1^3+35\#1^4+24\#1^5+7\#1^6+4\#1^7}\&\right]$$

Antiderivative was successfully verified.

```
[In] Integrate[(1 - Cosh[x]^5)^(-1),x]
```

```
[Out] Coth[x/2]/5 + RootSum[1 + 2*#1 + 8*#1^2 + 14*#1^3 + 30*#1^4 + 14*#1^5 + 8*#
1^6 + 2*#1^7 + #1^8 & , (x + 2*Log[-Cosh[x/2] - Sinh[x/2] + Cosh[x/2]*#1 -
Sinh[x/2]*#1] + 4*x*#1 + 8*Log[-Cosh[x/2] - Sinh[x/2] + Cosh[x/2]*#1 - Sinh
[x/2]*#1]*#1 + 15*x*#1^2 + 30*Log[-Cosh[x/2] - Sinh[x/2] + Cosh[x/2]*#1 - S
inh[x/2]*#1]*#1^2 + 40*x*#1^3 + 80*Log[-Cosh[x/2] - Sinh[x/2] + Cosh[x/2]*#
1 - Sinh[x/2]*#1]*#1^3 + 15*x*#1^4 + 30*Log[-Cosh[x/2] - Sinh[x/2] + Cosh[x
/2]*#1 - Sinh[x/2]*#1]*#1^4 + 4*x*#1^5 + 8*Log[-Cosh[x/2] - Sinh[x/2] + Cos
h[x/2]*#1 - Sinh[x/2]*#1]*#1^5 + x*#1^6 + 2*Log[-Cosh[x/2] - Sinh[x/2] + Co
sh[x/2]*#1 - Sinh[x/2]*#1]*#1^6)/(1 + 8*#1 + 21*#1^2 + 60*#1^3 + 35*#1^4 +
24*#1^5 + 7*#1^6 + 4*#1^7) & ]/10
```

Maple [C] Result contains higher order function than in optimal. Order 9 vs. order 3.
time = 0.62, size = 64, normalized size = 0.31

method	result
default	$\frac{\left(\sum_{\_R=\mathrm{RootOf}\left(\_Z^{8}+10\_Z^{4}+5\right)}\frac{\left(-\_R^{6}+5\_R^{4}-5\_R^{2}+5\right)\ln\left(\tanh\left(\frac{x}{2}\right)-\_R\right)}{\_R^{7}+5\_R^{3}}\right)}{10}+\frac{1}{5\tanh\left(\frac{x}{2}\right)}$
risch	$\frac{2}{5(\mathrm{e}^{x}-1)}+\left(\sum_{\_R=\mathrm{RootOf}\left(1953125\_Z^{8}-156250\_Z^{6}+6250\_Z^{4}-125\_Z^{2}+1\right)}\_R\ln\left(-2343750\_R^{7}+234375\_R^{6}+\right.\right.$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(1/(1-cosh(x)^5),x,method=_RETURNVERBOSE)
```

```
[Out] 1/10*sum((-_R^6+5*_R^4-5*_R^2+5)/(_R^7+5*_R^3)*ln(tanh(1/2*x)-_R),_R=RootOf
(_Z^8+10*_Z^4+5))+1/5/tanh(1/2*x)
```

Maxima [F]
time = 0.00, size = 0, normalized size = 0.00

Failed to integrate

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(1-cosh(x)^5),x, algorithm="maxima")
```

```
[Out] 2/5/(e^x - 1) + integrate(2/5*(e^(7*x) + 4*e^(6*x) + 15*e^(5*x) + 40*e^(4*x
) + 15*e^(3*x) + 4*e^(2*x) + e^x)/(e^(8*x) + 2*e^(7*x) + 8*e^(6*x) + 14*e^(
5*x) + 30*e^(4*x) + 14*e^(3*x) + 8*e^(2*x) + 2*e^x + 1), x)
```

Fricas [B] Leaf count of result is larger than twice the leaf count of optimal. 3260 vs. 2(137) = 274.
time = 0.53, size = 3260, normalized size = 15.90

Too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(1-cosh(x)^5),x, algorithm="fricas")
```

```
[Out] 1/8000*(8*sqrt(10)*sqrt(2*sqrt(10)*(2*sqrt(5) - 5)*sqrt(sqrt(5) + 5) - 20*s
qrt(5) + 60)*((sqrt(5) - 1)*e^x - sqrt(5) + 1)*(40*sqrt(5) + 200)^(1/4)*sqr
t(2*sqrt(5) + 5)*sqrt(sqrt(5) + 5)*arctan(1/40*sqrt(10)*((sqrt(5) - 5)*e^x
- sqrt(5) - 1)*sqrt(2*sqrt(5) + 5)*sqrt(sqrt(5) + 5) + 1/400*sqrt(10)*(sqrt
(10)*((sqrt(5) - 5)*e^x - 2*sqrt(5))*sqrt(2*sqrt(5) + 5)*sqrt(sqrt(5) + 5)
+ 10*((sqrt(5) - 1)*e^x + sqrt(5) + 1)*sqrt(2*sqrt(5) + 5))*sqrt(sqrt(5) +
5) - 1/64000*(80*sqrt(10)*sqrt(2*sqrt(5) + 5)*sqrt(sqrt(5) + 5)*(sqrt(5) -
5) + 8*sqrt(10)*(sqrt(10)*sqrt(2*sqrt(5) + 5)*sqrt(sqrt(5) + 5)*(sqrt(5) -
5) + 10*sqrt(2*sqrt(5) + 5)*(sqrt(5) - 1))*sqrt(sqrt(5) + 5) - sqrt(2*sqrt(
10)*(2*sqrt(5) - 5)*sqrt(sqrt(5) + 5) - 20*sqrt(5) + 60)*((sqrt(10)*sqrt(2*
sqrt(5) + 5)*sqrt(sqrt(5) + 5)*(sqrt(5) - 3) + 2*(3*sqrt(5) - 7)*sqrt(2*sqr
t(5) + 5))*(40*sqrt(5) + 200)^(3/4) + 4*(sqrt(10)*sqrt(2*sqrt(5) + 5)*sqrt(
sqrt(5) + 5)*(sqrt(5) - 5) + 10*sqrt(2*sqrt(5) + 5)*(sqrt(5) - 1))*(40*sqrt
(5) + 200)^(1/4)) + 1600*sqrt(2*sqrt(5) + 5))*sqrt(-20*sqrt(10)*sqrt(sqrt(5
) + 5)*(sqrt(5) - 5) + 200*(sqrt(5) + 1)*e^x + 2*(sqrt(10)*(sqrt(5)*e^x - s
qrt(5) + 5)*sqrt(sqrt(5) + 5) - 5*sqrt(5) + 25)*sqrt(2*sqrt(10)*(2*sqrt(5)
- 5)*sqrt(sqrt(5) + 5) - 20*sqrt(5) + 60)*(40*sqrt(5) + 200)^(1/4) + 400*e^
(2*x) + 400) - 1/16000*sqrt(2*sqrt(10)*(2*sqrt(5) - 5)*sqrt(sqrt(5) + 5) -
20*sqrt(5) + 60)*((sqrt(10)*(5*(sqrt(5) - 3)*e^x - 2*sqrt(5))*sqrt(2*sqrt(5
) + 5)*sqrt(sqrt(5) + 5) + 10*((3*sqrt(5) - 7)*e^x + 2)*sqrt(2*sqrt(5) + 5)
)*(40*sqrt(5) + 200)^(3/4) + 20*(sqrt(10)*((sqrt(5) - 5)*e^x - 2*sqrt(5))*s
qrt(2*sqrt(5) + 5)*sqrt(sqrt(5) + 5) + 10*((sqrt(5) - 1)*e^x + sqrt(5) + 1)
*sqrt(2*sqrt(5) + 5))*(40*sqrt(5) + 200)^(1/4)) + 1/4*sqrt(2*sqrt(5) + 5)*(
sqrt(5) + 2*e^x + 1)) + 8*sqrt(10)*sqrt(2*sqrt(10)*(2*sqrt(5) - 5)*sqrt(sqr
t(5) + 5) - 20*sqrt(5) + 60)*((sqrt(5) - 1)*e^x - sqrt(5) + 1)*(40*sqrt(5)
+ 200)^(1/4)*sqrt(2*sqrt(5) + 5)*sqrt(sqrt(5) + 5)*arctan(-1/40*sqrt(10)*((
sqrt(5) - 5)*e^x - sqrt(5) - 1)*sqrt(2*sqrt(5) + 5)*sqrt(sqrt(5) + 5) - 1/4
00*sqrt(10)*(sqrt(10)*((sqrt(5) - 5)*e^x - 2*sqrt(5))*sqrt(2*sqrt(5) + 5)*s
qrt(sqrt(5) + 5) + 10*((sqrt(5) - 1)*e^x + sqrt(5) + 1)*sqrt(2*sqrt(5) + 5)
)*sqrt(sqrt(5) + 5) + 1/64000*(80*sqrt(10)*sqrt(2*sqrt(5) + 5)*sqrt(sqrt(5)
 + 5)*(sqrt(5) - 5) + 8*sqrt(10)*(sqrt(10)*sqrt(2*sqrt(5) + 5)*sqrt(sqrt(5)
 + 5)*(sqrt(5) - 5) + 10*sqrt(2*sqrt(5) + 5)*(sqrt(5) - 1))*sqrt(sqrt(5) +
5) + sqrt(2*sqrt(10)*(2*sqrt(5) - 5)*sqrt(sqrt(5) + 5) - 20*sqrt(5) + 60)*(
(sqrt(10)*sqrt(2*sqrt(5) + 5)*sqrt(sqrt(5) + 5)*(sqrt(5) - 3) + 2*(3*sqrt(5
) - 7)*sqrt(2*sqrt(5) + 5))*(40*sqrt(5) + 200)^(3/4) + 4*(sqrt(10)*sqrt(2*s
qrt(5) + 5)*sqrt(sqrt(5) + 5)*(sqrt(5) - 5) + 10*sqrt(2*sqrt(5) + 5)*(sqrt(
5) - 1))*(40*sqrt(5) + 200)^(1/4)) + 1600*sqrt(2*sqrt(5) + 5))*sqrt(-20*sqr
t(10)*sqrt(sqrt(5) + 5)*(sqrt(5) - 5) + 200*(sqrt(5) + 1)*e^x - 2*(sqrt(10)
*(sqrt(5)*e^x - sqrt(5) + 5)*sqrt(sqrt(5) + 5) - 5*sqrt(5) + 25)*sqrt(2*sqr
t(10)*(2*sqrt(5) - 5)*sqrt(sqrt(5) + 5) - 20*sqrt(5) + 60)*(40*sqrt(5) + 20
0)^(1/4) + 400*e^(2*x) + 400) - 1/16000*sqrt(2*sqrt(10)*(2*sqrt(5) - 5)*sqr
```

```
t(sqrt(5) + 5) - 20*sqrt(5) + 60)*((sqrt(10)*(5*(sqrt(5) - 3)*e^x - 2*sqrt(
5))*sqrt(2*sqrt(5) + 5)*sqrt(sqrt(5) + 5) + 10*((3*sqrt(5) - 7)*e^x + 2)*sq
rt(2*sqrt(5) + 5))*(40*sqrt(5) + 200)^(3/4) + 20*(sqrt(10)*((sqrt(5) - 5)*e
^x - 2*sqrt(5))*sqrt(2*sqrt(5) + 5)*sqrt(sqrt(5) + 5) + 10*((sqrt(5) - 1)*e
^x + sqrt(5) + 1)*sqrt(2*sqrt(5) + 5))*(40*sqrt(5) + 200)^(1/4)) - 1/4*sqrt
(2*sqrt(5) + 5)*(sqrt(5) + 2*e^x + 1)) + 4*((sqrt(5) + 1)*e^x - sqrt(5) - 1
)*sqrt(-(2*sqrt(5) + 5)*sqrt(-40*sqrt(5) + 200) + 20*sqrt(5) + 60)*sqrt(-2*
sqrt(5) + 5)*(-40*sqrt(5) + 200)^(3/4)*arctan(-1/32000*((20*(3*sqrt(5) + 7)
*e^x + (5*(sqrt(5) + 3)*e^x - 2*sqrt(5))*sqrt(-40*sqrt(5) + 200) - 40)*(-40
*sqrt(5) + 200)^(3/4) + 20*(20*(sqrt(5) + 1)*e^x + ((sqrt(5) + 5)*e^x - 2*s
qrt(5))*sqrt(-40*sqrt(5) + 200) + 20*sqrt(5) - 20)*(-40*sqrt(5) + 200)^(1/4
))*sqrt(-(2*sqrt(5) + 5)*sqrt(-40*sqrt(5) + 200) + 20*sqrt(5) + 60)*sqrt(-2
*sqrt(5) + 5) + 1/128000*((((sqrt(5) + 3)*sqrt(-40*sqrt(5) + 200) + 12*sqrt
(5) + 28)*(-40*sqrt(5) + 200)^(3/4) + 4*((sqrt(5) + 5)*sqrt(-40*sqrt(5) + 2
00) + 20*sqrt(5) + 20)*(-40*sqrt(5) + 200)^(1/4))*sqrt(-(2*sqrt(5) + 5)*sqr
t(-40*sqrt(5) + 200) + 20*sqrt(5) + 60)*sqrt(-2*sqrt(5) + 5) + 4*(((sqrt(5)
 + 5)*sqrt(-40*sqrt(5) + 200) + 20*sqrt(5) + 20)*sqrt(-40*sqrt(5) + 200) +
20*(sqrt(5) + 5)*sqrt(-40*sqrt(5) + 200) - 800)*sqrt(-2*sqrt(5) + 5))*sqrt(
-200*(sqrt(5) - 1)*e^x + ((sqrt(5)*e^x - sqrt(5) - 5)*sqrt(-40*sqrt(5) + 20
0) - 10*sqrt(5) - 50)*sqrt(-(2*sqrt(5) + 5)*sqrt(-40*sqrt(5) + 200) + 20*sq
rt(5) + 60)*(-40*sqrt(5) + 200)^(1/4) + 10*(sqrt(5) + 5)*sqrt(-40*sqrt(5) +
 200) + 400*e^(2*x) + 400) - 1/1600*(20*((sqrt(5) + 5)*e^x - sqrt(5) + 1)*s
qrt(-40*sqrt(5) + 200) + (20*(sqrt(5) + 1)*e^x + ((sqrt(5) + 5)*e^x - 2*sqr
t(5))*sqrt(-40*sqrt(5) + 200) + 20*sqrt(5) - 20)*sqrt(-40*sqrt(5) + 200) +
400*sqrt(5) - 800*e^x - 400)*sqrt(-2*sqrt(5) + 5)) + 4*((sqrt(5) + 1)*e^x -
 sqrt(5) - 1)*sqrt(-(2*sqrt(5) + 5)*sqrt(-40*sq...
```

Sympy [F(-1)] Timed out
time = 0.00, size = 0, normalized size = 0.00

Timed out

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(1-cosh(x)**5),x)
```

```
[Out] Timed out
```

Giac [F]
time = 0.00, size = 0, normalized size = 0.00

could not integrate

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(1-cosh(x)^5),x, algorithm="giac")
```

```
[Out] sage0*x
```

Mupad [**F(-1)**]
time = 0.00, size = -1, normalized size = -0.00

Hanged

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(-1/(cosh(x)^5 - 1),x)
[Out] \text{Hanged}
```

3.74 $\int \frac{1}{1-\cosh^6(x)}\,dx$

Optimal. Leaf size=71

$$\frac{\tanh^{-1}\left(\frac{\tanh(x)}{\sqrt{1+\sqrt[3]{-1}}}\right)}{3\sqrt{1+\sqrt[3]{-1}}}+\frac{\tanh^{-1}\left(\frac{\tanh(x)}{\sqrt{1-(-1)^{2/3}}}\right)}{3\sqrt{1-(-1)^{2/3}}}+\frac{\coth(x)}{3}$$

```
[Out] 1/3*coth(x)+1/3*arctanh(tanh(x)/(1+(-1)^(1/3))^(1/2))/(1+(-1)^(1/3))^(1/2)+
1/3*arctanh(tanh(x)/(1-(-1)^(2/3))^(1/2))/(1-(-1)^(2/3))^(1/2)
```

Rubi [A]
time = 0.08, antiderivative size = 71, normalized size of antiderivative = 1.00, number of steps used = 8, number of rules used = 6, integrand size = 10, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.600, Rules used = {3290, 3260, 212, 3254, 3852, 8}

$$\frac{\tanh^{-1}\left(\frac{\tanh(x)}{\sqrt{1+\sqrt[3]{-1}}}\right)}{3\sqrt{1+\sqrt[3]{-1}}}+\frac{\tanh^{-1}\left(\frac{\tanh(x)}{\sqrt{1-(-1)^{2/3}}}\right)}{3\sqrt{1-(-1)^{2/3}}}+\frac{\coth(x)}{3}$$

Antiderivative was successfully verified.

```
[In] Int[(1 - Cosh[x]^6)^(-1),x]
```

```
[Out] ArcTanh[Tanh[x]/Sqrt[1 + (-1)^(1/3)]]/(3*Sqrt[1 + (-1)^(1/3)]) + ArcTanh[Ta
nh[x]/Sqrt[1 - (-1)^(2/3)]]/(3*Sqrt[1 - (-1)^(2/3)]) + Coth[x]/3
```

Rule 8

```
Int[a_, x_Symbol] :> Simp[a*x, x] /; FreeQ[a, x]
```

Rule 212

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

Rule 3254

```
Int[(u_.)*((a_) + (b_.)*sin[(e_.) + (f_.)*(x_)]^2)^(p_), x_Symbol] :> Dist[
a^p, Int[ActivateTrig[u*cos[e + f*x]^(2*p)], x], x] /; FreeQ[{a, b, e, f, p
}, x] && EqQ[a + b, 0] && IntegerQ[p]
```

Rule 3260

```
Int[((a_) + (b_.)*sin[(e_.) + (f_.)*(x_)]^2)^(-1), x_Symbol] :> With[{ff =
FreeFactors[Tan[e + f*x], x]}, Dist[ff/f, Subst[Int[1/(a + (a + b)*ff^2*x^2
), x], x, Tan[e + f*x]/ff], x]] /; FreeQ[{a, b, e, f}, x]
```

Rule 3290

```
Int[((a_) + (b_.)*sin[(e_.) + (f_.)*(x_)]^(n_))^(-1), x_Symbol] :> Module[{
k}, Dist[2/(a*n), Sum[Int[1/(1 - Sin[e + f*x]^2/((-1)^(4*(k/n))*Rt[-a/b, n/
2])), x], {k, 1, n/2}], x]] /; FreeQ[{a, b, e, f}, x] && IntegerQ[n/2]
```

Rule 3852

```
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]
```

Rubi steps

$$\int \frac{1}{1-\cosh^6(x)}\,dx = \frac{1}{3}\int \frac{1}{1-\cosh^2(x)}\,dx + \frac{1}{3}\int \frac{1}{1+\sqrt[3]{-1}\cosh^2(x)}\,dx + \frac{1}{3}\int \frac{1}{1-(-1)^{2/3}\cosh^2(x)}\,dx$$

$$= -\left(\frac{1}{3}\int \operatorname{csch}^2(x)\,dx\right) + \frac{1}{3}\text{Subst}\left(\int \frac{1}{1-\left(1+\sqrt[3]{-1}\right)x^2}\,dx, x, \coth(x)\right) + \frac{1}{3}\text{Subst}\Bigg($$

$$= \frac{\tanh^{-1}\left(\frac{\tanh(x)}{\sqrt{1+\sqrt[3]{-1}}}\right)}{3\sqrt{1+\sqrt[3]{-1}}} + \frac{\tanh^{-1}\left(\frac{\tanh(x)}{\sqrt{1-(-1)^{2/3}}}\right)}{3\sqrt{1-(-1)^{2/3}}} + \frac{1}{3}i\text{Subst}\left(\int 1\,dx, x, -i\cot\right.$$

$$= \frac{\tanh^{-1}\left(\frac{\tanh(x)}{\sqrt{1+\sqrt[3]{-1}}}\right)}{3\sqrt{1+\sqrt[3]{-1}}} + \frac{\tanh^{-1}\left(\frac{\tanh(x)}{\sqrt{1-(-1)^{2/3}}}\right)}{3\sqrt{1-(-1)^{2/3}}} + \frac{\coth(x)}{3}$$

Mathematica [C] Result contains complex when optimal does not.
time = 0.18, size = 111, normalized size = 1.56

$$-\frac{(15+8\cosh(2x)+\cosh(4x))\sinh(x)\left(-6\cosh(x)+\sqrt[4]{-3}\left(\left(3i+\sqrt{3}\right)\text{ArcTan}\left(\frac{(-1)^{3/4}\left(-i+\sqrt{3}\right)\tanh(x)}{2\sqrt[4]{3}}\right)+\left(3+i\sqrt{3}\right)\text{ArcTan}\left(\frac{1}{2}\sqrt[4]{-\frac{1}{3}}\left(i+\sqrt{3}\right)\tanh(x)\right)\right)\sinh(x)\right)}{144\left(-1+\cosh^6(x)\right)}$$

Antiderivative was successfully verified.

```
[In] Integrate[(1 - Cosh[x]^6)^(-1),x]
```

```
[Out] -1/144*((15 + 8*Cosh[2*x] + Cosh[4*x])*Sinh[x]*(-6*Cosh[x] + (-3)^(1/4)*((3
*I + Sqrt[3])*ArcTan[((-1)^(3/4)*(-I + Sqrt[3])*Tanh[x])/(2*3^(1/4))] + (3
+ I*Sqrt[3])*ArcTan[((-1/3)^(1/4)*(I + Sqrt[3])*Tanh[x])/2])*Sinh[x]))/(-1
+ Cosh[x]^6)
```

Maple [B] Leaf count of result is larger than twice the leaf count of optimal. 381 vs. $2(49) = 98$.
time = 0.62, size = 382, normalized size = 5.38

method	result
risch	$\frac{2}{3(\mathrm{e}^{2x}-1)}+\left(\sum_{\_R=\mathrm{RootOf}(3888\_Z^4-108\_Z^2+1)}\_R\ln\left(-1296\_R^3+216\_R^2+\mathrm{e}^{2x}-1\right)\right)$
default	$\frac{\tanh(\frac{x}{2})}{6}+\frac{1}{6\tanh(\frac{x}{2})}+\frac{3^{\frac{3}{4}}\sqrt{2}\left(\ln\left(\frac{\tanh^2(\frac{x}{2})+\frac{3^{\frac{3}{4}}\tanh(\frac{x}{2})\sqrt{2}}{3}+\frac{\sqrt{3}}{3}}{\tanh^2(\frac{x}{2})-\frac{3^{\frac{3}{4}}\tanh(\frac{x}{2})\sqrt{2}}{3}+\frac{\sqrt{3}}{3}}\right)+2\arctan\left(\sqrt{2}\,3^{\frac{1}{4}}\tanh(\frac{x}{2})+1\right)+2\arctan\left(\sqrt{2}\right.\right.}{72}$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(1/(1-cosh(x)^6),x,method=_RETURNVERBOSE)
```

```
[Out] 1/6*tanh(1/2*x)+1/6/tanh(1/2*x)+1/72*3^(3/4)*2^(1/2)*(ln((tanh(1/2*x)^2+1/3
*3^(3/4)*tanh(1/2*x)*2^(1/2)+1/3*3^(1/2))/(tanh(1/2*x)^2-1/3*3^(3/4)*tanh(1
/2*x)*2^(1/2)+1/3*3^(1/2)))+2*arctan(2^(1/2)*3^(1/4)*tanh(1/2*x)+1)+2*arcta
n(2^(1/2)*3^(1/4)*tanh(1/2*x)-1))-1/24*3^(1/4)*2^(1/2)*(ln((tanh(1/2*x)^2-1
/3*3^(3/4)*tanh(1/2*x)*2^(1/2)+1/3*3^(1/2))/(tanh(1/2*x)^2+1/3*3^(3/4)*tanh
(1/2*x)*2^(1/2)+1/3*3^(1/2)))+2*arctan(2^(1/2)*3^(1/4)*tanh(1/2*x)+1)+2*arc
tan(2^(1/2)*3^(1/4)*tanh(1/2*x)-1))+1/24*3^(1/4)*2^(1/2)*(ln((tanh(1/2*x)^2
+2^(1/2)*3^(1/4)*tanh(1/2*x)+3^(1/2))/(tanh(1/2*x)^2-2^(1/2)*3^(1/4)*tanh(1
/2*x)+3^(1/2)))+2*arctan(1/3*3^(3/4)*tanh(1/2*x)*2^(1/2)+1)+2*arctan(1/3*3^
(3/4)*tanh(1/2*x)*2^(1/2)-1))-1/72*3^(3/4)*2^(1/2)*(ln((tanh(1/2*x)^2-2^(1/
2)*3^(1/4)*tanh(1/2*x)+3^(1/2))/(tanh(1/2*x)^2+2^(1/2)*3^(1/4)*tanh(1/2*x)+
3^(1/2)))+2*arctan(1/3*3^(3/4)*tanh(1/2*x)*2^(1/2)+1)+2*arctan(1/3*3^(3/4)*
tanh(1/2*x)*2^(1/2)-1))
```

Maxima [F]
time = 0.00, size = 0, normalized size = 0.00

Failed to integrate

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(1-cosh(x)^6),x, algorithm="maxima")
```

```
[Out] 2/3/(e^(2*x) - 1) + integrate(1/3*(e^(3*x) + 4*e^(2*x) + e^x)/(e^(4*x) + 2*
e^(3*x) + 6*e^(2*x) + 2*e^x + 1), x) - integrate(1/3*(e^(3*x) - 4*e^(2*x) +
 e^x)/(e^(4*x) - 2*e^(3*x) + 6*e^(2*x) - 2*e^x + 1), x)
```

Fricas [B] Leaf count of result is larger than twice the leaf count of optimal. 694 vs. $2(49) = 98$.
time = 0.41, size = 694, normalized size = 9.77

[illegible]

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(1-cosh(x)^6),x, algorithm="fricas")
```

```
[Out] 1/144*(4*(12^(1/4)*sqrt(6)*e^(2*x) - 12^(1/4)*sqrt(6))*sqrt(-4*sqrt(3) + 8)
*arctan((sqrt(3) + 2)*e^(2*x) + 1/216*sqrt(6*(12^(1/4)*sqrt(6)*(sqrt(3) + 3
)*e^(2*x) + 12^(1/4)*sqrt(6)*(5*sqrt(3) + 9))*sqrt(-4*sqrt(3) + 8) + 144*sq
rt(3) + 36*e^(4*x) + 144*e^(2*x) + 252)*((12^(3/4)*sqrt(6)*(sqrt(3) + 3) +
3*12^(1/4)*sqrt(6)*(sqrt(3) + 3))*sqrt(-4*sqrt(3) + 8) - 36*sqrt(3) - 72) +
 2/3*sqrt(3)*(2*sqrt(3) - 3) + 1/36*(12^(3/4)*sqrt(6)*(sqrt(3) - 3) - (12^(
3/4)*sqrt(6)*(sqrt(3) + 3) + 3*12^(1/4)*sqrt(6)*(sqrt(3) + 3))*e^(2*x) + 3*
12^(1/4)*sqrt(6)*(sqrt(3) - 3))*sqrt(-4*sqrt(3) + 8) + 2*sqrt(3) - 4) + 4*(
12^(1/4)*sqrt(6)*e^(2*x) - 12^(1/4)*sqrt(6))*sqrt(-4*sqrt(3) + 8)*arctan(-(
sqrt(3) + 2)*e^(2*x) + 1/216*sqrt(-6*(12^(1/4)*sqrt(6)*(sqrt(3) + 3)*e^(2*x
) + 12^(1/4)*sqrt(6)*(5*sqrt(3) + 9))*sqrt(-4*sqrt(3) + 8) + 144*sqrt(3) +
36*e^(4*x) + 144*e^(2*x) + 252)*((12^(3/4)*sqrt(6)*(sqrt(3) + 3) + 3*12^(1/
4)*sqrt(6)*(sqrt(3) + 3))*sqrt(-4*sqrt(3) + 8) + 36*sqrt(3) + 72) - 2/3*sqr
t(3)*(2*sqrt(3) - 3) + 1/36*(12^(3/4)*sqrt(6)*(sqrt(3) - 3) - (12^(3/4)*sqr
t(6)*(sqrt(3) + 3) + 3*12^(1/4)*sqrt(6)*(sqrt(3) + 3))*e^(2*x) + 3*12^(1/4)
*sqrt(6)*(sqrt(3) - 3))*sqrt(-4*sqrt(3) + 8) - 2*sqrt(3) + 4) - (12^(1/4)*s
qrt(6)*(sqrt(3) + 2)*e^(2*x) - 12^(1/4)*sqrt(6)*(sqrt(3) + 2))*sqrt(-4*sqrt
(3) + 8)*log(6*(12^(1/4)*sqrt(6)*(sqrt(3) + 3)*e^(2*x) + 12^(1/4)*sqrt(6)*(
5*sqrt(3) + 9))*sqrt(-4*sqrt(3) + 8) + 144*sqrt(3) + 36*e^(4*x) + 144*e^(2*
x) + 252) + (12^(1/4)*sqrt(6)*(sqrt(3) + 2)*e^(2*x) - 12^(1/4)*sqrt(6)*(sqr
t(3) + 2))*sqrt(-4*sqrt(3) + 8)*log(-6*(12^(1/4)*sqrt(6)*(sqrt(3) + 3)*e^(2
*x) + 12^(1/4)*sqrt(6)*(5*sqrt(3) + 9))*sqrt(-4*sqrt(3) + 8) + 144*sqrt(3)
+ 36*e^(4*x) + 144*e^(2*x) + 252) + 96)/(e^(2*x) - 1)
```

Sympy [B] Leaf count of result is larger than twice the leaf count of optimal. 632 vs. $2(65) = 130$.
time = 10.45, size = 632, normalized size = 8.90

[illegible]

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(1-cosh(x)**6),x)
```

```
[Out] -sqrt(2)*3**(1/4)*log(4*tanh(x/2)**2 - 4*sqrt(2)*3**(1/4)*tanh(x/2) + 4*sqr
t(3))/24 - sqrt(2)*3**(3/4)*log(4*tanh(x/2)**2 - 4*sqrt(2)*3**(1/4)*tanh(x/
2) + 4*sqrt(3))/72 + sqrt(2)*3**(3/4)*log(4*tanh(x/2)**2 + 4*sqrt(2)*3**(1/
4)*tanh(x/2) + 4*sqrt(3))/72 + sqrt(2)*3**(1/4)*log(4*tanh(x/2)**2 + 4*sqrt
(2)*3**(1/4)*tanh(x/2) + 4*sqrt(3))/24 - sqrt(2)*3**(1/4)*log(36*tanh(x/2)*
*2 - 12*sqrt(2)*3**(3/4)*tanh(x/2) + 12*sqrt(3))/24 - sqrt(2)*3**(3/4)*log(
36*tanh(x/2)**2 - 12*sqrt(2)*3**(3/4)*tanh(x/2) + 12*sqrt(3))/72 + sqrt(2)*
3**(3/4)*log(36*tanh(x/2)**2 + 12*sqrt(2)*3**(3/4)*tanh(x/2) + 12*sqrt(3))/
72 + sqrt(2)*3**(1/4)*log(36*tanh(x/2)**2 + 12*sqrt(2)*3**(3/4)*tanh(x/2) +
 12*sqrt(3))/24 + tanh(x/2)/6 - sqrt(2)*3**(1/4)*atan(sqrt(2)*3**(1/4)*tanh
(x/2) - 1)/12 + sqrt(2)*3**(3/4)*atan(sqrt(2)*3**(1/4)*tanh(x/2) - 1)/36 -
sqrt(2)*3**(1/4)*atan(sqrt(2)*3**(1/4)*tanh(x/2) + 1)/12 + sqrt(2)*3**(3/4)
*atan(sqrt(2)*3**(1/4)*tanh(x/2) + 1)/36 - sqrt(2)*3**(3/4)*atan(sqrt(2)*3*
*(3/4)*tanh(x/2)/3 - 1)/36 + sqrt(2)*3**(1/4)*atan(sqrt(2)*3**(3/4)*tanh(x/
2)/3 - 1)/12 - sqrt(2)*3**(3/4)*atan(sqrt(2)*3**(3/4)*tanh(x/2)/3 + 1)/36 +
 sqrt(2)*3**(1/4)*atan(sqrt(2)*3**(3/4)*tanh(x/2)/3 + 1)/12 + 1/(6*tanh(x/2
))
```

Giac [A]
time = 0.43, size = 10, normalized size = 0.14

$$\frac{2}{3\left(e^{(2x)}-1\right)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(1-cosh(x)^6),x, algorithm="giac")
```

```
[Out] 2/3/(e^(2*x) - 1)
```

Mupad [B]
time = 4.52, size = 329, normalized size = 4.63

$$\ln\left(\frac{1061158912\,e^{2x}}{27}+\sqrt{\frac{1}{72}-\frac{\sqrt{3}\,1\mathrm{i}}{216}}\left(\frac{2539651072\,e^{2x}}{9}-\sqrt{\frac{1}{72}-\frac{\sqrt{3}\,1\mathrm{i}}{216}}\left(\frac{21515730944\,e^{2x}}{9}+\sqrt{\frac{1}{72}-\frac{\sqrt{3}\,1\mathrm{i}}{216}}\left(19788726272\,e^{2x}+2864709632\right)+\frac{3870294016}{9}\right)+\frac{548405248}{27}\right)+\frac{351797248}{81}\right)\sqrt{\frac{1}{72}-\frac{\sqrt{3}\,1\mathrm{i}}{216}}+\ln\left(\frac{1061158912\,e^{2x}}{27}+\sqrt{\frac{1}{72}+\frac{\sqrt{3}\,1\mathrm{i}}{216}}\left(\frac{2539651072\,e^{2x}}{9}-\sqrt{\frac{1}{72}+\frac{\sqrt{3}\,1\mathrm{i}}{216}}\left(\frac{21515730944\,e^{2x}}{9}+\sqrt{\frac{1}{72}+\frac{\sqrt{3}\,1\mathrm{i}}{216}}\left(19788726272\,e^{2x}+2864709632\right)+\frac{3870294016}{9}\right)+\frac{548405248}{27}\right)+\frac{351797248}{81}\right)\sqrt{\frac{1}{72}+\frac{\sqrt{3}\,1\mathrm{i}}{216}}-\ln\left(\frac{1061158912\,e^{2x}}{27}-\sqrt{\frac{1}{72}-\frac{\sqrt{3}\,1\mathrm{i}}{216}}\left(\frac{2539651072\,e^{2x}}{9}+\sqrt{\frac{1}{72}-\frac{\sqrt{3}\,1\mathrm{i}}{216}}\left(\frac{21515730944\,e^{2x}}{9}-\sqrt{\frac{1}{72}-\frac{\sqrt{3}\,1\mathrm{i}}{216}}\left(19788726272\,e^{2x}+2864709632\right)+\frac{3870294016}{9}\right)+\frac{548405248}{27}\right)+\frac{351797248}{81}\right)\sqrt{\frac{1}{72}-\frac{\sqrt{3}\,1\mathrm{i}}{216}}-\ln\left(\frac{1061158912\,e^{2x}}{27}-\sqrt{\frac{1}{72}+\frac{\sqrt{3}\,1\mathrm{i}}{216}}\left(\frac{2539651072\,e^{2x}}{9}+\sqrt{\frac{1}{72}+\frac{\sqrt{3}\,1\mathrm{i}}{216}}\left(\frac{21515730944\,e^{2x}}{9}-\sqrt{\frac{1}{72}+\frac{\sqrt{3}\,1\mathrm{i}}{216}}\left(19788726272\,e^{2x}+2864709632\right)+\frac{3870294016}{9}\right)+\frac{548405248}{27}\right)+\frac{351797248}{81}\right)\sqrt{\frac{1}{72}+\frac{\sqrt{3}\,1\mathrm{i}}{216}}+\frac{2}{3\left(e^{2x}-1\right)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(-1/(cosh(x)^6 - 1),x)
```

```
[Out] log((1061158912*exp(2*x))/27 + (1/72 - (3^(1/2)*1i)/216)^(1/2)*((2539651072
*exp(2*x))/9 - (1/72 - (3^(1/2)*1i)/216)^(1/2)*((21515730944*exp(2*x))/9 +
(1/72 - (3^(1/2)*1i)/216)^(1/2)*(19788726272*exp(2*x) + 2864709632) + 38702
94016/9) + 548405248/27) + 351797248/81)*(1/72 - (3^(1/2)*1i)/216)^(1/2) +
log((1061158912*exp(2*x))/27 + ((3^(1/2)*1i)/216 + 1/72)^(1/2)*((2539651072
*exp(2*x))/9 - ((3^(1/2)*1i)/216 + 1/72)^(1/2)*((21515730944*exp(2*x))/9 +
((3^(1/2)*1i)/216 + 1/72)^(1/2)*(19788726272*exp(2*x) + 2864709632) + 38702
94016/9) + 548405248/27) + 351797248/81)*((3^(1/2)*1i)/216 + 1/72)^(1/2) -
log((1061158912*exp(2*x))/27 - (1/72 - (3^(1/2)*1i)/216)^(1/2)*((2539651072
```

```
*exp(2*x))/9 + (1/72 - (3^(1/2)*1i)/216)^(1/2)*((21515730944*exp(2*x))/9 -
(1/72 - (3^(1/2)*1i)/216)^(1/2)*(19788726272*exp(2*x) + 2864709632) + 38702
94016/9) + 548405248/27) + 351797248/81)*(1/72 - (3^(1/2)*1i)/216)^(1/2) -
log((1061158912*exp(2*x))/27 - ((3^(1/2)*1i)/216 + 1/72)^(1/2)*((2539651072
*exp(2*x))/9 + ((3^(1/2)*1i)/216 + 1/72)^(1/2)*((21515730944*exp(2*x))/9 -
((3^(1/2)*1i)/216 + 1/72)^(1/2)*(19788726272*exp(2*x) + 2864709632) + 38702
94016/9) + 548405248/27) + 351797248/81)*((3^(1/2)*1i)/216 + 1/72)^(1/2) +
2/(3*(exp(2*x) - 1))
```

3.75 $\int \frac{1}{1-\cosh^8(x)}\,dx$

Optimal. Leaf size=69

$$\frac{\tanh^{-1}\left(\frac{\tanh(x)}{\sqrt{1-i}}\right)}{4\sqrt{1-i}}+\frac{\tanh^{-1}\left(\frac{\tanh(x)}{\sqrt{1+i}}\right)}{4\sqrt{1+i}}+\frac{\tanh^{-1}\left(\frac{\tanh(x)}{\sqrt{2}}\right)}{4\sqrt{2}}+\frac{\coth(x)}{4}$$

```
[Out] 1/4*coth(x)+1/4*arctanh(tanh(x)/(1-I)^(1/2))/(1-I)^(1/2)+1/4*arctanh(tanh(x
)/(1+I)^(1/2))/(1+I)^(1/2)+1/8*arctanh(1/2*2^(1/2)*tanh(x))*2^(1/2)
```

Rubi [A]
time = 0.05, antiderivative size = 69, normalized size of antiderivative = 1.00, number of steps used = 10, number of rules used = 6, integrand size = 10, $\frac{\text{number of rules}}{\text{integrand size}} = 0.600$, Rules used = {3290, 3260, 212, 3254, 3852, 8}

$$\frac{\tanh^{-1}\left(\frac{\tanh(x)}{\sqrt{1-i}}\right)}{4\sqrt{1-i}}+\frac{\tanh^{-1}\left(\frac{\tanh(x)}{\sqrt{1+i}}\right)}{4\sqrt{1+i}}+\frac{\tanh^{-1}\left(\frac{\tanh(x)}{\sqrt{2}}\right)}{4\sqrt{2}}+\frac{\coth(x)}{4}$$

Antiderivative was successfully verified.

```
[In] Int[(1 - Cosh[x]^8)^(-1),x]
```

```
[Out] ArcTanh[Tanh[x]/Sqrt[1 - I]]/(4*Sqrt[1 - I]) + ArcTanh[Tanh[x]/Sqrt[1 + I]]
/(4*Sqrt[1 + I]) + ArcTanh[Tanh[x]/Sqrt[2]]/(4*Sqrt[2]) + Coth[x]/4
```

Rule 8

```
Int[a_, x_Symbol] :> Simp[a*x, x] /; FreeQ[a, x]
```

Rule 212

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

Rule 3254

```
Int[(u_.)*((a_) + (b_.)*sin[(e_.) + (f_.)*(x_)]^2)^(p_), x_Symbol] :> Dist[
a^p, Int[ActivateTrig[u*cos[e + f*x]^(2*p)], x], x] /; FreeQ[{a, b, e, f, p
}, x] && EqQ[a + b, 0] && IntegerQ[p]
```

Rule 3260

```
Int[((a_) + (b_.)*sin[(e_.) + (f_.)*(x_)]^2)^(-1), x_Symbol] :> With[{ff =
FreeFactors[Tan[e + f*x], x]}, Dist[ff/f, Subst[Int[1/(a + (a + b)*ff^2*x^2
```

```
), x], x, Tan[e + f*x]/ff], x]] /; FreeQ[{a, b, e, f}, x]
```

Rule 3290

```
Int[((a_) + (b_.)*sin[(e_.) + (f_.)*(x_)]^(n_))^(-1), x_Symbol] :> Module[{
k}, Dist[2/(a*n), Sum[Int[1/(1 - Sin[e + f*x]^2/((-1)^(4*(k/n))*Rt[-a/b, n/
2])), x], {k, 1, n/2}], x]] /; FreeQ[{a, b, e, f}, x] && IntegerQ[n/2]
```

Rule 3852

```
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]
```

Rubi steps

$$\begin{aligned}\int \frac{1}{1-\cosh^8(x)}\,dx &= \frac{1}{4}\int \frac{1}{1-\cosh^2(x)}\,dx+\frac{1}{4}\int \frac{1}{1-i\cosh^2(x)}\,dx+\frac{1}{4}\int \frac{1}{1+i\cosh^2(x)}\,dx+\frac{1}{4}\int \frac{1}{1+\mathrm{co}\ldots}\\ &= -\left(\frac{1}{4}\int \operatorname{csch}^2(x)\,dx\right)+\frac{1}{4}\mathrm{Subst}\left(\int \frac{1}{1-2x^2}\,dx,x,\coth(x)\right)+\frac{1}{4}\mathrm{Subst}\left(\int \frac{1}{1-(1+\ldots}\right.\\ &= \frac{\tanh^{-1}\left(\frac{\tanh(x)}{\sqrt{1-i}}\right)}{4\sqrt{1-i}}+\frac{\tanh^{-1}\left(\frac{\tanh(x)}{\sqrt{1+i}}\right)}{4\sqrt{1+i}}+\frac{\tanh^{-1}\left(\frac{\tanh(x)}{\sqrt{2}}\right)}{4\sqrt{2}}+\frac{1}{4}i\mathrm{Subst}(\int 1\,dx,x,\ldots\\ &= \frac{\tanh^{-1}\left(\frac{\tanh(x)}{\sqrt{1-i}}\right)}{4\sqrt{1-i}}+\frac{\tanh^{-1}\left(\frac{\tanh(x)}{\sqrt{1+i}}\right)}{4\sqrt{1+i}}+\frac{\tanh^{-1}\left(\frac{\tanh(x)}{\sqrt{2}}\right)}{4\sqrt{2}}+\frac{\coth(x)}{4}\end{aligned}$$

Mathematica [A]
time = 0.32, size = 64, normalized size = 0.93

$$\frac{1}{8}\left(\frac{2\tanh^{-1}\left(\frac{\tanh(x)}{\sqrt{1-i}}\right)}{\sqrt{1-i}}+\frac{2\tanh^{-1}\left(\frac{\tanh(x)}{\sqrt{1+i}}\right)}{\sqrt{1+i}}+\sqrt{2}\tanh^{-1}\left(\frac{\tanh(x)}{\sqrt{2}}\right)+2\coth(x)\right)$$

Antiderivative was successfully verified.

```
[In] Integrate[(1 - Cosh[x]^8)^(-1),x]
[Out] ((2*ArcTanh[Tanh[x]/Sqrt[1 - I]])/Sqrt[1 - I] + (2*ArcTanh[Tanh[x]/Sqrt[1 +
 I]])/Sqrt[1 + I] + Sqrt[2]*ArcTanh[Tanh[x]/Sqrt[2]] + 2*Coth[x])/8
```

Maple [C] Result contains higher order function than in optimal. Order 9 vs. order 3.
time = 0.74, size = 190, normalized size = 2.75

method	result
risch	$\frac{1}{2\,\mathrm{e}^{2x}-2}+\left(\sum_{\_R=\mathrm{RootOf}(8192\_Z^4-128\_Z^2+1)}\_R\ln\left(-2048\_R^3+256\_R^2+\mathrm{e}^{2x}-1\right)\right)+\frac{\sqrt{2}\,\ln\left(\mathrm{e}^{2x}+3-\right.}{16}$
default	$\frac{\tanh\left(\frac{x}{2}\right)}{8}+\frac{1}{8\tanh\left(\frac{x}{2}\right)}+\frac{\left(\sum_{\_R=\mathrm{RootOf}\left(2\_Z^4-2\_Z^2+1\right)}\_R\ln\left(2\tanh\left(\frac{x}{2}\right)\_R+\tanh^2\left(\frac{x}{2}\right)+1\right)\right)}{8}+\frac{\sqrt{2}\,\left(\ln\left(\frac{\tanh^2\left(\frac{x}{2}\right)+\tanh}{\tanh^2\left(\frac{x}{2}\right)-\tanh}\right.\right.}{}$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(1/(1-cosh(x)^8),x,method=_RETURNVERBOSE)
```

```
[Out] 1/8*tanh(1/2*x)+1/8/tanh(1/2*x)+1/8*sum(_R*ln(2*tanh(1/2*x)*_R+tanh(1/2*x)^
2+1),_R=RootOf(2*_Z^4-2*_Z^2+1))+1/32*2^(1/2)*(ln((tanh(1/2*x)^2+tanh(1/2*x
)*2^(1/2)+1)/(tanh(1/2*x)^2-tanh(1/2*x)*2^(1/2)+1))+2*arctan(tanh(1/2*x)*2^
(1/2)+1)+2*arctan(tanh(1/2*x)*2^(1/2)-1))-1/32*2^(1/2)*(ln((tanh(1/2*x)^2-t
anh(1/2*x)*2^(1/2)+1)/(tanh(1/2*x)^2+tanh(1/2*x)*2^(1/2)+1))+2*arctan(tanh(
1/2*x)*2^(1/2)+1)+2*arctan(tanh(1/2*x)*2^(1/2)-1))
```

Maxima [F]
time = 0.00, size = 0, normalized size = 0.00

Failed to integrate

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(1-cosh(x)^8),x, algorithm="maxima")
```

```
[Out] 1/16*sqrt(2)*log(-(2*sqrt(2) - e^(2*x) - 3)/(2*sqrt(2) + e^(2*x) + 3)) + 1/
2/(e^(2*x) - 1) + 8*integrate(e^(4*x)/(e^(8*x) + 4*e^(6*x) + 22*e^(4*x) + 4
*e^(2*x) + 1), x)
```

Fricas [B] Leaf count of result is larger than twice the leaf count of optimal. 713 vs. 2(42) = 84.
time = 0.43, size = 713, normalized size = 10.33

[illegible]

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(1-cosh(x)^8),x, algorithm="fricas")
```

```
[Out] 1/32*(4*(2^(1/4)*e^(2*x) - 2^(1/4))*sqrt(-2*sqrt(2) + 4)*arctan(1/14*(sqrt(
2)*(5*sqrt(2) + 6) + 8*sqrt(2) + 4)*e^(2*x) - 1/28*(2*sqrt(2)*(5*sqrt(2) +
6) - (2^(3/4)*(8*sqrt(2) + 11) + 2*2^(1/4)*(5*sqrt(2) + 6))*sqrt(-2*sqrt(2)
 + 4) + 16*sqrt(2) + 8)*sqrt((2^(3/4)*e^(2*x) + 2^(1/4)*(3*sqrt(2) + 4))*sq
```

```
rt(-2*sqrt(2) + 4) + 4*sqrt(2) + e^(4*x) + 2*e^(2*x) + 5) + 1/14*sqrt(2)*(3
*sqrt(2) - 2) - 1/28*((2^(3/4)*(8*sqrt(2) + 11) + 2*2^(1/4)*(5*sqrt(2) + 6)
)*e^(2*x) + 2^(3/4)*(2*sqrt(2) + 1) + 2*2^(1/4)*(3*sqrt(2) - 2))*sqrt(-2*sq
rt(2) + 4) + 1/7*sqrt(2) - 3/7) + 4*(2^(1/4)*e^(2*x) - 2^(1/4))*sqrt(-2*sqr
t(2) + 4)*arctan(-1/14*(sqrt(2)*(5*sqrt(2) + 6) + 8*sqrt(2) + 4)*e^(2*x) +
1/28*(2*sqrt(2)*(5*sqrt(2) + 6) + (2^(3/4)*(8*sqrt(2) + 11) + 2*2^(1/4)*(5*
sqrt(2) + 6))*sqrt(-2*sqrt(2) + 4) + 16*sqrt(2) + 8)*sqrt(-(2^(3/4)*e^(2*x)
 + 2^(1/4)*(3*sqrt(2) + 4))*sqrt(-2*sqrt(2) + 4) + 4*sqrt(2) + e^(4*x) + 2*
e^(2*x) + 5) - 1/14*sqrt(2)*(3*sqrt(2) - 2) - 1/28*((2^(3/4)*(8*sqrt(2) + 1
1) + 2*2^(1/4)*(5*sqrt(2) + 6))*e^(2*x) + 2^(3/4)*(2*sqrt(2) + 1) + 2*2^(1/
4)*(3*sqrt(2) - 2))*sqrt(-2*sqrt(2) + 4) - 1/7*sqrt(2) + 3/7) - (2^(1/4)*(s
qrt(2) + 1)*e^(2*x) - 2^(1/4)*(sqrt(2) + 1))*sqrt(-2*sqrt(2) + 4)*log((2^(3
/4)*e^(2*x) + 2^(1/4)*(3*sqrt(2) + 4))*sqrt(-2*sqrt(2) + 4) + 4*sqrt(2) + e
^(4*x) + 2*e^(2*x) + 5) + (2^(1/4)*(sqrt(2) + 1)*e^(2*x) - 2^(1/4)*(sqrt(2)
 + 1))*sqrt(-2*sqrt(2) + 4)*log(-(2^(3/4)*e^(2*x) + 2^(1/4)*(3*sqrt(2) + 4)
)*sqrt(-2*sqrt(2) + 4) + 4*sqrt(2) + e^(4*x) + 2*e^(2*x) + 5) + 2*(sqrt(2)*
e^(2*x) - sqrt(2))*log(-(2*(2*sqrt(2) - 3)*e^(2*x) + 12*sqrt(2) - e^(4*x) -
 17)/(e^(4*x) + 6*e^(2*x) + 1)) + 16)/(e^(2*x) - 1)
```

Sympy [**F(-1)**] Timed out
time = 0.00, size = 0, normalized size = 0.00

Timed out

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(1-cosh(x)**8),x)
```

```
[Out] Timed out
```

Giac [**A**]
time = 0.49, size = 45, normalized size = 0.65

$$\frac{1}{16}\,\sqrt{2}\,\log\left(-\frac{2\,\sqrt{2}\,-e^{(2\,x)}-3}{2\,\sqrt{2}\,+e^{(2\,x)}+3}\right)+\frac{1}{2\,(e^{(2\,x)}-1)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(1/(1-cosh(x)^8),x, algorithm="giac")
```

```
[Out] 1/16*sqrt(2)*log(-(2*sqrt(2) - e^(2*x) - 3)/(2*sqrt(2) + e^(2*x) + 3)) + 1/
2/(e^(2*x) - 1)
```

Mupad [**B**]
time = 2.63, size = 271, normalized size = 3.93

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(-1/(cosh(x)^8 - 1),x)
```

```
[Out] (2^(1/2)*log(582732658686033920*exp(2*x) + 706973263556771842^(1/2) + 4120
54214575915008*2^(1/2)*exp(2*x) + 99981117754441728))/16 - (2^(1/2)*log(706
97326355677184*2^(1/2) - 582732658686033920*exp(2*x) + 412054214575915008*2
^(1/2)*exp(2*x) - 99981117754441728))/16 + 1/(2*(exp(2*x) - 1)) - (2^(1/2)*
(1 - 1i)^(1/2)*log((70836483296067584 - 69311013991743488i) - 2^(1/2)*(1 -
1i)^(1/2)*(54684829282729984 - 21956972328779776i) - 2^(1/2)*(1 - 1i)^(1/2)
*exp(2*x)*(12296353929494528 - 271474128182050816i) - exp(2*x)*(15561343400
2538496 + 429723297714798592i)))/16 + (2^(1/2)*(1 - 1i)^(1/2)*log(2^(1/2)*(
1 - 1i)^(1/2)*(54684829282729984 - 21956972328779776i) - exp(2*x)*(15561343
4002538496 + 429723297714798592i) + 2^(1/2)*(1 - 1i)^(1/2)*exp(2*x)*(122963
53929494528 - 271474128182050816i) + (70836483296067584 - 69311013991743488
i)))/16 - (2^(1/2)*(1 + 1i)^(1/2)*log((70836483296067584 + 6931101399174348
8i) - 2^(1/2)*(1 + 1i)^(1/2)*(54684829282729984 + 21956972328779776i) - 2^(
1/2)*(1 + 1i)^(1/2)*exp(2*x)*(12296353929494528 + 271474128182050816i) - ex
p(2*x)*(155613434002538496 - 429723297714798592i)))/16 + (2^(1/2)*(1 + 1i)^
(1/2)*log(2^(1/2)*(1 + 1i)^(1/2)*(54684829282729984 + 21956972328779776i) -
 exp(2*x)*(155613434002538496 - 429723297714798592i) + 2^(1/2)*(1 + 1i)^(1/
2)*exp(2*x)*(12296353929494528 + 271474128182050816i) + (70836483296067584
+ 69311013991743488i)))/16
```

3.76 $\int \frac{\tanh(x)}{1+\cosh^2(x)}\,dx$

Optimal. Leaf size=15

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

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

Rubi [A]
time = 0.02, antiderivative size = 15, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 4, integrand size = 11, $\frac{\text{number of rules}}{\text{integrand size}} = 0.364$, Rules used = {3273, 36, 29, 31}

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

Antiderivative was successfully verified.

```
[In] Int[Tanh[x]/(1 + Cosh[x]^2),x]
```

```
[Out] Log[Cosh[x]] - Log[1 + Cosh[x]^2]/2
```

Rule 29

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

Rule 31

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

Rule 36

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

Rule 3273

```
Int[((a_) + (b_.)*sin[(e_.) + (f_.)*(x_)]^2)^(p_.)*tan[(e_.) + (f_.)*(x_)]^
(m_.), x_Symbol] :> With[{ff = FreeFactors[Sin[e + f*x]^2, x]}, Dist[ff^((m
 + 1)/2)/(2*f), Subst[Int[x^((m - 1)/2)*((a + b*ff*x)^p/(1 - ff*x)^((m + 1)
/2)), x], x, Sin[e + f*x]^2/ff], x]] /; FreeQ[{a, b, e, f, p}, x] && Intege
rQ[(m - 1)/2]
```

Rubi steps

$$\begin{aligned}\int \frac{\tanh(x)}{1+\cosh^2(x)}\,dx &= \frac{1}{2}\text{Subst}\left(\int \frac{1}{x(1+x)}\,dx, x, \cosh^2(x)\right)\\ &= \frac{1}{2}\text{Subst}\left(\int \frac{1}{x}\,dx, x, \cosh^2(x)\right) - \frac{1}{2}\text{Subst}\left(\int \frac{1}{1+x}\,dx, x, \cosh^2(x)\right)\\ &= \log(\cosh(x)) - \frac{1}{2}\log\left(1+\cosh^2(x)\right)\end{aligned}$$

Mathematica [A]
time = 0.01, size = 15, normalized size = 1.00

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

Antiderivative was successfully verified.

```
[In] Integrate[Tanh[x]/(1 + Cosh[x]^2),x]
[Out] Log[Cosh[x]] - Log[1 + Cosh[x]^2]/2
```

Maple [A]
time = 0.61, size = 14, normalized size = 0.93

method	result	size
derivativedivides	$\ln(\cosh(x)) - \frac{\ln(\cosh^2(x)+1)}{2}$	14
default	$\ln(\cosh(x)) - \frac{\ln(\cosh^2(x)+1)}{2}$	14
risch	$\ln(1+e^{2x}) - \frac{\ln(e^{4x}+6\,e^{2x}+1)}{2}$	24

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(tanh(x)/(cosh(x)^2+1),x,method=_RETURNVERBOSE)
[Out] ln(cosh(x))-1/2*ln(cosh(x)^2+1)
```

Maxima [A]
time = 0.26, size = 23, normalized size = 1.53

$$-\frac{1}{2}\log\left(6\,e^{(-2\,x)} + e^{(-4\,x)} + 1\right) + \log\left(e^{(-2\,x)} + 1\right)$$

Verification of antiderivative is not currently implemented for this CAS.

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

Fricas [B] Leaf count of result is larger than twice the leaf count of optimal. 47 vs. $2(13) = 26$.
time = 0.38, size = 47, normalized size = 3.13

$$-\frac{1}{2}\log\left(\frac{2\left(\cosh\left(x\right)^{2}+\sinh\left(x\right)^{2}+3\right)}{\cosh\left(x\right)^{2}-2\cosh\left(x\right)\sinh\left(x\right)+\sinh\left(x\right)^{2}}\right)+\log\left(\frac{2\cosh\left(x\right)}{\cosh\left(x\right)-\sinh\left(x\right)}\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(tanh(x)/(1+cosh(x)^2),x, algorithm="fricas")
[Out] -1/2*log(2*(cosh(x)^2 + sinh(x)^2 + 3)/(cosh(x)^2 - 2*cosh(x)*sinh(x) + sin
h(x)^2)) + log(2*cosh(x)/(cosh(x) - sinh(x)))
```

Sympy [F]
time = 0.00, size = 0, normalized size = 0.00

$$\int\frac{\tanh\left(x\right)}{\cosh^{2}\left(x\right)+1}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(tanh(x)/(1+cosh(x)**2),x)
[Out] Integral(tanh(x)/(cosh(x)**2 + 1), x)
```

Giac [A]
time = 0.42, size = 23, normalized size = 1.53

$$-\frac{1}{2}\log\left(e^{(4x)}+6e^{(2x)}+1\right)+\log\left(e^{(2x)}+1\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(tanh(x)/(1+cosh(x)^2),x, algorithm="giac")
[Out] -1/2*log(e^(4*x) + 6*e^(2*x) + 1) + log(e^(2*x) + 1)
```

Mupad [B]
time = 1.11, size = 27, normalized size = 1.80

$$\ln\left(-5184\,\mathrm{e}^{2x}-5184\right)-\frac{\ln\left(54\,\mathrm{e}^{2x}+9\,\mathrm{e}^{4x}+9\right)}{2}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(tanh(x)/(cosh(x)^2 + 1),x)
[Out] log(- 5184*exp(2*x) - 5184) - log(54*exp(2*x) + 9*exp(4*x) + 9)/2
```

3.77 $\int \sqrt{a+b\cosh^2(x)}\,\tanh(x)\,dx$

Optimal. Leaf size=39

$$-\sqrt{a}\,\tanh^{-1}\left(\frac{\sqrt{a+b\cosh^2(x)}}{\sqrt{a}}\right)+\sqrt{a+b\cosh^2(x)}$$

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

Rubi [A]
time = 0.05, antiderivative size = 39, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 4, integrand size = 15, $\frac{\text{number of rules}}{\text{integrand size}} = 0.267$, Rules used = {3273, 52, 65, 214}

$$\sqrt{a+b\cosh^2(x)}-\sqrt{a}\,\tanh^{-1}\left(\frac{\sqrt{a+b\cosh^2(x)}}{\sqrt{a}}\right)$$

Antiderivative was successfully verified.

```
[In] Int[Sqrt[a + b*Cosh[x]^2]*Tanh[x],x]
```

```
[Out] -(Sqrt[a]*ArcTanh[Sqrt[a + b*Cosh[x]^2]/Sqrt[a]]) + Sqrt[a + b*Cosh[x]^2]
```

Rule 52

```
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 65

```
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 214

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

Rule 3273

```
Int[((a_) + (b_.)*sin[(e_.) + (f_.)*(x_)]^2)^(p_.)*tan[(e_.) + (f_.)*(x_)]^
(m_.), x_Symbol] :> With[{ff = FreeFactors[Sin[e + f*x]^2, x]}, Dist[ff^((m
 + 1)/2)/(2*f), Subst[Int[x^((m - 1)/2)*((a + b*ff*x)^p/(1 - ff*x)^((m + 1)
/2)), x], x, Sin[e + f*x]^2/ff], x]] /; FreeQ[{a, b, e, f, p}, x] && Intege
rQ[(m - 1)/2]
```

Rubi steps

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

Mathematica [A]
time = 0.03, size = 39, normalized size = 1.00

$$-\sqrt{a}\,\tanh^{-1}\left(\frac{\sqrt{a+b\cosh^2(x)}}{\sqrt{a}}\right) + \sqrt{a+b\cosh^2(x)}$$

Antiderivative was successfully verified.

```
[In] Integrate[Sqrt[a + b*Cosh[x]^2]*Tanh[x],x]
[Out] -(Sqrt[a]*ArcTanh[Sqrt[a + b*Cosh[x]^2]/Sqrt[a]]) + Sqrt[a + b*Cosh[x]^2]
```

Maple [A]
time = 0.54, size = 42, normalized size = 1.08

method	result	size
derivativedivides	$\sqrt{a+b\left(\cosh^2(x)\right)} - \sqrt{a}\,\ln\left(\frac{2a+2\sqrt{a}\,\sqrt{a+b\left(\cosh^2(x)\right)}}{\cosh(x)}\right)$	42

default	$\sqrt{a+b\left(\cosh^2\left(x\right)\right)}-\sqrt{a}\,\ln\left(\frac{2a+2\sqrt{a}\,\sqrt{a+b\left(\cosh^2\left(x\right)\right)}}{\cosh\left(x\right)}\right)$	42

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a+b*cosh(x)^2)^(1/2)*tanh(x),x,method=_RETURNVERBOSE)
```

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

Maxima [F]
time = 0.00, size = 0, normalized size = 0.00

Failed to integrate

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*cosh(x)^2)^(1/2)*tanh(x),x, algorithm="maxima")
```

```
[Out] integrate(sqrt(b*cosh(x)^2 + a)*tanh(x), x)
```

Fricas [B] Leaf count of result is larger than twice the leaf count of optimal. 122 vs. 2(31) = 62.
time = 0.57, size = 357, normalized size = 9.15

$$\left[\frac{\sqrt{a}\left(\cosh\left(x\right)+\sinh\left(x\right)\right)\log\left(\frac{b\cosh(x)^4+4b\cosh(x)\sinh(x)^3+b\sinh(x)^4+2(4a+b)\cosh(x)^2+2\left(3b\cosh(x)^2+4a+b\right)\sinh(x)^2-4\sqrt{2}\sqrt{a}\sqrt{\frac{b\cosh\left(x\right)^2+b\sinh\left(x\right)^2+2a+b}{\cosh\left(x\right)^2-2\cosh\left(x\right)\sinh\left(x\right)+\sinh\left(x\right)^2}}(\cosh(x)+\sinh(x))+4\left(b\cosh(x)^3+(4a+b)\cosh(x)\right)\sinh(x)+b}{\cosh(x)^4+4\cosh(x)\sinh(x)^3+\sinh(x)^4+2\left(3\cosh(x)^2+1\right)\sinh(x)^2+2\cosh(x)^2+4\left(\cosh(x)^3+\cosh(x)\right)\sinh(x)+1}\right)+\sqrt{2}\sqrt{\frac{b\cosh\left(x\right)^2+b\sinh\left(x\right)^2+2a+b}{\cosh\left(x\right)^2-2\cosh\left(x\right)\sinh\left(x\right)+\sinh\left(x\right)^2}}}{2\left(\cosh\left(x\right)+\sinh\left(x\right)\right)}, \frac{2\sqrt{-a}\left(\cosh\left(x\right)+\sinh\left(x\right)\right)\arctan\left(\frac{\sqrt{2}\sqrt{-a}\sqrt{\frac{b\cosh\left(x\right)^2+b\sinh\left(x\right)^2+2a+b}{\cosh\left(x\right)^2-2\cosh\left(x\right)\sinh\left(x\right)+\sinh\left(x\right)^2}}}{2(a\cosh(x)+a\sinh(x))}\right)+\sqrt{2}\sqrt{\frac{b\cosh\left(x\right)^2+b\sinh\left(x\right)^2+2a+b}{\cosh\left(x\right)^2-2\cosh\left(x\right)\sinh\left(x\right)+\sinh\left(x\right)^2}}}{2\left(\cosh\left(x\right)+\sinh\left(x\right)\right)}\right]$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*cosh(x)^2)^(1/2)*tanh(x),x, algorithm="fricas")
```

```
[Out] [1/2*(sqrt(a)*(cosh(x) + sinh(x))*log((b*cosh(x)^4 + 4*b*cosh(x)*sinh(x)^3
+ b*sinh(x)^4 + 2*(4*a + b)*cosh(x)^2 + 2*(3*b*cosh(x)^2 + 4*a + b)*sinh(x)
^2 - 4*sqrt(2)*sqrt(a)*sqrt((b*cosh(x)^2 + b*sinh(x)^2 + 2*a + b)/(cosh(x)^
2 - 2*cosh(x)*sinh(x) + sinh(x)^2))*(cosh(x) + sinh(x)) + 4*(b*cosh(x)^3 +
(4*a + b)*cosh(x))*sinh(x) + b)/(cosh(x)^4 + 4*cosh(x)*sinh(x)^3 + sinh(x)^
4 + 2*(3*cosh(x)^2 + 1)*sinh(x)^2 + 2*cosh(x)^2 + 4*(cosh(x)^3 + cosh(x))*s
inh(x) + 1)) + sqrt(2)*sqrt((b*cosh(x)^2 + b*sinh(x)^2 + 2*a + b)/(cosh(x)^
2 - 2*cosh(x)*sinh(x) + sinh(x)^2)))/(cosh(x) + sinh(x)), 1/2*(2*sqrt(-a)*(
cosh(x) + sinh(x))*arctan(1/2*sqrt(2)*sqrt(-a)*sqrt((b*cosh(x)^2 + b*sinh(x
)^2 + 2*a + b)/(cosh(x)^2 - 2*cosh(x)*sinh(x) + sinh(x)^2))/(a*cosh(x) + a*
sinh(x))) + sqrt(2)*sqrt((b*cosh(x)^2 + b*sinh(x)^2 + 2*a + b)/(cosh(x)^2 -
 2*cosh(x)*sinh(x) + sinh(x)^2)))/(cosh(x) + sinh(x))]
```

Sympy [F]
time = 0.00, size = 0, normalized size = 0.00

$$\int\sqrt{a+b\cosh^2\left(x\right)}\,\tanh\left(x\right)dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*cosh(x)**2)**(1/2)*tanh(x),x)
```

```
[Out] Integral(sqrt(a + b*cosh(x)**2)*tanh(x), x)
```

Giac [F]
time = 0.00, size = 0, normalized size = 0.00

could not integrate

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*cosh(x)^2)^(1/2)*tanh(x),x, algorithm="giac")
```

```
[Out] integrate(sqrt(b*cosh(x)^2 + a)*tanh(x), x)
```

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

$$\int \tanh(x)\ \sqrt{b\cosh\left(x\right)^2+a}\ dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

3.78 $\int \frac{\tanh(x)}{\sqrt{a+b\cosh^2(x)}}\,dx$

Optimal. Leaf size=26

$$-\frac{\tanh^{-1}\left(\frac{\sqrt{a+b\cosh^2(x)}}{\sqrt{a}}\right)}{\sqrt{a}}$$

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

Rubi [A]
time = 0.04, antiderivative size = 26, normalized size of antiderivative = 1.00, number of steps used = 3, number of rules used = 3, integrand size = 15, $\frac{\text{number of rules}}{\text{integrand size}} = 0.200$, Rules used = {3273, 65, 214}

$$-\frac{\tanh^{-1}\left(\frac{\sqrt{a+b\cosh^2(x)}}{\sqrt{a}}\right)}{\sqrt{a}}$$

Antiderivative was successfully verified.

```
[In] Int[Tanh[x]/Sqrt[a + b*Cosh[x]^2],x]
```

```
[Out] -(ArcTanh[Sqrt[a + b*Cosh[x]^2]/Sqrt[a]]/Sqrt[a])
```

Rule 65

```
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 214

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

Rule 3273

```
Int[((a_) + (b_.)*sin[(e_.) + (f_.)*(x_)]^2)^(p_.)*tan[(e_.) + (f_.)*(x_)]^
(m_.), x_Symbol] :> With[{ff = FreeFactors[Sin[e + f*x]^2, x]}, Dist[ff^((m
 + 1)/2)/(2*f), Subst[Int[x^((m - 1)/2)*((a + b*ff*x)^p/(1 - ff*x)^((m + 1)
/2)), x], x, Sin[e + f*x]^2/ff], x]] /; FreeQ[{a, b, e, f, p}, x] && Intege
rQ[(m - 1)/2]
```

Rubi steps

$$\int \frac{\tanh(x)}{\sqrt{a+b\cosh^2(x)}}\,dx = \frac{1}{2}\text{Subst}\left(\int \frac{1}{x\sqrt{a+bx}}\,dx, x, \cosh^2(x)\right)$$
$$= \frac{\text{Subst}\left(\int \frac{1}{-\frac{a}{b}+\frac{x^2}{b}}\,dx, x, \sqrt{a+b\cosh^2(x)}\right)}{b}$$
$$= -\frac{\tanh^{-1}\left(\frac{\sqrt{a+b\cosh^2(x)}}{\sqrt{a}}\right)}{\sqrt{a}}$$

Mathematica [**A**]
time = 0.02, size = 26, normalized size = 1.00

$$-\frac{\tanh^{-1}\left(\frac{\sqrt{a+b\cosh^2(x)}}{\sqrt{a}}\right)}{\sqrt{a}}$$

Antiderivative was successfully verified.

```
[In] Integrate[Tanh[x]/Sqrt[a + b*Cosh[x]^2],x]
```

```
[Out] -(ArcTanh[Sqrt[a + b*Cosh[x]^2]/Sqrt[a]]/Sqrt[a])
```

Maple [**A**]
time = 0.68, size = 31, normalized size = 1.19

method	result	size
derivativedivides	$-\frac{\ln\left(\frac{2a+2\sqrt{a}\,\sqrt{a+b\left(\cosh^2\left(x\right)\right)}}{\cosh\left(x\right)}\right)}{\sqrt{a}}$	31
default	$-\frac{\ln\left(\frac{2a+2\sqrt{a}\,\sqrt{a+b\left(\cosh^2\left(x\right)\right)}}{\cosh\left(x\right)}\right)}{\sqrt{a}}$	31

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(tanh(x)/(a+b*cosh(x)^2)^(1/2),x,method=_RETURNVERBOSE)
```

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

Maxima [F]
time = 0.00, size = 0, normalized size = 0.00

Failed to integrate

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(tanh(x)/(a+b*cosh(x)^2)^(1/2),x, algorithm="maxima")
[Out] integrate(tanh(x)/sqrt(b*cosh(x)^2 + a), x)
```

Fricas [B] Leaf count of result is larger than twice the leaf count of optimal. 68 vs. $2(20) = 40$.
time = 0.44, size = 248, normalized size = 9.54

$$\left[\frac{\log\left(\frac{b\cosh(x)^4+4b\cosh(x)\sinh(x)^3+b\sinh(x)^4+2(4a+b)\cosh(x)^2+2\left(3b\cosh(x)^2+4a+b\right)\sinh(x)^2-4\sqrt{2}\sqrt{a}\sqrt{\frac{b\cosh(x)^2+b\sinh(x)^2+2a+b}{\cosh(x)^2-2\cosh(x)\sinh(x)+\sinh(x)^2}}(\cosh(x)+\sinh(x))+4\left(b\cosh(x)^3+(4a+b)\cosh(x)\right)\sinh(x)+b}{\cosh(x)^4+4\cosh(x)\sinh(x)^3+\sinh(x)^4+2\left(3\cosh(x)^2+1\right)\sinh(x)^2+2\cosh(x)^2+4\left(\cosh(x)^3+\cosh(x)\right)\sinh(x)+1}\right)}{2\sqrt{a}}, \frac{\sqrt{-a}\arctan\left(\frac{\sqrt{2}\sqrt{-a}\sqrt{\frac{b\cosh(x)^2+b\sinh(x)^2+2a+b}{\cosh(x)^2-2\cosh(x)\sinh(x)+\sinh(x)^2}}}{2(a\cosh(x)+a\sinh(x))}\right)}{a}\right]$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(tanh(x)/(a+b*cosh(x)^2)^(1/2),x, algorithm="fricas")
[Out] [1/2*log((b*cosh(x)^4 + 4*b*cosh(x)*sinh(x)^3 + b*sinh(x)^4 + 2*(4*a + b)*c
osh(x)^2 + 2*(3*b*cosh(x)^2 + 4*a + b)*sinh(x)^2 - 4*sqrt(2)*sqrt(a)*sqrt((
b*cosh(x)^2 + b*sinh(x)^2 + 2*a + b)/(cosh(x)^2 - 2*cosh(x)*sinh(x) + sinh(
x)^2))*(cosh(x) + sinh(x)) + 4*(b*cosh(x)^3 + (4*a + b)*cosh(x))*sinh(x) +
b)/(cosh(x)^4 + 4*cosh(x)*sinh(x)^3 + sinh(x)^4 + 2*(3*cosh(x)^2 + 1)*sinh(
x)^2 + 2*cosh(x)^2 + 4*(cosh(x)^3 + cosh(x))*sinh(x) + 1))/sqrt(a), sqrt(-a
)*arctan(1/2*sqrt(2)*sqrt(-a)*sqrt((b*cosh(x)^2 + b*sinh(x)^2 + 2*a + b)/(c
osh(x)^2 - 2*cosh(x)*sinh(x) + sinh(x)^2))/(a*cosh(x) + a*sinh(x)))/a]
```

Sympy [F]
time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\tanh(x)}{\sqrt{a + b\cosh^2(x)}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(tanh(x)/(a+b*cosh(x)**2)**(1/2),x)
[Out] Integral(tanh(x)/sqrt(a + b*cosh(x)**2), x)
```

Giac [F]
time = 0.00, size = 0, normalized size = 0.00

could not integrate

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(tanh(x)/(a+b*cosh(x)^2)^(1/2),x, algorithm="giac")
```

```
[Out] integrate(tanh(x)/sqrt(b*cosh(x)^2 + a), x)
```

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

$$\int \frac{\tanh(x)}{\sqrt{b\cosh(x)^2 + a}}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

3.79 $\int \frac{\tanh(x)}{\sqrt{1+\cosh^2(x)}} \, dx$

Optimal. Leaf size=13

$$-\tanh^{-1}\left(\sqrt{1+\cosh^2(x)}\right)$$

[Out] -arctanh((1+cosh(x)^2)^(1/2))

Rubi [A]
time = 0.03, antiderivative size = 13, normalized size of antiderivative = 1.00, number of steps used = 3, number of rules used = 3, integrand size = 13, $\frac{\text{number of rules}}{\text{integrand size}} = 0.231$, Rules used = {3273, 65, 213}

$$-\tanh^{-1}\left(\sqrt{\cosh^2(x)+1}\right)$$

Antiderivative was successfully verified.

[In] Int[Tanh[x]/Sqrt[1 + Cosh[x]^2],x]

[Out] -ArcTanh[Sqrt[1 + Cosh[x]^2]]

Rule 65

```
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 213

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

Rule 3273

```
Int[((a_) + (b_.)*sin[(e_.) + (f_.)*(x_)]^2)^(p_.)*tan[(e_.) + (f_.)*(x_)]^
(m_.), x_Symbol] :> With[{ff = FreeFactors[Sin[e + f*x]^2, x]}, Dist[ff^((m
 + 1)/2)/(2*f), Subst[Int[x^((m - 1)/2)*((a + b*ff*x)^p/(1 - ff*x)^((m + 1)
/2)), x], x, Sin[e + f*x]^2/ff], x]] /; FreeQ[{a, b, e, f, p}, x] && Intege
rQ[(m - 1)/2]
```

Rubi steps

$$\int \frac{\tanh(x)}{\sqrt{1+\cosh^2(x)}}\,dx = \frac{1}{2}\text{Subst}\left(\int \frac{1}{x\sqrt{1+x}}\,dx, x, \cosh^2(x)\right)$$
$$= \text{Subst}\left(\int \frac{1}{-1+x^2}\,dx, x, \sqrt{1+\cosh^2(x)}\right)$$
$$= -\tanh^{-1}\left(\sqrt{1+\cosh^2(x)}\right)$$

Mathematica [A]
time = 0.01, size = 13, normalized size = 1.00

$$-\tanh^{-1}\left(\sqrt{1+\cosh^2(x)}\right)$$

Antiderivative was successfully verified.

```
[In] Integrate[Tanh[x]/Sqrt[1 + Cosh[x]^2],x]
```

```
[Out] -ArcTanh[Sqrt[1 + Cosh[x]^2]]
```

Maple [A]
time = 0.65, size = 12, normalized size = 0.92

method	result	size
derivativedivides	$-\operatorname{arctanh}\left(\frac{1}{\sqrt{\cosh^2(x)+1}}\right)$	12
default	$-\operatorname{arctanh}\left(\frac{1}{\sqrt{\cosh^2(x)+1}}\right)$	12

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(tanh(x)/(cosh(x)^2+1)^(1/2),x,method=_RETURNVERBOSE)
```

```
[Out] -arctanh(1/(cosh(x)^2+1)^(1/2))
```

Maxima [F]
time = 0.00, size = 0, normalized size = 0.00

Failed to integrate

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(tanh(x)/(1+cosh(x)^2)^(1/2),x, algorithm="maxima")
```

```
[Out] integrate(tanh(x)/sqrt(cosh(x)^2 + 1), x)
```

Fricas [**B**] Leaf count of result is larger than twice the leaf count of optimal. 63 vs. $2(11) = 22$.
time = 0.40, size = 63, normalized size = 4.85

$$\log\left(\frac{\sqrt{2}\sqrt{\frac{\cosh\left(x\right)^{2}+\sinh\left(x\right)^{2}+3}{\cosh\left(x\right)^{2}-2\,\cosh\left(x\right)\sinh\left(x\right)+\sinh\left(x\right)^{2}}}-2\,\cosh\left(x\right)-2\,\sinh\left(x\right)}{\cosh\left(x\right)^{2}+2\,\cosh\left(x\right)\sinh\left(x\right)+\sinh\left(x\right)^{2}+1}\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(tanh(x)/(1+cosh(x)^2)^(1/2),x, algorithm="fricas")
```

```
[Out] log((sqrt(2)*sqrt((cosh(x)^2 + sinh(x)^2 + 3)/(cosh(x)^2 - 2*cosh(x)*sinh(x
) + sinh(x)^2)) - 2*cosh(x) - 2*sinh(x))/(cosh(x)^2 + 2*cosh(x)*sinh(x) + s
inh(x)^2 + 1))
```

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

$$\int\frac{\tanh\left(x\right)}{\sqrt{\cosh^{2}\left(x\right)+1}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(tanh(x)/(1+cosh(x)**2)**(1/2),x)
```

```
[Out] Integral(tanh(x)/sqrt(cosh(x)**2 + 1), x)
```

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

could not integrate

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(tanh(x)/(1+cosh(x)^2)^(1/2),x, algorithm="giac")
```

```
[Out] integrate(tanh(x)/sqrt(cosh(x)^2 + 1), x)
```

Mupad [**F**]
time = 0.00, size = -1, normalized size = -0.08

$$\int\frac{\tanh(x)}{\sqrt{\cosh\left(x\right)^{2}+1}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(tanh(x)/(cosh(x)^2 + 1)^(1/2),x)
[Out] int(tanh(x)/(cosh(x)^2 + 1)^(1/2), x)
```

3.80 $\int \frac{\tanh(x)}{\sqrt{1-\cosh^2(x)}} \, dx$

Optimal. Leaf size=13

$$-\tanh^{-1}\left(\sqrt{-\sinh^2(x)}\right)$$

[Out] -arctanh((-sinh(x)^2)^(1/2))

Rubi [A]
time = 0.04, antiderivative size = 13, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 4, integrand size = 15, $\frac{\text{number of rules}}{\text{integrand size}} = 0.267$, Rules used = {3255, 3284, 65, 212}

$$-\tanh^{-1}\left(\sqrt{-\sinh^2(x)}\right)$$

Antiderivative was successfully verified.

[In] Int[Tanh[x]/Sqrt[1 - Cosh[x]^2],x]

[Out] -ArcTanh[Sqrt[-Sinh[x]^2]]

Rule 65

```
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 212

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

Rule 3255

```
Int[(u_.)*((a_) + (b_.)*sin[(e_.) + (f_.)*(x_)]^2)^(p_), x_Symbol] :> Int[A
ctivateTrig[u*(a*cos[e + f*x]^2)^p], x] /; FreeQ[{a, b, e, f, p}, x] && EqQ
[a + b, 0]
```

Rule 3284

```
Int[((b_.)*sin[(e_.) + (f_.)*(x_)]^(n_))^(p_.)*tan[(e_.) + (f_.)*(x_)]^(m_.
), x_Symbol] :> With[{ff = FreeFactors[Sin[e + f*x]^2, x]}, Dist[ff^((m + 1
)/2)/(2*f), Subst[Int[x^((m - 1)/2)*((b*ff^(n/2)*x^(n/2))^p/(1 - ff*x)^((m
```

```
+ 1)/2)), x], x, Sin[e + f*x]^2/ff], x]] /; FreeQ[{b, e, f, p}, x] && Integ
erQ[(m - 1)/2] && IntegerQ[n/2]
```

Rubi steps

$$\begin{aligned}\int \frac{\tanh(x)}{\sqrt{1-\cosh^2(x)}}\,dx &= \int \frac{\tanh(x)}{\sqrt{-\sinh^2(x)}}\,dx\\ &= \frac{1}{2}\text{Subst}\left(\int \frac{1}{\sqrt{-x}\,(1+x)}\,dx, x, \sinh^2(x)\right)\\ &= -\text{Subst}\left(\int \frac{1}{1-x^2}\,dx, x, \sqrt{-\sinh^2(x)}\right)\\ &= -\tanh^{-1}\left(\sqrt{-\sinh^2(x)}\right)\end{aligned}$$

Mathematica [A]
time = 0.01, size = 21, normalized size = 1.62

$$\frac{2\text{ArcTan}\left(\tanh\left(\frac{x}{2}\right)\right)\sinh(x)}{\sqrt{-\sinh^2(x)}}$$

Antiderivative was successfully verified.

```
[In] Integrate[Tanh[x]/Sqrt[1 - Cosh[x]^2],x]
[Out] (2*ArcTan[Tanh[x/2]]*Sinh[x])/Sqrt[-Sinh[x]^2]
```

Maple [A]
time = 1.08, size = 12, normalized size = 0.92

method	result	size
default	$-\operatorname{arctanh}\left(\frac{1}{\sqrt{-\left(\sinh^2(x)\right)}}\right)$	12
risch	$\frac{i e^{-x}\left(e^{2x}-1\right)\ln\left(e^x+i\right)}{\sqrt{-\left(e^{2x}-1\right)^2 e^{-2x}}}-\frac{i e^{-x}\left(e^{2x}-1\right)\ln\left(e^x-i\right)}{\sqrt{-\left(e^{2x}-1\right)^2 e^{-2x}}}$	72

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(tanh(x)/(1-cosh(x)^2)^(1/2),x,method=_RETURNVERBOSE)
[Out] -arctanh(1/(-sinh(x)^2)^(1/2))
```

Maxima [C] Result contains complex when optimal does not.
time = 0.49, size = 7, normalized size = 0.54

$$-2i\arctan\left(e^{(-x)}\right)$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(tanh(x)/(1-cosh(x)^2)^(1/2),x, algorithm="maxima")
[Out] -2*I*arctan(e^(-x))
```

Fricas [F]
time = 0.45, size = 1, normalized size = 0.08

$$0$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(tanh(x)/(1-cosh(x)^2)^(1/2),x, algorithm="fricas")
[Out] 0
```

Sympy [F]
time = 0.00, size = 0, normalized size = 0.00

$$\int\frac{\tanh\left(x\right)}{\sqrt{-\left(\cosh\left(x\right)-1\right)\left(\cosh\left(x\right)+1\right)}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(tanh(x)/(1-cosh(x)**2)**(1/2),x)
[Out] Integral(tanh(x)/sqrt(-(cosh(x) - 1)*(cosh(x) + 1)), x)
```

Giac [C] Result contains complex when optimal does not.
time = 0.42, size = 38, normalized size = 2.92

$$-\frac{\log\left(e^{x}+i\right)}{\mathrm{sgn}\left(-e^{(3x)}+e^{x}\right)}+\frac{\log\left(e^{x}-i\right)}{\mathrm{sgn}\left(-e^{(3x)}+e^{x}\right)}$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(tanh(x)/(1-cosh(x)^2)^(1/2),x, algorithm="giac")
[Out] -log(e^x + I)/sgn(-e^(3*x) + e^x) + log(e^x - I)/sgn(-e^(3*x) + e^x)
```

Mupad [F]
time = 0.00, size = -1, normalized size = -0.08

$$\int\frac{\tanh(x)}{\sqrt{1-\cosh\left(x\right)^2}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(tanh(x)/(1 - cosh(x)^2)^(1/2),x)
[Out] int(tanh(x)/(1 - cosh(x)^2)^(1/2), x)
```

3.81 $\int \frac{\tanh^3(x)}{a+b\cosh^3(x)}\,dx$

Optimal. Leaf size=153

$$-\frac{b^{2/3}\text{ArcTan}\left(\frac{\sqrt[3]{a}-2\sqrt[3]{b}\cosh(x)}{\sqrt{3}\sqrt[3]{a}}\right)}{\sqrt{3}\,a^{5/3}}+\frac{\log(\cosh(x))}{a}+\frac{b^{2/3}\log\left(\sqrt[3]{a}+\sqrt[3]{b}\cosh(x)\right)}{3a^{5/3}}-\frac{b^{2/3}\log\left(a^{2/3}-\sqrt[3]{a}\sqrt[3]{b}\,\mathrm{c}\ldots\right.}{6a^{\ldots}}$$

```
[Out] ln(cosh(x))/a+1/3*b^(2/3)*ln(a^(1/3)+b^(1/3)*cosh(x))/a^(5/3)-1/6*b^(2/3)*l
n(a^(2/3)-a^(1/3)*b^(1/3)*cosh(x)+b^(2/3)*cosh(x)^2)/a^(5/3)-1/3*ln(a+b*cos
h(x)^3)/a+1/2*sech(x)^2/a-1/3*b^(2/3)*arctan(1/3*(a^(1/3)-2*b^(1/3)*cosh(x)
)/a^(1/3)*3^(1/2))/a^(5/3)*3^(1/2)
```

Rubi [A]
time = 0.15, antiderivative size = 153, normalized size of antiderivative = 1.00, number of steps used = 11, number of rules used = 10, integrand size = 15, $\frac{\text{number of rules}}{\text{integrand size}} = 0.667$, Rules used = {3309, 1848, 1885, 206, 31, 648, 631, 210, 642, 266}

$$-\frac{b^{2/3}\text{ArcTan}\left(\frac{\sqrt[3]{a}-2\sqrt[3]{b}\cosh(x)}{\sqrt{3}\sqrt[3]{a}}\right)}{\sqrt{3}\,a^{5/3}}-\frac{b^{2/3}\log\left(a^{2/3}-\sqrt[3]{a}\sqrt[3]{b}\cosh(x)+b^{2/3}\cosh^2(x)\right)}{6a^{5/3}}+\frac{b^{2/3}\log\left(\sqrt[3]{a}+\sqrt[3]{b}\cosh(x)\right)}{3a^{5/3}}-\frac{\log\left(a+b\cosh^3(x)\right)}{3a}+\frac{\text{sech}^2(x)}{2a}+\frac{\log(\cosh(x))}{a}$$

Antiderivative was successfully verified.

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

```
[Out] -((b^(2/3)*ArcTan[(a^(1/3) - 2*b^(1/3)*Cosh[x])/(Sqrt[3]*a^(1/3))])/(Sqrt[3
]*a^(5/3))) + Log[Cosh[x]]/a + (b^(2/3)*Log[a^(1/3) + b^(1/3)*Cosh[x]])/(3*
a^(5/3)) - (b^(2/3)*Log[a^(2/3) - a^(1/3)*b^(1/3)*Cosh[x] + b^(2/3)*Cosh[x]
^2])/(6*a^(5/3)) - Log[a + b*Cosh[x]^3]/(3*a) + Sech[x]^2/(2*a)
```

Rule 31

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

Rule 206

```
Int[((a_) + (b_.)*(x_)^3)^(-1), x_Symbol] :> Dist[1/(3*Rt[a, 3]^2), Int[1/(
Rt[a, 3] + Rt[b, 3]*x), x], x] + Dist[1/(3*Rt[a, 3]^2), Int[(2*Rt[a, 3] - R
t[b, 3]*x)/(Rt[a, 3]^2 - Rt[a, 3]*Rt[b, 3]*x + Rt[b, 3]^2*x^2), x], x] /; F
reeQ[{a, b}, x]
```

Rule 210

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

Rule 266

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

Rule 631

```
Int[((a_) + (b_.)*(x_) + (c_.)*(x_)^2)^(-1), x_Symbol] :> With[{q = 1 - 4*S
implify[a*(c/b^2)]}, Dist[-2/b, Subst[Int[1/(q - x^2), x], x, 1 + 2*c*(x/b)
], x] /; RationalQ[q] && (EqQ[q^2, 1] ||  !RationalQ[b^2 - 4*a*c])] /; Free
Q[{a, b, c}, x] && NeQ[b^2 - 4*a*c, 0]
```

Rule 642

```
Int[((d_) + (e_.)*(x_))/((a_.) + (b_.)*(x_) + (c_.)*(x_)^2), x_Symbol] :> S
imp[d*(Log[RemoveContent[a + b*x + c*x^2, x]]/b), x] /; FreeQ[{a, b, c, d,
e}, x] && EqQ[2*c*d - b*e, 0]
```

Rule 648

```
Int[((d_.) + (e_.)*(x_))/((a_) + (b_.)*(x_) + (c_.)*(x_)^2), x_Symbol] :> D
ist[(2*c*d - b*e)/(2*c), Int[1/(a + b*x + c*x^2), x], x] + Dist[e/(2*c), In
t[(b + 2*c*x)/(a + b*x + c*x^2), x], x] /; FreeQ[{a, b, c, d, e}, x] && NeQ
[2*c*d - b*e, 0] && NeQ[b^2 - 4*a*c, 0] &&  !NiceSqrtQ[b^2 - 4*a*c]
```

Rule 1848

```
Int[((Pq_)*((c_.)*(x_))^(m_.))/((a_) + (b_.)*(x_)^(n_)), x_Symbol] :> Int[E
xpandIntegrand[(c*x)^m*(Pq/(a + b*x^n)), x], x] /; FreeQ[{a, b, c, m}, x] &
& PolyQ[Pq, x] && IntegerQ[n] &&  !IGtQ[m, 0]
```

Rule 1885

```
Int[(P2_)/((a_) + (b_.)*(x_)^3), x_Symbol] :> With[{A = Coeff[P2, x, 0], B
= Coeff[P2, x, 1], C = Coeff[P2, x, 2]}, Int[(A + B*x)/(a + b*x^3), x] + Di
st[C, Int[x^2/(a + b*x^3), x], x] /; EqQ[a*B^3 - b*A^3, 0] ||  !RationalQ[a
/b]] /; FreeQ[{a, b}, x] && PolyQ[P2, x, 2]
```

Rule 3309

```
Int[((a_) + (b_.)*((c_.)*sin[(e_.) + (f_.)*(x_)])^(n_))^(p_.)*tan[(e_.) + (
f_.)*(x_)]^(m_.), x_Symbol] :> With[{ff = FreeFactors[Sin[e + f*x], x]}, Di
st[ff^(m + 1)/f, Subst[Int[x^m*((a + b*(c*ff*x)^n)^p/(1 - ff^2*x^2)^((m + 1
)/2)), x], x, Sin[e + f*x]/ff], x]] /; FreeQ[{a, b, c, e, f, n, p}, x] && I
LtQ[(m - 1)/2, 0]
```

Rubi steps

$$
\begin{aligned}
\int \frac{\tanh^3(x)}{a+b\cosh^3(x)}\,dx &= -\text{Subst}\left(\int \frac{1-x^2}{x^3\left(a+bx^3\right)}\,dx,x,\cosh(x)\right)\\
&= -\text{Subst}\left(\int \left(\frac{1}{ax^3}-\frac{1}{ax}+\frac{b(-1+x^2)}{a\left(a+bx^3\right)}\right)\,dx,x,\cosh(x)\right)\\
&= \frac{\log(\cosh(x))}{a}+\frac{\text{sech}^2(x)}{2a}-\frac{b\text{Subst}\left(\int \frac{-1+x^2}{a+bx^3}\,dx,x,\cosh(x)\right)}{a}\\
&= \frac{\log(\cosh(x))}{a}+\frac{\text{sech}^2(x)}{2a}+\frac{b\text{Subst}\left(\int \frac{1}{a+bx^3}\,dx,x,\cosh(x)\right)}{a}-\frac{b\text{Subst}\left(\int \frac{x^2}{a+bx^3}\,dx,x,\right.}{a}\\
&= \frac{\log(\cosh(x))}{a}-\frac{\log\left(a+b\cosh^3(x)\right)}{3a}+\frac{\text{sech}^2(x)}{2a}+\frac{b\text{Subst}\left(\int \frac{1}{\sqrt[3]{a}+\sqrt[3]{b}\,x}\,dx,x,\cosh\right.}{3a^{5/3}}\\
&= \frac{\log(\cosh(x))}{a}+\frac{b^{2/3}\log\left(\sqrt[3]{a}+\sqrt[3]{b}\cosh(x)\right)}{3a^{5/3}}-\frac{\log\left(a+b\cosh^3(x)\right)}{3a}+\frac{\text{sech}^2(x)}{2a}-\\
&= \frac{\log(\cosh(x))}{a}+\frac{b^{2/3}\log\left(\sqrt[3]{a}+\sqrt[3]{b}\cosh(x)\right)}{3a^{5/3}}-\frac{b^{2/3}\log\left(a^{2/3}-\sqrt[3]{a}\sqrt[3]{b}\cosh(x)+\right.}{6a^{5/3}}\\
&= -\frac{b^{2/3}\tan^{-1}\left(\frac{1-\frac{2\sqrt[3]{b}\cosh(x)}{\sqrt[3]{a}}}{\sqrt{3}}\right)}{\sqrt{3}\,a^{5/3}}+\frac{\log(\cosh(x))}{a}+\frac{b^{2/3}\log\left(\sqrt[3]{a}+\sqrt[3]{b}\cosh(x)\right)}{3a^{5/3}}-\frac{b^{2/}}{}
\end{aligned}
$$

Mathematica [C] Result contains higher order function than in optimal. Order 9 vs. order 3 in optimal.
time = 0.92, size = 145, normalized size = 0.95

$$
\frac{-6x+6\log(\cosh(x))-2\text{RootSum}\left[b+3b\#1^2+8a\#1^3+3b\#1^4+b\#1^6\&,\frac{-bx+b\log\left(e^x-\#1\right)-4ax\#1^3+4a\log\left(e^x-\#1\right)\#1^3-3bx\#1^4+3b\log\left(e^x-\#1\right)\#1^4}{b+2b\#1^2+4a\#1^3+b\#1^4}\&\right]+3\text{sech}^2(x)}{6a}
$$

Antiderivative was successfully verified.

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

```
[Out] (-6*x + 6*Log[Cosh[x]] - 2*RootSum[b + 3*b*#1^2 + 8*a*#1^3 + 3*b*#1^4 + b*#
1^6 & , (-(b*x) + b*Log[E^x - #1] - 4*a*x*#1^3 + 4*a*Log[E^x - #1]*#1^3 - 3
*b*x*#1^4 + 3*b*Log[E^x - #1]*#1^4)/(b + 2*b*#1^2 + 4*a*#1^3 + b*#1^4) & ]
+ 3*Sech[x]^2)/(6*a)
```

Maple [C] Result contains higher order function than in optimal. Order 9 vs. order 3.
time = 1.00, size = 145, normalized size = 0.95

method	result
risch	$\frac{2\,\mathrm{e}^{2x}}{(1+\mathrm{e}^{2x})^2 a}+\frac{\ln(1+\mathrm{e}^{2x})}{a}+\left(\sum_{\_R=\mathrm{RootOf}(27a^5\_Z^3+27a^4\_Z^2+9\_Za^3+a^2-b^2)}\_R\ln\left(\mathrm{e}^{2x}+\left(\frac{6a^2\_R}{b}+\frac{2a}{b}\right)\mathrm{e}^x+1\right.\right.$
default	$\frac{\ln\left(\tanh^2\left(\frac{x}{2}\right)+1\right)-\frac{2}{\tanh^2\left(\frac{x}{2}\right)+1}+\frac{2}{\left(\tanh^2\left(\frac{x}{2}\right)+1\right)^2}}{a}-\frac{\sum_{\_R=\mathrm{RootOf}\left((a-b)\_Z^3+(-3a-3b)\_Z^2+(3a-3b)\_Z-a-b\right)}\frac{\left(\_R^2a-\_R^2b-2\_R\right.}{\_R^2a-}}{3a}$

Verification of antiderivative is not currently implemented for this CAS.

[In] int(tanh(x)^3/(a+b*cosh(x)^3),x,method=_RETURNVERBOSE)

[Out] 1/a*(ln(tanh(1/2*x)^2+1)-2/(tanh(1/2*x)^2+1)+2/(tanh(1/2*x)^2+1)^2)-1/3/a*sum((_R^2*a-_R^2*b-2*_R*a-4*_R*b+a+b)/(_R^2*a-_R^2*b-2*_R*a-2*_R*b+a-b)*ln(tanh(1/2*x)^2-_R),_R=RootOf((a-b)*_Z^3+(-3*a-3*b)*_Z^2+(3*a-3*b)*_Z-a-b))

Maxima [F]
time = 0.00, size = 0, normalized size = 0.00

Failed to integrate

Verification of antiderivative is not currently implemented for this CAS.

[In] integrate(tanh(x)^3/(a+b*cosh(x)^3),x, algorithm="maxima")

[Out] 2*b*(x/(a*b) - integrate((b*e^(5*x) + 3*b*e^(3*x) + 8*a*e^(2*x) + 3*b*e^x)*e^x/(b*e^(6*x) + 3*b*e^(4*x) + 8*a*e^(3*x) + 3*b*e^(2*x) + b), x)/(a*b)) + 6*b*integrate(e^(4*x)/(b*e^(6*x) + 3*b*e^(4*x) + 8*a*e^(3*x) + 3*b*e^(2*x) + b), x)/a - 2*(x*e^(4*x) + (2*x - 1)*e^(2*x) + x)/(a*e^(4*x) + 2*a*e^(2*x) + a) + log(e^(2*x) + 1)/a + 8*integrate(e^(3*x)/(b*e^(6*x) + 3*b*e^(4*x) + 8*a*e^(3*x) + 3*b*e^(2*x) + b), x)

Fricas [C] Result contains complex when optimal does not.
time = 1.20, size = 1138, normalized size = 7.44

Verification of antiderivative is not currently implemented for this CAS.

[In] integrate(tanh(x)^3/(a+b*cosh(x)^3),x, algorithm="fricas")

[Out] -1/12*(12*sqrt(1/3)*(a*e^(4*x) + 2*a*e^(2*x) + a)*sqrt((((1/2)^(1/3)*(I*sqrt(3) + 1)*(1/a^3 + b^2/a^5 - (a^2 - b^2)/a^5)^(1/3) + 2/a)^2*a^2 - 4*((1/2)^(1/3)*(I*sqrt(3) + 1)*(1/a^3 + b^2/a^5 - (a^2 - b^2)/a^5)^(1/3) + 2/a)*a + 4)/a^2)*arctan(-1/8*(2*sqrt(1/3)*sqrt(((1/2)^(1/3)*(I*sqrt(3) + 1)*(1/a^3

```
+ b^2/a^5 - (a^2 - b^2)/a^5)^(1/3) + 2/a)^2*a^4*e^(2*x) + b^2*e^(4*x) - 2*a
*b*e^(3*x) - 2*a*b*e^x + (a^2*b*e^(3*x) - 4*a^3*e^(2*x) + a^2*b*e^x)*((1/2)
^(1/3)*(I*sqrt(3) + 1)*(1/a^3 + b^2/a^5 - (a^2 - b^2)/a^5)^(1/3) + 2/a) + b
^2 + 2*(2*a^2 + b^2)*e^(2*x))*(((1/2)^(1/3)*(I*sqrt(3) + 1)*(1/a^3 + b^2/a^
5 - (a^2 - b^2)/a^5)^(1/3) + 2/a)*a^3 - 2*a^2)*sqrt((((1/2)^(1/3)*(I*sqrt(3
) + 1)*(1/a^3 + b^2/a^5 - (a^2 - b^2)/a^5)^(1/3) + 2/a)^2*a^2 - 4*((1/2)^(1
/3)*(I*sqrt(3) + 1)*(1/a^3 + b^2/a^5 - (a^2 - b^2)/a^5)^(1/3) + 2/a)*a + 4)
/a^2) - sqrt(1/3)*(((1/2)^(1/3)*(I*sqrt(3) + 1)*(1/a^3 + b^2/a^5 - (a^2 - b
^2)/a^5)^(1/3) + 2/a)^2*a^5*e^x - 4*a^2*b*e^(2*x) + 4*a^3*e^x - 4*a^2*b + 2
*(a^3*b*e^(2*x) - 2*a^4*e^x + a^3*b)*((1/2)^(1/3)*(I*sqrt(3) + 1)*(1/a^3 +
b^2/a^5 - (a^2 - b^2)/a^5)^(1/3) + 2/a))*sqrt((((1/2)^(1/3)*(I*sqrt(3) + 1)
*(1/a^3 + b^2/a^5 - (a^2 - b^2)/a^5)^(1/3) + 2/a)^2*a^2 - 4*((1/2)^(1/3)*(I
*sqrt(3) + 1)*(1/a^3 + b^2/a^5 - (a^2 - b^2)/a^5)^(1/3) + 2/a)*a + 4)/a^2))
*e^(-x)/b^2) + 2*(a*e^(4*x) + 2*a*e^(2*x) + a)*((1/2)^(1/3)*(I*sqrt(3) + 1)
*(1/a^3 + b^2/a^5 - (a^2 - b^2)/a^5)^(1/3) + 2/a)*log(-((1/2)^(1/3)*(I*sqrt
(3) + 1)*(1/a^3 + b^2/a^5 - (a^2 - b^2)/a^5)^(1/3) + 2/a)*a^2*e^x + b*e^(2*
x) + 2*a*e^x + b) - ((a*e^(4*x) + 2*a*e^(2*x) + a)*((1/2)^(1/3)*(I*sqrt(3)
+ 1)*(1/a^3 + b^2/a^5 - (a^2 - b^2)/a^5)^(1/3) + 2/a) - 6*e^(4*x) - 12*e^(2
*x) - 6)*log(((1/2)^(1/3)*(I*sqrt(3) + 1)*(1/a^3 + b^2/a^5 - (a^2 - b^2)/a^
5)^(1/3) + 2/a)^2*a^4*e^(2*x) + b^2*e^(4*x) - 2*a*b*e^(3*x) - 2*a*b*e^x + (
a^2*b*e^(3*x) - 4*a^3*e^(2*x) + a^2*b*e^x)*((1/2)^(1/3)*(I*sqrt(3) + 1)*(1/
a^3 + b^2/a^5 - (a^2 - b^2)/a^5)^(1/3) + 2/a) + b^2 + 2*(2*a^2 + b^2)*e^(2*
x)) - 12*(e^(4*x) + 2*e^(2*x) + 1)*log(e^(2*x) + 1) - 24*e^(2*x))/(a*e^(4*x
) + 2*a*e^(2*x) + a)
```

Sympy [F]
time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\tanh^3(x)}{a + b\cosh^3(x)}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(tanh(x)**3/(a+b*cosh(x)**3),x)
```

```
[Out] Integral(tanh(x)**3/(a + b*cosh(x)**3), x)
```

Giac [A]
time = 0.43, size = 191, normalized size = 1.25

$$-\frac{b\left(-\frac{a}{b}\right)^{\frac{1}{3}}\log\left(\left|-2\left(-\frac{a}{b}\right)^{\frac{1}{3}}+e^{(-x)}+e^{x}\right|\right)}{3\,a^{2}}+\frac{\log\left(e^{(-x)}+e^{x}\right)}{a}-\frac{\log\left(\left|b\left(e^{(-x)}+e^{x}\right)^{3}+8\,a\right|\right)}{3\,a}+\frac{\sqrt{3}\left(-ab^{2}\right)^{\frac{1}{3}}\arctan\left(\frac{\sqrt{3}\left(\left(-\frac{a}{b}\right)^{\frac{1}{3}}+e^{(-x)}+e^{x}\right)}{3\left(-\frac{a}{b}\right)^{\frac{1}{3}}}\right)}{3\,a^{2}}+\frac{\left(-ab^{2}\right)^{\frac{1}{3}}\log\left(\left(e^{(-x)}+e^{x}\right)^{2}+2\left(-\frac{a}{b}\right)^{\frac{1}{3}}\left(e^{(-x)}+e^{x}\right)+4\left(-\frac{a}{b}\right)^{\frac{2}{3}}\right)}{6\,a^{2}}-\frac{3\left(e^{(-x)}+e^{x}\right)^{2}-4}{2\,a\left(e^{(-x)}+e^{x}\right)^{2}}$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

```
2)^(1/3)*arctan(1/3*sqrt(3)*((-a/b)^(1/3) + e^(-x) + e^x)/(-a/b)^(1/3))/a^2
 + 1/6*(-a*b^2)^(1/3)*log((e^(-x) + e^x)^2 + 2*(-a/b)^(1/3)*(e^(-x) + e^x)
+ 4*(-a/b)^(2/3))/a^2 - 1/2*(3*(e^(-x) + e^x)^2 - 4)/(a*(e^(-x) + e^x)^2)
```

Mupad [B]
time = 0.92, size = 1173, normalized size = 7.67

Verification of antiderivative is not currently implemented for this CAS.

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

[Out] 2/(a + a*exp(2*x)) - 2/(a + 2*a*exp(2*x) + a*exp(4*x)) + symsum(log(-(50331
648*a^6*exp(2*x) - 786432*b^6*exp(2*x) + 452984832*root(27*a^5*z^3 + 27*a^4
*z^2 + 9*a^3*z + a^2 - b^2, z, k)*a^7 + 50331648*a^6 - 786432*b^6 + 1358954
496*root(27*a^5*z^3 + 27*a^4*z^2 + 9*a^3*z + a^2 - b^2, z, k)^2*a^8 + 13589
54496*root(27*a^5*z^3 + 27*a^4*z^2 + 9*a^3*z + a^2 - b^2, z, k)^3*a^9 + 505
93792*a^2*b^4 - 102498304*a^4*b^2 + 1358954496*root(27*a^5*z^3 + 27*a^4*z^2
 + 9*a^3*z + a^2 - b^2, z, k)^2*a^8*exp(2*x) + 1358954496*root(27*a^5*z^3 +
 27*a^4*z^2 + 9*a^3*z + a^2 - b^2, z, k)^3*a^9*exp(2*x) + 50593792*a^2*b^4*
exp(2*x) - 102498304*a^4*b^2*exp(2*x) + 7602176*root(27*a^5*z^3 + 27*a^4*z^
2 + 9*a^3*z + a^2 - b^2, z, k)*a^3*b^4 - 465305600*root(27*a^5*z^3 + 27*a^4
*z^2 + 9*a^3*z + a^2 - b^2, z, k)*a^5*b^2 + 524288*a*b^5*exp(x) + 24379392*
root(27*a^5*z^3 + 27*a^4*z^2 + 9*a^3*z + a^2 - b^2, z, k)^2*a^4*b^4 - 13833
33888*root(27*a^5*z^3 + 27*a^4*z^2 + 9*a^3*z + a^2 - b^2, z, k)^2*a^6*b^2 +
 18874368*root(27*a^5*z^3 + 27*a^4*z^2 + 9*a^3*z + a^2 - b^2, z, k)^3*a^5*b
^4 - 1370750976*root(27*a^5*z^3 + 27*a^4*z^2 + 9*a^3*z + a^2 - b^2, z, k)^3
*a^7*b^2 + 452984832*root(27*a^5*z^3 + 27*a^4*z^2 + 9*a^3*z + a^2 - b^2, z,
 k)*a^7*exp(2*x) - 5242880*a^3*b^3*exp(x) - 524288*root(27*a^5*z^3 + 27*a^4
*z^2 + 9*a^3*z + a^2 - b^2, z, k)*a^2*b^5*exp(x) - 8912896*root(27*a^5*z^3
+ 27*a^4*z^2 + 9*a^3*z + a^2 - b^2, z, k)*a^4*b^3*exp(x) + 7602176*root(27*
a^5*z^3 + 27*a^4*z^2 + 9*a^3*z + a^2 - b^2, z, k)*a^3*b^4*exp(2*x) - 465305
600*root(27*a^5*z^3 + 27*a^4*z^2 + 9*a^3*z + a^2 - b^2, z, k)*a^5*b^2*exp(2
*x) + 14155776*root(27*a^5*z^3 + 27*a^4*z^2 + 9*a^3*z + a^2 - b^2, z, k)^3*
a^6*b^3*exp(x) + 24379392*root(27*a^5*z^3 + 27*a^4*z^2 + 9*a^3*z + a^2 - b^
2, z, k)^2*a^4*b^4*exp(2*x) - 1383333888*root(27*a^5*z^3 + 27*a^4*z^2 + 9*a
^3*z + a^2 - b^2, z, k)^2*a^6*b^2*exp(2*x) + 18874368*root(27*a^5*z^3 + 27*
a^4*z^2 + 9*a^3*z + a^2 - b^2, z, k)^3*a^5*b^4*exp(2*x) - 1370750976*root(2
7*a^5*z^3 + 27*a^4*z^2 + 9*a^3*z + a^2 - b^2, z, k)^3*a^7*b^2*exp(2*x))/(3*
a^6*b^6))*root(27*a^5*z^3 + 27*a^4*z^2 + 9*a^3*z + a^2 - b^2, z, k), k, 1,
3) + log(3221225472*a^6*exp(2*x) - 786432*b^6*exp(2*x) + 3221225472*a^6 - 7
86432*b^6 + 101449728*a^2*b^4 - 3321888768*a^4*b^2 + 101449728*a^2*b^4*exp(
2*x) - 3321888768*a^4*b^2*exp(2*x))/a
```

3.82 $\int \frac{\tanh(x)}{\sqrt{a+b\cosh^3(x)}}\,dx$

Optimal. Leaf size=28

$$-\frac{2\tanh^{-1}\left(\frac{\sqrt{a+b\cosh^3(x)}}{\sqrt{a}}\right)}{3\sqrt{a}}$$

[Out] -2/3*arctanh((a+b*cosh(x)^3)^(1/2)/a^(1/2))/a^(1/2)

Rubi [A]
time = 0.05, antiderivative size = 28, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 4, integrand size = 15, $\frac{\text{number of rules}}{\text{integrand size}} = 0.267$, Rules used = {3309, 272, 65, 214}

$$-\frac{2\tanh^{-1}\left(\frac{\sqrt{a+b\cosh^3(x)}}{\sqrt{a}}\right)}{3\sqrt{a}}$$

Antiderivative was successfully verified.

[In] Int[Tanh[x]/Sqrt[a + b*Cosh[x]^3],x]

[Out] (-2*ArcTanh[Sqrt[a + b*Cosh[x]^3]/Sqrt[a]])/(3*Sqrt[a])

Rule 65

```
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 214

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

Rule 272

```
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 3309

```
Int[((a_) + (b_.)*((c_.)*sin[(e_.) + (f_.)*(x_)])^(n_))^(p_.)*tan[(e_.) + (
f_.)*(x_)]^(m_.), x_Symbol] :> With[{ff = FreeFactors[Sin[e + f*x], x]}, Di
st[ff^(m + 1)/f, Subst[Int[x^m*((a + b*(c*ff*x)^n)^p/(1 - ff^2*x^2)^((m + 1
)/2)), x], x, Sin[e + f*x]/ff], x]] /; FreeQ[{a, b, c, e, f, n, p}, x] && I
LtQ[(m - 1)/2, 0]
```

Rubi steps

$$\begin{aligned}\int \frac{\tanh(x)}{\sqrt{a+b\cosh^3(x)}}\,dx &= \text{Subst}\left(\int \frac{1}{x\sqrt{a+bx^3}}\,dx, x, \cosh(x)\right)\\ &= \frac{1}{3}\text{Subst}\left(\int \frac{1}{x\sqrt{a+bx}}\,dx, x, \cosh^3(x)\right)\\ &= \frac{2\text{Subst}\left(\int \frac{1}{-\frac{a}{b}+\frac{x^2}{b}}\,dx, x, \sqrt{a+b\cosh^3(x)}\right)}{3b}\\ &= -\frac{2\tanh^{-1}\left(\frac{\sqrt{a+b\cosh^3(x)}}{\sqrt{a}}\right)}{3\sqrt{a}}\end{aligned}$$

Mathematica [**A**]
time = 0.02, size = 28, normalized size = 1.00

$$-\frac{2\tanh^{-1}\left(\frac{\sqrt{a+b\cosh^3(x)}}{\sqrt{a}}\right)}{3\sqrt{a}}$$

Antiderivative was successfully verified.

```
[In] Integrate[Tanh[x]/Sqrt[a + b*Cosh[x]^3],x]
[Out] (-2*ArcTanh[Sqrt[a + b*Cosh[x]^3]/Sqrt[a]])/(3*Sqrt[a])
```

Maple [**A**]
time = 7.13, size = 21, normalized size = 0.75

method	result	size

derivativedivides	$-\frac{2\,\mathrm{arctanh}\left(\frac{\sqrt{a+b\left(\cosh^{3}\left(x\right)\right)}}{\sqrt{a}}\right)}{3\sqrt{a}}$	21
default	$-\frac{2\,\mathrm{arctanh}\left(\frac{\sqrt{a+b\left(\cosh^{3}\left(x\right)\right)}}{\sqrt{a}}\right)}{3\sqrt{a}}$	21

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(tanh(x)/(a+b*cosh(x)^3)^(1/2),x,method=_RETURNVERBOSE)
```

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

Maxima [F]
time = 0.00, size = 0, normalized size = 0.00

Failed to integrate

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(tanh(x)/(a+b*cosh(x)^3)^(1/2),x, algorithm="maxima")
```

```
[Out] integrate(tanh(x)/sqrt(b*cosh(x)^3 + a), x)
```

Fricas [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(tanh(x)/(a+b*cosh(x)^3)^(1/2),x, algorithm="fricas")
```

```
[Out] Exception raised: TypeError >>  Error detected within library code:   faile
d of mode Union(SparseUnivariatePolynomial(Expression(Integer)),failed) can
not be coerced to mode SparseUnivariatePolynomial(Expression(Integer))
```

Sympy [F]
time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\tanh\left(x\right)}{\sqrt{a+b\cosh^{3}\left(x\right)}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(tanh(x)/(a+b*cosh(x)**3)**(1/2),x)
```

```
[Out] Integral(tanh(x)/sqrt(a + b*cosh(x)**3), x)
```

Giac [F]
time = 0.00, size = 0, normalized size = 0.00

could not integrate

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(tanh(x)/(a+b*cosh(x)^3)^(1/2),x, algorithm="giac")
```

```
[Out] integrate(tanh(x)/sqrt(b*cosh(x)^3 + a), x)
```

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

$$\int \frac{\tanh(x)}{\sqrt{b\cosh{(x)}^3 + a}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

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

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

3.83 $\int \sqrt{a+b\cosh^3(x)} \tanh(x)\,dx$

Optimal. Leaf size=45

$$-\frac{2}{3}\sqrt{a}\tanh^{-1}\left(\frac{\sqrt{a+b\cosh^3(x)}}{\sqrt{a}}\right)+\frac{2}{3}\sqrt{a+b\cosh^3(x)}$$

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

Rubi [A]
time = 0.05, antiderivative size = 45, normalized size of antiderivative = 1.00, number of steps used = 5, number of rules used = 5, integrand size = 15, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.333, Rules used = {3309, 272, 52, 65, 214}

$$\frac{2}{3}\sqrt{a+b\cosh^3(x)}-\frac{2}{3}\sqrt{a}\tanh^{-1}\left(\frac{\sqrt{a+b\cosh^3(x)}}{\sqrt{a}}\right)$$

Antiderivative was successfully verified.

```
[In] Int[Sqrt[a + b*Cosh[x]^3]*Tanh[x],x]
```

```
[Out] (-2*Sqrt[a]*ArcTanh[Sqrt[a + b*Cosh[x]^3]/Sqrt[a]])/3 + (2*Sqrt[a + b*Cosh[
x]^3])/3
```

Rule 52

```
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 65

```
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 214

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

Rule 272

```
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 3309

```
Int[((a_) + (b_.)*((c_.)*sin[(e_.) + (f_.)*(x_)])^(n_))^(p_.)*tan[(e_.) + (
f_.)*(x_)]^(m_.), x_Symbol] :> With[{ff = FreeFactors[Sin[e + f*x], x]}, Di
st[ff^(m + 1)/f, Subst[Int[x^m*((a + b*(c*ff*x)^n)^p/(1 - ff^2*x^2)^((m + 1
)/2)), x], x, Sin[e + f*x]/ff], x]] /; FreeQ[{a, b, c, e, f, n, p}, x] && I
LtQ[(m - 1)/2, 0]
```

Rubi steps

$$
\begin{aligned}
\int \sqrt{a+b\cosh^3(x)}\,\tanh(x)\,dx &= \text{Subst}\left(\int \frac{\sqrt{a+bx^3}}{x}\,dx,x,\cosh(x)\right)\\
&= \frac{1}{3}\text{Subst}\left(\int \frac{\sqrt{a+bx}}{x}\,dx,x,\cosh^3(x)\right)\\
&= \frac{2}{3}\sqrt{a+b\cosh^3(x)}+\frac{1}{3}a\text{Subst}\left(\int \frac{1}{x\sqrt{a+bx}}\,dx,x,\cosh^3(x)\right)\\
&= \frac{2}{3}\sqrt{a+b\cosh^3(x)}+\frac{(2a)\text{Subst}\left(\int \frac{1}{-\frac{a}{b}+\frac{x^2}{b}}\,dx,x,\sqrt{a+b\cosh^3(x)}\right)}{3b}\\
&= -\frac{2}{3}\sqrt{a}\,\tanh^{-1}\left(\frac{\sqrt{a+b\cosh^3(x)}}{\sqrt{a}}\right)+\frac{2}{3}\sqrt{a+b\cosh^3(x)}
\end{aligned}
$$

Mathematica [**A**]
time = 0.02, size = 45, normalized size = 1.00

$$-\frac{2}{3}\sqrt{a}\,\tanh^{-1}\left(\frac{\sqrt{a+b\cosh^3(x)}}{\sqrt{a}}\right)+\frac{2}{3}\sqrt{a+b\cosh^3(x)}$$

Antiderivative was successfully verified.

```
[In] Integrate[Sqrt[a + b*Cosh[x]^3]*Tanh[x],x]
[Out] (-2*Sqrt[a]*ArcTanh[Sqrt[a + b*Cosh[x]^3]/Sqrt[a]])/3 + (2*Sqrt[a + b*Cosh[
x]^3])/3
```

Maple [A]
time = 6.06, size = 34, normalized size = 0.76

method	result	size
derivativedivides	$-\frac{2 \operatorname{arctanh}\left(\frac{\sqrt{a+b\left(\cosh^{3}(x)\right)}}{\sqrt{a}}\right) \sqrt{a}}{3}+\frac{2 \sqrt{a+b\left(\cosh^{3}(x)\right)}}{3}$	34
default	$-\frac{2 \operatorname{arctanh}\left(\frac{\sqrt{a+b\left(\cosh^{3}(x)\right)}}{\sqrt{a}}\right) \sqrt{a}}{3}+\frac{2 \sqrt{a+b\left(\cosh^{3}(x)\right)}}{3}$	34

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a+b*cosh(x)^3)^(1/2)*tanh(x),x,method=_RETURNVERBOSE)
```

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

Maxima [F]
time = 0.00, size = 0, normalized size = 0.00

Failed to integrate

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*cosh(x)^3)^(1/2)*tanh(x),x, algorithm="maxima")
```

```
[Out] integrate(sqrt(b*cosh(x)^3 + a)*tanh(x), x)
```

Fricas [B] Leaf count of result is larger than twice the leaf count of optimal. 271 vs. $2(33) = 66$.
time = 0.94, size = 1648, normalized size = 36.62

Too large to display

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*cosh(x)^3)^(1/2)*tanh(x),x, algorithm="fricas")
```

```
[Out] [1/6*(sqrt(a)*(cosh(x) + sinh(x))*log(-(b^2*cosh(x)^12 + 12*b^2*cosh(x)*sin
h(x)^11 + b^2*sinh(x)^12 + 6*b^2*cosh(x)^10 + 64*a*b*cosh(x)^9 + 6*(11*b^2*
cosh(x)^2 + b^2)*sinh(x)^10 + 15*b^2*cosh(x)^8 + 4*(55*b^2*cosh(x)^3 + 15*b
^2*cosh(x) + 16*a*b)*sinh(x)^9 + 192*a*b*cosh(x)^7 + 3*(165*b^2*cosh(x)^4 +
 90*b^2*cosh(x)^2 + 192*a*b*cosh(x) + 5*b^2)*sinh(x)^8 + 24*(33*b^2*cosh(x)
^5 + 30*b^2*cosh(x)^3 + 96*a*b*cosh(x)^2 + 5*b^2*cosh(x) + 8*a*b)*sinh(x)^7
 + 192*a*b*cosh(x)^5 + 4*(128*a^2 + 5*b^2)*cosh(x)^6 + 4*(231*b^2*cosh(x)^6
```

```
 + 315*b^2*cosh(x)^4 + 1344*a*b*cosh(x)^3 + 105*b^2*cosh(x)^2 + 336*a*b*cos
h(x) + 128*a^2 + 5*b^2)*sinh(x)^6 + 15*b^2*cosh(x)^4 + 24*(33*b^2*cosh(x)^7
 + 63*b^2*cosh(x)^5 + 336*a*b*cosh(x)^4 + 35*b^2*cosh(x)^3 + 168*a*b*cosh(x
)^2 + 8*a*b + (128*a^2 + 5*b^2)*cosh(x))*sinh(x)^5 + 64*a*b*cosh(x)^3 + 3*(
165*b^2*cosh(x)^8 + 420*b^2*cosh(x)^6 + 2688*a*b*cosh(x)^5 + 350*b^2*cosh(x
)^4 + 2240*a*b*cosh(x)^3 + 320*a*b*cosh(x) + 20*(128*a^2 + 5*b^2)*cosh(x)^2
 + 5*b^2)*sinh(x)^4 + 6*b^2*cosh(x)^2 + 4*(55*b^2*cosh(x)^9 + 180*b^2*cosh(
x)^7 + 1344*a*b*cosh(x)^6 + 210*b^2*cosh(x)^5 + 1680*a*b*cosh(x)^4 + 480*a*
b*cosh(x)^2 + 20*(128*a^2 + 5*b^2)*cosh(x)^3 + 15*b^2*cosh(x) + 16*a*b)*sin
h(x)^3 + 6*(11*b^2*cosh(x)^10 + 45*b^2*cosh(x)^8 + 384*a*b*cosh(x)^7 + 70*b
^2*cosh(x)^6 + 672*a*b*cosh(x)^5 + 320*a*b*cosh(x)^3 + 10*(128*a^2 + 5*b^2)
*cosh(x)^4 + 15*b^2*cosh(x)^2 + 32*a*b*cosh(x) + b^2)*sinh(x)^2 + b^2 - 16*
(b*cosh(x)^8 + 8*b*cosh(x)*sinh(x)^7 + b*sinh(x)^8 + 3*b*cosh(x)^6 + (28*b*
cosh(x)^2 + 3*b)*sinh(x)^6 + 16*a*cosh(x)^5 + 2*(28*b*cosh(x)^3 + 9*b*cosh(
x) + 8*a)*sinh(x)^5 + 3*b*cosh(x)^4 + (70*b*cosh(x)^4 + 45*b*cosh(x)^2 + 80
*a*cosh(x) + 3*b)*sinh(x)^4 + 4*(14*b*cosh(x)^5 + 15*b*cosh(x)^3 + 40*a*cos
h(x)^2 + 3*b*cosh(x))*sinh(x)^3 + b*cosh(x)^2 + (28*b*cosh(x)^6 + 45*b*cosh
(x)^4 + 160*a*cosh(x)^3 + 18*b*cosh(x)^2 + b)*sinh(x)^2 + 2*(4*b*cosh(x)^7
+ 9*b*cosh(x)^5 + 40*a*cosh(x)^4 + 6*b*cosh(x)^3 + b*cosh(x))*sinh(x))*sqrt
(a)*sqrt((b*cosh(x)^3 + 3*b*cosh(x)*sinh(x)^2 + 3*b*cosh(x) + 4*a)/(cosh(x)
^2 - 2*cosh(x)*sinh(x) + sinh(x)^2)) + 12*(b^2*cosh(x)^11 + 5*b^2*cosh(x)^9
 + 48*a*b*cosh(x)^8 + 10*b^2*cosh(x)^7 + 112*a*b*cosh(x)^6 + 80*a*b*cosh(x)
^4 + 2*(128*a^2 + 5*b^2)*cosh(x)^5 + 5*b^2*cosh(x)^3 + 16*a*b*cosh(x)^2 + b
^2*cosh(x))*sinh(x))/(cosh(x)^12 + 12*cosh(x)*sinh(x)^11 + sinh(x)^12 + 6*(
11*cosh(x)^2 + 1)*sinh(x)^10 + 6*cosh(x)^10 + 20*(11*cosh(x)^3 + 3*cosh(x))
*sinh(x)^9 + 15*(33*cosh(x)^4 + 18*cosh(x)^2 + 1)*sinh(x)^8 + 15*cosh(x)^8
+ 24*(33*cosh(x)^5 + 30*cosh(x)^3 + 5*cosh(x))*sinh(x)^7 + 4*(231*cosh(x)^6
 + 315*cosh(x)^4 + 105*cosh(x)^2 + 5)*sinh(x)^6 + 20*cosh(x)^6 + 24*(33*cos
h(x)^7 + 63*cosh(x)^5 + 35*cosh(x)^3 + 5*cosh(x))*sinh(x)^5 + 15*(33*cosh(x
)^8 + 84*cosh(x)^6 + 70*cosh(x)^4 + 20*cosh(x)^2 + 1)*sinh(x)^4 + 15*cosh(x
)^4 + 20*(11*cosh(x)^9 + 36*cosh(x)^7 + 42*cosh(x)^5 + 20*cosh(x)^3 + 3*cos
h(x))*sinh(x)^3 + 6*(11*cosh(x)^10 + 45*cosh(x)^8 + 70*cosh(x)^6 + 50*cosh(
x)^4 + 15*cosh(x)^2 + 1)*sinh(x)^2 + 6*cosh(x)^2 + 12*(cosh(x)^11 + 5*cosh(
x)^9 + 10*cosh(x)^7 + 10*cosh(x)^5 + 5*cosh(x)^3 + cosh(x))*sinh(x) + 1)) +
 2*sqrt((b*cosh(x)^3 + 3*b*cosh(x)*sinh(x)^2 + 3*b*cosh(x) + 4*a)/(cosh(x)^
2 - 2*cosh(x)*sinh(x) + sinh(x)^2)))/(cosh(x) + sinh(x)), 1/3*(sqrt(-a)*(co
sh(x) + sinh(x))*arctan(8*(cosh(x)^2 + 2*cosh(x)*sinh(x) + sinh(x)^2)*sqrt(
-a)*sqrt((b*cosh(x)^3 + 3*b*cosh(x)*sinh(x)^2 + 3*b*cosh(x) + 4*a)/(cosh(x)
^2 - 2*cosh(x)*sinh(x) + sinh(x)^2))/(b*cosh(x)^6 + 6*b*cosh(x)*sinh(x)^5 +
 b*sinh(x)^6 + 3*b*cosh(x)^4 + 3*(5*b*cosh(x)^2 + b)*sinh(x)^4 + 16*a*cosh(
x)^3 + 4*(5*b*cosh(x)^3 + 3*b*cosh(x) + 4*a)*sinh(x)^3 + 3*b*cosh(x)^2 + 3*
(5*b*cosh(x)^4 + 6*b*cosh(x)^2 + 16*a*cosh(x) + b)*sinh(x)^2 + 6*(b*cosh(x)
^5 + 2*b*cosh(x)^3 + 8*a*cosh(x)^2 + b*cosh(x))*sinh(x) + b)) + sqrt((b*cos
h(x)^3 + 3*b*cosh(x)*sinh(x)^2 + 3*b*cosh(x) + 4*a)/(cosh(x)^2 - 2*cosh(x)*
sinh(x) + sinh(x)^2)))/(cosh(x) + sinh(x))]
```

Sympy [F]
time = 0.00, size = 0, normalized size = 0.00

$$\int \sqrt{a + b\cosh^3(x)}\, \tanh(x)\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*cosh(x)**3)**(1/2)*tanh(x),x)
[Out] Integral(sqrt(a + b*cosh(x)**3)*tanh(x), x)
```

Giac [F]
time = 0.00, size = 0, normalized size = 0.00

could not integrate

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*cosh(x)^3)^(1/2)*tanh(x),x, algorithm="giac")
[Out] integrate(sqrt(b*cosh(x)^3 + a)*tanh(x), x)
```

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

$$\int \tanh(x)\,\sqrt{b\cosh(x)^3 + a}\, dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(tanh(x)*(a + b*cosh(x)^3)^(1/2),x)
[Out] int(tanh(x)*(a + b*cosh(x)^3)^(1/2), x)
```

3.84 $\int \frac{\tanh(x)}{\sqrt{a+b\cosh^n(x)}}\,dx$

Optimal. Leaf size=29

$$-\frac{2\tanh^{-1}\left(\frac{\sqrt{a+b\cosh^n(x)}}{\sqrt{a}}\right)}{\sqrt{a}\,n}$$

[Out] -2*arctanh((a+b*cosh(x)^n)^(1/2)/a^(1/2))/n/a^(1/2)

Rubi [A]
time = 0.06, antiderivative size = 29, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 4, integrand size = 15, $\frac{\text{number of rules}}{\text{integrand size}} = 0.267$, Rules used = {3309, 272, 65, 214}

$$-\frac{2\tanh^{-1}\left(\frac{\sqrt{a+b\cosh^n(x)}}{\sqrt{a}}\right)}{\sqrt{a}\,n}$$

Antiderivative was successfully verified.

[In] Int[Tanh[x]/Sqrt[a + b*Cosh[x]^n],x]

[Out] (-2*ArcTanh[Sqrt[a + b*Cosh[x]^n]/Sqrt[a]])/(Sqrt[a]*n)

Rule 65

```
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 214

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

Rule 272

```
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 3309

```
Int[((a_) + (b_.)*((c_.)*sin[(e_.) + (f_.)*(x_)])^(n_))^(p_.)*tan[(e_.) + (
f_.)*(x_)]^(m_.), x_Symbol] :> With[{ff = FreeFactors[Sin[e + f*x], x]}, Di
```

```
st[ff^(m + 1)/f, Subst[Int[x^m*((a + b*(c*ff*x)^n)^p/(1 - ff^2*x^2)^((m + 1
)/2)), x], x, Sin[e + f*x]/ff], x]] /; FreeQ[{a, b, c, e, f, n, p}, x] && I
LtQ[(m - 1)/2, 0]
```

Rubi steps

$$\int \frac{\tanh(x)}{\sqrt{a+b\cosh^n(x)}}\,dx = \text{Subst}\left(\int \frac{1}{x\sqrt{a+bx^n}}\,dx, x, \cosh(x)\right)$$
$$= \frac{\text{Subst}\left(\int \frac{1}{x\sqrt{a+bx}}\,dx, x, \cosh^n(x)\right)}{n}$$
$$= \frac{2\text{Subst}\left(\int \frac{1}{-\frac{a}{b}+\frac{x^2}{b}}\,dx, x, \sqrt{a+b\cosh^n(x)}\right)}{bn}$$
$$= -\frac{2\tanh^{-1}\left(\frac{\sqrt{a+b\cosh^n(x)}}{\sqrt{a}}\right)}{\sqrt{a}\,n}$$

Mathematica [A]
time = 0.02, size = 29, normalized size = 1.00

$$-\frac{2\tanh^{-1}\left(\frac{\sqrt{a+b\cosh^n(x)}}{\sqrt{a}}\right)}{\sqrt{a}\,n}$$

Antiderivative was successfully verified.

```
[In] Integrate[Tanh[x]/Sqrt[a + b*Cosh[x]^n],x]
[Out] (-2*ArcTanh[Sqrt[a + b*Cosh[x]^n]/Sqrt[a]])/(Sqrt[a]*n)
```

Maple [A]
time = 7.02, size = 24, normalized size = 0.83

method	result	size
derivativedivides	$-\frac{2\,\mathrm{arctanh}\left(\frac{\sqrt{a+b\left(\cosh^n(x)\right)}}{\sqrt{a}}\right)}{n\sqrt{a}}$	24
default	$-\frac{2\,\mathrm{arctanh}\left(\frac{\sqrt{a+b\left(\cosh^n(x)\right)}}{\sqrt{a}}\right)}{n\sqrt{a}}$	24

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(tanh(x)/(a+b*cosh(x)^n)^(1/2),x,method=_RETURNVERBOSE)
```

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

<u>Maxima</u> [F]
time = 0.00, size = 0, normalized size = 0.00

Failed to integrate

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(tanh(x)/(a+b*cosh(x)^n)^(1/2),x, algorithm="maxima")
```

```
[Out] integrate(tanh(x)/sqrt(b*cosh(x)^n + a), x)
```

<u>Fricas</u> [A]
time = 0.40, size = 113, normalized size = 3.90

$$\left[\frac{\log\left(\frac{b\cosh\left(n\log\left(\cosh\left(x\right)\right)\right)+b\sinh\left(n\log\left(\cosh\left(x\right)\right)\right)-2\sqrt{b\cosh\left(n\log\left(\cosh\left(x\right)\right)\right)+b\sinh\left(n\log\left(\cosh\left(x\right)\right)\right)+a}\sqrt{a}+2a}{\cosh\left(n\log\left(\cosh\left(x\right)\right)\right)+\sinh\left(n\log\left(\cosh\left(x\right)\right)\right)}\right)}{\sqrt{a}\,n}, \frac{2\sqrt{-a}\arctan\left(\frac{\sqrt{b\cosh\left(n\log\left(\cosh\left(x\right)\right)\right)+b\sinh\left(n\log\left(\cosh\left(x\right)\right)\right)+a}\sqrt{-a}}{a}\right)}{an}\right]$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(tanh(x)/(a+b*cosh(x)^n)^(1/2),x, algorithm="fricas")
```

```
[Out] [log((b*cosh(n*log(cosh(x))) + b*sinh(n*log(cosh(x))) - 2*sqrt(b*cosh(n*log
(cosh(x))) + b*sinh(n*log(cosh(x))) + a)*sqrt(a) + 2*a)/(cosh(n*log(cosh(x)
)) + sinh(n*log(cosh(x)))))/(sqrt(a)*n), 2*sqrt(-a)*arctan(sqrt(b*cosh(n*lo
g(cosh(x))) + b*sinh(n*log(cosh(x))) + a)*sqrt(-a)/a)/(a*n)]
```

<u>Sympy</u> [F]
time = 0.00, size = 0, normalized size = 0.00

$$\int \frac{\tanh\left(x\right)}{\sqrt{a+b\cosh^{n}\left(x\right)}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(tanh(x)/(a+b*cosh(x)**n)**(1/2),x)
```

```
[Out] Integral(tanh(x)/sqrt(a + b*cosh(x)**n), x)
```

<u>Giac</u> [F]
time = 0.00, size = 0, normalized size = 0.00

could not integrate

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate(tanh(x)/(a+b*cosh(x)^n)^(1/2),x, algorithm="giac")
```

```
[Out] integrate(tanh(x)/sqrt(b*cosh(x)^n + a), x)
```

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

$$\int \frac{\tanh(x)}{\sqrt{a + b\cosh(x)^n}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(tanh(x)/(a + b*cosh(x)^n)^(1/2),x)
```

```
[Out] int(tanh(x)/(a + b*cosh(x)^n)^(1/2), x)
```

3.85 $\int \sqrt{a+b\cosh^n(x)}\,\tanh(x)\,dx$

Optimal. Leaf size=47

$$-\frac{2\sqrt{a}\,\tanh^{-1}\left(\frac{\sqrt{a+b\cosh^n(x)}}{\sqrt{a}}\right)}{n}+\frac{2\sqrt{a+b\cosh^n(x)}}{n}$$

[Out] -2*arctanh((a+b*cosh(x)^n)^(1/2)/a^(1/2))*a^(1/2)/n+2*(a+b*cosh(x)^n)^(1/2)/n

Rubi [A]
time = 0.06, antiderivative size = 47, normalized size of antiderivative = 1.00, number of steps used = 5, number of rules used = 5, integrand size = 15, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.333, Rules used = {3309, 272, 52, 65, 214}

$$\frac{2\sqrt{a+b\cosh^n(x)}}{n}-\frac{2\sqrt{a}\,\tanh^{-1}\left(\frac{\sqrt{a+b\cosh^n(x)}}{\sqrt{a}}\right)}{n}$$

Antiderivative was successfully verified.

[In] Int[Sqrt[a + b*Cosh[x]^n]*Tanh[x],x]

[Out] (-2*Sqrt[a]*ArcTanh[Sqrt[a + b*Cosh[x]^n]/Sqrt[a]])/n + (2*Sqrt[a + b*Cosh[x]^n])/n

Rule 52

```
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 65

```
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 214

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

Rule 272

```
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 3309

```
Int[((a_) + (b_.)*((c_.)*sin[(e_.) + (f_.)*(x_)])^(n_))^(p_.)*tan[(e_.) + (
f_.)*(x_)]^(m_.), x_Symbol] :> With[{ff = FreeFactors[Sin[e + f*x], x]}, Di
st[ff^(m + 1)/f, Subst[Int[x^m*((a + b*(c*ff*x)^n)^p/(1 - ff^2*x^2)^((m + 1
)/2)), x], x, Sin[e + f*x]/ff], x]] /; FreeQ[{a, b, c, e, f, n, p}, x] && I
LtQ[(m - 1)/2, 0]
```

Rubi steps

$$\begin{aligned}\int \sqrt{a+b\cosh^n(x)}\,\tanh(x)\,dx &= \text{Subst}\left(\int \frac{\sqrt{a+bx^n}}{x}\,dx, x, \cosh(x)\right)\\ &= \frac{\text{Subst}\left(\int \frac{\sqrt{a+bx}}{x}\,dx, x, \cosh^n(x)\right)}{n}\\ &= \frac{2\sqrt{a+b\cosh^n(x)}}{n} + \frac{a\text{Subst}\left(\int \frac{1}{x\sqrt{a+bx}}\,dx, x, \cosh^n(x)\right)}{n}\\ &= \frac{2\sqrt{a+b\cosh^n(x)}}{n} + \frac{(2a)\text{Subst}\left(\int \frac{1}{-\frac{a}{b}+\frac{x^2}{b}}\,dx, x, \sqrt{a+b\cosh^n(x)}\right)}{bn}\\ &= -\frac{2\sqrt{a}\,\tanh^{-1}\left(\frac{\sqrt{a+b\cosh^n(x)}}{\sqrt{a}}\right)}{n} + \frac{2\sqrt{a+b\cosh^n(x)}}{n}\end{aligned}$$

Mathematica [A]
time = 0.02, size = 45, normalized size = 0.96

$$\frac{-2\sqrt{a}\,\tanh^{-1}\left(\frac{\sqrt{a+b\cosh^n(x)}}{\sqrt{a}}\right)+2\sqrt{a+b\cosh^n(x)}}{n}$$

Antiderivative was successfully verified.

```
[In] Integrate[Sqrt[a + b*Cosh[x]^n]*Tanh[x],x]
```

```
[Out] (-2*Sqrt[a]*ArcTanh[Sqrt[a + b*Cosh[x]^n]/Sqrt[a]] + 2*Sqrt[a + b*Cosh[x]^n
])/n
```

Maple [A]
time = 1.60, size = 38, normalized size = 0.81

method	result	size
derivativedivides	$\frac{2\sqrt{a+b\left(\cosh^{n}\left(x\right)\right)}-2\sqrt{a}\,\operatorname{arctanh}\left(\frac{\sqrt{a+b\left(\cosh^{n}\left(x\right)\right)}}{\sqrt{a}}\right)}{n}$	38
default	$\frac{2\sqrt{a+b\left(\cosh^{n}\left(x\right)\right)}-2\sqrt{a}\,\operatorname{arctanh}\left(\frac{\sqrt{a+b\left(\cosh^{n}\left(x\right)\right)}}{\sqrt{a}}\right)}{n}$	38

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int((a+b*cosh(x)^n)^(1/2)*tanh(x),x,method=_RETURNVERBOSE)
```

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

Maxima [F]
time = 0.00, size = 0, normalized size = 0.00

Failed to integrate

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*cosh(x)^n)^(1/2)*tanh(x),x, algorithm="maxima")
```

```
[Out] integrate(sqrt(b*cosh(x)^n + a)*tanh(x), x)
```

Fricas [A]
time = 0.40, size = 156, normalized size = 3.32

$$\left[\frac{\sqrt{a}\log\left(\frac{b\cosh\left(n\log\left(\cosh\left(x\right)\right)\right)+b\sinh\left(n\log\left(\cosh\left(x\right)\right)\right)-2\sqrt{b\cosh\left(n\log\left(\cosh\left(x\right)\right)\right)+b\sinh\left(n\log\left(\cosh\left(x\right)\right)\right)+a}\sqrt{a}+2a}{\cosh\left(n\log\left(\cosh\left(x\right)\right)\right)+\sinh\left(n\log\left(\cosh\left(x\right)\right)\right)}\right)+2\sqrt{b\cosh\left(n\log\left(\cosh\left(x\right)\right)\right)+b\sinh\left(n\log\left(\cosh\left(x\right)\right)\right)+a}}{n},\ \frac{2\left(\sqrt{-a}\arctan\left(\frac{\sqrt{b\cosh\left(n\log\left(\cosh\left(x\right)\right)\right)+b\sinh\left(n\log\left(\cosh\left(x\right)\right)\right)+a}\sqrt{-a}}{a}\right)+\sqrt{b\cosh\left(n\log\left(\cosh\left(x\right)\right)\right)+b\sinh\left(n\log\left(\cosh\left(x\right)\right)\right)+a}\right)}{n}\right]$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*cosh(x)^n)^(1/2)*tanh(x),x, algorithm="fricas")
```

```
[Out] [(sqrt(a)*log((b*cosh(n*log(cosh(x))) + b*sinh(n*log(cosh(x))) - 2*sqrt(b*c
osh(n*log(cosh(x))) + b*sinh(n*log(cosh(x))) + a)*sqrt(a) + 2*a)/(cosh(n*lo
g(cosh(x))) + sinh(n*log(cosh(x))))) + 2*sqrt(b*cosh(n*log(cosh(x))) + b*si
nh(n*log(cosh(x))) + a))/n, 2*(sqrt(-a)*arctan(sqrt(b*cosh(n*log(cosh(x)))
+ b*sinh(n*log(cosh(x))) + a)*sqrt(-a)/a) + sqrt(b*cosh(n*log(cosh(x))) + b
*sinh(n*log(cosh(x))) + a))/n]
```

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

$$\int \sqrt{a + b\cosh^{n}(x)}\,\tanh(x)\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*cosh(x)**n)**(1/2)*tanh(x),x)
[Out] Integral(sqrt(a + b*cosh(x)**n)*tanh(x), x)
```

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

could not integrate

Verification of antiderivative is not currently implemented for this CAS.

```
[In] integrate((a+b*cosh(x)^n)^(1/2)*tanh(x),x, algorithm="giac")
[Out] integrate(sqrt(b*cosh(x)^n + a)*tanh(x), x)
```

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

$$\int \tanh(x)\,\sqrt{a + b\cosh(x)^{n}}\,dx$$

Verification of antiderivative is not currently implemented for this CAS.

```
[In] int(tanh(x)*(a + b*cosh(x)^n)^(1/2),x)
[Out] int(tanh(x)*(a + b*cosh(x)^n)^(1/2), x)
```

Chapter 4

Appendix

Local contents

4.1 Download section 416
4.2 Listing of Grading functions 416

4.1 Download section

The following zip files contain the raw integrals used in this test.

Mathematica format Mathematica_syntax.zip

Maple and Mupad format Maple_syntax.zip

Sympy format SYMPY_syntax.zip

Sage math format SAGE_syntax.zip

4.2 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.

4.2.1 Mathematica and Rubi grading function

```
(* Original version thanks to Albert Rich emailed on 03/21/2017 *)
(* ::Package:: *)

(* Nasser: April 7,2022. add second output which gives reason for the grade *)
(*                       Small rewrite of logic in main function to make it*)
(*                       match Maple's logic. No change in functionality otherwise*)

(* ::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_] := Module[{expnResult,expnOptimal,leafCountResult,leafC
    expnResult  = ExpnType[result];
    expnOptimal = ExpnType[optimal];
    leafCountResult = LeafCount[result];
    leafCountOptimal = LeafCount[optimal];

    (*Print["expnResult=",expnResult," expnOptimal=",expnOptimal];*)
    If[expnResult<=expnOptimal,
        If[Not[FreeQ[result,Complex]], (*result contains complex*)
            If[Not[FreeQ[optimal,Complex]], (*optimal contains complex*)
                If[leafCountResult<=2*leafCountOptimal,
                    finalresult={"A","none"}
                    ,(*ELSE*)
                    finalresult={"B","Both result and optimal contain complex but leaf count
                  ]
            ,(*ELSE*)
                finalresult={"C","Result contains complex when optimal does not."}
            ]
        ,(*ELSE*)(*result does not contains complex*)
            If[leafCountResult<=2*leafCountOptimal,
               finalresult={"A","none"}
            ,(*ELSE*)
               finalresult={"B","Leaf count is larger than twice the leaf count of optimal. $
              ]
        ]
    ,(*ELSE*) (*expnResult>expnOptimal*)
        If[FreeQ[result,Integrate] && FreeQ[result,Int],
            finalresult={"C","Result contains higher order function than in optimal. Order "<
            ,
            finalresult={"F","Contains unresolved integral."}
        ]
    ];

    finalresult
]

(* ::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]
```

4.2.2 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
#Nasser 4/07/2022   add second output which gives reason for the grade

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","result has leaf size over 500,000. Avoiding possible recursion issues
        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","Result contains unresolved integral";
    fi;


    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;
                if leaf_count_result<=2*leaf_count_optimal then
                    return "A","";
                else
                   return "B",cat("Both result and optimal contain complex but leaf count of re
                                convert(leaf_count_result,string)," vs. $2 (",
                                convert(leaf_count_optimal,string)," ) = ",convert(2*leaf_co
                end if
            else #result contains complex but optimal is not
                if debug then
                        print("result contains complex but optimal is not");
                fi;
                return "C","Result contains complex when optimal does not.";
            fi;
        else # result do not contain complex
```

```
             # this assumes optimal do not as well. No check is needed here.
            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",cat("Leaf count of result is larger than twice the leaf count of o
                               convert(leaf_count_result,string),"$ vs. $2(",
                               convert(leaf_count_optimal,string),")=",convert(2*leaf_cou
            fi;
        fi;
    else #ExpnType(result) > ExpnType(optimal)
        if debug then
            print("ExpnType(result) > ExpnType(optimal)");
        fi;
        return "C",cat("Result contains higher order function than in optimal. Order ",
                       convert(ExpnType_result,string)," vs. order ",
                       convert(ExpnType_optimal,string),".");
    fi;

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:
```

4.2.3 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)),ExpnT
    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):

    #print ("Enter grade_antiderivative for sagemath")
    #print("Enter grade_antiderivative, result=",result," optimal=",optimal)

    leaf_count_result  = leaf_count(result)
    leaf_count_optimal = leaf_count(optimal)

    #print("leaf_count_result=",leaf_count_result)
    #print("leaf_count_optimal=",leaf_count_optimal)

    expnType_result  = expnType(result)
    expnType_optimal = expnType(optimal)

    if str(result).find("Integral") != -1:
        grade = "F"
        grade_annotation =""
    else:
        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:
                        grade = "A"
                        grade_annotation =""
                    else:
                        grade = "B"
                        grade_annotation ="Both result and optimal contain complex but leaf count of result is larger
                else: #result contains complex but optimal is not
                    grade = "C"
                    grade_annotation ="Result contains complex when optimal does not."
            else: # result do not contain complex, this assumes optimal do not as well
                if leaf_count_result <= 2*leaf_count_optimal:
                    grade = "A"
                    grade_annotation =""
                else:
                    grade = "B"
                    grade_annotation ="Leaf count of result is larger than twice the leaf count of optimal. "+str(lea
        else:
            grade = "C"
            grade_annotation ="Result contains higher order function than in optimal. Order "+str(ExpnType_re
```

```
    #print("Before returning. grade=",grade, " grade_annotation=",grade_annotation)

    return grade, grade_annotation
```

4.2.4 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'
#June 4, 2022  Made default grade_annotation "none" instead of "" due
#              issue later when reading the file.
#July 14, 2022. Added ellipticF. This is until they fix sagemath, then remove it.

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.
    """
    #print("Enter tree_size, expr is ",expr)

    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','ellipticF',
          '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, expn=",expn)

   if not hasattr(expn, 'parent'):
      return False


   #thanks to answer at https://ask.sagemath.org/question/49179/what-is-sagemath-equivalent-to-atomic-
   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:
      print("Exception,AttributeError in  is_atom")
      print ("cought exception" , type(error).__name__ )
      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.op
elif expn.operator() == add_vararg or expn.operator() == mul_vararg: #isinstance(expn,Add) or isinstan
    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")
        print("Enter grade_antiderivative, result=",result)
        print("Enter grade_antiderivative, optimal=",optimal)
        print("type(anti)=",type(result))
        print("type(optimal)=",type(optimal))

    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:
                grade = "A"
                grade_annotation ="none"
            else:
                grade = "B"
                grade_annotation ="Both result and optimal contain complex but leaf count of result is larger t
        else: #result contains complex but optimal is not
            grade = "C"
            grade_annotation ="Result contains complex when optimal does not."
    else: # result do not contain complex, this assumes optimal do not as well
        if leaf_count_result <= 2*leaf_count_optimal:
            grade = "A"
            grade_annotation ="none"
        else:
            grade = "B"
            grade_annotation ="Leaf count of result is larger than twice the leaf count of optimal. "+str(leaf_
else:
    grade = "C"
    grade_annotation ="Result contains higher order function than in optimal. Order "+str(expnType_resu


print("Before returning. grade=",grade, " grade_annotation=",grade_annotation)

return grade, grade_annotation
```